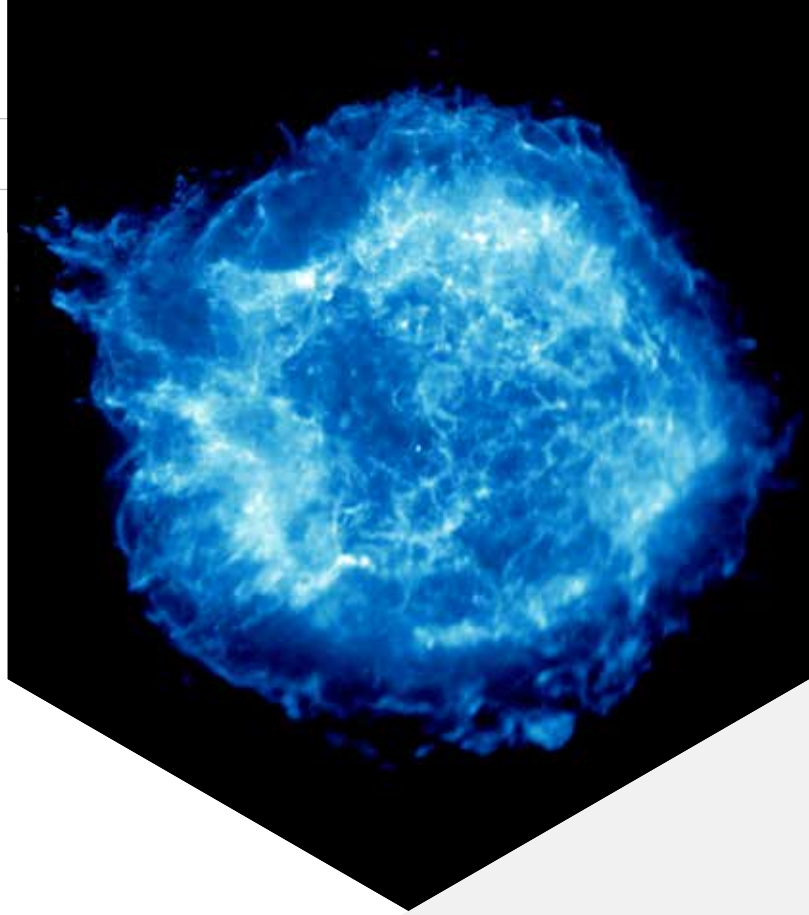


RFM

Heat recovery units

WITH BUILT-IN HEAT PUMP SYSTEM

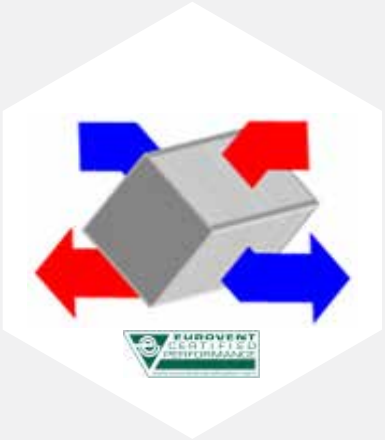
from 900 to 4.000 m^3/h

Pre-painted frame and fully removable sandwich panels with 20 mm thickness thermal and acoustic insulation.
Static heat recovery of the air-to-air cross flows type with condensation collection pan.
G4 efficiency class synthetic cell filters.
Single speed double inlet forward curved fans, on request supplied with inverter driven fan motors with constant air flow algorithm.
Heat pump refrigerant system (R410A) composed of scroll hermetic compressor, Cu-Al evaporator and condenser coils, bi-directional thermostatic valve, liquid separator and receiver, 4-way valve for cycle inversion, overpressure safety valve, high and low pressure switches, freon filter and fluid indicator.
Internal electrical board for supplying all the electrical powers; room, outside and frost temperature sensors.
Microprocessor control for fully automatic management of room temperature, display for setting and for visualizing sensor and set-point temperature values, connected up to 20 m far from unit board.

HP · ROTARY · SCROLL · R410A · PLUG&PLAY · >50% EFFICIENCY

Accessories

Pre or post electric heater	SKE
Class M6 compact filter	FC6
Class F7 compact filter	FC7
Inverter motors with electronic control	DDE
Filters differential pressure switches	PSTD
Adjusting damper	SKR
On/off damper actuator	SSE
Flexible connection	GAT
Roof cover	TPR
External hood with wire mesh	CFA
Supports H=180 mm	PD2



HIGH EFFICIENCY ALUMINIUM HEAT EXCHANGER

R410A GAS REFRIGERANT SYSTEM

THE SIDE TECHNICAL SPACE, EXTERNAL FROM THE AIR FLOW, ALLOWS TO WORK VERY EASILY

INSIDE

PARTIAL OUTSIDE

Models

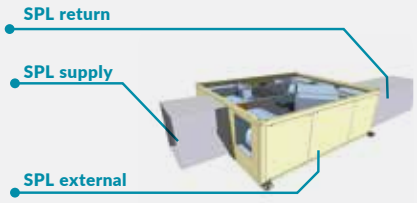
RFM		14	19	25	30	40	50
Airflow	m^3/h	900	1400	2000	2600	3300	4000
External static pressure on supply	Pa	225	154	187	179	211	159
External static pressure on return	Pa	184	122	130	148	153	133
1 m sound pressure level	dB(A)	55	52	59	58	58	62
Total max current absorption	A	14,6	21,6	36,3	22,6	26,9	24,8
Power supply	V-Ph-Hz	230-1-50			400-3+N-50		
Efficiency (1)	%	46,7	44,6	49,2	47,8	48,8	47,8
Recovered cooling capacity (1)	W	803	1184	1888	2336	3033	3594
Compressor cooling capacity (1)	W	4597	7010	10352	12705	17548	19928
Total cooling capacity (1)	W	5400	8194	12240	15041	20581	23522
Available cooling capacity (1)	W	1838	2678	4085	4804	6740	7521
EER (1)		2,80	2,57	2,60	2,86	2,94	2,78
Supply temperature (1)	°C	19,7	20,1	19,7	20,3	19,7	20,2
Efficiency (2)	%	54,0	51,4	56,9	55,2	56,4	55,2
Recovered heating capacity (2)	W	4015	6004	9446	11892	15463	18296
Compressor heating capacity (2)	W	4860	7672	11612	14571	19629	22137
Total heating capacity (2)	W	8875	13676	21058	26464	35092	40433
Available heating capacity (2)	W	796	1095	3060	3094	5386	4488
COP (2)		6,12	5,65	5,69	5,88	6,03	5,62
Supply temperature (2)	°C	22,6	22,3	24,5	23,5	24,8	23,3
FANS							
Max current consumption	A	2 x 1,80	2 x 2,20	2 x 2,60	2 x 4,00	2 x 5,10	2 x 3,00
Max. total power absorbed	W	2 x 395	2 x 470	2 x 585	2 x 900	2 x 1100	2 x 1870
Specific fan power	$W/(m^3/s)$	1499	1209	1053	1246	1200	1683
2009/125/EC ErP Compliance	-	2015	2015	2015	2015	2015	2015
Motor protection rating		IP 44	IP 44	IP 44	IP 44	IP 44	IP 55
Motor insulation class		F	F	F	F	F	F
Power supply	V-Ph-Hz	230-1-50					400-3-50
COMPRESSOR							
Refrigerant gas		R410A					
Type		rotativo	rotativo	scroll	scroll	scroll	scroll
Max current consumption	A	8,83	15,4	22,1	10,6	14,9	16,4
Full load power input	W	1930	3360	4860	5630	7965	8735
Power supply	V-Ph-Hz	230-1-50			400-3-50		
ELECTRIC PRE OR POST-HEATING ACCESSORY SKE							
Stages		1	1	1	1	1	1
Heating capacity	kW	2,50	2,50	5,00	5,00	7,00	7,00
ΔT air side	°C	8,2	5,3	7,4	5,7	6,2	5,1
Pressure drop	Pa	5	9	6	9	7	9
Power supply	V-Ph-Hz	400-3+N-50					

(1) Outdoor air 32°C 50% RH, ambient air 26°C 50% RH
(2) Outdoor air -5°C 90% RH, ambient air 20°C 50% RH

HIGH EFFICIENCY FILTERS							
FC6 Pressure drop	Pa	40	65	55	70	55	70
FC7 Pressure drop	Pa	41	67	56	74	56	70

Noise levels

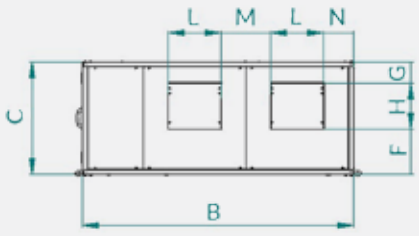
The table lists the sound power values (SWL) in octave bands and totals; it also indicates the values of sound pressure level (SPL) at 1 m, 5 m and 10 m at supply, return and at the outside of the unit.
All values refer to the operation of the ducted unit at FULL speed and at the nominal flow rate.

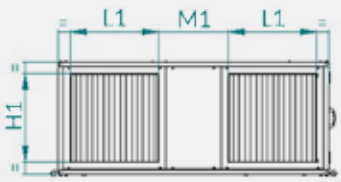


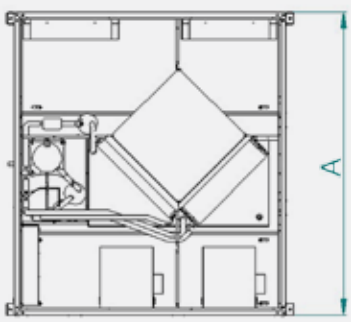
RFM	SWL [dB] OCTAVE BAND [HZ]								SWL		SPL SUPPLY			SPL RETURN			SPL OUTSIDE		
											1 m	5 m	10 m	1 m	5 m	10 m	1 m	5 m	10 m
	63	125	250	500	1000	2000	4000	8000	dB	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
14	95,6	80,4	84,1	75,0	77,3	76,9	73,7	67,5	96	83	68	57	52	65	54	49	55	44	39
19	84,6	78,0	82,8	74,6	75,0	74,6	71,6	65,6	88	81	66	55	50	63	52	47	52	41	36
25	103,4	83,2	88,7	78,6	80,0	79,9	77,6	72,6	104	87	72	61	56	69	58	53	59	48	43
30	102,2	82,9	88,1	78,8	79,0	79,1	77,2	72,5	102	86	71	60	55	68	57	52	58	47	42
40	102,8	83,0	88,4	79,0	78,9	79,0	77,6	73,1	103	87	71	61	56	67	57	52	58	48	43
50	79,1	76,6	87,8	89,5	85,2	87,2	88,7	86,6	96	95	79	69	64	74	64	59	62	52	47

Dimensions and weights

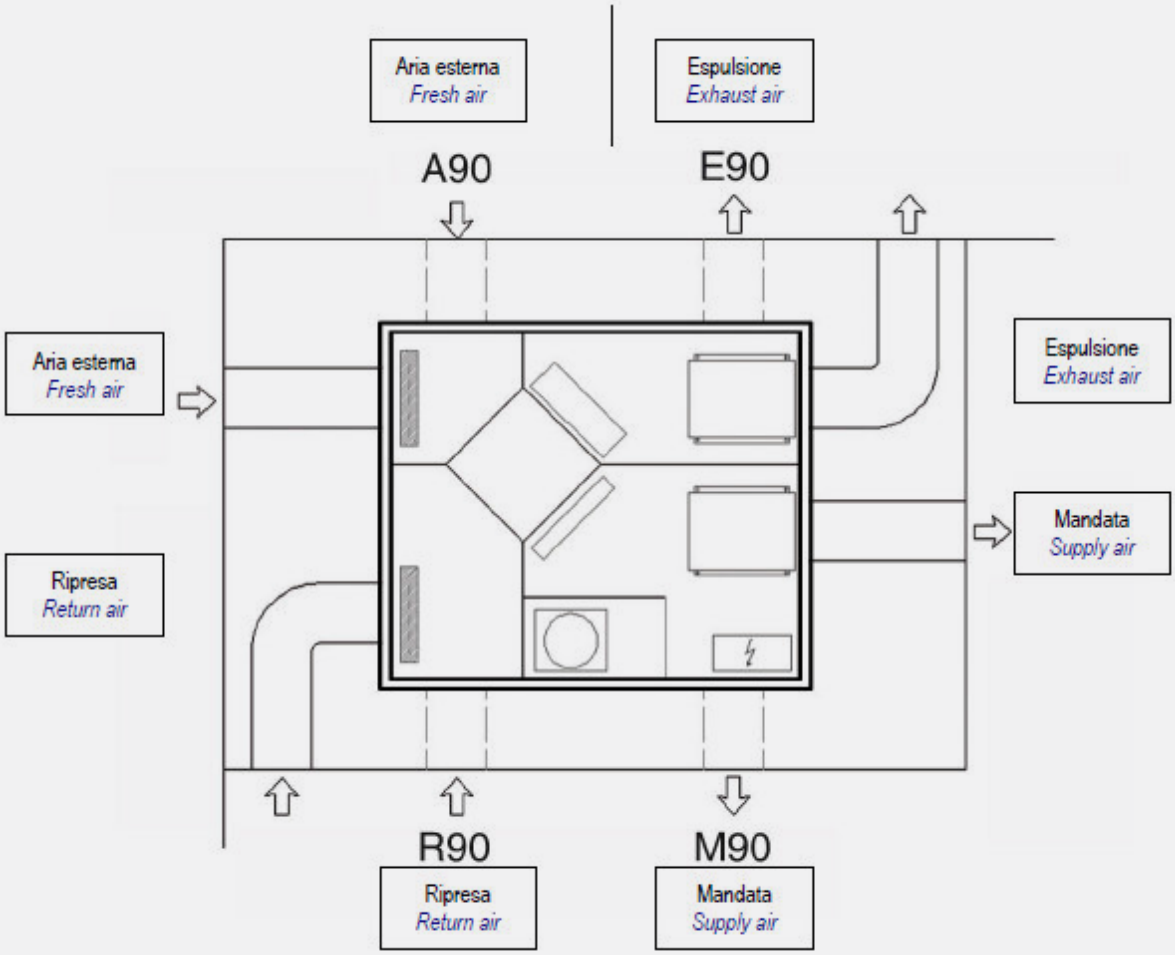
RFM		14	19	25	30	40	50
A	mm	1450	1450	1700	1700	1900	1900
B	mm	1230	1230	1560	1560	1700	1700
C	mm	470	470	530	530	705	705
F	mm	50	50	192	182	280	280
G	mm	154	154	72	59	135	135
L	mm	235	235	303	330	335	335
H	mm	265	265	266	290	290	290
M	mm	182	182	280	254	313	313
N	mm	120	120	172	136	183	183
L1	mm	331	331	502	502	545	545
H1	mm	323	323	387	387	545	545
M1	mm	417	417	412	412	450	450
Weight	kg	212	225	258	258	405	415







Configurations



Controls

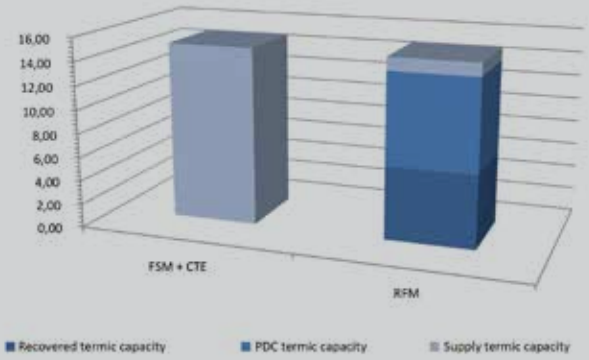
Constant flow management	DDE	•
Manual ON-OFF		•
Management of refrigerant circuit in heat pump (R410A)		•
Defrost recovery management		•
ON-OFF electric heater management	SKE	•
Management of phase sequence		•
Filter pressure switch management	PSTD	•
Management of motorized dampers	SKR+SSE	•
Alarms management		•
Post ventilation		•
Weekly programming		•
Remote ON-OFF		•
Remote display		•
BMS Modbus RS485 protocol		•
Reference diagram		15

LCC (Life cycle cost)

Units with integrated cooling circuit are increasingly required as they represent a compact solution that does not require hydraulic connections and thus simplifies the system in which it is used.

The initial investment, however, turns out to be much higher compared to traditional solutions, and maintenance is more expensive since the units are more complex.

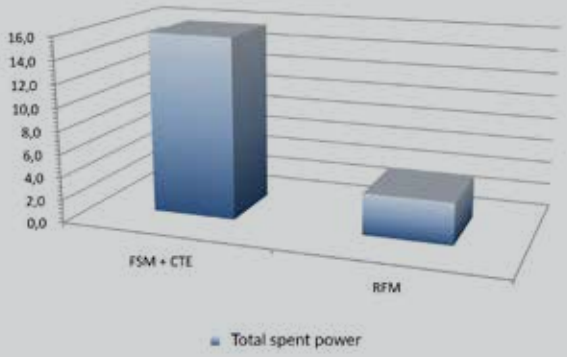
We propose therefore to examine the life cycle cost of these units.



We compare a traditional solution, consisting of a air handling unit (FSM) “full fresh air” and a fan box (CTE), and a heat recovery unit with integrated cooling circuit (RFM).

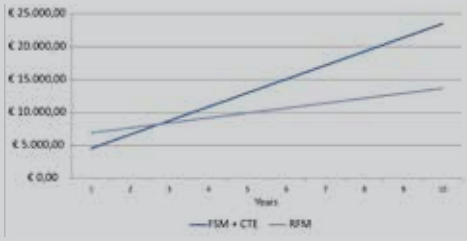
The previous graph demonstrates the different contributions of heat output, you can see how the heat pump covers large part of the energy requirements.

Then we analyse the total absorbed power in 2 solutions.



The heat recovery of the heat exchanger and the high efficiency of the cooling circuit, ensure that the power spent in standard solution is more than 4 times higher than that absorbed by the RFM unit.

By analysing the cost of the life cycle in both cases it becomes clear the convenience of a thermodynamic and static recovery solution; despite the initial investment may be higher, in fact, reduced operating costs mean that in less than 3 years, the recovery unit is cost-effective.



The simulation is referred to an air flow of 2000m³/h and an energy requirement of 15kW.
The data shown are purely indicative and referred to a life cycle period of 10 years.