RRU-FA

INTEGRATED AIR HANDLING UNITS

- Air-to-Air type heat pump
- 100% Fresh air
- Air flows from 2,500 to 25,000 m³/h
- Total cooling capacity from 44.3 to 404 kW
- Total heating capacity from 44.7 to 425 kW

BIM READY

ErP 2021 COMPLIANT

R410A

The RRU-FA range was conceived by Roccheggiani to meet the growing demand for air quality and energy savings. These units are intended to suit all systems where primary air supply has to be guaranteed: systems with hydronic terminals or chilled beams, induction systems, radiant systems, existing systems needing improvements because insufficient fresh air supply had been planned for in the original.
Fresh air handling is initially performed through a first stage of sensitive and latent heat recovery by means of a thermal wheel, with efficiencies exceeding 85%; a second stage of heat recovery is performed through a fully integrated refrigeration/heat pump cycle with R410A ecological coolant (thermodynamic recovery). A third stage of heat recovery takes place during cooling using the latent heat in condensation; during the summer dehumidification phase, a fourth heat recovery stage is performed by reheating the air using appropriately drawn hot R410A.
An additional fifth heat recovery stage can be added using the discharge heat, in cooling phase, for the production of hot water in conjunction with a storage rank and a circulation pump. The units can be equipped (as an optional) with a water-filled pre-heating/cooling coil. This kind of coil can be fed with return water from radiant systems or chilled beams; alternatively, RRU-FA units can also be integrated with geothermal or solar heat sources. Ten sizes are available with nominal air flows ranging from 2,500 to 25,000 m³/h.

Publication: Technical bulletin Integrated air handling units (RRU-FA)

Regulatory Compliance

All the integrated fresh air handling units in the RRU-FA 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.). More specifically, the integrated fresh air handling units in the RRU-FA 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);
- UNI EN 1886:2008;

Application fields

Roccheggiani offers the ideal solution for cooling, heating and changing air inside divided or open-space offices, through an integrated system consisting of an RRU-FA air handling unit with integrated regulation, and of chilled beams used as room terminal units.
The units have been designed to respond in a specialised manner to applications such as:

- Tertiary
- Hotel
- Schools and Colleges
- Medium-to-large sized shopping centres
- Offices
- Nursing homes

Presentation of the Plant Engineering System

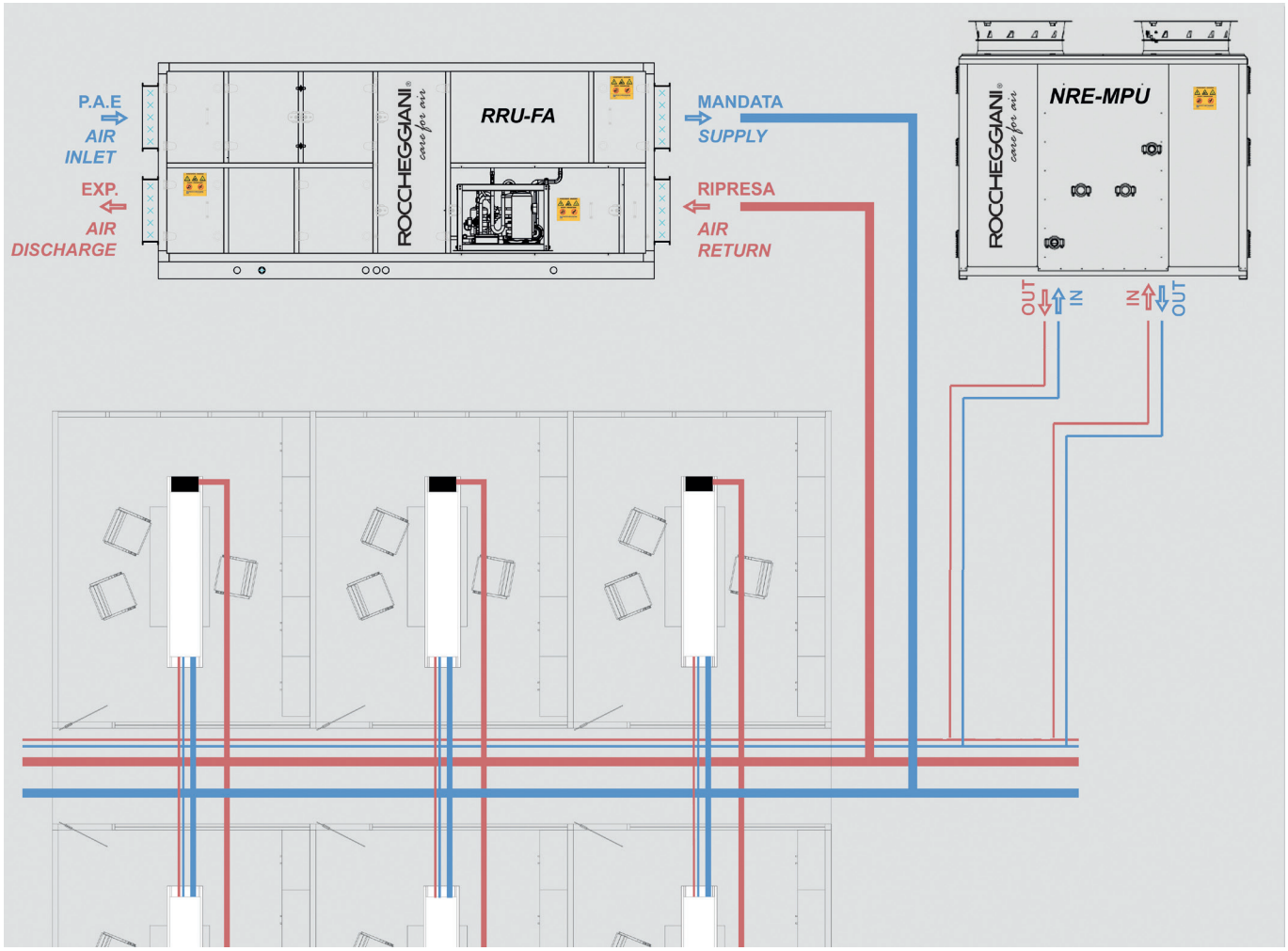
Example of 4- pipe system with NRE-MPU Multi-purpose unit and primary air handling with RRU-FA units.

For air conditioning in buildings, especially those that are divided up into different areas and different floors, or in modern premises with very high energy efficiency (n-ZEB - Nearly Zero Energy Buildings), the ideal solution proposed by Roccheggiani is a system that has multi-purpose units from the NRE-MPU series as the generator of hot and cold fluids, serving a primary air handling unit with a very high-efficiency RRU-FA heat recovery unit and serving chilled beams (or fan-coils from the TCU series) used as room terminal units that provide cooling, heating and changes of air.

Each area is managed independently and the multi-purpose unit from the NRE-MPU series guarantees the correct energy level to the terminal units, thanks to the hot and cold fluid flow-rate modulation ranging from 40% to 100%, optimising the generation of heat and cold as required, and always ensuring maximum overall energy efficiency.

Picture showing an example of where Multi-purpose units from the NRE-MPU range are used to serve a 4-pipe system fitted with chilled beams and RRU-FA primary air handling units.

The air handling unit is the motor behind the chilled-beam system. It provides air renewal inside the spaces, in accordance with regulations, ensuring correct humidity values, optimised with the use of the innovative air handling unit with four RRU-FA heat recovery stages.



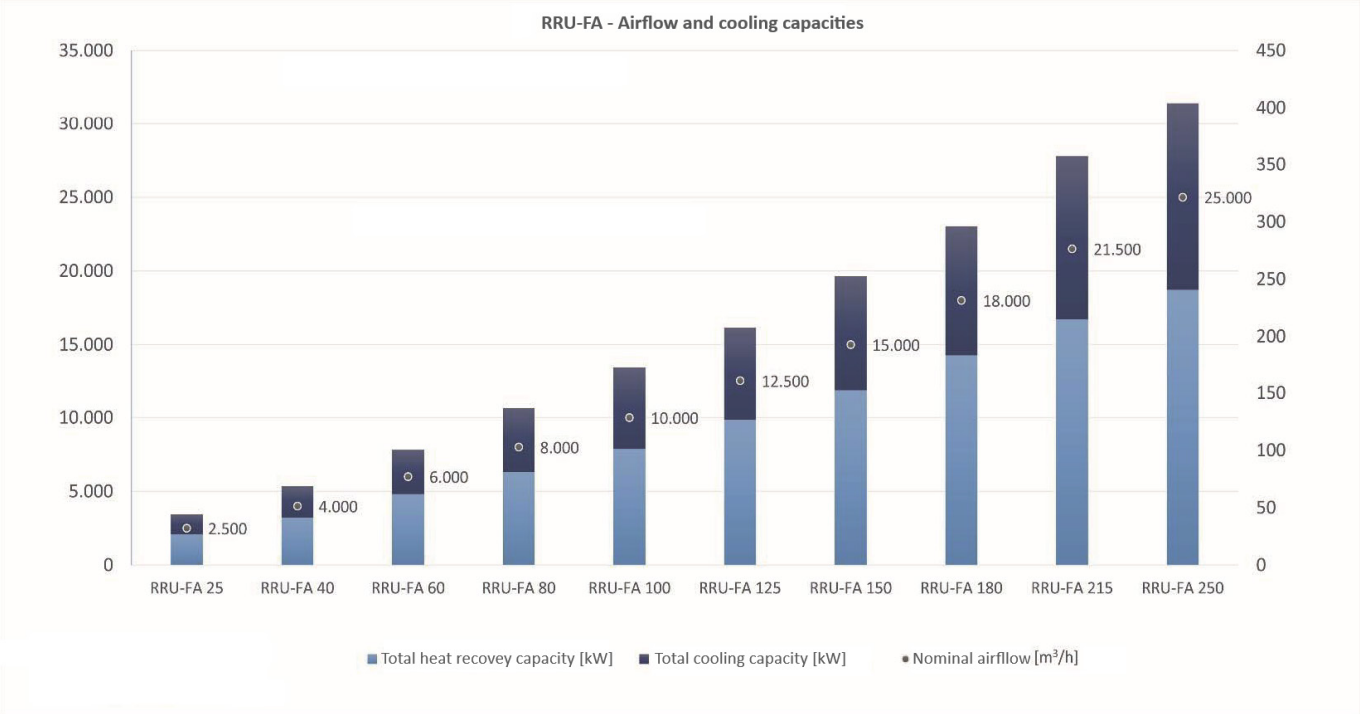
Picture showing an example of where Multi-purpose units from the NRE-MPU range are used to serve a 4-pipe system fitted with chilled beams and RRU-FA primary air handling units.

RRU-FA: The most efficient solution for fresh air handling

With the use of cutting-edge materials and manufacturing techniques, the energy requirements for new buildings are continuing to fall increasingly, in line with the provisions of Directive 2010/31/EU - EPBD (Energy Performance Buildings Directive). Consequently, the energy requirement needed to ensure a correct change of air is becoming a determining factor in overall energy consumption, especially in buildings of recent conception.
The RRU-FA units by Roccheggiani are designed to provide the highest possible energy performance through managing the change of air correctly and efficiently, by having a decisive impact on the improvements to energy performance thanks to the 4 recovery systems within a single unit.

Model RRU-FA			25	40	60	80	100	125	150	180	215	250
Cooling System Efficiency	(1)(3)	ŋ	6,48	7,21	6,33	6,48	6,42	6,76	6,13	6,65	6,19	6,00
Heating System Efficiency	(2)(3)	ŋ	13,54	11,13	10,36	11,38	11,34	10,62	10,58	10,96	10,18	10,37

(1) Internal Air Temperature 26°C/50% RH - Fresh Air Temperature 35°C/60% RH
(2) Internal Air Temperature 21°C/50% RH - Fresh Air Temperature -10°C/80% RH
(3) Pressure drop in Supply ducts 50 Pa - Return 50 Pa



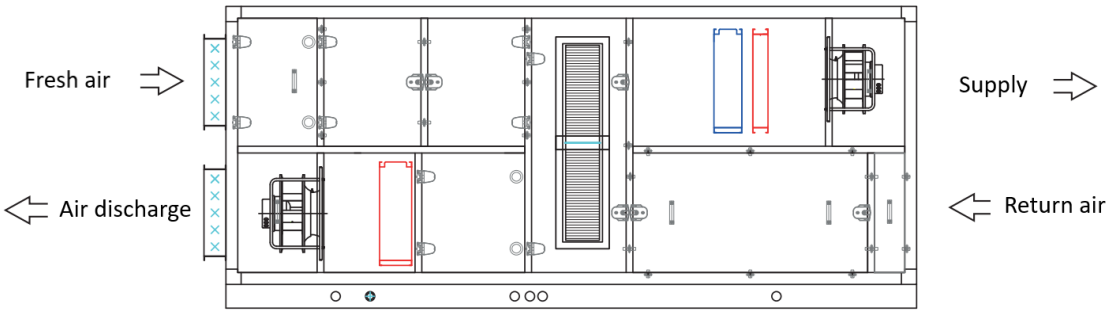
Variable flow rate operation can be achieved through customised control programs developed according to customer requirements, making the unit compatible with different plant configurations, such as VAV systems or based on air quality control (IAQ).

An interface with BMS is also available on request, through various communication protocols (ModBus®, BACnet™, connection to a WebServer).

Operating principles

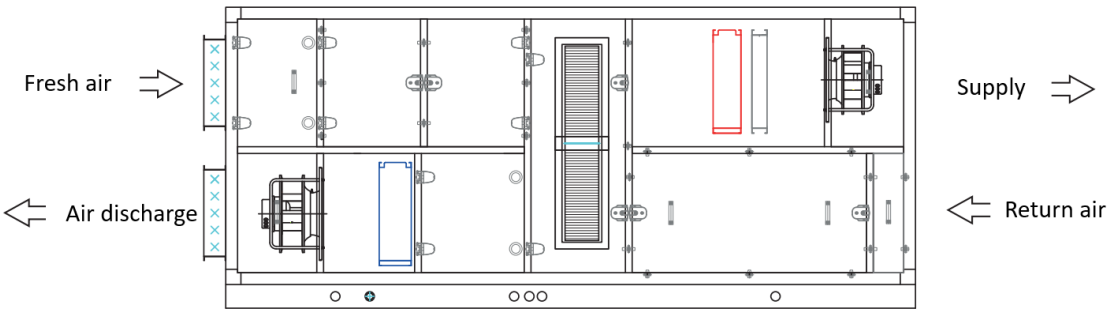
Handling performed by an RRU-FA unit on fresh air is intended to maintain user-defined temperature and relative humidity set-points. The integrated automatic control system modulates the operation of the unit in order to fulfil this objective and optimise overall energy consumption. In general, one can distinguish between summer and winter operations of the unit.

Summer operation



Both sensitive and latent heat exchange occurs between renewal air and return air through the thermal wheel and the renewal air is thus cooled and dehumidified. Further cooling is provided by the evaporator coil in the refrigeration cycle and by the (optional) water coil. Hot gas is circulated through the supply air reheating coil and its drawing allows reheating for free achieving considerable savings in the consumption of the compressor unit.
The refrigerant condenses in the return air; in this way, lower condensation temperatures are used compared to those needed for condensing with fresh air, allowing improved overall efficiency in the refrigeration cycle. A further improvement in the refrigeration cycle is ensured by adiabatic cooling, achieved during discharge by evaporating the condensate water produced by the cooling coil. By maintaining the supply and return air flows unchanged with respect to the space, the booster function on the return fan aims to improve the exchange and lower the condensing pressure when working to achieve standard or particular operating conditions.

Winter operation



Both sensitive and latent heat exchange occurs between renewal air and return air through the thermal wheel. Thus the renewal air is heated up and humidified. Further heating takes place due to the condenser coil on the heat pump and the (optional) water coil, allowing the desired supply conditions to be achieved.
The refrigerant evaporates on the return air, already cooled down by flowing through the thermal wheel. Evaporation temperatures can therefore be kept at higher values than those required when operating with fresh air, allowing improved overall efficiency in the heat pump cycle.
The cutting-edge regulation system automatically prevents the formation of frost and minimises the need to reverse the direct cycle to perform defrosting operations. Therefore, a high level of indoor comfort can be guaranteed without interruption. When defrosting is required due to particular thermo-hygrometric conditions, the operating and activation logic on the unit's three coils, nevertheless, ensures the supply of neutral air to the space.

Description of the Unit and main components

Casing

The load-bearing structure is made from UNI 9006/14-6060 ASTM extruded aluminium profiles with triple-chamber thermal break and are specially shaped to improve safety. The profiles are connected by 3-way corner couplings made of fibreglass-reinforced nylon. The profiles have a special shape that contains the securing screws of the panels, so that the interior parts of the RRU-FA 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/m^3). The inside of the panel is in galvanised sheet metal and the outside is in pre-coated galvanised sheet metal.

Rigid bag filters F7 (optional F8 – F9)

Filters for fine dust particles: synthetic-fibre, mini-pleated rigid-bag filters, F7 class (EN 779:2012) Classe ePM2.5 70% (ISO 16890), compact; airtightness between the filter packs and the frame is guaranteed by a hot-laid polyurethane seal.

Fan sections

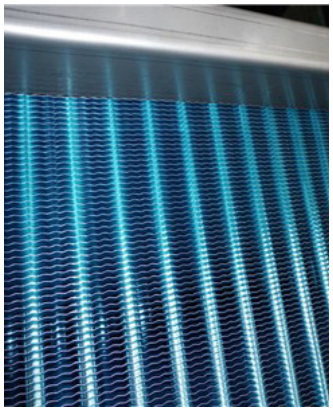
The fan sections are fitted with plug-fan type centrifugal fans with single inlet with an EC electric motor directly coupled to the impeller.

Undulated synthetic filters

Pre-filters for coarse dust particles: synthetic-fibre pleated filters with regenerative cells, G4 class (EN 779:2012) - Coarse Class 55% (ISO 16890), 48 mm thick with self-extinguishing filtering media bound with chlorine-vinyl resin, complete with galvanised sheet metal frame with U-profile th. 8/10, with double-welded galvanised metal mesh.

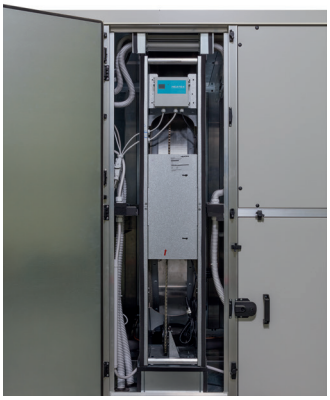
Refrigerant coils

The frame is in galvanised steel, the pipes in copper and the fins in aluminium. The discharge-heat dissipation coil has fins with hydrophilic treatment.



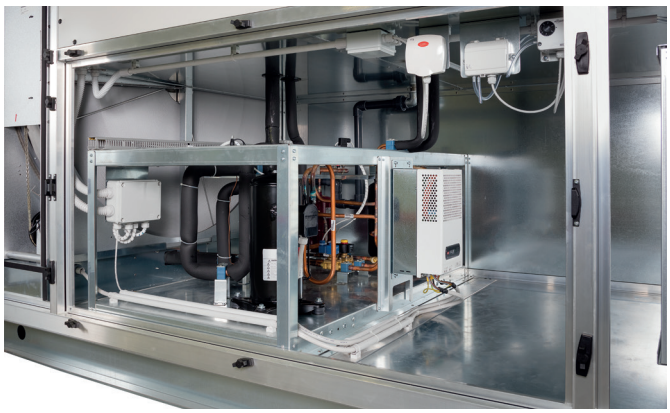
Thermal wheel heat recovery unit

The thermal wheel is made from aluminium subjected to hygroscopic treatment with 0.08 mm thick plates.
Transmission is provided by a trapezoidal belt while the motor (230/400v-50/60Hz-0.18kW-0.99/0.57A) complies with IEC 34-1 standard and has IP55 protection.



Compressors

The unit is equipped with BLDC permanent-magnet compressors, controlled by inverters with continuous modulation between 10% and 100%, low noise emission, high efficiency and long useful life. On large-sized units the BLDC compressors are installed with a tandem or trio configuration.



4 ROWS

RIR Regulation

The RRU-FA unit is fitted with an RIR ("Roccheggiani integrated regulation") system. The RIR consists of an on-board control panel with an LCD control panel, plus an optional remote location LCD or touch screen terminal.
The LCD display ensures full control over the unit and also allows calibrations by the manufacturer's service centre. Conversely, the touch screen display has a simplified interface.
The integrated automatic regulation of the system controls and monitors the functions and set-points of the unit.
The system is based on a programmable microprocessor control, specific for enhancing the efficiency of HVSC&R systems.

The system monitors and controls several devices and components, performing multiple adjustments aimed at optimising the machine's operation:
- Evaporating and condensing coils
- Reheating coil
- Auxiliary cooling of the condensation coil in summer mode with an evaporating pack fed by self-produced condensation water
- Rotary recovery unit
- BLDC compressor with inverter
- Actuators of dampers for fresh air, return air, booster
- Supply and return air fans
- Fresh air humidity and temperature probes, in supply and return
- Air quality probe (VOC/CO2)
- Safety pressure switches and differential pressure switches for filters
- Electronic throttling valve (on refrigeration/heat pump cycle) and safety valves for high and low pressure.
- Regulation valve for the water flow to the optional pre-cooling/preheating coil

The RIR regulation is provided with the following external connections:
- Integrated RS485 for connection to the tERA system
- USB programming portals
- Ethernet plug-in card: BACnet/IP, Modbus TCP/IP Master/Slave, Webserver, Ftp, SNTPv1, v2c, DHCP, DNS (optional)
- Optoisolated RS485 plug-in card: Modbus RTU (optional)
- Optoisolated RS485 plug-in card: BACnet MSTP (optional)
- LONWORKS plug-in card: LON (optional)
- Konnex plug-in card: KNX/EIB (optional)
- CANBus plug-in card: CANopen (optional)

tERA is a remote, centralised management platform for HVAC applications. A subscription is required for this service.
tERA offers a monitoring system based on a hardware device and a specially-prepared software program which allows a series of values and parameters to be kept under control, including the machine status and significant measurements regarding the operation of the whole system.

It also allows intervention through the software to modify or force certain values.
It is associated with an alarm system; in this case the values are compared with a pre-set series of values defined as standard or ideal or with a range of values which the series of monitored parameters need to come within.
Whenever the values do not coincide with the pre-set parameters, the alarm system signals the anomaly so that action can be taken to re-establish optimum operating conditions.

The GSM solution is useful when it is difficult to connect to the site network. Therefore an independent channel is used by the plant infrastructure.
The SIM to be used for all data transmission is already included in the installation box.
So, all that you need to do is to register the new plant on the tERA portal and all the information will be available to you with a few clicks. The data is transmitted by means of a secure and reliable line: the Machine2Machine (M2M) iconnection is available through a private protected channel (VPN – Virtual Private Network).

If the network of the plant is unavailable or the cell phone coverage is insufficient, one can use a tERA Ethernet subscription.
The installation box is already pre-configured for automatic connection to the router of the plant.
No configuration is required for static IPs nor any change of router parameters in order to activate the subscription. Thanks to the advanced SW of SSL encryption, access to your data is safe and fast.

Description and dimensions of accessories

Water coil

The preheating/pre-cooling coils are provided with a condensate collection pan made of AISI 304 stainless steel. The frame is in galvanised steel, the pipes in copper and the fins in aluminium.

H10 Electronic filters

The electrostatic/electronic filter consists of electrostatically-charged active aluminium plates.
It is a purification system which separates solid (dust/powders) and liquid (oily vapour) pollutants from the intake air flow.
By means of a difference in potentials generated between the input and output electrodes, the system separates the contaminants from the air that flows between the electrodes.
When the filter is saturated, it only needs to be washed with water and detergent to remove the dirt and allow regeneration. This improves the length of useful life and significantly reduces running costs compared to units fitted with high-efficiency mechanical filters.

The main features are:

Performance
- high filtration efficiency on particles of 0.3-0.4 microns, comparable to E10, E11 class under the UNI 1822:2009 standard and comparable to the F7, F8, F9 class under the EN 779:2012 standard;
- excellent solution against outdoor pollution from PM10, PM2.5 and PM1;
- significant reduction of air bacterial load;
- excellent protection of the heat-exchange coils and air distribution ducts.

Compared to conventional filtration, the electronic filter allows:
- significant energy savings due to low pressure losses;
- constant filtration efficiency up to a load of 600 g of fine particulates.

Furthermore, electronic filters have high antibacterial power due to high efficiency with sub-micron particles and to the electric field action.
Electrostatic filters only cause minimal pressure drop increases compared to the initial pressure as a result of accumulated soiling of the filter itself. This feature, combined with a high, pollutant accumulation capacity, allows filters to be used for longer periods between one maintenance cycle and the next.

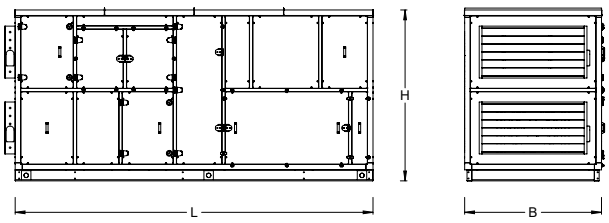
General technical data

Model RRU-FA			**25**	**40**	**60**	**80**	**100**	**125**	**150**	**180**	**215**	**250**
Supply air flow rate		m^3/h	2500	4000	6000	8000	10000	12500	15000	18000	21500	25000
Return air flow rate		m^3/h	2500	4000	6000	8000	10000	12500	15000	18000	21500	25000
Exhaust Airflow Summer Mode		m^3/h	3750	6000	9000	12000	15000	18750	22500	27000	32250	37500
Fresh Air Airflow Summer Mode		m^3/h	3750	6000	9000	12000	15000	18750	22500	27000	32250	37500
External static pressure supply		Pa	300	300	300	300	300	300	300	300	300	300
External static pressure return		Pa	200	200	200	200	200	200	200	200	200	200
Compliance with 2016-2281 EU - ENER LOT 21												
Cooling												
ηs,c Seasonal Space Cooling Efficiency	(5)	%	203.4	209.2	207.3	208.3	202.9	208.2	204.8	205.3	222.4	206.6
Cooling Energy Efficiency Class	(6)		A	A	A	A	A	A	A	A	A	A
Heating												
ηs,h Seasonal Space Heating Efficiency	(5)	%	173.0	173.0	163.0	160.0	163.0	167.0	154.0	157.0	164.0	158.0
Bivalent Temperature	(5)	° C	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0
Heating Energy Class	(6)		A++	A++	A++	A++	A++	A++	A++	A++	A++	A++
Heat recovery unit												
Total Heat Recovery Capacity	(1)	kW	26.8	41.6	62.0	81.1	101.3	126.7	152.5	183.6	215.0	240.8
Sensible Heat Recovery Capacity	(1)	kW	6.4	10.1	15.1	19.9	24.9	31.1	37.4	45.0	53.0	60.3
Total Cooling Capacity	(1)	kW	17.5	27.1	38.5	55.8	71.0	81.0	100.2	112.6	142.2	163.3
Sensible Cooling Capacity	(1)	kW	12.0	19.3	27.7	39.0	48.8	58.1	69.6	83.4	99.7	115.9
Air Outlet Temperature	(1)	° C	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Air Outlet Relative Humidity	(1)	g/kg	7.1	6.9	6.9	6.8	6.8	6.8	6.8	6.8	6.7	6.6
Total Cooling Capacity	(1)	kW	44.3	68.7	100.5	136.9	172.3	207.7	252.7	296.2	357.2	404.1
Total Powrm Consumptoni	(1) (3)	kW	7.0	10.3	16.8	22.8	29.1	33.7	44.7	47.7	62.3	72.8
System Efficiency	(1) (3)	η	6.8	7.2	6.3	6.5	6.4	6.8	6.1	6.7	6.2	6.0
Total Heat Recovery Capacity	(2)	kW	34.3	54.0	80.6	105.9	132.7	165.4	199.0	240.0	281.7	320.0
Sensible Heat Recovery Capacity	(2)	kW	22.0	34.9	52.1	68.6	85.8	107.1	128.9	155.2	182.6	207.5
Total heating capacity	(2)	kW	10.4	16.4	23.7	35.4	44.3	52.9	63.2	75.2	90.0	104.7
Air Outlet Temperature	(2)	° C	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
Supply air absolute humidity	(2)	g/kg										
Total Heat Capacity	(2)	kW	44.7	70.4	104.3	141.3	177.0	218.3	262.2	315.2	371.7	424.7
Total Powrm Consumptoni	(2) (3)	kW	3.8	7.0	10.8	13.9	17.4	23.1	27.8	31.5	40.5	45.7
System Efficiency	(2) (3)	η	13.5	11.1	10.4	11.4	11.3	10.6	10.6	11.0	10.2	10.4
Electric performance												
Power absorption at full load		kW	15.8	19.8	29.5	37.6	47.3	49.4	65.4	71.4	90.7	103.9
Current absorption at full load		A	20.3	29.7	39.0	59.9	71.3	80.0	103.0	135.0	145.0	155.0
Current absorption at start-up		A	31.8	40.5	61.9	79.7	101.1	105.7	140.8	154.0	196.5	225.5
Acoustic performance (Sound power level)												
Fresh air intake	(4)	dB (A)	53.6	54.6	58.2	62.2	58.8	60,0	61.2	62.8	64.9	67,0
Supply duct	(4)	dB (A)	82.9	83.4	86.5	90.5	86.7	87.4	88	90.5	93.2	95.8
Return duct	(4)	dB (A)	63.7	69.3	70,0	72,0	75.2	75.4	75.5	77.4	77.4	77.4
Exhaust	(4)	dB (A)	79.9	85,0	86.9	88.2	92.3	91.9	91.4	94.7	93.9	93,0
Airborne	(4)	dB (A)	69.3	71.7	75.1	77.4	78.6	78.3	78,0	81.6	82.2	82.8

NOTES: **(1)** Return air temperature 26°C / 50% u.r. - Fresh air temperature 35°C / 60% u.r. ; **(2)** Return air temperature 21°C / 50% u.r. - Fresh air temperature -10°C / 80% u.r. ; **(3)** Total power with 50 Pa Supply external static pressure and 50 Pa Return external static pressure; **(4)** Sound power with 300 Pa Supply external static pressure and 250 Pa Return external static pressure in cooling mode; **(5)** According to (EU) n. 2016/2281 - Ener Lot 21 (ErP); **(6)** According to Eurovent Certification Program (RT) powers up to 200 kW in cooling mode.

Dimensions and weights

Dimensions												
RRU-FA		25	40	60	80	100	125	150	180	215	250
B	mm	1.220	1.370	1.600	1.740	1.920	2.110	2.310	2.540	2.770	2.940
H	mm	1.680	1.780	2.030	2.170	2.370	2.520	2.670	2.980	2.980	2.980
L	mm	4.090	4.090	4.490	4.550	4.810	4.810	4.810	4.900	4.900	4.900
Weight	kg	1.175	1.490	1.900	2.100	2.450	2.700	3.050	3.500	3.760	3.980



Sound powers

RRU-FA 25	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Fresh Air Intake	62	51	52	51	47	47	43	39	53.6
Supply	69	69	77	75	79	77	73	69	82.9
Return	62	56	65	61	56	55	52	52	63.7
Air discharge	66	66	76	74	76	73	69	67	79.9
Irradiated to the outside of the structure	66	62	66	63	67	62	43	35	69.3

RRU-FA 40	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Fresh Air Intake	60	49	56	51	47	46	44	43	54.6
Supply	70	69	79	77	79	77	73	70	83.4
Return	65	58	71	65	61	59	57	65	69.3
Air discharge	70	69	83	78	81	77	73	76	85
Irradiated to the outside of the structure	69	63	71	66	69	64	44	41	71.7

RRU-FA 60	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Fresh Air Intake	64	51	62	54	51	49	46	47	58.2
Supply	75	73	84	81	83	78	74	74	86.5
Return	67	67	71	68	64	60	58	57	70
Air discharge	73	77	89	84	82	77	74	72	86.9
Irradiated to the outside of the structure	73	69	77	71	72	65	45	40	75.1

RRU-FA 80	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Fresh Air Intake	67	58	63	59	56	51	49	55	62.2
Supply	76	77	91	86	86	81	78	81	90.5
Return	68	70	74	70	65	61	61	60	72
Air discharge	76	81	89	86	83	77	76	74	88.2
Irradiated to the outside of the structure	75	73	80	74	74	66	48	46	77.4

RRU-FA 100	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Fresh Air Intake	63	62	61	56	52	50	47	43	58.8
Supply	76	81	87	84	82	77	74	70	86.7
Return	74	70	76	73	69	65	63	66	75.2
Air discharge	79	80	92	89	88	83	80	80	92.3
Irradiated to the outside of the structure	76	74	80	75	75	68	49	45	78.6

RRU-FA 150	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Fresh Air Intake	70	69	61	58	54	53	50	44	61.2
Supply	81	88	87	85	83	80	76	71	88
Return	71	74	78	74	68	64	64	62	75.5
Air discharge	79	86	93	89	86	80	79	76	91.4
Irradiated to the outside of the structure	79	81	81	75	74	67	49	41	78

RRU-FA 180	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Fresh Air Intake	75	71	71	64	57	52	44	41	65.5
Supply	80	87	87	86	84	79	74	70	88
Return	71	69	78	73	69	65	62	61	75.4
Air discharge	80	92	88	88	85	80	75	71	89.7
Irradiated to the outside of the structure	76	78	76	73	72	67	63	61	76.2

RRU-FA 215	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Fresh Air Intake	74	67	69.5	64	59	54.5	49	51	66.3
Supply	80.5	84.5	91.5	89	87.5	82.5	78.5	78.5	91.9
Return	72.5	72	79	74	69.5	66	64	63.5	76.4
Air discharge	80.5	89	91	89.5	86.5	81	78	75.5	91.4
Irradiated to the outside of the structure	78	78	80.5	76.5	75.5	69	58	56.5	79.5

RRU-FA 250	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Fresh Air Intake	73	63	68	64	61	57	54	61	67
Supply	81	82	96	92	91	86	83	87	95.8
Return	74	75	80	75	70	67	66	66	77.4
Air discharge	81	86	94	91	88	82	81	80	93
Irradiated to the outside of the structure	80	78	85	80	79	71	53	52	82.8

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