Energy PLUS Recovery Units

Heating / Air conditioning

TECHNICAL MANUAL

Energy PLUS |

Contents

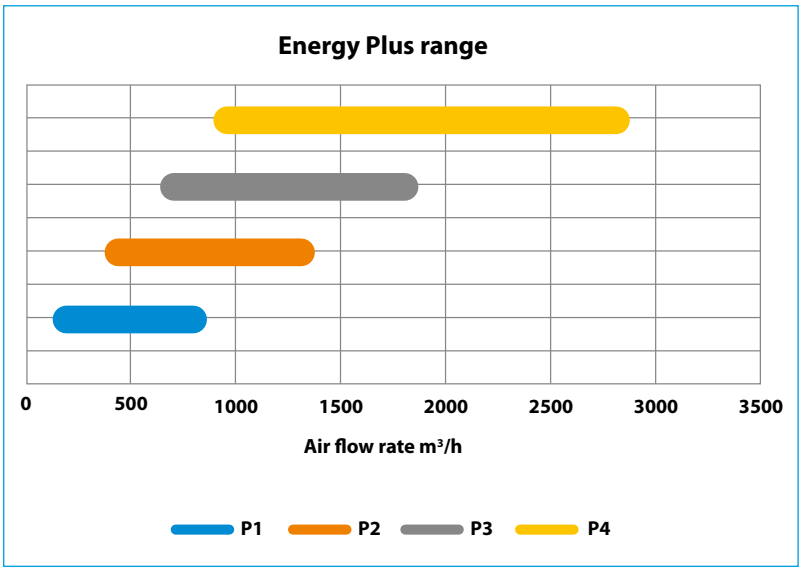
REFERENCE STANDARD: IEC 60335-2-80

INTRODUCTION

The high-efficiency heat recovery units of the **Energy Plus** series have been designed to ensure energy savings in ventilation systems of public and private premises such as bars, restaurants, offices, shops, etc., making it possible to recover heat from the exhaust air and transferring it to the air released into the room.

The heat exchange between the exhaust air and the intake air takes place through a static heat exchanger with countercurrent flow, sized to obtain a heat recovery up to 94%.

The **Energy Plus** series includes 4 sizes suitable for horizontal installation and covers a range of flow rates from 300 to 2600 m³/h. The units are available both in the version for installation on ceilings and floors.



The **Energy Plus** are supplied in 2 versions:

- for ceiling installation **(ENY-P1-S, ENY-P2-S, ENY-P3-S, ENY-P4-S)**
- for floor installation **(ENY-P1-P, ENY-P2-P, ENY-P3-P, ENY-P4-P)**

and they are equipped with centrifugal fans, featuring backward-inclined blades, and a continuous modulation electronic motor which ensure variable flow control, so as to reduce power consumption to the minimum necessary.

The **Energy Plus** units are ERP 2018 and therefore comply with the regulatory requirements of the European Ecodesign Directive (EU Regulation 1253/14). The checks concern both the energy performance relating to heat recovery and the intrinsic energy consumption parameter SFPint in the nominal conditions declared by the manufacturer.

External double sandwich panels made of 24 mm galvanised sheet steel, pre-insulated with polyurethane foam, density 45 kg/m^3. The polyurethane foam uses a water-based foaming agent (GWP-0).

Heat recovery unit. Heat recovery units are high efficiency static exchangers featuring aluminium plates with counter-current exchange. The achievable efficiency can exceed 90% because they ensure the transfer of countercurrent heat between two air flows with different inlet temperatures. Static heat recovery units do not feature moving parts and guarantee high reliability and safe operation.
In order to increase the efficiency of the exchanger, the plate surfaces feature special baffle plates.

The performance of the HOLMAK HEATX B.V. heat recovery unit is EUROVENT-certified

EUROVENT CERTIFIED PERFORMANCE www.eurovent-certification.com

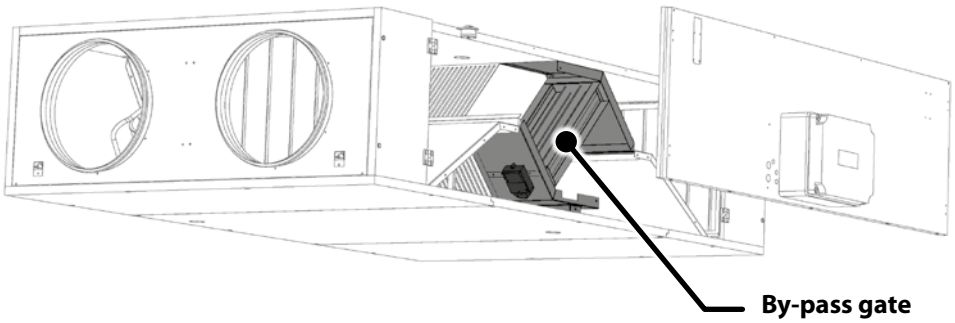
Plug-type centrifugal fan for supply and return with an electronically-controlled (EC) permanent magnet synchronous motor, supply voltage 230V 50Hz.
The impellers are designed to ensure an optimal air flow, which crosses the internal components with minimum noise.

Air filters with pleated micro cells, 98 mm thick, fine filtration efficiency F7 - ePM$_1$ 55% for the intake circuit and average M6 - ePM$_{10}$ 55% for the exhaust one, sized to minimise the internal pressure drops.
Access to the unit filters is ensured by special side openings.

Differential pressure switches to inspect the cleanliness of the filters and to indicate replacement suggestions.

Electrical panel on-board the machine, accessible from the side.
The panel includes the line fuse and the electronic power board for the manual or automatic control of the operation of fans and air treatment accessories.
The user interface remote control is a control with display and capacitive-type touch keyboard.

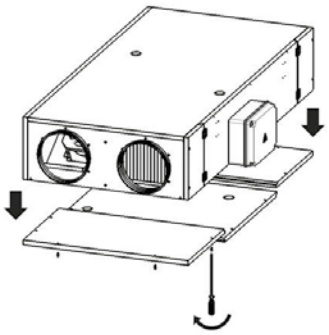
By-pass gate with servocontrol. All the units are equipped with an automatic by-pass system that allows to leave out the recovery unit in order to let the free-cooling (or the free-heating). The system depends from a logic based on the integrated cut-out thermostats.



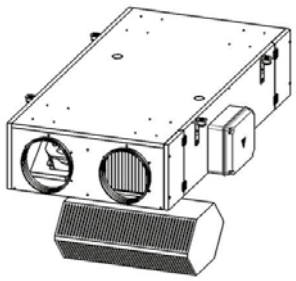
Possibility of variable flow control according to the measured concentration of CO_2.

The filters can be inspected through hatches for checking, cleaning and replacing.
Possibility of fast panel disassembly for accessing the ventilation and heat exchange sections for maintenance.

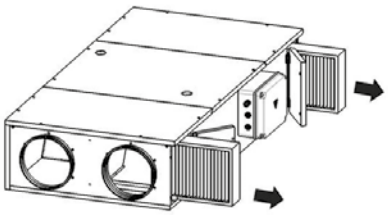
Access for special maintenance



Access to heat exchanger

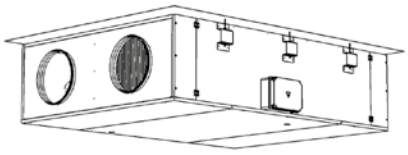


Access for routine maintenance (filter replacement)

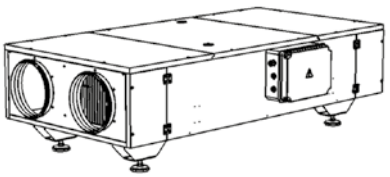


Ceiling installation or floor installation.
Availability of additional support and coupling systems, adjustable and sized according to the weight of the units.

Ceiling installation



Floor installation

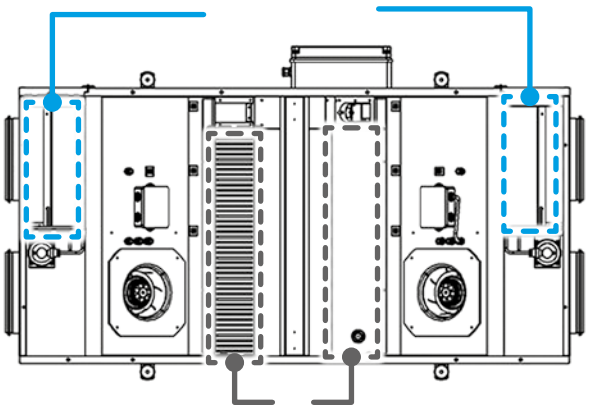


Reversibility

The **Energy Plus** units feature a perfectly symmetrical configuration which allows the airflow circuits to be easily inverted, acting either as external/intake air flows or internal/exhaust air return flows:

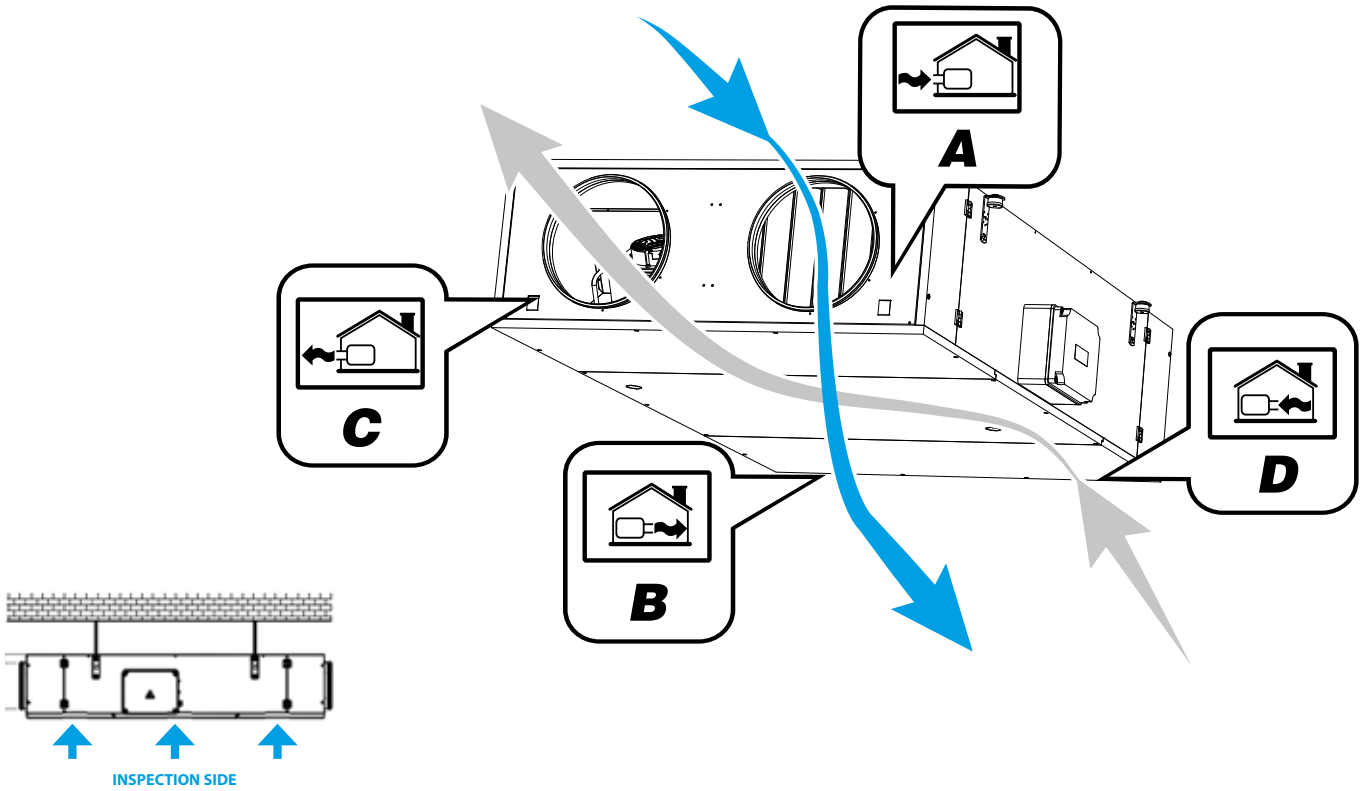
- The operating and automatic control logic can easily be reconfigured, by activating the DIP of the electronic board dedicated to the inversion of the flow function.
- Thanks to the perfect geometric symmetry, filters F7 - ePM_1 55% and M6 - ePM_{10} 55% can be invariably mounted in both compartments.
- In the event of flow inversion, the condensate collection tray must be removed from the standard position and e applied to the opposite side of the heat exchanger.
  In the event of floor installation, in which the lower inspection panels cannot be removed, the machine is supplied with two collection trays set-up for both possible configurations.

Interchangeable filter F7 and M6

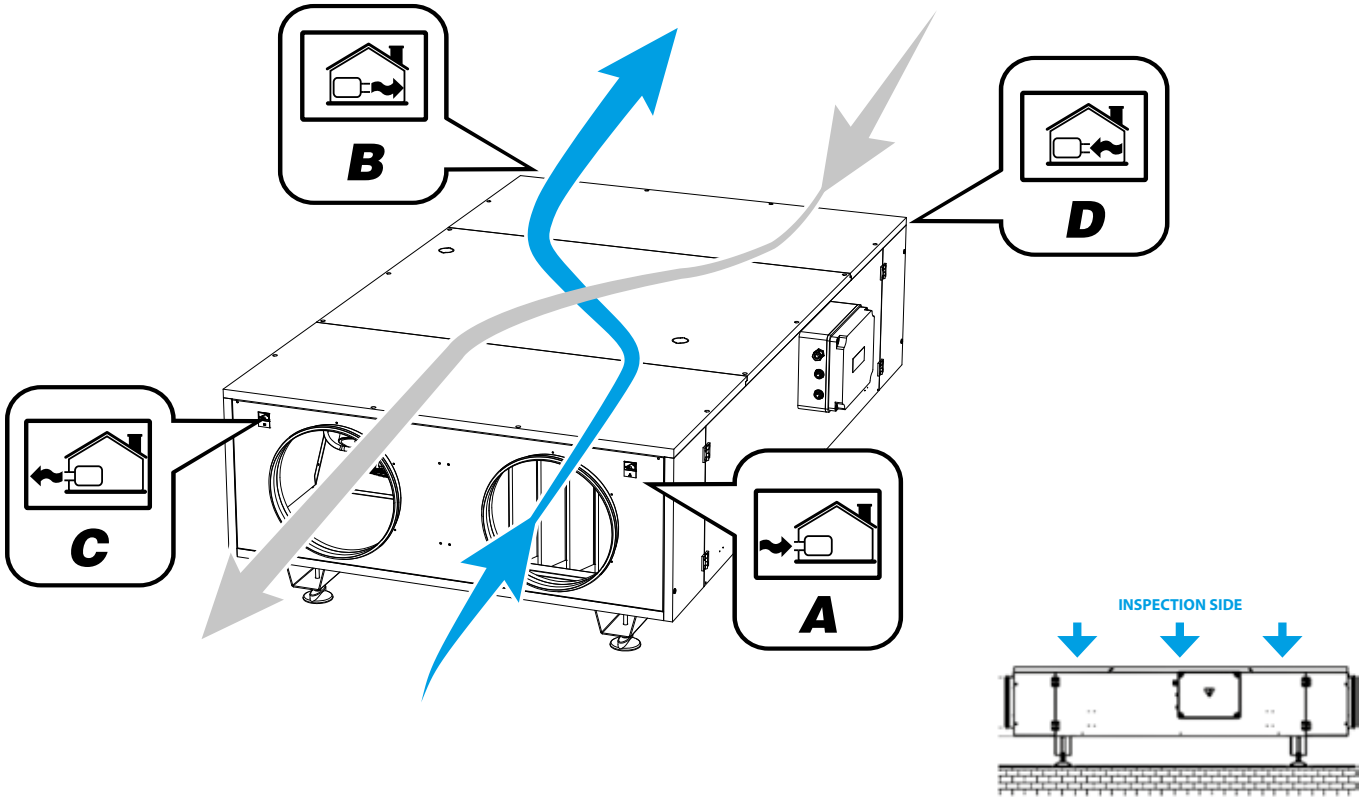


Tray can be mounted on both sides

Ceiling units



Floor units



KEY:

A = Fresh air	**B** = Supply air
C = Exhausted air	**D** = Extracted air

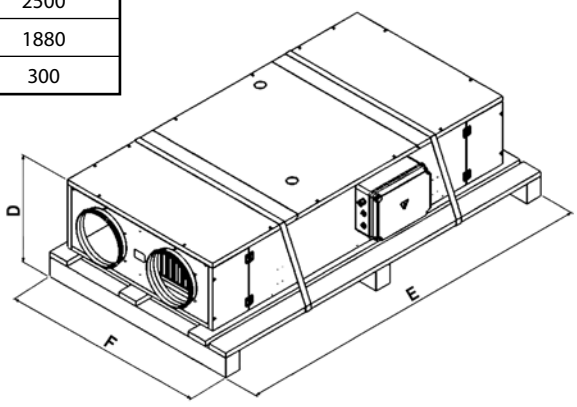
Energy PLUS | Characteristic technical data

Model		ENY-P1	ENY-P2	ENY-P3	ENY-P4
Maximum supply and return air flow rate	m^3/h	720	1150	1700	2600
	m^3/s	0.20	0.32	0.47	0.72
Supply and return rated available static pressure	Pa	170	220	250	250
Minimum supply and return air flow rate	m^3/h	270	300	600	690
Thermal efficiency EU regulation 1253/14 (1)	%	80	80	80	85
Total thermal output recovered (1)	kW	3.9	6.2	9.1	14.8
Maximum recovery efficiency (2)	%	90	90	90	94
Total thermal output recovered (2)	kW	6.5	10.5	15.4	24.5
Sound power level emitted by structure	LWA	56	63	62	61
Total number of fans	-	2	2	2	2
Rated absorbed electrical power (3)	W	330	770	1060	1460
Maximum total absorbed current (3)	A	2.8	3.6	4.7	6.5
Unit power supply (3)	V-Ph	230-1 + N / 50Hz	230-1 + N / 50Hz	230-1 + N / 50Hz	230-1 + N / 50Hz
Protection rating with machine installed	-	IP20	IP20	IP20	IP20
Unit weight	kg	110	154	180	290

1) Air conditions: EAT = 5 °C and t_i = 25 °C, no condensate
2) Air conditions: EAT = -10 °C and t_i = 20 °C, RH_i 50% RH
3) Basic version

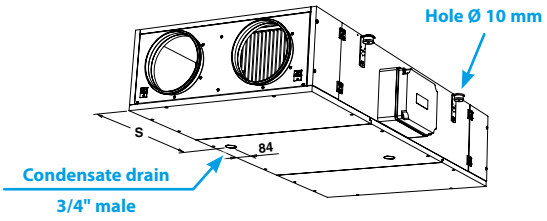
Overall dimensions of the packaged unit

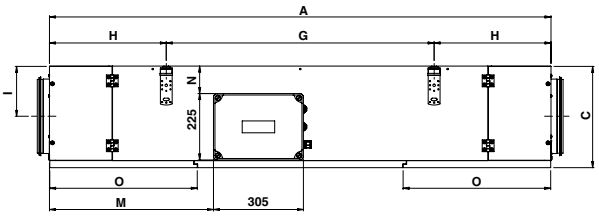
Model			ENY-P1	ENY-P2	ENY-P3	ENY-P4
Dimensions	D	mm	469	510	595	735
	E	mm	1845	1895	2245	2500
	F	mm	1030	1330	1430	1880
Weight		kg	120	164	190	300



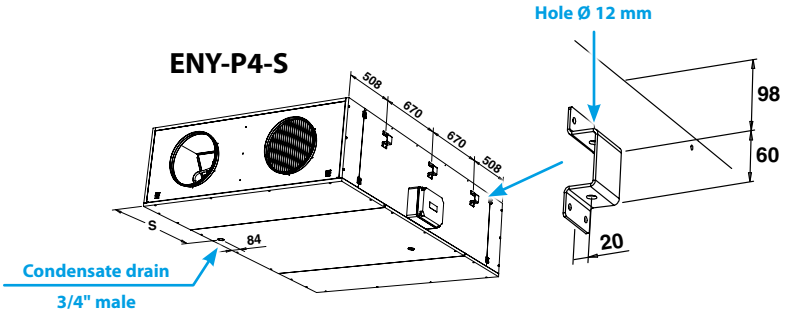
Ceiling units

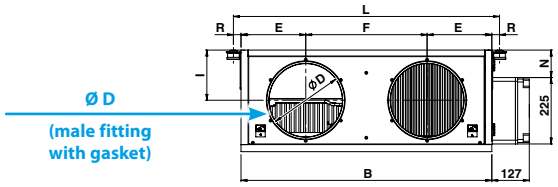
ENY-P1-S / ENY-P2-S / ENY-P3-S





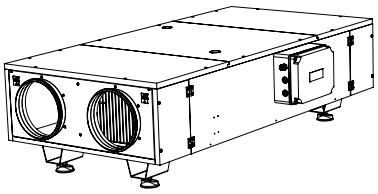
ENY-P4-S

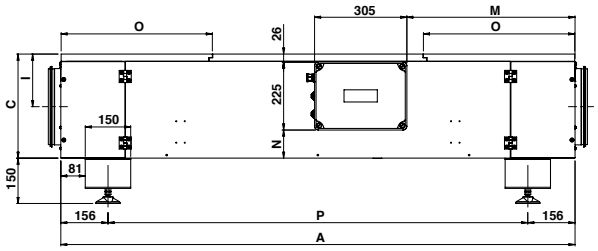




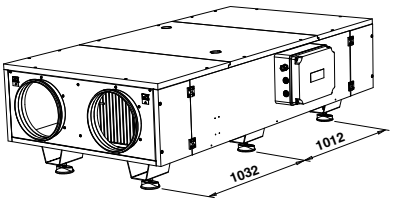
Floor units

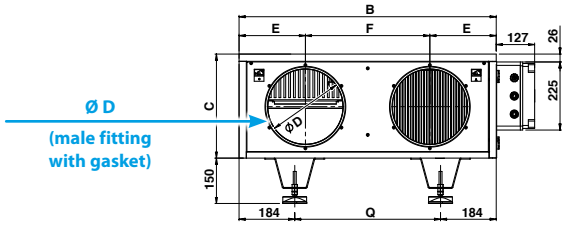
ENY-P1-P / ENY-P2-P / ENY-P3-P





ENY-P4-P

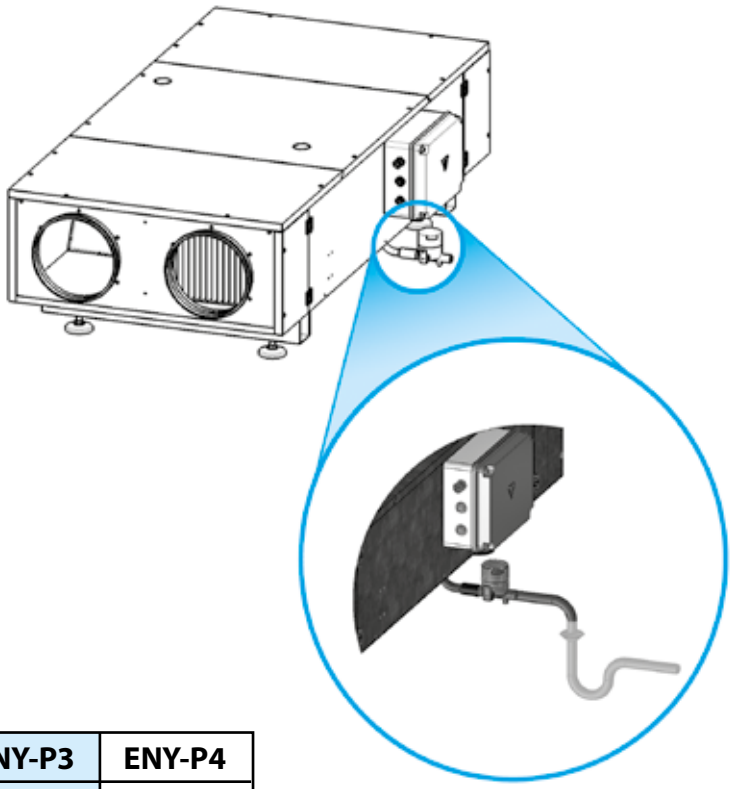




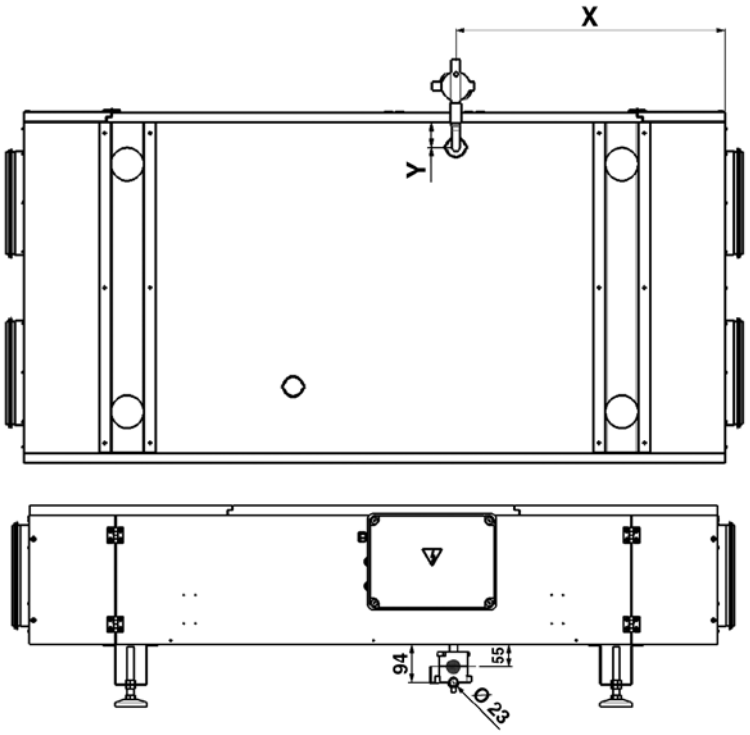
Model			ENY-P1	ENY-P2	ENY-P3	ENY-P4
Dimensions	**A**	mm	1700	1750	2100	2355
	B	mm	850	1150	1250	1700
	C	mm	344	385	470	610
	ØD	mm	250	250	355	400
	E	mm	220	295	325	435
	F	mm	410	560	600	830
	G	mm	908	1108	1328	670 + 670
	H	mm	396	321	386	508
	I	mm	170	190	234	305
	L	mm	902	1202	1302	1740
	M	mm	556	581	758	885
	N	mm	93	134	219	359
	O	mm	500	500	580	580
	P	mm	1388	1438	1788	1032 + 1012
	Q	mm	482	782	882	1332
	R	mm	26	26	26	20
	S	mm	654	678	791	856

Condensate drain

(Not supplied by Sabiana).



Model			ENY-P1	ENY-P2	ENY-P3	ENY-P4
Dimensions	X	mm	655	680	790	855
	Y	mm	85	85	80	85



Internal air conditions: ti = 20°C - RHi = 50%

Model	Qv	EAT: 10 °C			EAT: 5 °C			EAT: 0 °C			EAT: -5 °C			EAT: -10 °C		
		Ph	εt	mw	Ph	εt	mw	Ph	εt	mw	Ph	εt	mw	Ph	εt	mw
	m³/h	kW	%	kg/h	kW	%	kg/h	kW	%	kg/h	kW	%	kg/h	kW	%	kg/h
ENY-P1	100	0.30	90.4	0.00	0.46	90.5	0.15	0.62	91.7	0.26	0.79	94.3	0.36	0.97	96.5	0.44
	150	0.44	88.2	0.00	0.67	88.3	0.21	0.90	89.8	0.38	1.17	92.7	0.53	1.44	95.4	0.65
	300	0.85	84.6	0.00	1.28	84.7	0.42	1.74	86.4	0.72	2.26	90.0	1.03	2.81	93.2	1.25
	450	1.25	82.6	0.00	1.87	82.7	0.62	2.55	84.5	1.09	3.34	88.4	1.52	4.16	91.9	1.85
	600	1.63	81.2	0.00	2.45	81.3	0.81	3.35	83.2	1.43	4.39	87.3	2.01	5.49	90.9	2.47
	750	2.01	80.1	0.00	3.03	80.2	0.96	4.13	82.2	1.71	5.43	86.4	2.43	6.80	90.1	3.01
ENY-P2	200	0.60	89.4	0.00	0.90	89.5	0.29	1.22	90.8	0.51	1.57	93.5	0.70	1.93	96.0	0.86
	250	0.74	88.2	0.00	1.11	88.3	0.36	1.50	89.7	0.63	1.94	92.7	0.88	2.40	95.3	1.08
	500	1.42	84.6	0.00	2.13	84.7	0.69	2.90	86.4	1.20	3.77	90.0	1.72	4.69	93.2	2.08
	750	2.08	82.5	0.00	3.12	82.6	1.04	4.25	84.5	1.81	5.56	88.4	2.52	6.93	91.8	3.09
	1000	2.72	81.1	0.00	4.08	81.2	1.35	5.57	83.1	2.38	7.31	87.2	3.35	9.14	90.8	4.12
	1250	3.35	80.0	0.00	5.04	80.1	1.68	6.88	82.1	2.85	9.04	86.3	4.05	11.32	90.0	5.00
ENY-P3	300	0.89	88.4	0.00	1.34	88.5	0.43	1.81	89.9	0.76	2.34	92.9	1.06	2.88	95.5	1.31
	400	1.17	86.9	0.00	1.75	87.0	0.56	2.38	88.5	1.00	3.08	91.8	1.37	3.81	94.6	1.69
	800	2.24	83.4	0.00	3.36	83.5	1.10	4.57	85.2	1.91	5.97	89.0	2.66	7.44	92.4	3.36
	1200	3.27	81.4	0.00	4.92	81.5	1.64	6.71	83.4	2.88	8.79	87.4	3.90	10.99	91.0	4.97
	1650	4.42	79.8	0.00	6.63	79.9	2.20	9.06	81.9	3.88	11.91	86.1	5.31	14.92	89.9	6.57
	2000	5.29	78.9	0.00	7.95	79.0	2.53	10.87	81.0	4.54	14.31	85.4	6.49	17.95	89.2	8.05
ENY-P4	400	1.28	95.3	0.00	1.92	95.4	0.63	2.58	96.1	1.10	3.27	97.5	1.50	3.97	98.7	1.75
	550	1.72	93.5	0.00	2.59	93.6	0.84	3.49	94.5	1.49	4.44	96.4	1.98	5.42	98.0	2.43
	1100	3.31	89.7	0.00	4.97	89.8	1.61	6.72	91.1	2.82	8.65	93.8	3.89	10.64	96.1	4.74
	1700	4.98	87.4	0.00	7.48	87.5	2.45	10.14	89.0	4.34	13.13	92.1	5.87	16.23	94.9	7.25
	2300	6.62	85.8	0.00	9.94	85.9	3.22	13.50	87.5	5.77	17.53	90.9	7.90	21.74	93.9	9.83
	2900	8.23	84.6	0.00	12.36	84.7	4.02	16.81	86.4	6.97	21.88	90.0	9.99	27.19	93.2	12.09

KEY:

ti = Internal air temperature.
RHi = Internal relative humidity.
EAT = External air temperature.
Qv = Intake air flow rate.
Qr = Return air flow rate.
Ph = Thermal recovery on the intake flow.
εt = Recovery efficiency with balanced flow rates.
mw = Condensate production.
b = Unbalance percentage.
εt* = Recovery efficiency with unbalanced flow rates.
FT = Correction coefficient according to EAT variation.
FQ = Correction coefficient according to Qv variation.

FORMULAE:

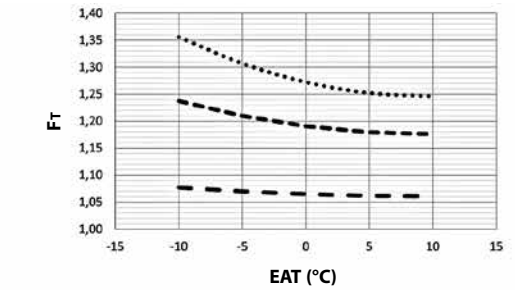
$$\varepsilon_t = \frac{2980\ P_h}{Q_v\ (t_i - TAE)}$$

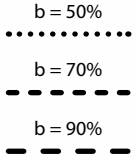
$$b = Q_r / Q_v$$

$$\varepsilon_t^* = \varepsilon_t\ \ b\ F_T\ F_Q$$

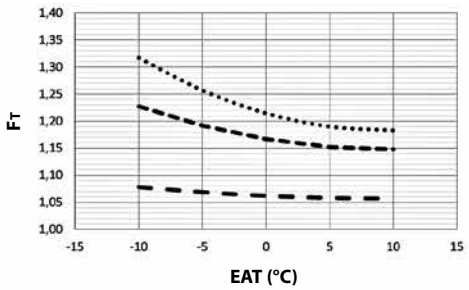
Correction coefficients of the recovery efficiency under unbalanced flow rate conditions

ENY-P1 / ENY-P2 / ENY-P3

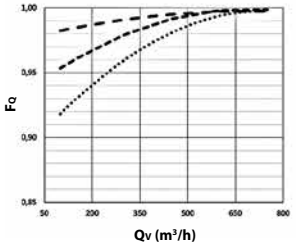




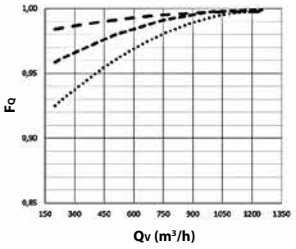
ENY-P4



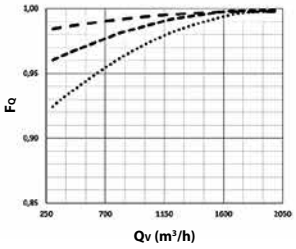
ENY-P1



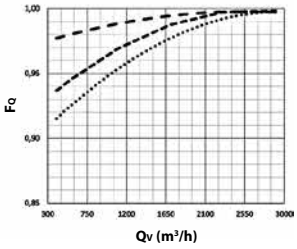
ENY-P2



ENY-P3

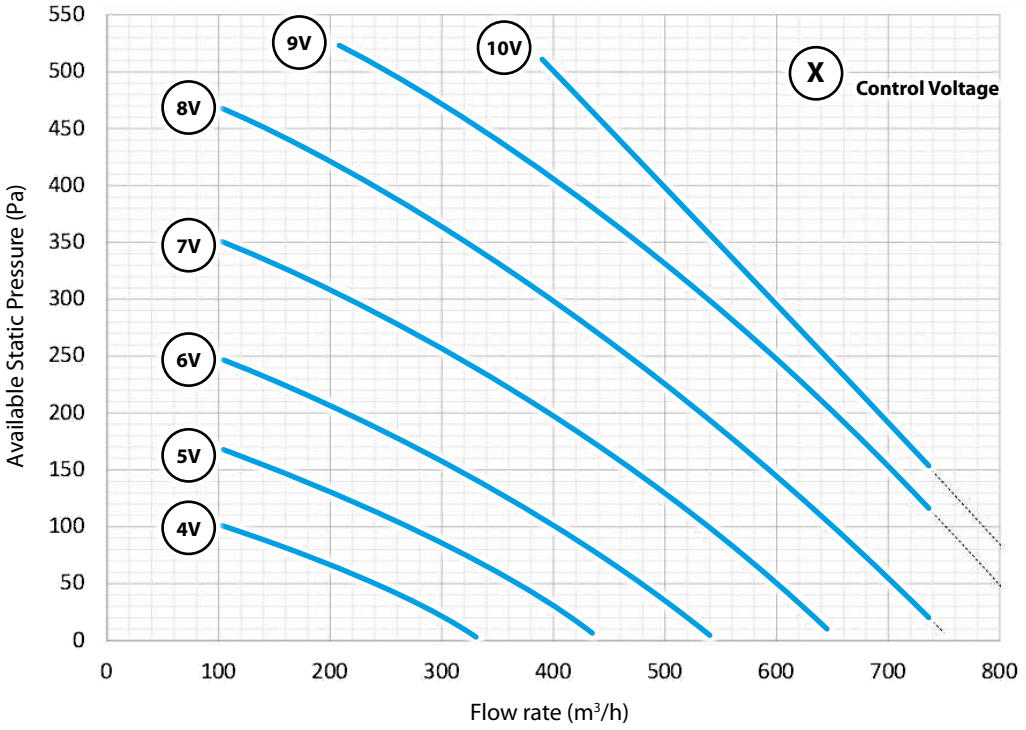


ENY-P4

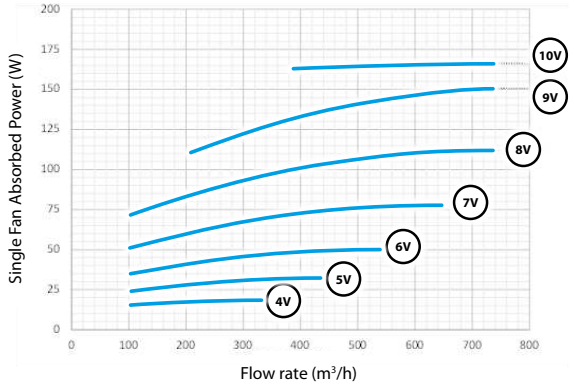


SUPPLY AND RETURN VENTILATION CIRCUITS

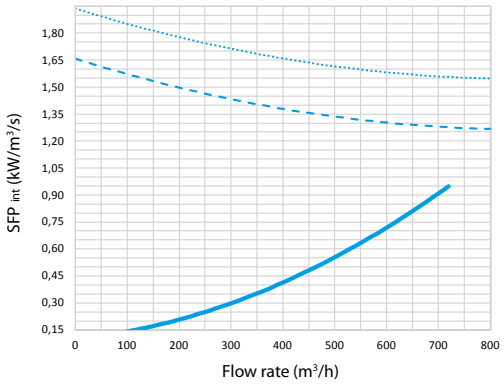
Flow rate / Available static pressure (Pa)



ELECTRICAL POWER ABSORBED by the single circuit (1)



SFP int (2) EU 1253/14



SFP int (kW/m³/s)

SFP int_lim 2018 (kW/m³/s)

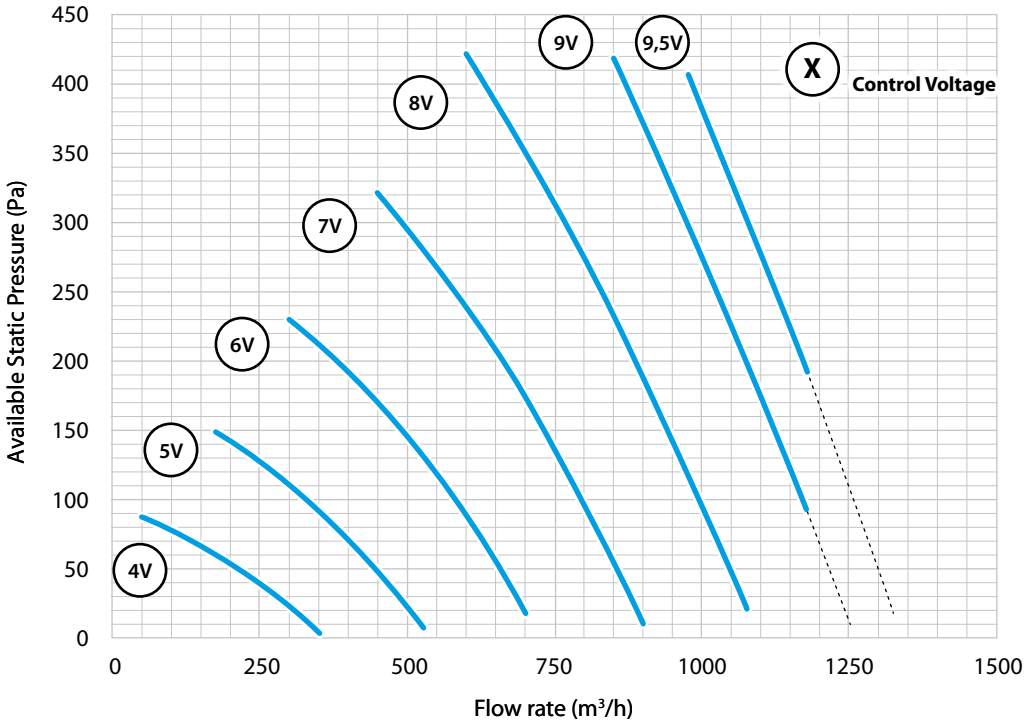
SFP int_lim 2016 (kW/m³/s)

1) The indication of the power absorbed by the single fan is useful in the event that the two fans are calibrated at unbalanced flow rates and absorb different powers.

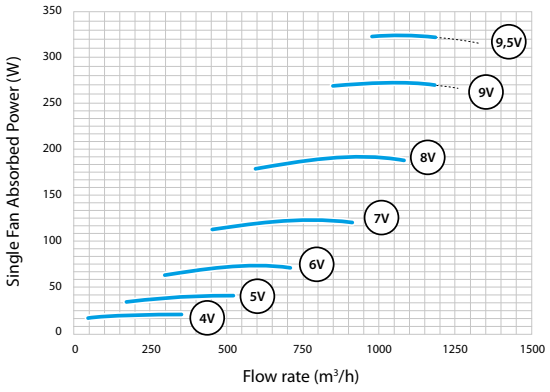
2) The charts provided in this catalogue to verify the SFPint apply in the event of flow rates balanced between supply and return.

SUPPLY AND RETURN VENTILATION CIRCUITS

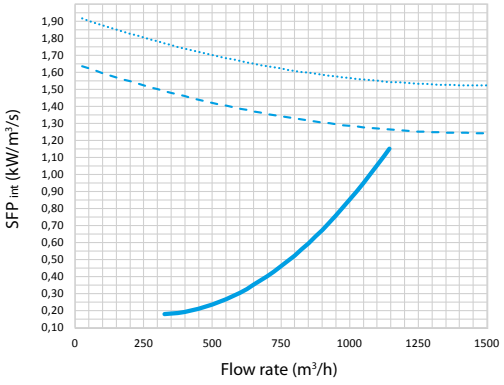
Flow rate / Available static pressure (Pa)



ELECTRICAL POWER ABSORBED by the single circuit (1)



SFP int (2) EU 1253/14



SFP int (kW/m³/s)

SFP int_lim 2018 (kW/m³/s)

SFP int_lim 2016 (kW/m³/s)

1) The indication of the power absorbed by the single fan is useful in the event that the two fans are calibrated at unbalanced flow rates and absorb different powers.

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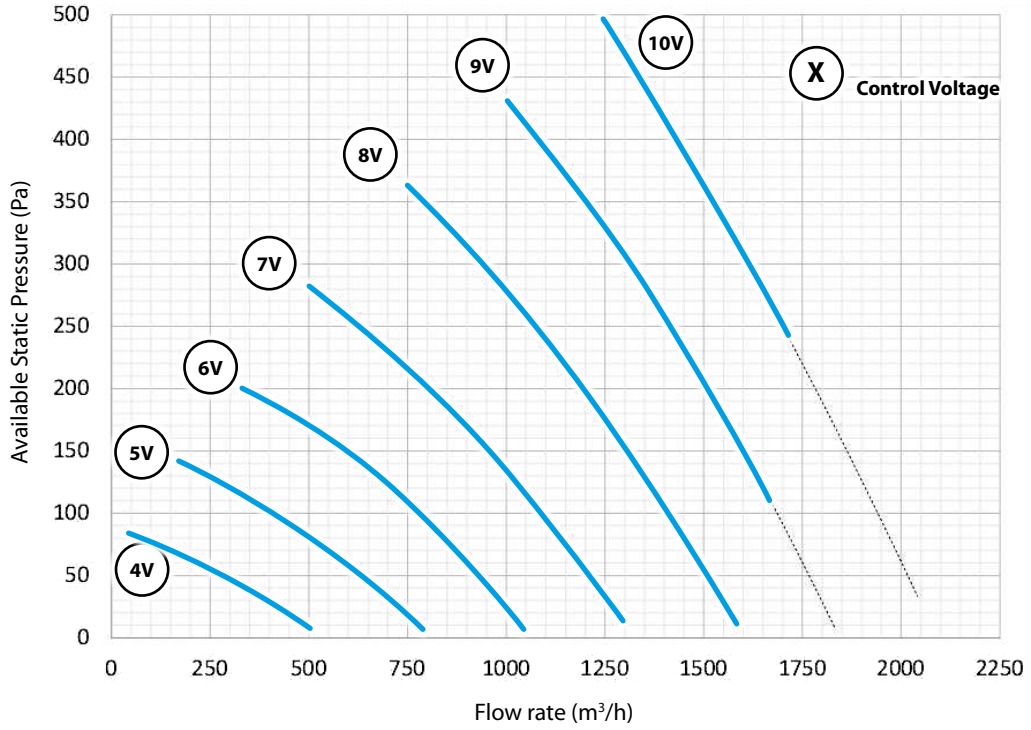
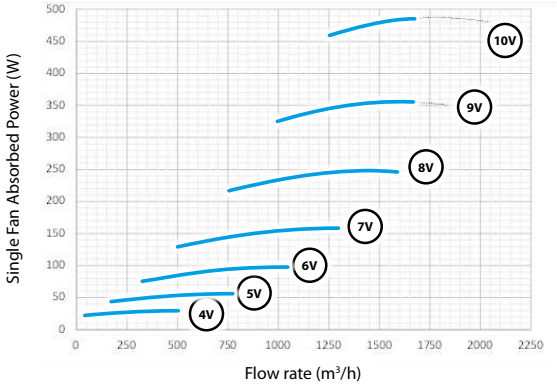
SUPPLY AND RETURN VENTILATION CIRCUITS

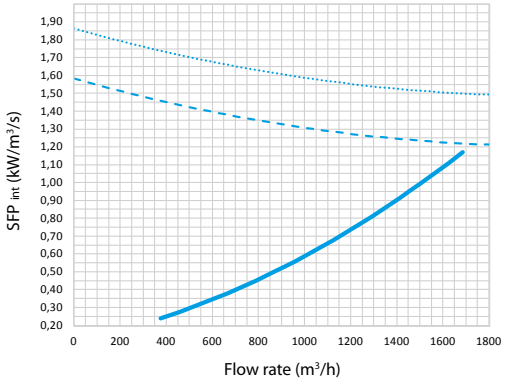
Flow rate / Available static pressure (Pa)



ELECTRICAL POWER ABSORBED by the single circuit (1)



SFP int (2) EU 1253/14



SFP int (kW/m³/s)

SFP int_lim 2018 (kW/m³/s)

SFP int_lim 2016 (kW/m³/s)

1) The indication of the power absorbed by the single fan is useful in the event that the two fans are calibrated at unbalanced flow rates and absorb different powers.

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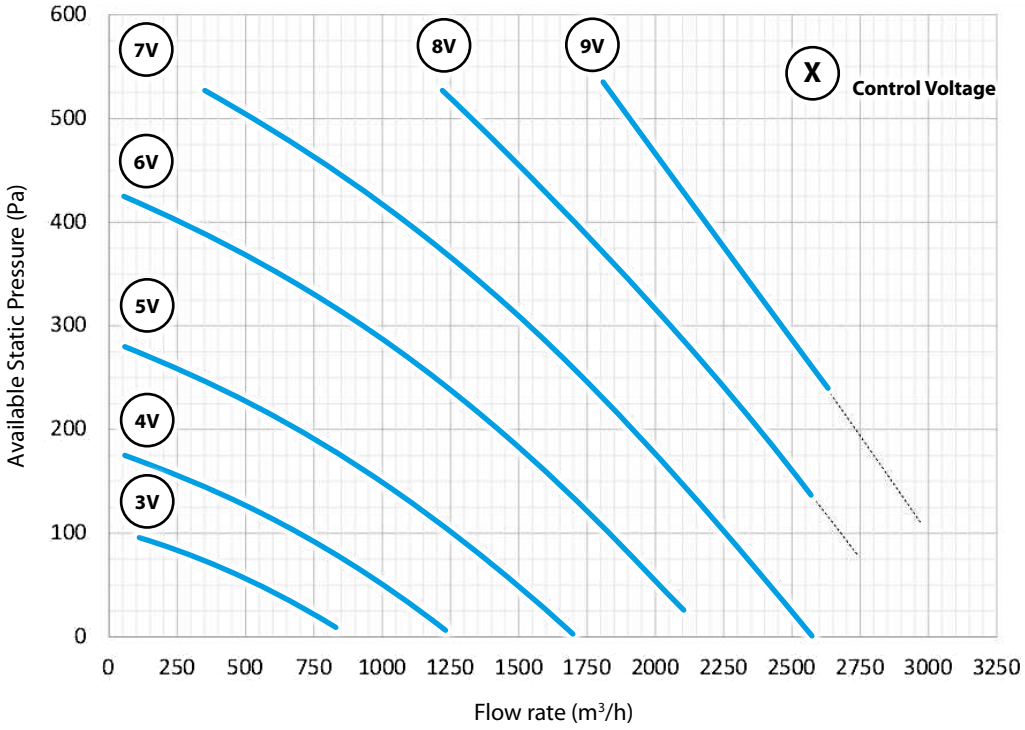
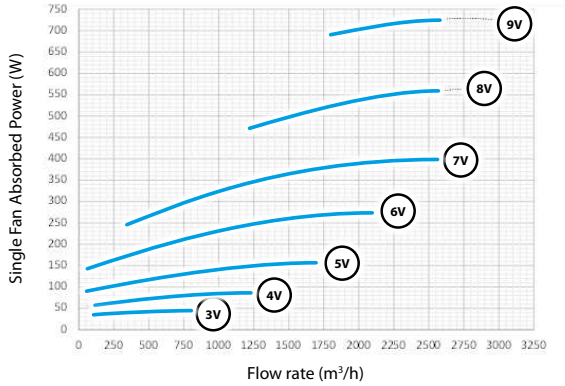
SUPPLY AND RETURN VENTILATION CIRCUITS

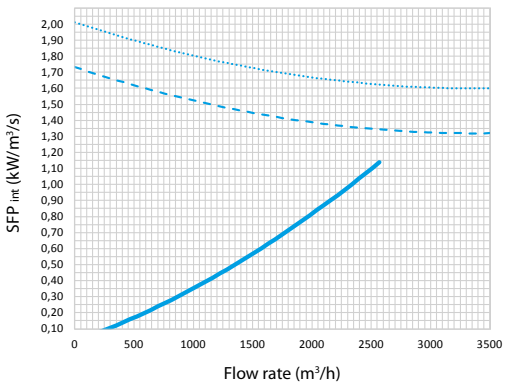
Flow rate / Available static pressure (Pa)



ELECTRICAL POWER ABSORBED by the single circuit (1)



SFP int (2) EU 1253/14



SFP int (kW/m³/s)

SFP int_lim 2018 (kW/m³/s)

SFP int_lim 2016 (kW/m³/s)

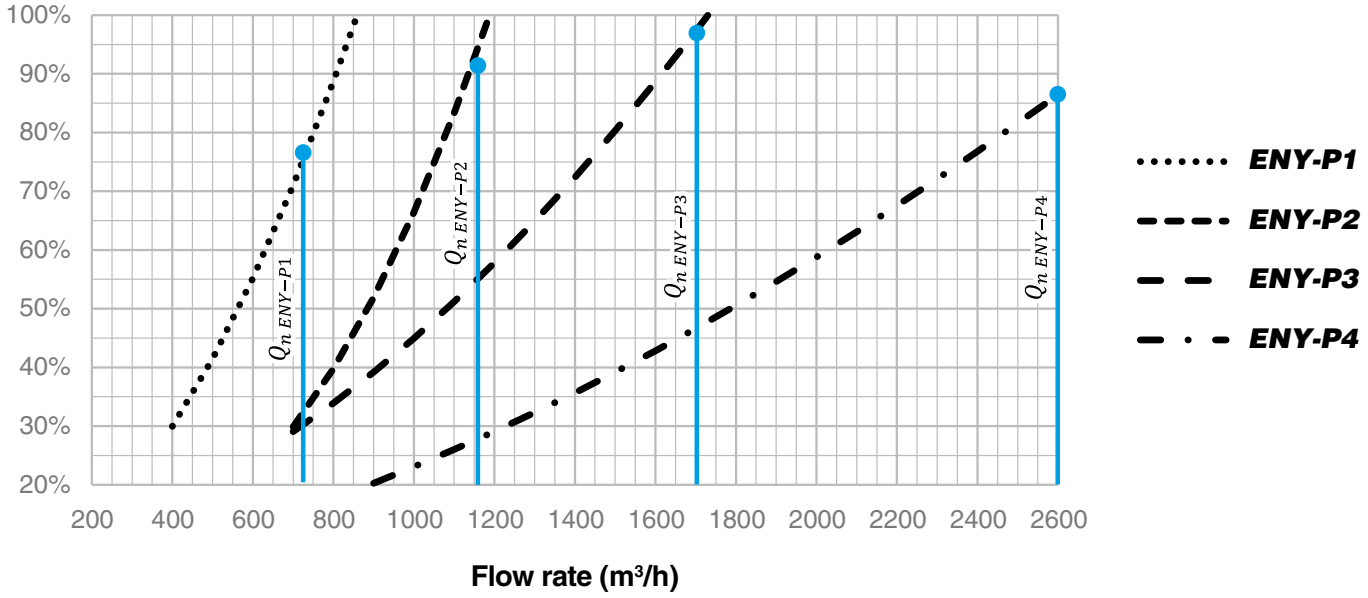
1) The indication of the power absorbed by the single fan is useful in the event that the two fans are calibrated at unbalanced flow rates and absorb different powers.

2) The charts provided in this catalogue to verify the SFPint apply in the event of flow rates balanced between supply and return.

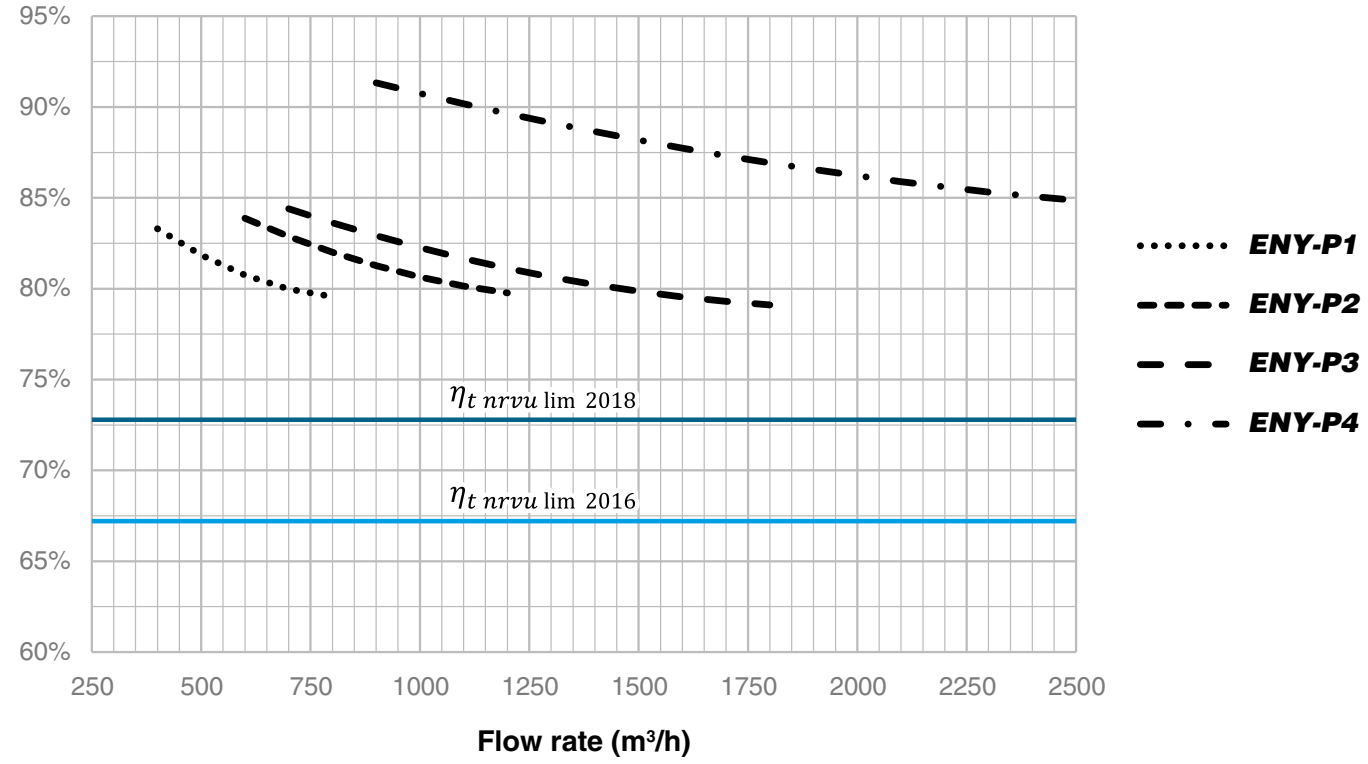
EU 1253-14 Annex V
Requirements relating to information for NRVU indicated in Article 4, paragraph 2.

Manufacturer's commercial name	**Energy Plus**			
Manufacturer's model identification	**ENY-P1**	**ENY-P2**	**ENY-P3**	**ENY-P4**
HRS type	**Static Countercurrent**	**Static Countercurrent**	**Static Countercurrent**	**Static Countercurrent**
Thermal efficiency of the heat recovery (%)	**80.0**	**80.0**	**79.5**	**85.0**
Nominal flow rate of the NRVU (m^3/s)	**0.20**	**0.32**	**0.47**	**0.72**
Actual absorbed electrical power (W)	**332**	**684**	**974**	**1454**
SFP_{int} ($W/m^3/s$)	**950**	**1165**	**1185**	**1159**
$SFP_{int\_lim\ 2016}$ ($W/m^3/s$)	**1560**	**1542**	**1504**	**1632**
$SFP_{int\_lim\ 2018}$ ($W/m^3/s$)	**1280**	**1262**	**1224**	**1352**
Nominal external pressure Δps, ext (Pa)	**170**	**250**	**250**	**250**
Front speed at the design speed (m/s)	**1.73**	**1.77**	**1.94**	**1.59**
Pressure drop inside the ventilation components Δps, int (Pa)	**478**	**545**	**670**	**655**
Static efficiency of fans used as per EU regulation no. 327/2011	**61.7**	**53.6**	**67.3**	**67.2**
Maximum declared external leakage percentage (%) EN 13141-7	**<1%**	**<1%**	**<1%**	**<1%**
Maximum declared internal leakage percentage (%) EN 13141-7	**<3%**	**<3%**	**<3%**	**<3%**
Energy performance or preferably energy classification of filters	**Integrated filters supplied in the units: F7 - ePM_1 55% intake M6 - ePM_{10} 55% exhaust**			
Description of the visual warning signal for the filter of NRVU to be used with filters	**Each filtering section is equipped with a differential pressure switch that opens the circuit of an ohmic line connected directly to the electronic board. When the limit fouling level is reached, after which it is recommended to replace the filter, the signal is perceived by the board and is resent to the user interface display, reporting the ID of the filter to be replaced. The filter replacement alarm is only enabled for information purposes and does not affect the operation of the ventilation units, which stays unchanged.**			
Sound power level on the case (L_{WA})	**56**	**63**	**62**	**61**
Internet address with the disassembly instructions	**www.sabiana.it**			

$$\frac{SFP_{int}}{SFP_{int\ \mathrm{lim}\ 2018}}$$



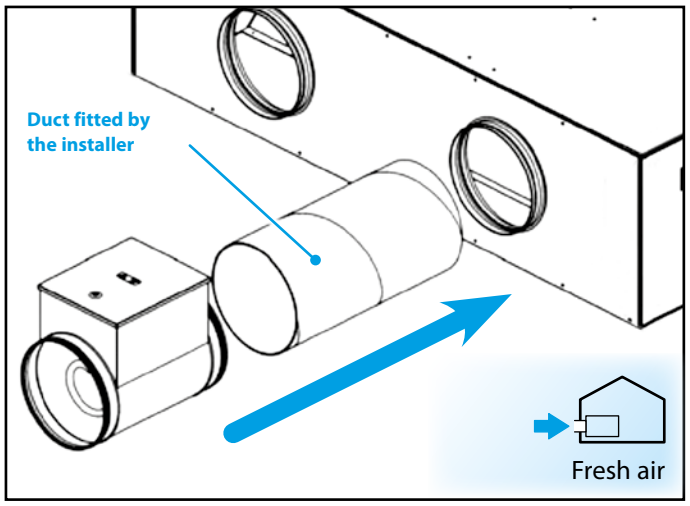
$$\eta_{t\_nrvu}$$

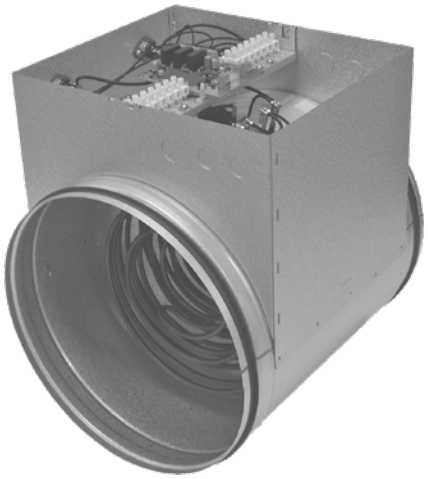


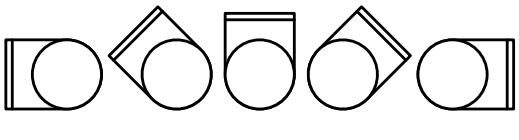
Electric antifreeze coil BEP
(to be placed on the "External air" intake duct)

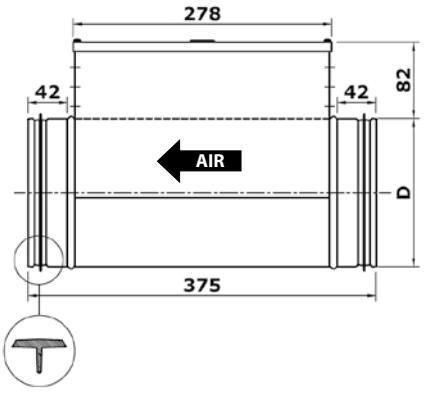
Electric heating coil consisting of armored elements inserted inside a galvanised sheet metal duct section with circular flanges and rubber gasket.
The electric coil can be used in premises with air temperature between -20 °C and +40 °C and is equipped with double safety thermostat: one with automatic reset and one with manual reset. The purpose of the pre-heating resistance is to prevent the heat exchanger from freezing and is controlled from the control board with PWM modulating logic according to the external and exhaust air temperature. Protection class IP 43.

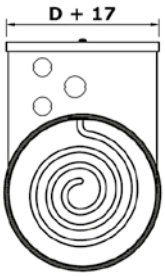
For heat recovery unit		ENY-P1	ENY-P2	ENY-P3	ENY-P4
Resistance Identification		BEP 25/2/M	BEP 25/3/M	BEP 35/6/T	BEP 40/9/T
Code		9022113	9022213	9022313	9022413
Rated power	kW	2.1	3.0	6.0	9.0
Power supply voltage	V/Hz/Ph	230V 50Hz 1Ph + Pe		400V 50Hz 3Ph + Pe	
Amperes absorbed by the resistance	A	9.1	13.0	8.7	13.0
Shank Diameter D	mm	250	250	355	400
Minimum air flow rate	m³/h	270	300	600	690



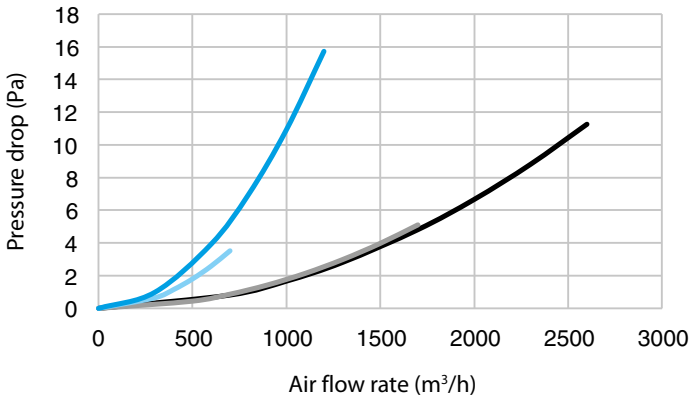








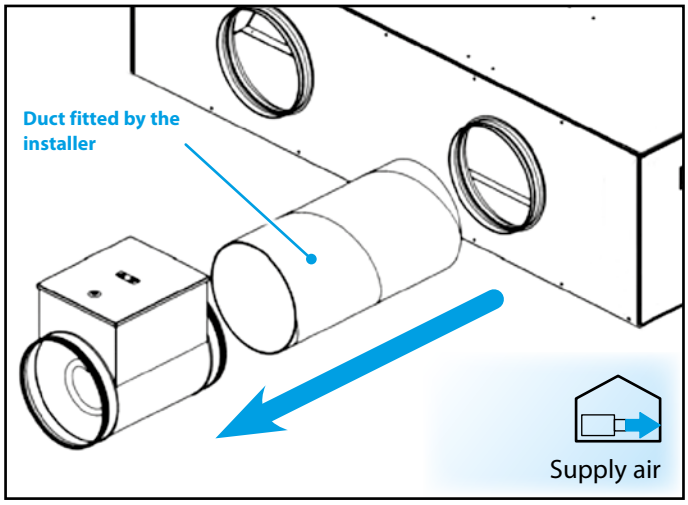
Pressure drop BEP

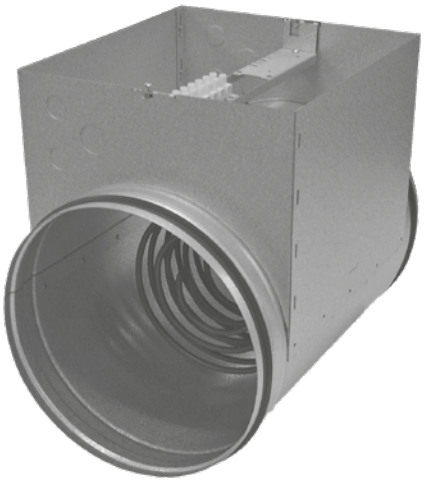


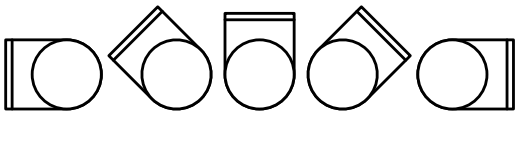
Electric post-heating coil BER (to be placed on the "Intake air" duct)

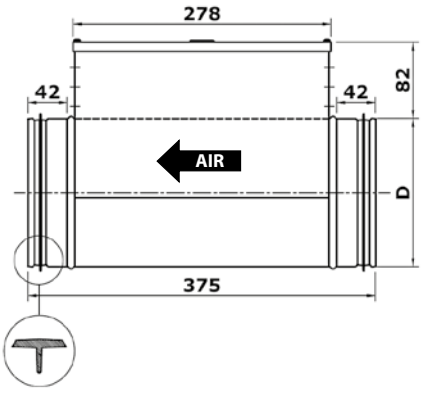
Electric heating coil consisting of armored elements inserted inside a galvanised sheet metal duct section with circular flanges and rubber gasket. The electric coil can be used in premises with air temperature between -20 °C and +40 °C and is equipped with double safety thermostat: one with automatic reset and one with manual reset. Operation is driven by control with ON/OFF logic depending on the inlet temperature, by installing the ENP PT2 accessory probe downstream of the heater, or room air temperature. The resistance supply circuit is fitted with an adjustable thermostat, which has a limiting function. Protection class IP 43.

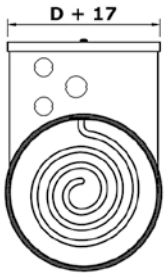
For heat recovery unit		ENY-P1	ENY-P2	ENY-P3	ENY-P4
Resistance Identification		BER 25/2/M	BER 25/3/M	BER 35/5/T	BER 40/6/T
Code		9022114	9022214	9022314	9022414
Rated power	kW	2.1	3.0	4.5	6.0
Power supply voltage	V/Hz/Ph	230V 50Hz 1Ph + Pe		400V 50Hz 3Ph + Pe	
Amperes absorbed by the resistance	A	9.1	13.0	7.2	8.7
Shank Diameter D	mm	250	250	355	400
Minimum air flow rate	m³/h	270	300	600	690



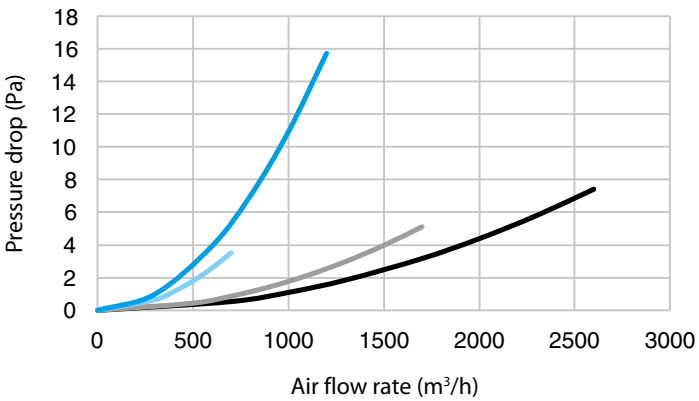




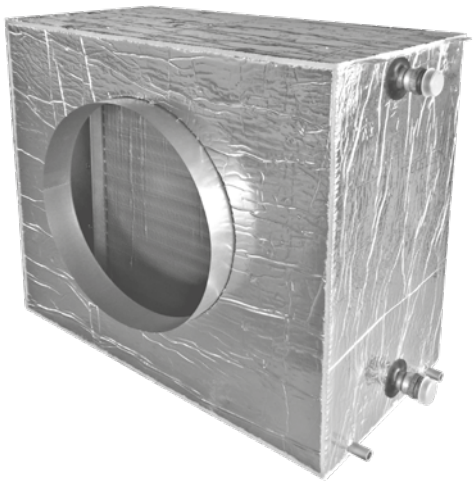




Pressure drop BER

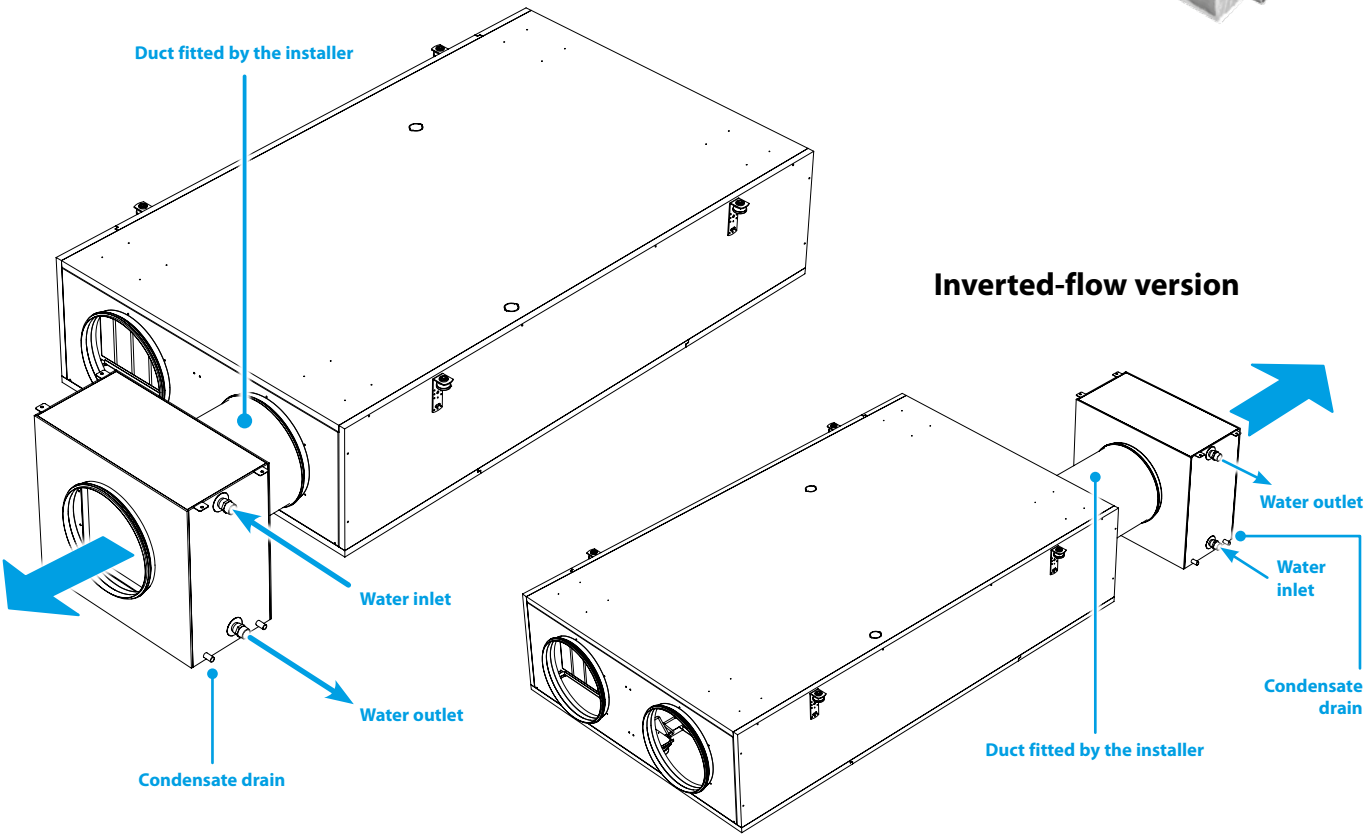


Water coil



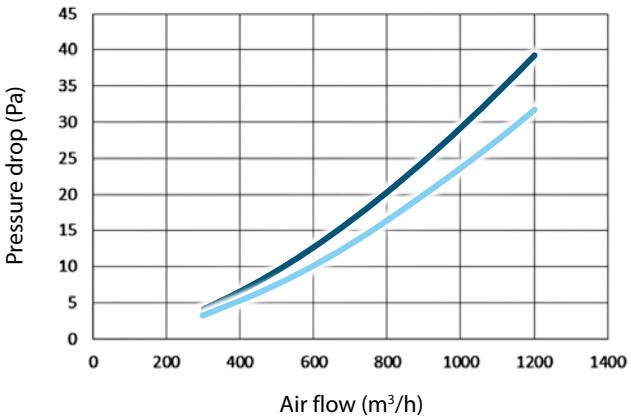
It consists of a galvanised steel structure insulated externally complete with circular flanges which facilitate its connection to the heat recovery unit or application to the circular duct.

The interior of the section is fitted with a finned coil mounted on a special supporting frame made of galvanised sheet metal, expanded 3/8" copper tubes, aluminium fins pitch 2.5 mm, brass manifolds protruding at the sides. The interior of the section contains the condensate collection tray with 16 mm drain fitting. The treatment section is suitable both for post-heating and for cooling the intake air. To control the inlet temperature, the ENP PT2 accessory probe must be installed downstream of the coil.

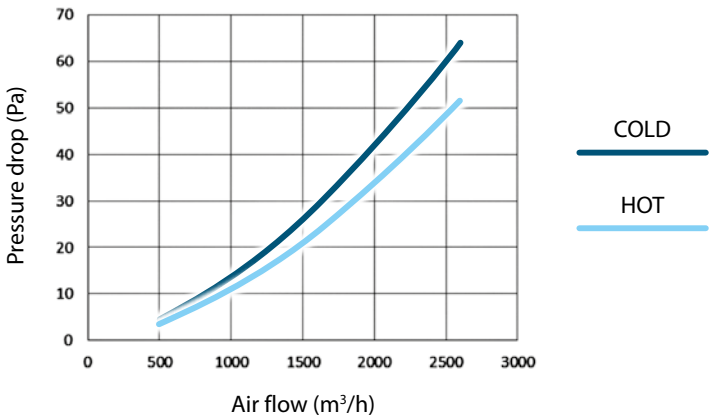


Air side pressure drop

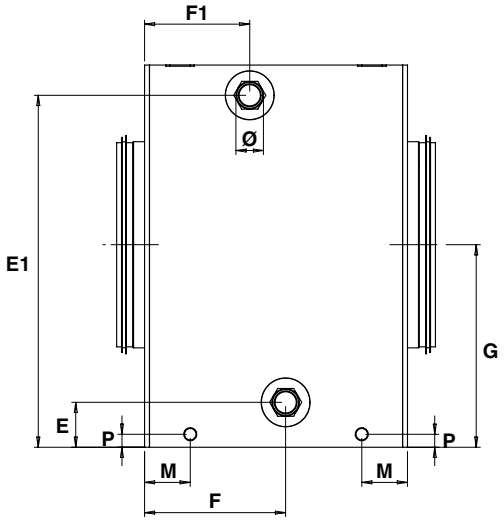
ENY-P1 / ENY-P2

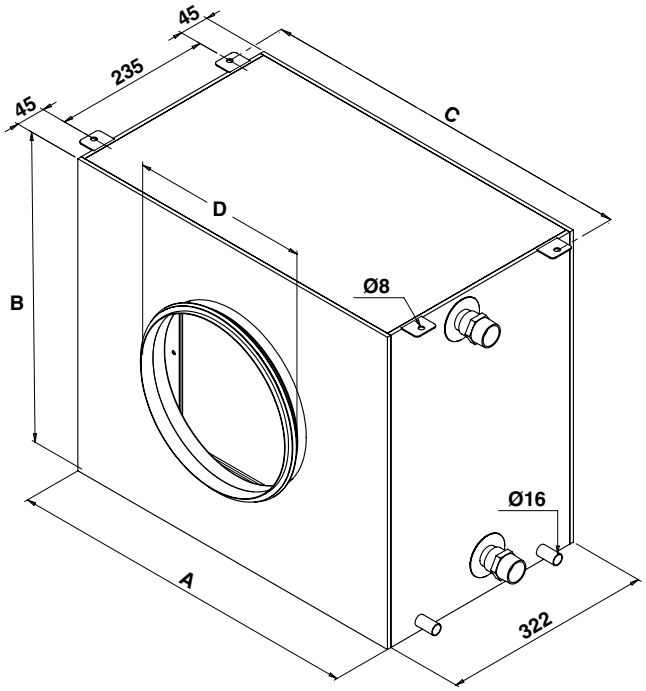


ENY-P3 / ENY-P4

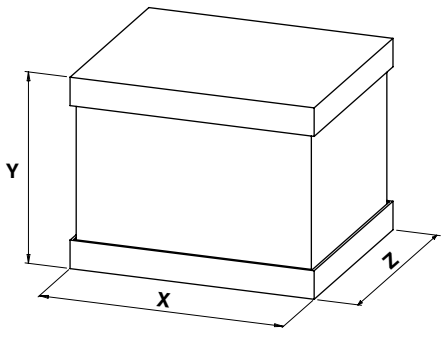


For heat recovery unit			ENY-P1	ENY-P2	ENY-P3	ENY-P4
Coil Identification			BAE 1-2	BAE 1-2	BAE 3	BAE 4
Code			9022012	9022012	9022013	9022014
Dimensions	A	mm	536	536	645	645
	B	mm	468	468	568	568
	C	mm	567	567	676	676
	D	mm	250	250	355	400
	E	mm	55	55	55	55
	F	mm	180	180	180	180
	E1	mm	431	431	531	531
	F1	mm	133	133	133	133
	G	mm	250	250	300	300
Diameter	Ø		1"	1"	1"	1"
Condensate drain	M		56	56	56	56
	P		16	16	16	16





Packaging dimensions



Model			ENY-P1 / P2	ENY-P3	ENY-P4
Dimensions	X	mm	690	800	800
	Y	mm	540	540	540
	Z	mm	590	700	700

Efficiency table for the Water coil - ENY-P1 in heating mode

WT °C/°C	AT °C			Qv 250 m³/h		300 m³/h		400 m³/h		500 m³/h		600 m³/h		700 m³/h	
80/70	11	**Ph** *(kW)*	**LAT** *(°C)*	5.07	69.6	5.91	67.9	7.48	65.0	8.94	62.5	10.29	60.5	11.54	58.6
		Qw *(l/h)*	**Dp(c)** *(kPa)*	436	1.1	509	1.4	644	2.2	768	3.0	885	3.8	993	4.7
	15	**Ph** *(kW)*	**LAT** *(°C)*	4.70	70.0	5.48	68.4	6.94	65.7	8.28	63.4	9.53	61.5	10.70	59.7
		Qw *(l/h)*	**Dp(c)** *(kPa)*	404	0.9	471	1.2	596	1.9	712	2.6	820	3.3	920	4.1
70/60	11	**Ph** *(kW)*	**LAT** *(°C)*	4.27	60.3	4.97	58.8	6.28	56.3	7.49	54.2	8.61	52.4	9.66	50.8
		Qw *(l/h)*	**Dp(c)** *(kPa)*	367	0.8	428	1.1	540	1.6	644	2.2	740	2.9	831	3.5
	15	**Ph** *(kW)*	**LAT** *(°C)*	3.91	60.8	4.55	59.4	5.75	57.0	6.85	55.1	7.87	53.3	8.83	51.9
		Qw *(l/h)*	**Dp(c)** *(kPa)*	336	0.7	391	0.9	494	1.4	589	1.9	677	2.4	759	3.0
60/50	11	**Ph** *(kW)*	**LAT** *(°C)*	3.46	51.0	4.03	49.7	5.07	47.6	6.03	45.8	6.93	44.3	7.76	43.0
		Qw *(l/h)*	**Dp(c)** *(kPa)*	298	0.6	346	0.8	436	1.1	519	1.6	596	2.0	667	2.5
	15	**Ph** *(kW)*	**LAT** *(°C)*	3.11	51.4	3.61	50.2	4.55	48.3	5.41	46.6	6.20	45.2	6.95	44.0
		Qw *(l/h)*	**Dp(c)** *(kPa)*	268	0.5	311	0.6	391	0.9	465	1.3	533	1.6	598	2.0
45/40	11	**Ph** *(kW)*	**LAT** *(°C)*	2.47	39.5	2.87	38.6	3.63	37.2	4.33	36.0	4.98	34.9	5.58	34.0
		Qw *(l/h)*	**Dp(c)** *(kPa)*	424	1.1	494	1.5	624	2.3	744	3.1	856	4.0	960	5.0
	15	**Ph** *(kW)*	**LAT** *(°C)*	2.13	39.9	2.48	39.1	3.12	37.9	3.72	36.8	4.28	35.9	4.80	35.1
		Qw *(l/h)*	**Dp(c)** *(kPa)*	366	0.9	426	1.1	537	1.7	640	2.4	736	3.1	825	3.8

Efficiency table for the Water coil - ENY-P2 in heating mode

WT °C/°C	AT °C			Qv 400 m³/h		550 m³/h		700 m³/h		850 m³/h		1000 m³/h		1150 m³/h	
80/70	11	**Ph** *(kW)*	**LAT** *(°C)*	7.48	65.0	9.62	61.5	11.54	58.6	13.30	56.1	14.90	54.0	16.41	52.2
		Qw *(l/h)*	**Dp(c)** *(kPa)*	644	2.2	828	3.4	993	4.7	1144	6.1	1282	7.4	1412	8.9
	15	**Ph** *(kW)*	**LAT** *(°C)*	6.94	65.7	8.92	62.4	10.70	59.7	12.32	57.4	13.82	55.4	15.21	53.7
		Qw *(l/h)*	**Dp(c)** *(kPa)*	596	1.9	767	3.0	920	4.1	1060	5.3	1189	6.5	1308	7.7
70/60	11	**Ph** *(kW)*	**LAT** *(°C)*	6.28	56.3	8.05	53.2	9.66	50.8	11.10	48.7	12.44	46.9	13.69	45.3
		Qw *(l/h)*	**Dp(c)** *(kPa)*	540	1.6	693	2.5	831	3.5	955	4.5	1070	5.6	1177	6.6
	15	**Ph** *(kW)*	**LAT** *(°C)*	5.75	57.0	7.37	54.2	8.83	51.9	10.16	50.0	11.38	48.3	12.50	46.8
		Qw *(l/h)*	**Dp(c)** *(kPa)*	494	1.4	634	2.2	759	3.0	874	3.9	978	4.7	1075	5.6
60/50	11	**Ph** *(kW)*	**LAT** *(°C)*	5.07	47.6	6.49	45.0	7.76	43.0	8.91	41.2	9.97	39.8	10.95	38.5
		Qw *(l/h)*	**Dp(c)** *(kPa)*	436	1.1	558	1.8	667	2.5	766	3.2	857	3.9	942	4.6
	15	**Ph** *(kW)*	**LAT** *(°C)*	4.55	48.3	5.81	45.9	6.95	44.0	7.98	42.5	8.92	41.1	9.80	39.9
		Qw *(l/h)*	**Dp(c)** *(kPa)*	391	0.9	500	1.5	598	2.0	686	2.6	767	3.2	842	3.7
45/40	11	**Ph** *(kW)*	**LAT** *(°C)*	3.63	37.2	4.66	35.4	5.58	34.0	6.43	32.8	7.19	31.8	7.92	30.9
		Qw *(l/h)*	**Dp(c)** *(kPa)*	624	2.3	801	3.6	960	5.0	1106	6.4	1237	7.8	1362	9.3
	15	**Ph** *(kW)*	**LAT** *(°C)*	3.12	37.9	4.00	36.3	4.80	35.1	5.52	34.0	6.18	33.1	6.80	32.3
		Qw *(l/h)*	**Dp(c)** *(kPa)*	537	1.7	689	2.7	825	3.8	949	4.8	1063	5.9	1169	7.1

KEY:

WT = Water temperature **AT** = Air temperature **Qv** = Air flow **Ph** = Thermal power

LAT = Air outlet temperature **Qw** = Water flow rate **Dp(c)** = Pressure drop water side

Efficiency table for the Water coil - ENY-P3 in heating mode

WT °C/°C	AT °C			Qv											
				700 m³/h		900 m³/h		1100 m³/h		1300 m³/h		1500 m³/h		1700 m³/h	
80/70	11	**Ph** (kW)	**LAT** (°C)	12.97	64.4	15.79	61.6	18.40	59.2	20.80	57.2	23.02	55.3	25.14	53.7
		Qw (l/h)	**Dp(c)** (kPa)	1115	2.5	1358	3.5	1582	4.7	1789	5.8	1980	7.0	2162	8,2
	15	**Ph** (kW)	**LAT** (°C)	12.02	65.2	14.64	62.6	17.04	60.3	19.28	58.4	21.35	56.6	23.30	55.1
		Qw (l/h)	**Dp(c)** (kPa)	1033	2.2	1259	3.1	1466	4.1	1658	5.1	1836	6.1	2003	7.1
70/60	11	**Ph** (kW)	**LAT** (°C)	10.89	55.9	13.25	53.5	15.41	51.4	17.41	49.6	19.27	48.0	21.00	46.6
		Qw (l/h)	**Dp(c)** (kPa)	937	1.9	1139	2.7	1326	3.5	1497	4.4	1657	5.2	1806	6.1
	15	**Ph** (kW)	**LAT** (°C)	9.97	56.7	12.12	54.4	14.10	52.5	15.93	50.9	17.63	49.4	19.21	48.1
		Qw (l/h)	**Dp(c)** (kPa)	858	1.6	1042	2.3	1212	3.0	1370	3.7	1516	4.5	1652	5.2
60/50	11	**Ph** (kW)	**LAT** (°C)	8.81	47.3	10.69	45.3	12.43	43.6	14.02	42.1	15.49	40.8	16.86	39.6
		Qw (l/h)	**Dp(c)** (kPa)	758	1.3	919	1.9	1069	2.5	1206	3.0	1332	3.6	1450	4.3
	15	**Ph** (kW)	**LAT** (°C)	7.91	48.0	9.60	46.2	11.14	44.6	12.57	43.3	13.88	42.1	15.12	41.0
		Qw (l/h)	**Dp(c)** (kPa)	680	1.1	826	1.5	958	2.0	1081	2.5	1194	3.0	1300	3.5
45/40	11	**Ph** (kW)	**LAT** (°C)	6.30	37.0	7.67	35.6	8.91	34.4	10.07	33.3	11.15	32.4	12.15	31.6
		Qw (l/h)	**Dp(c)** (kPa)	1084	2.6	1319	3.7	1533	4.9	1732	6.1	1918	7.4	2090	8.6
	15	**Ph** (kW)	**LAT** (°C)	5.43	37.7	6.60	36.4	7.67	35.4	8.67	34.5	9.58	33.7	10.45	33.0
		Qw (l/h)	**Dp(c)** (kPa)	933	2.0	1135	2.9	1320	3.8	1491	4.7	1649	5.6	1798	6.6

Efficiency table for the Water coil - ENY-P4 in heating mode

WT °C/°C	AT °C			Qv											
				900 m³/h		1200 m³/h		1500 m³/h		1800 m³/h		2100 m³/h		2400 m³/h	
80/70	11	**Ph** (kW)	**LAT** (°C)	15.79	61.6	19.62	58.2	23.02	55.3	26.13	52.9	28.99	50.8	31.68	49.1
		Qw (l/h)	**Dp(c)** (kPa)	1358	3.5	1688	5.2	1980	7.0	2247	8.8	2493	10.6	2724	12.4
	15	**Ph** (kW)	**LAT** (°C)	14.64	62.6	18.19	59.3	21.35	56.6	24.22	54.4	26.89	52.5	29.35	50.8
		Qw (l/h)	**Dp(c)** (kPa)	1259	3.1	1564	4.6	1836	6.1	2083	7.6	2312	9.2	2524	10.8
70/60	11	**Ph** (kW)	**LAT** (°C)	13.25	53.5	16.43	50.5	19.27	48.0	21.84	46.0	24.20	44.2	26.41	42.7
		Qw (l/h)	**Dp(c)** (kPa)	1139	2.7	1413	3.9	1657	5.2	1878	6.5	2081	7.9	2272	9.2
	15	**Ph** (kW)	**LAT** (°C)	12.12	54.4	15.03	51.6	17.63	49.4	19.98	47.5	22.13	45.8	24.15	44.4
		Qw (l/h)	**Dp(c)** (kPa)	1042	2.3	1292	3.3	1516	4.5	1718	5.6	1903	6.7	2077	7.8
60/50	11	**Ph** (kW)	**LAT** (°C)	10.69	45.3	13.24	42.8	15.49	40.8	17.53	39.1	19.42	37.7	21.18	36.5
		Qw (l/h)	**Dp(c)** (kPa)	919	1.9	1138	2.8	1332	3.6	1507	4.6	1670	5.5	1822	6.4
	15	**Ph** (kW)	**LAT** (°C)	9.60	46.2	11.86	43.9	13.88	42.1	15.71	40.5	17.40	39.2	18.97	38.1
		Qw (l/h)	**Dp(c)** (kPa)	826	1.5	1020	2.3	1194	3.0	1351	3.7	1496	4.5	1631	5.3
45/40	11	**Ph** (kW)	**LAT** (°C)	7.67	35.6	9.50	33.8	11.15	32.4	12.64	31.3	14.02	30.3	15.30	29.4
		Qw (l/h)	**Dp(c)** (kPa)	1319	3.7	1635	5.5	1918	7.4	2174	9.2	2411	11.1	2632	13.0
	15	**Ph** (kW)	**LAT** (°C)	6.60	36.4	8.18	35.0	9.58	33.7	10.87	32.7	12.05	31.8	13.15	31.0
		Qw (l/h)	**Dp(c)** (kPa)	1135	2.9	1408	4.2	1649	5.6	1870	7.0	2073	8.5	2262	9.9

KEY:

WT = Water temperature **AT** = Air temperature **Qv** = Air flow **Ph** = Thermal power

LAT = Air outlet temperature **Qw** = Water flow rate **Dp(c)** = Pressure drop water side

Efficiency table for the Water coil - ENY-P1 in cooling mode

WT °C/°C	AT °C			Qv 250 m³/h		300 m³/h		400 m³/h		500 m³/h		600 m³/h		700 m³/h	
7/12	32 40% Rh	**Pc** *(kW)*	**Ps** *(kW)*	2.03	1.46	2.31	1.69	2.81	2.12	3.24	2.51	3.62	2.87	3.96	3.21
		LAT *(°C)*	**C** *(l/h)*	14.0	0.8	14.6	0.9	15.6	1.0	16.6	1.0	17.3	1.0	17.9	1.0
		Qw *(l/h)*	**Dp(c)** *(kPa)*	349	1.5	398	1.9	484	2.7	557	3.5	622	4.3	680	5.0
7/12	27 50% Rh	**Pc** *(kW)*	**Ps** *(kW)*	1.57	1.13	1.79	1.30	2.16	1.62	2.49	1.92	2.77	2.20	3.03	2.46
		LAT *(°C)*	**C** *(l/h)*	13.3	0.6	13.9	0.7	14.7	0.8	15.4	0.8	15.9	0.8	16.4	0.8
		Qw *(l/h)*	**Dp(c)** *(kPa)*	270	1.0	308	1.2	372	1.7	428	2.2	477	2.7	522	3.1
7/12	25 50% Rh	**Pc** *(kW)*	**Ps** *(kW)*	1.21	1.01	1.38	1.17	1.68	1.47	1.94	1.76	2.17	2.03	2.39	2.28
		LAT *(°C)*	**C** *(l/h)*	12.9	0.3	13.3	0.3	13.9	0.3	14.4	0.3	14.8	0.2	15.2	0.1
		Qw *(l/h)*	**Dp(c)** *(kPa)*	209	0.6	238	0.8	289	1.1	334	1.4	374	1.7	410	2.0
10/15	32 40% Rh	**Pc** *(kW)*	**Ps** *(kW)*	1.48	1.28	1.68	1.49	2.05	1.90	2.38	2.28	2.66	2.64	2.93	2.93
		LAT *(°C)*	**C** *(l/h)*	16.2	0.3	16.7	0.3	17.4	0.2	18.0	0.1	18.5	0.0	18.9	0.0
		Qw *(l/h)*	**Dp(c)** *(kPa)*	245	0.8	290	1.1	353	1.5	409	2.0	457	2.4	503	2.9
10/15	27 50% Rh	**Pc** *(kW)*	**Ps** *(kW)*	1.07	0.95	1.22	1.11	1.48	1.42	1.72	1.70	1.93	1.93	2.12	2.12
		LAT *(°C)*	**C** *(l/h)*	15.5	0.2	15.8	0.1	16.3	0.0	16.7	0.0	17.1	0.0	17.4	0.0
		Qw *(l/h)*	**Dp(c)** *(kPa)*	183	0.5	209	0.6	255	0.8	295	1.1	331	1.4	365	1.6
10/15	25 50% Rh	**Pc** *(kW)*	**Ps** *(kW)*	0.79	0.79	0.91	0.91	1.12	1.12	1.31	1.31	1.48	1.48	1.64	1.64
		LAT *(°C)*	**C** *(l/h)*	14.7	0.0	14.9	0.0	15.3	0.0	15.6	0.0	15.9	0.0	16.1	0.0
		Qw *(l/h)*	**Dp(c)** *(kPa)*	137	0.3	157	0.4	193	0.5	225	0.7	254	0.8	281	1.0

Efficiency table for the Water coil - ENY-P2 in cooling mode

WT °C/°C	AT °C			Qv 400 m³/h		550 m³/h		700 m³/h		850 m³/h		1000 m³/h		1150 m³/h	
7/12	32 40% Rh	**Pc** *(kW)*	**Ps** *(kW)*	2.81	2.12	3.43	2.69	3.96	3.21	4.42	3.70	4.82	4.16	5.36	4.69
		LAT *(°C)*	**C** *(l/h)*	15.7	1.0	16.9	1.0	17.9	1.0	18.6	1.0	19.2	0.9	19.5	0.9
		Qw *(l/h)*	**Dp(c)** *(kPa)*	484	2.7	590	3.9	680	5.0	759	6.1	829	7.2	922	8.7
7/12	27 50% Rh	**Pc** *(kW)*	**Ps** *(kW)*	2.16	1.62	2.63	2.06	3.03	2.46	3.38	2.82	3.76	3.21	3.97	3.50
		LAT *(°C)*	**C** *(l/h)*	14.7	0.8	15.6	0.8	16.4	0.8	16.9	0.8	17.3	0.8	17.8	0.7
		Qw *(l/h)*	**Dp(c)** *(kPa)*	372	1.7	453	2.4	522	3.1	581	3.8	647	4.6	683	5.1
7/12	25 50% Rh	**Pc** *(kW)*	**Ps** *(kW)*	1.68	1.47	2.06	1.89	2.39	2.28	2.67	2.65	2.93	2.93	3.17	3.17
		LAT *(°C)*	**C** *(l/h)*	13.9	0.3	14.6	0.2	15.2	0.1	15.6	0.0	16.0	0.0	16.3	0.0
		Qw *(l/h)*	**Dp(c)** *(kPa)*	289	1.1	354	1.6	410	2.0	459	2.5	505	2.9	545	3.4
10/15	32 40% Rh	**Pc** *(kW)*	**Ps** *(kW)*	2.05	1.90	2.52	2.46	2.93	2.93	3.29	3.29	3.61	3.61	3.91	3.91
		LAT *(°C)*	**C** *(l/h)*	17.4	0.2	18.2	0.0	18.9	0.0	19.4	0.0	19.8	0.0	20.2	0.0
		Qw *(l/h)*	**Dp(c)** *(kPa)*	353	1.5	434	2.2	503	2.9	565	3.6	620	4.2	672	4.9
10/15	27 50% Rh	**Pc** *(kW)*	**Ps** *(kW)*	1.48	1.42	1.82	1.82	2.12	2.12	2.38	2.38	2.62	2.62	2.84	2.84
		LAT *(°C)*	**C** *(l/h)*	16.3	0.0	16.9	0.0	17.4	0.0	17.7	0.0	18.1	0.0	18.3	0.0
		Qw *(l/h)*	**Dp(c)** *(kPa)*	255	0.8	314	1.2	365	1.6	410	2.0	451	2.4	488	2.7
10/15	25 50% Rh	**Pc** *(kW)*	**Ps** *(kW)*	1.12	1.12	1.39	1.39	1.64	1.64	1.85	1.85	2.05	2.05	2.24	2.24
		LAT *(°C)*	**C** *(l/h)*	15.3	0.0	15.7	0.0	16.1	0.0	16.4	0.0	16.6	0.0	16.8	0.0
		Qw *(l/h)*	**Dp(c)** *(kPa)*	193	0.5	240	0.8	281	1.0	319	1.3	353	1.5	385	1.8

KEY:

WT = Water temperature **AT** = Air temperature **Rh** = Relative humidity **Qv** = Air flow

Pc = Total power **Ps** = Sensitive power **LAT** = Air outlet temperature

C = Condensate **Qw** = Water flow rate **Dp(c)** = Pressure drop on water side

Efficiency table for the Water coil - ENY-P3 in cooling mode

WT °C/°C	AT °C			Qv 700 m³/h		900 m³/h		1100 m³/h		1300 m³/h		1500 m³/h		1700 m³/h	
7/12	32 40% Rh	**Pc** (kW)	**Ps** (kW)	4.99	3.69	5.83	4.45	6.57	5.15	7.23	5.80	7.81	6.42	8.34	7.00
		LAT (°C)	**C** (l/h)	15.7	1.8	16.8	1.9	17.6	2.0	18.3	2.0	18.8	2.0	19.3	1.9
		Qw (l/h)	**Dp(c)** (kPa)	858	4.8	1002	6.3	1131	7.9	1243	9.3	1344	10.7	1435	12.1
7/12	27 50% Rh	**Pc** (kW)	**Ps** (kW)	3.86	2.84	4.50	3.42	5.06	3.95	5.56	4.45	6.12	4.97	6.60	5.45
		LAT (°C)	**C** (l/h)	14.7	1.4	15.5	1.5	16.1	1.6	16.6	1.6	17.0	1.6	17.3	1.6
		Qw (l/h)	**Dp(c)** (kPa)	664	3.0	774	4.0	871	4.9	957	5.8	1052	6.9	1135	7.9
7/12	25 50% Rh	**Pc** (kW)	**Ps** (kW)	3.01	2.58	3.52	3.14	3.99	3.66	4.40	4.15	4.77	4.62	5.12	5.07
		LAT (°C)	**C** (l/h)	13.9	0.6	14.5	0.5	15.0	0.5	15.4	0.3	15.7	0.2	16.0	0.0
		Qw (l/h)	**Dp(c)** (kPa)	517	1.9	606	2.6	686	3.2	756	3.8	821	4.4	880	5.0
10/15	32 40% Rh	**Pc** (kW)	**Ps** (kW)	3.66	3.32	4.29	4.06	4.86	4.76	5.38	5.38	5.84	5.84	6.27	6.27
		LAT (°C)	**C** (l/h)	17.4	0.5	18.1	0.3	18.7	0.1	19.1	0.0	19.6	0.0	20.0	0.0
		Qw (l/h)	**Dp(c)** (kPa)	629	2.7	738	3.6	837	4.5	926	5.4	1005	6.3	1079	7.1
10/15	27 50% Rh	**Pc** (kW)	**Ps** (kW)	2.65	2.48	3.12	3.04	3.54	3.54	3.92	3.92	4.26	4.26	4.59	4.59
		LAT (°C)	**C** (l/h)	16.3	0.2	16.8	0.1	17.2	0.0	17.5	0.0	17.4	0.0	18.1	0.0
		Qw (l/h)	**Dp(c)** (kPa)	456	1.5	537	2.0	609	2.5	674	3.1	733	3.6	789	4.1
10/15	25 50% Rh	**Pc** (kW)	**Ps** (kW)	2.01	2.01	2.39	2.39	2.73	2.73	3.04	3.04	3.33	3.33	3.59	3.59
		LAT (°C)	**C** (l/h)	15.3	0.0	15.6	0.0	16.0	0.0	16.2	0.0	16.4	0.0	16.6	0.0
		Qw (l/h)	**Dp(c)** (kPa)	346	0.9	411	1.3	469	1.6	523	1.9	572	2.3	618	2.6

Efficiency table for the Water coil - ENY-P4 in cooling mode

WT °C/°C	AT °C			Qv 900 m³/h		1200 m³/h		1500 m³/h		1800 m³/h		2100 m³/h		2400 m³/h	
7/12	32 40% Rh	**Pc** (kW)	**Ps** (kW)	5.83	4.45	6.91	5.48	7.81	6.42	8.61	7.29	9.30	8.11	10.40	9.17
		LAT (°C)	**C** (l/h)	16.8	1.9	17.9	2.0	18.8	2.0	19.5	1.8	20.1	1.7	20.2	1.7
		Qw (l/h)	**Dp(c)** (kPa)	1002	6.3	1189	8.6	1344	10.7	1481	12.8	1600	14.7	1789	18.0
7/12	27 50% Rh	**Pc** (kW)	**Ps** (kW)	4.50	3.42	5.32	4.20	6.12	4.97	6.64	5.59	7.15	6.19	7.71	6.83
		LAT (°C)	**C** (l/h)	15.5	1.5	16.4	1.6	17.0	1.6	17.6	1.5	18.1	1.3	18.4	1.2
		Qw (l/h)	**Dp(c)** (kPa)	774	4.0	915	5.4	1052	6.9	1143	8.0	1229	9.2	1327	10.5
7/12	25 50% Rh	**Pc** (kW)	**Ps** (kW)	3.52	3.14	4.20	3.91	4.77	4.62	5.29	5.29	5.75	5.75	6.17	6.17
		LAT (°C)	**C** (l/h)	14.5	0.5	15.2	0.4	15.7	0.2	16.2	0.0	16.5	0.0	16.8	0.0
		Qw (l/h)	**Dp(c)** (kPa)	606	2.6	722	3.5	821	4.4	909	5.3	990	6.2	1061	7.0
10/15	32 40% Rh	**Pc** (kW)	**Ps** (kW)	4.29	4.06	5.13	5.10	5.84	5.84	6.48	6.48	7.06	7.06	7.58	7.58
		LAT (°C)	**C** (l/h)	18.1	0.3	18.9	0.0	19.6	0.0	20.1	0.0	20.5	0.0	50.8	0.0
		Qw (l/h)	**Dp(c)** (kPa)	738	3.6	882	5.0	1005	6.3	1115	7.6	1214	8.8	1304	10.0
10/15	27 50% Rh	**Pc** (kW)	**Ps** (kW)	3.12	3.04	3.73	3.73	4.26	4.26	4.74	4.74	5.17	5.17	5.56	5.56
		LAT (°C)	**C** (l/h)	16.8	0.1	17.4	0.0	17.8	0.0	18.2	0.0	18.5	0.0	18.8	0.0
		Qw (l/h)	**Dp(c)** (kPa)	537	2.0	642	2.8	733	3.6	815	4.3	889	5.0	957	5.7
10/15	25 50% Rh	**Pc** (kW)	**Ps** (kW)	2.39	2.39	2.89	2.89	3.33	3.33	3.72	3.72	4.09	4.09	4.43	4.43
		LAT (°C)	**C** (l/h)	15.6	0.0	16.1	0.0	16.4	0.0	16.7	0.0	17.0	0.0	17.2	0.0
		Qw (l/h)	**Dp(c)** (kPa)	411	1.3	496	1.8	572	2.3	641	2.8	703	3.3	761	3.8

KEY:

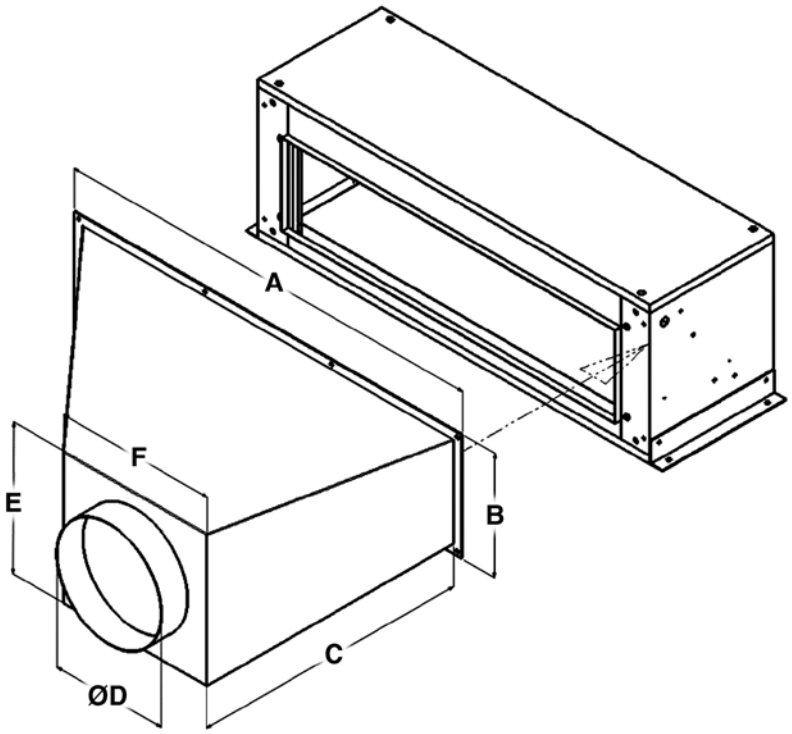
WT = Water temperature **AT** = Air temperature **Rh** = Relative humidity **Qv** = Air flow

Pc = Total power **Ps** = Sensitive power **LAT** = Air outlet temperature

C = Condensate **Qw** = Water flow rate **Dp(c)** = Pressure drop on water side

Connecting Duct for Ocean air handling section with 4 row coil and Ocean ECM Section with pre-filter and electrostatic filter

FOR HEAT RECOVERY UNIT			ENY-P1 / P2	ENY-P3	ENY-P4
ENERGY CONNECTING DUCT	IDENTIFICATION		ENP 1-2	ENP 3	ENP 4
	CODE		9035241	9035243	9035244
Dimensions	A	mm	1050	1050	1050
	B	mm	270	270	337
	C	mm	600	600	600
	D	mm	250	355	400
	E	mm	350	428	473
	F	mm	370	448	493
OCEAN ECM MODEL			1	2	3



Accessory probe for post-treatment according to inlet temperature

Energy Plus units offer the possibility of adjusting the operation of the post-treatments in two different modes.

DESCRIPTION	IDENTIFICATION	CODE
PT1000 probe 5 m for post-treatment	*ENP PT2*	*9022511*

The room temperature control uses the T3 temperature probe, located on the exhaust air outlet flow.

No changes to the positioning of the unit probes are required to use this logic.

The inlet temperature control allows the temperature of the air being supplied into the rooms to be kept steady. To use this logic, it is mandatory to move the T2 probe inside the unit, positioning it downstream of the post-treatment elements. It will then be necessary to order the accessory temperature probe.

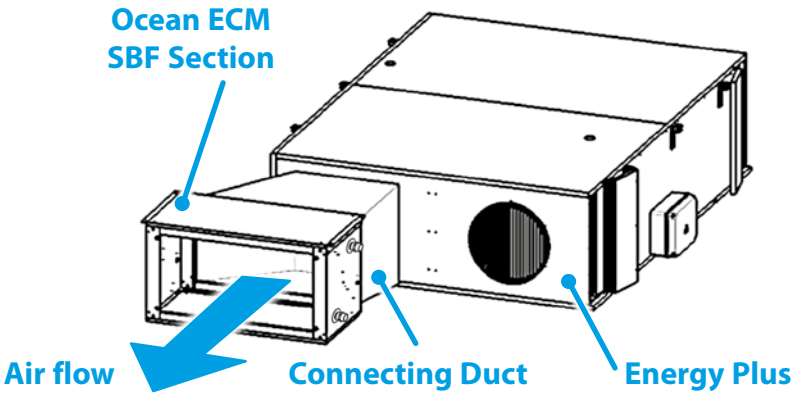
The Energy heat recovery units can be matched with the Ocean ECM SBF
or with the Ocean ECM SFE-DP sections; this is achieved by using the special Connecting Duct.

Ocean ECM air handling section with 4 row coil - Ocean ECM SBF

The SBF sections are equipped with a 4-row heat exchange coil suitable to be fed with chilled water.
The table below shows the recommended combinations.

When ordering indicate the connections side of the coil section; in the picture the connections side is on the left.

To control the inlet temperature, the ENP PT2 accessory probe must be installed downstream of the coil.

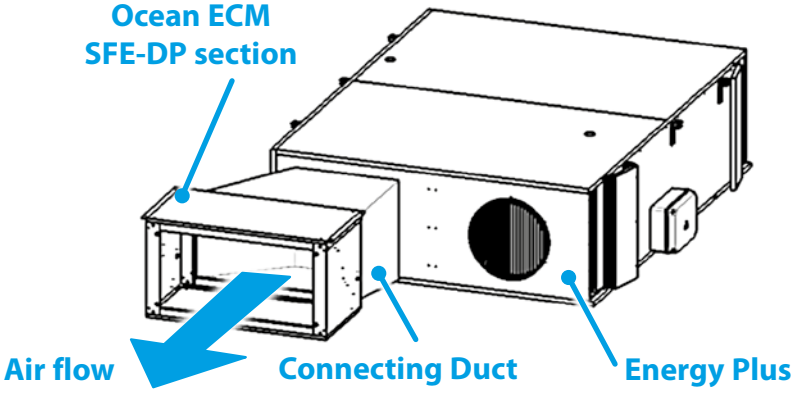


For Heat Recovery Unit	Energy Connecting Duct			Ocean ECM air handling section with 4 row coil			Flat flange for duct connection*	
	Type	Code		Type	Code		Type	Code
ENY-P1	ENP 1-2	9035241	+	SBF-14	0035371	+	FMP/FRP-1-2	9035221
ENY-P2	ENP 1-2	9035241	+	SBF-14	0035371	+	FMP/FRP-1-2	9035221
ENY-P3	ENP 3	9035243	+	SBF-24	0035372	+	FMP/FRP-1-2	9035221
ENY-P4	ENP 4	9035244	+	SBF-34	0035373	+	FMP/FRP-3	9035223

* Two flat flanges are required to connect the ducts, to be mounted on both ports of the Ocean section.

Ocean ECM section with pre-filter and electrostatic filter - Ocean ECM SFE-DP

SFE-DP section are equipped with a Crystall electrostatic filter suitable for purifying air.
The table below shows the recommended combinations.



For Heat Recovery Unit	Energy Connecting Duct			Ocean ECM section with pre-filter and electrostatic filter			Flat flange for duct connection*	
	Type	Code		Type	Code		Type	Code
ENY-P1	ENP 1-2	9035241	+	SFE-DP 1-2	0035741	+	FMP/FRP-1-2	9035221
ENY-P2	ENP 1-2	9035241	+	SFE-DP 1-2	0035741	+	FMP/FRP-1-2	9035221
ENY-P3	ENP 3	9035243	+	SFE-DP 1-2	0035741	+	FMP/FRP-1-2	9035221
ENY-P4	ENP 4	9035244	+	SFE-DP-3	0035743	+	FMP/FRP-3	9035223

* Two flat flanges are required to connect the ducts, to be mounted on both ports of the Ocean section.

Antifreeze logic, electrical pre-heating resistance

In the event of installation in cold climates (indicatively with air temperatures below -5 °C) to prevent the formation of ice inside the heat exchanger, you must install the electrical resistance accessory (BEP). This is managed automatically by the control board, mounted on the machine, by means of a PWM signal in order to optimise the electrical consumption according to the real needs.
The controller actives the resistance below a critical temperature of the external environment for the formation of ice in the heat exchanger and modulates the power of the resistance to maintain the exhaust air temperature above the freezing point.

Free-cooling / free-heating management logic with by-pass gate

The following indoor air setpoint temperatures are defined:
$t_{heating}$, normally 20 °C
$t_{cooling}$, normally 26 °C

The following are also defined:
t_i = internal air temperature (return air)
EAT = External air temperature

FREE-COOLING CONDITION
EAT > $t_{heating}$ and simultaneously t_i > EAT

Example:
In the summer, occasionally t_i = 25 °C, consistent with operating setpoint $t_{cooling}$ = 26 °C±2 °C.
This condition may occur during an evening of a very sunny day during which, however,
the outside air temperature is quite cool, EAT = 21 °C.
There is no need for heating, because the winter setpoint is $t_{heating}$ = 20 °C.

EAT =21 °C >20 °C and t_i = 25 °C > EAT: the external air can be used to cool the premises for free.

FREE-HEATING CONDITION

EAT < $t_{cooling}$ and simultaneouslyt_i < EAT

Example:
In a Mediterranean winter condition, occasionally t_i = 21 °C, consistent with operating setpoint $t_{heating}$ = 20 °C±2 °C.
This condition may occur during the sunny afternoon of a day characterised by a cold morning
. The outside air temperature heats up and reaches the EAT value = 23 °C.
There is no need to cool, because the summer setpoint is $t_{cooling}$ = 26 °C.

EAT =23 °C <26 °C and t_i = 21 °C < EAT: the external air can be used to heat the premises for free.

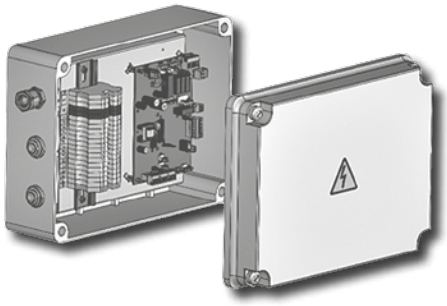
In all the remaining conditions it is convenient to maintain the heat recovery active to save on
heating in the winter and on air conditioning in the summer.

Operating logic with post-treatment elements

Downstream of the heat recovery unit, on the ambient air intake duct, it is possible to install a post-heating resistance or a post-heating and/or cooling coil.

The machine controller can handle 230 volt outputs for ON/OFF control of the resistance or of the water shut-off valve feeding the post-treatment coil. You can manage the post-heating only or heating and/or cooling function both in the 2 and 4 pipe configuration.
The control of the post-treatment elements is managed according to the intake or exhaust air temperature.

To control the inlet temperature, the T2 accessory probe must be installed downstream of the coil.



The electrical panel, consisting of a box made of ABS plastic material, is located to the side of the machine on the air filter inspection side; the panel houses:
- the terminal block for the connection of the power cable and auxiliaries,
- the electronic management and control board.

Management and control board

The electronic management and control board is connected to:
- PT1000 temperature probes placed on 4 air transit points;
- Intake air circuit fan motor controlled with 0-10 V signal;
- Exhaust air circuit fan motor controlled with 0-10 V signal;
- By-pass gate movement actuator;
- Contacts of the filter differential pressure switches.

The electronic board also features:
- Dry contact terminals for remote machine ON/OFF control;
- Terminals for connecting the remote control T-EP;
- Terminals for RS485 connection with external Modbus system connection;
- Terminals for connecting the 0-10 V signal of a remote CO_2 measurement sensor (range 0-2000 ppm);
- Machine setting configuration Dip:
  - Air intake/exhaust direction;
  - Presence of external air pre-heating electrical coil with antifreeze function;
  - Presence of electrical and/or water coil for post-heating/cooling treatment;
  - Presence of Crystall filter.
- Address configuration Dip in Modbus connection.

The electronic board can also manage:
- External air pre-heating electrical resistance in antifreeze mode; PWM signal;
- External air pre-heating water coil in antifreeze mode; ON/OFF signal;
- Post-heating electrical coil: ON/OFF signal;
- Post-heating water coil: ON/OFF signal;
- Post-cooling water coil: ON/OFF signal;
- Eventual Crystall filter mounted on the air intake duct: ON/OFF signal.

Controls

Description	Identification	Code
Wall control (mandatory)	*T-EP*	*9022011*

Dimensions: 89x80x20 mm
Colour: RAL 9003

To manage and control the **Energy Plus** units use the control panel **T-EP** with which you can set the initial work conditions, operating independently on the rotation speeds of the intake and exhaust fans. Using the flow rate / actual static pressure diagrams you can find the voltage that is required to set the desired flow rate at the actual static pressure according to design values.

Using the touch control, according to the instructions of the manual attached to the machine, the control voltage of the two fans can be altered to set the speeds that ensure the desired balancing of the flow rates according to design values.

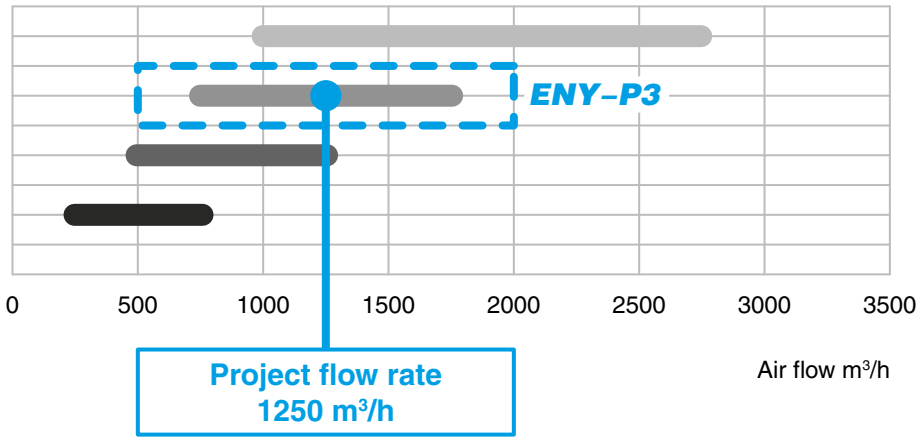
The wall-mounted controller is used to:
- Set a weekly operating program with the possibility to reduce the air flow rate and/or switch the heat recovery unit off when people are away.
- Activate or disable the weekly program.
- Manually set an air flow rate value other than the nominal one, reducing it compared to the value set during installation according to 4 default activation percentages.
- Automatically check the value of the air flow rate according to the quality of the ambient air by connecting the power board of the ENY-P unit to an external CO_2 sensor with 0-10 V output or to an external relative humidity sensor.

Energy PLUS | Selection example

The project involves installing a primary air ventilation system with very high thermal recovery performance in an average-sized commercial space.
The ventilation unit fits in the context of a central air conditioning system with four pipes provided by the owner and used for water terminals.
The commercial space is located in the climate area characterised by cold winter temperatures (climate area E, design temperature -8 °C).
The intention is to use the primary air as an energy source to contribute to summer air conditioning.
Below summarises the project data useful for the selection of the machine:

Actual surface	200	m^2
Crowding index:	0.25	pers/m^2
Renewal flow rate per capita:	25	m^3/h pers
Total renewal flow rate:	1250	m^3/h

Using the fast selection prospectus you can immediately find the most suitable **Energy Plus** model and the necessary accessories:



Supply configuration selected:

- Model: **ENY-P3**
- Antifreeze resistance: **BEP35/6/T**
- Cooling water coil: **BAE 3**

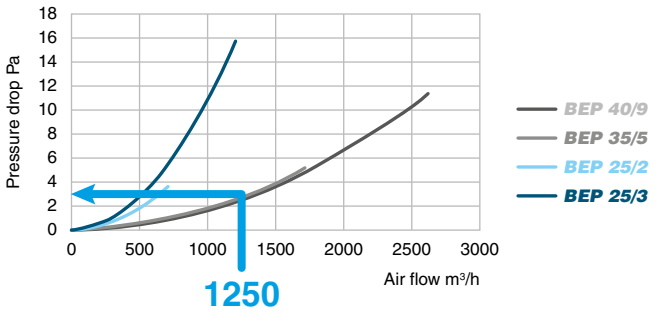
After selecting the most suitable **Energy Plus model,** you can find the parameters necessary for the correct calibration of the machine and consequently the characteristic performance parameters.
The next pages contain the diagrams that have already been presented starting from page 10.

The control voltage at which the EC fan motors must be operated depends on:

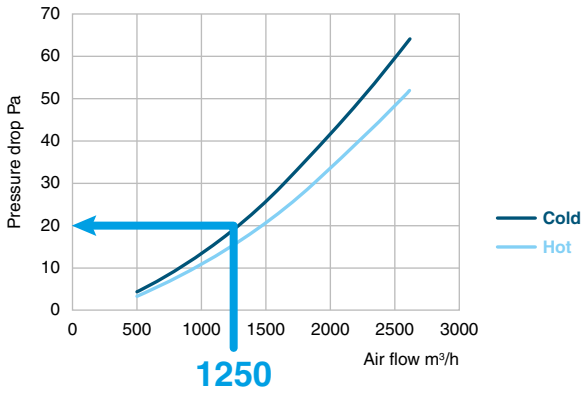
- the design actual static pressure of the supply and return air circuits outside the machine, to which the leaks due to the accessories are added.

	SUPPLY CIRCUIT	RETURN CIRCUIT
Design external system leaks	200 Pa	100 Pa
Electric Antifreeze coil - BEP35/6/T	3 Pa	-
Cold Coil	20 Pa	-
Safety coefficient (at design engineer's discretion)	1.05	1.05
Actual Static Pressure	**≈ 230 Pa**	**≈ 110 Pa**

Pressure drop BEP



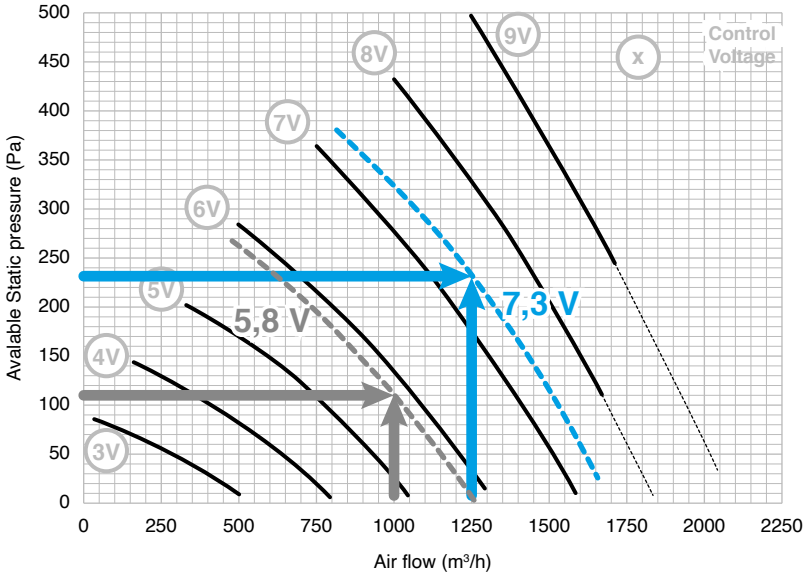
Air side pressure drop ENY-P3/P4

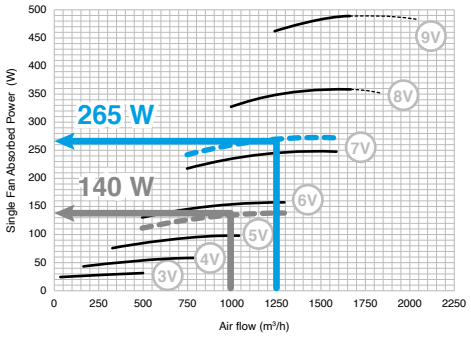


- The envisaged design imbalance between supply flow rate and the return one.
  For the case in question, according to the design, there is an envisaged ratio between flow rate and delivery of 80% due to the effect of the presence of extractor fans in the bathrooms and as a result of the desire to maintain the space in overpressure compared to outside.

  Qr = 1250*0.8 = 1000 m³/h

Using the Flow Rate / Actual Static Pressure diagrams, you can find the calibration control voltage for the two circuits and estimate the power absorbed by the machine with the resistance disabled.





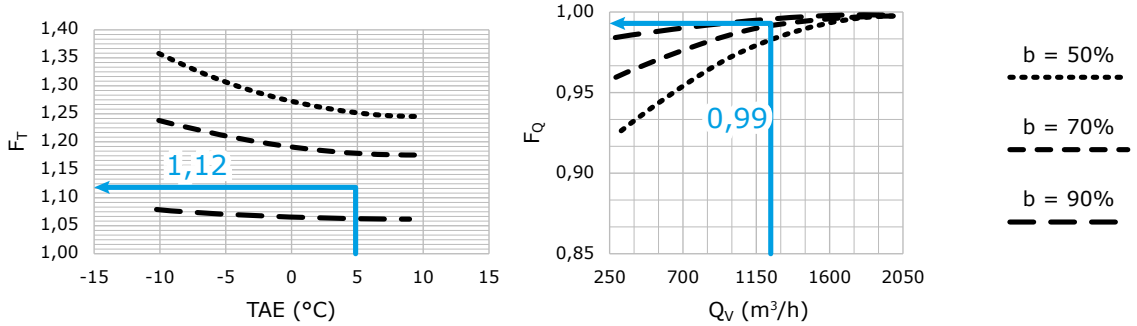
SUPPLY control voltage: **7.3 V**
RETURN control voltage: **5.8 V**

Electrical power absorbed:
Pel = 140+260 = 400 W

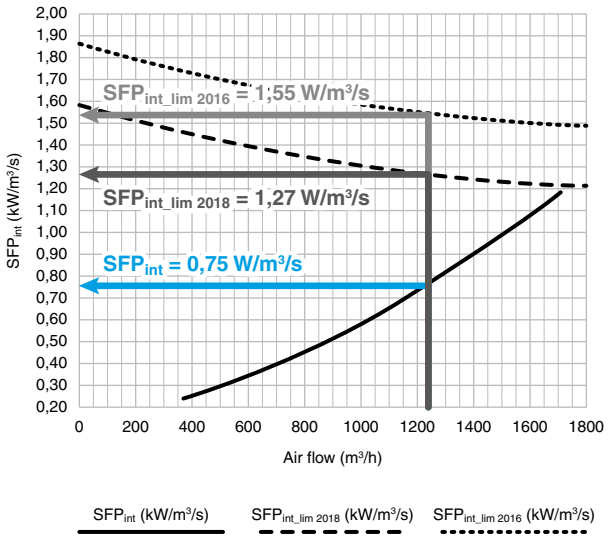
Energy PLUS | Selection example

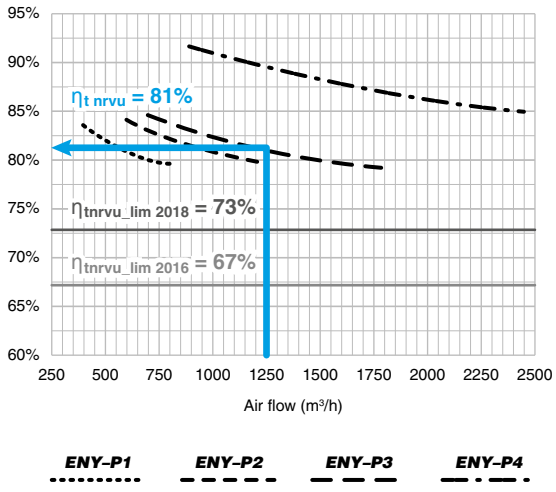
Using the Thermal Efficiency tables and diagrams of the **Energy Plus Models,** you can estimate the actual recovery efficiency of the machine in the design temperature conditions or in the average monthly temperature conditions of interest for the energy calculations.
Without prejudice to the possibility of maintaining the indoor space at a winter temperature of 20 °C, we shall assume calculating the recovery efficiency in the event of operation at the design flow rate and with an external temperature of 5 °C.
The "Recovery efficiency with balanced flow rates" value can be obtained from the table on p. 9 for linear interpolation.

ε_t	Recovery efficiency with balanced flow rates.	81.2%
	Unbalance coefficient	80%
	Temperature correction factor	1.12
	Flow rate correction factor	0.99
ε_t*	Actual recovery efficiency	**72%**



You can also verify the compliance of the ventilation unit with the performance requirements of EU Regulation 1253/14.
Under the regulation, the nominal verification flow rates correspond to the design flow rates.
The charts provided in this catalogue to verify the SFP_{int} apply in the event of flow rates balanced between supply and return. A further precautionary element concerns the calculation of limit values of SFP_{int}, which always refer to the maximum characteristic flow rate of each model and not to the nominal, i.e. design, flow rate, whichis unknown beforehand.
SFP_{int} control should be conducted with reference to a nominal verification flow rate equal to the greatest between the two design supply and return flow rates; this way there is an overestimation of the consumption due to the circuit designed for the lower flow rate.
The maximum flow rate is also the flow rate recommended by Sabiana to verify the thermal efficiency η_{t_nrvu} of the **Energy Plus units.**
In this the check is conducted with reference to the intake flow rate **Qv** = 1250 m³/h.





Energy Plus units always comply with the requirements of EU Regulation 1253/14 for all flow rates below the maximum ones stated in the "Characteristic technical data" table.

Il presente documento annulla e sostituisce il certificato di pari numero emesso in data 06/05/2022.

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WE HEREBY CERTIFY THAT THE QUALITY MANAGEMENT SYSTEM OPERATED BY

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Processi direzionali, primari e di supporto relativamente a Progettazione, produzione e assistenza di apparecchiature per il riscaldamento e il condizionamento dell'aria (aerotermi, termostrisce radianti, ventilconvettori e unità trattamento aria) e canne fumarie.
Unità Operative
Via Virgilio, 2 - 20013 Magenta (MI) – Italia
Produzione di ventilconvettori. Magazzino Logistica.
(Presente solo reparto produttivo, magazzino componenti e logistica: Magazzino P.F. e spedizione).
Via Zanella, 27 - 20011 Corbetta (MI) – Italia
Assemblaggio unità trattamento aria, lavorazioni meccaniche, saldatura, magazzino, assemblaggio recuperatori.

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