

# RWH/HE

## HEAT RECOVERY UNITS WITH ROTARY WHEEL



### INTRODUCTION

Any occupied room requires the correct supply of fresh air and, at the same time, the control of the internal thermo-hygrometric conditions, through the recovery of energy from the air extracted from the room, by means of rotary wheel heat recovery, the level of well-being of the occupants is guaranteed, both in summer and winter.

For buildings that require air changes and are not equipped with dedicated air conditioning systems, the installation of such units allows the supply of primary air at controlled temperature without substantially changing the internal conditions in the occupied spaces.

These units also make it possible to guarantee support for the air conditioning system in the intermediate seasons using free-cooling or free-heating modes.

These units, if installed on existing buildings, guarantee the energy requalification of the system through the management of the air change without additional charges; in the case of new installations, instead, the air change is completely carried out allowing to reduce the size of the main air conditioning system.

In the intermediate seasons the building will benefit from free or partially-generated cooling from these units, which during the partial load phases allow the main system to operate with higher efficiency.



## MAIN CHARACTERISTICS

### STRUCTURE AND PANELS

The structure of the units can be realised in 2 types:

#### Type 1: Panels 50 mm Standard [T3/TB3]

50 x 50 mm extruded anodised aluminium profiles with mechanical resistance requirements according to EN 1886: D1 (M). 50 mm thick double-wall sandwich type panelling with exterior in prepainted steel RAL 9010 and interior in galvanised steel with polyurethane foam insulation with a density of 40 kg/m<sup>3</sup> or mineral wool (90 kg/m<sup>3</sup>). This structure has a tightness class L1 while the thermal transmittance and thermal bridge characteristic is class T3/TB3 in accordance with EN1886.

#### Type 2: Panels 50 mm TB [T2/TB2]

50 x 50 mm thermal break profiles in extruded anodised aluminium, with mechanical resistance requirements in accordance with EN 1886: D1 (M). 50 mm thermal break sandwich type double-wall panelling with exterior in prepainted steel RAL 9010 and interior in galvanised steel with polyurethane foam insulation with a density of 40 kg/m<sup>3</sup> or mineral wool (90 kg/m<sup>3</sup>). This structure has a tightness class L1 while the thermal transmittance and thermal bridge characteristic is class T2/TB2 in accordance with EN1886.

Safety microswitches are applied to the inspection doors to allow internal access to the various compartments of the unit only when the unit is completely switched off.

The main access and inspection panels consist of inspection doors with perimeter hinges made of non-corrosive polyamide and handles.

All units are supplied in monobloc sections.

### AIR FILTERS

The units can host different types of filters, both in the room air extract and in the fresh air intake.

They are mounted on guides equipped with gaskets to guarantee effective sealing. Their position, upstream of the internal components, also guarantees their protection.

All units are equipped with differential pressure switches to monitor the air side pressure drops of the filtering sections.

### FANS

The units are equipped with high efficiency plug-fan type fans with built-in brushless EC motor.

In this way it is possible to guarantee an accurate control of the airflow both in the supply and extract section, ensuring that all regulatory requirements such as SFP are met.

The airflow rate of the fan is managed through the integrated electronic control system thus ensuring, according to the needs of the system, that the correct operation of the unit is maintained with consequent saving of the energy absorbed by the unit.

The fans are fixed to the frame by means of self-centering brackets to ensure the correct distance between the impeller and the nozzle, thus optimizing performance.

### HEAT RECOVERY

The units are equipped with an air-to-air rotary wheel exchanger, consisting by a cylindrical rotor containing thousands of channels and characterised by an extremely elevate surface development, a supporting frame, and an electric motor drive system. The heat exchange surface, very high in relation to the volume, allows very high thermal performances when compared to other types of heat recovery systems.

In rotary wheel heat recovery units the heat exchange takes place by accumulating the heat in the rotor; as a matter of fact while the cylinder rotates slowly, the exhaust air volume crosses half of the casing and gives its heat to the rotor matrix, which accumulates it.

The fresh air, crossing the other half, absorbs the accumulated heat. The parts absorbing and releasing the heat are continuously inverted, as the rotation proceeds, and the process may continue indefinitely.

The heat exchanger participates to the **Eurovent Certification** program and it is sized according to the **ECO Design** specification.

### CONTROLS

The unit is managed by a microprocessor electronic board with dedicated software and external LCD display as user interface. Through the external or remote LCD display it is possible to set all the working set-points of the unit and display the operating status and any alarm conditions present.

Through the values acquired by the room temperature probe and the supply air, the thermoregulation will be managed with reference to the set-points.

The unit can manage the automatic change of operating modes by comparing the temperature and humidity of the outside and room air.

The microprocessor also activates and modulates all the dampers of the unit.

The RS485 interface is standard (MODBUS protocol) to be used for connection to remote supervision and control systems. The control can also be supplied with a second remotable control panel (optional).



LCD REMOTE GRAPHIC DISPLAY

## CONTROLS

The units are supplied as standard with a microprocessor control system and remotable control panel with graphic LCD display. They are available in two versions: **PLUS** and **TOP**.

**PLUS:** this control option is set to operate at **CONSTANT PRESSURE**, it is supplied complete with pressure transducer and air temperature sensors installed on the fresh air intake and room return air.

**TOP:** this control option is set to operate at **CONSTANT AIRFLOW**, it is supplied complete with pressure transducer and air temperature sensors installed on the fresh air intake and room return air.

All control systems allows to select, in stepless mode, the supply and return fan speeds, through the use of differential transducers and automatically manages the heat recovery by-pass damper through the motorized On/Off control.

They also manages the summer/winter seasonal change over and programming for daily time bands.

The controls can also manages an optional hot water or cold water coil through a 3-way modulating valve and an additional supply air sensor in order to maintain a fixed point operating logic. The same logic can also be used to manage an electric post-heating coil, if present.

They are also able to manage the unit's defrosting system, (optional), by means of an additional temperature probe located in the heat exchanger exhaust air.

The systems alerts to the user when filters need replacing (the clogged state of the filters is monitored by a pair of differential pressure switches supplied as standard) or the onset of any alarm and this may also be integrated into modern home automation systems via RS485 serial port with Modbus protocol (supplied as standard).

## OPERATING MODE

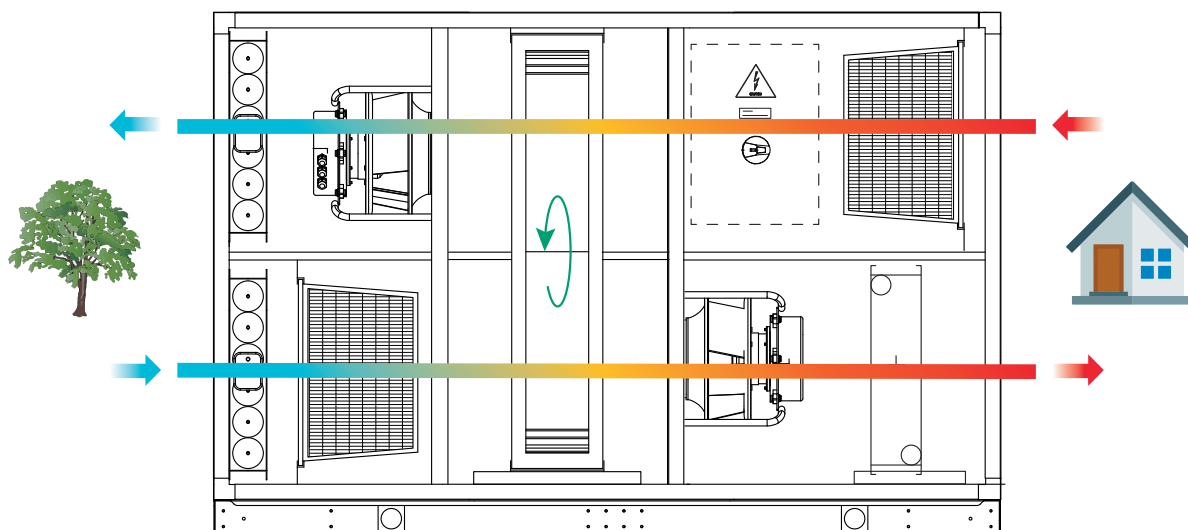
In winter the return air from the room with a higher thermal load passes through the rotary heat exchanger, releasing heat and cooling down before being exhausted.

The fresh air, with a lower thermal load, passes through the exchanger in the opposite direction, warming up before being introduced into the room.

The airflow is modulated by varying the speed of the EC fans to precisely control the supply air temperature. To prevent frost formation, the unit automatically manages a defrost cycle by temporarily stopping the rotation of the heat wheel exchanger.

In summer, the return air from the room with a lower thermal load passes through the rotary heat exchanger, warming up before being exhausted. The fresh air, with a higher thermal load, passes through the exchanger in the opposite direction, cooling down before being introduced into the room. The airflow is modulated by varying the speed of the EC fans to precisely control the supply air temperature.

When the outdoor air temperature is lower than the temperature of the room and if the latter requires cooling, the unit stops the rotation movement of the wheel exchanger to allow the entry of external air without heat recovery.



## TECHNICAL DATA

MODEL		010	015	020	030	040	060	080
Nominal airflow rate	m <sup>3</sup> /h	1000	1500	2000	3000	4000	6000	8000
Type of ventilation unit		UVNR-B (Non Residential Ventilation Units - Bidirectional)						
Type of drive installed		Analog signal on EC fan (0-10Vdc)						
Type of fans	type/nr.	EC/4	EC/2	EC/2	EC/2	EC/2	EC/4	EC/4
Type of heat recovery system (HRS)	type/nr.	enthalpic rotary wheel / 1						
Winter Thermal Efficiency ( $\eta_{t\_nr\vee u}$ ) <sup>(1)</sup>	%	79,6	75,2	76,9	76,6	74,7	74,4	76,0
Winter Thermal Efficiency <sup>(2)</sup>	%	79,6	75,2	76,9	76,6	74,7	74,4	76,0
Nominal electric power input <sup>(2)</sup>	kW	0,53	0,83	0,85	0,98	1,80	2,20	4,70
Max electrical power absorbed	kW	0,68	1,00	1,50	2,20	3,00	4,40	6,40
Max electrical current absorbed	A	2,8	4,6	6,6	3,5	4,8	7,0	9,6
SFP <sub>int</sub>	W/(m <sup>3</sup> /s)	852	816	808	740	960	851	788
SFP <sub>lim</sub> 2018	W/(m <sup>3</sup> /s)	1118	1104	1132	1083	984	892	890
External nominal pressure $\Delta p_{s, ext}$ <sup>(3)</sup>	Pa	250	250	250	250	250	250	250
Internal pressure drop $\Delta p_{s, int}$ on supply air	Pa	270	301	263	297	353	335	293
Fans static efficiency (UE) n.327/2011	%	58	59	60	62	61	65	63
Max. external / internal leakage percentage	%	max 3,5 % at -400 Pa   max 5,0 % at +250 Pa						
Energy classification filters		ePM1 55% (F7)   ePM1 55% (F7)						
Filter pressure switch		present						
Sound power level $L_{WA}$ <sup>(4)</sup>	dB(A)	62	66	62	67	71	70	74
Sound pressure level <sup>(5)</sup>	dB(A)	45	49	43	50	55	53	58
Power supply	V/ph/Hz	230/1/50			400/3/50			

<sup>(1)</sup> ratio between the thermal gain of the inlet air (0 °C) and the thermal loss of the exhaust air (20 °C), both referred to the external temperature, measured under dry reference conditions, with balanced mass flow and a thermal difference of the internal/external air of 20K, excluding the thermal gain generated by the fan motors and the internal leakage, in accordance with the provisions of attached V of EU Regulation No 1253/2014

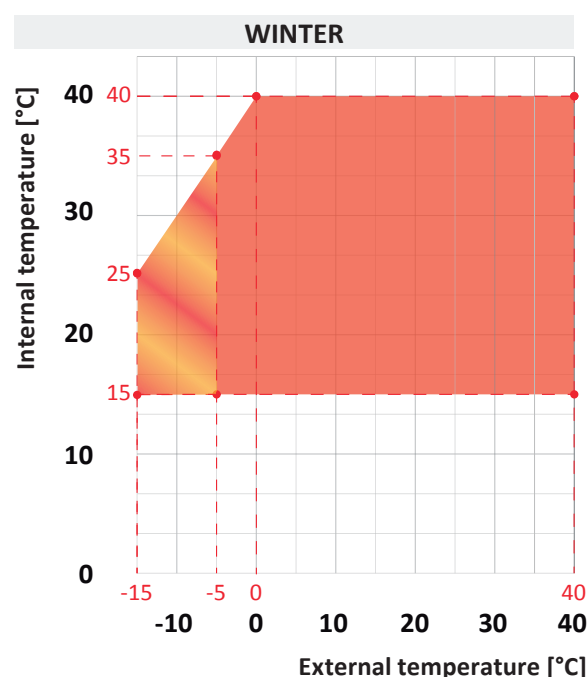
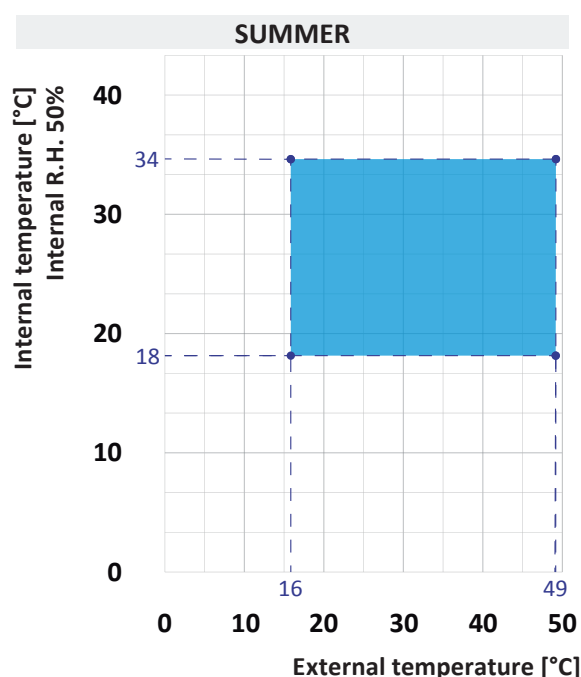
<sup>(2)</sup> outside air: -5 °C / 80 % RH - Inside air: 20 °C / 50 % RH

<sup>(3)</sup> performance with clean filters

<sup>(4)</sup> sound power level calculated in accordance with EN 3744

<sup>(5)</sup> sound pressure level measured at 1 m free field distance, ducted unit, in accordance with EN 3744

## OPERATING LIMITS



## ACCESSORIES

### ePM<sub>10</sub> 50% (G4) air pre-filter

Synthetic panel filter with low pressure drop.

### ePM<sub>10</sub> 60% (M5), ePM<sub>1</sub> 55% (F7), ePM<sub>1</sub> 80% (F9) air filters

Rigid bag filters with large filtering surface area that guarantees long operating life and less frequent replacements.

### Electric re-heating battery

Made up of steel electric heaters, supplied complete with PWM control system and safety thermostat wired.

### Hot / Cold water coil

Coil manufactured with copper pipes mechanically expanded in the aluminium fins, complete with condensate drain pan with water discharge (only for cold water coil).

### 3 way modulating valve

Valve with modulating electric actuator for the control of the water flow of the hot / cold water coil.  
Connections not included (to be arranged by the installer).

### Air damper with actuator

It operates to exclude the fresh air intake and/or the room return air flow. The damper is controlled by On/Off actuator for the opening or the closing, or with return closing spring.

### Flexible joints kit (4 pcs)

Flexible joint for rectangular ducts, complete with galvanized steel flange and screws.

### CO<sub>2</sub> probe

This accessory is installed and wired in the factory on the return air and it allows to determine the quantity of carbon dioxide present in the environment, increasing the quantity of external air to dilute its content.

**NOTE:** CO<sub>2</sub> probe is available in TOP version only.

### Ethernet port and TCP/IP modbus | BACnet port

Ethernet port for BMS Modbus or BACnet network connection.

### Second remotable control panel with LCD display

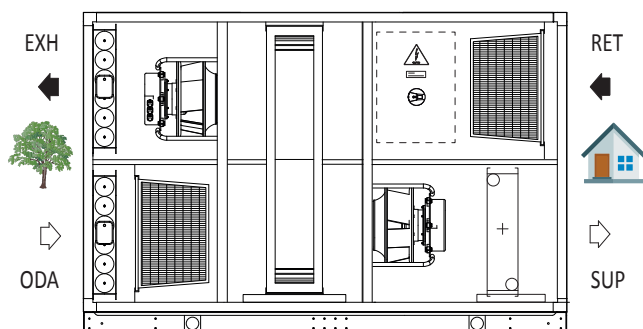
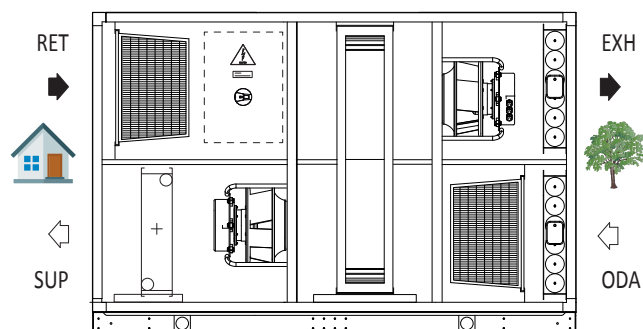
All units are supplied as standard with a control panel installed on board the unit. It is possible, however, to install a second control panel remotable up to 50 m away.

MODEL	010	015	020	030	040	060	080
50 mm Thermal Break frame [T2/TB2]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ePM <sub>10</sub> 50% (G4) pre-filter on supply and return air	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ePM <sub>10</sub> 60% (M5) rigid bag filter on supply and return air	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ePM <sub>1</sub> 55% (F7) rigid bag filter on supply and return air	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ePM <sub>1</sub> 80% (F9) rigid bag filter on supply and return air	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electric post-heating coil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hot water coil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cold water coil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 way modulating valve	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fresh air / Exhaust air damper with On/Off actuator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flexible joints kit (4 pcs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CO <sub>2</sub> probe (available in TOP version only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ethernet port and TCP/IP Modbus   BACnet port	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Second remotable control panel with LCD display	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

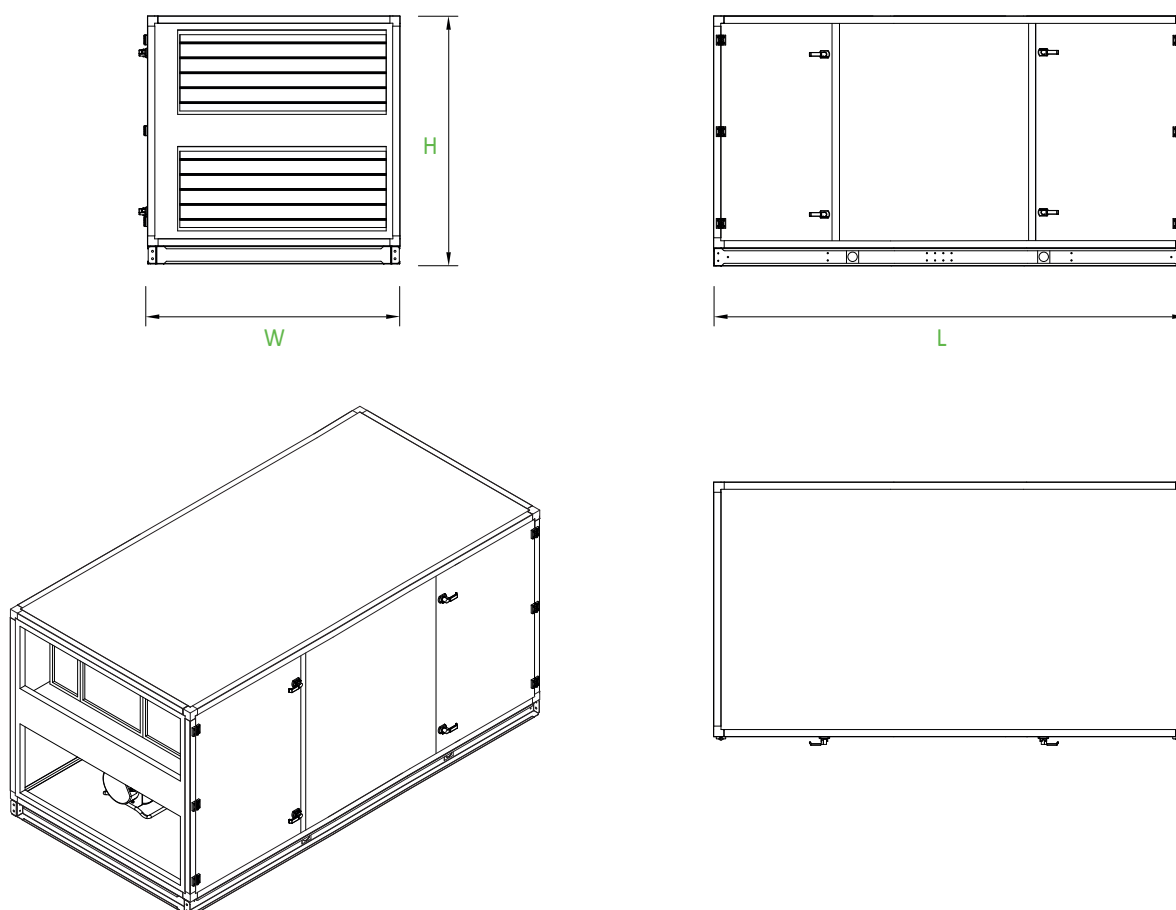
■ Standard    □ Optional    – Not available



## CONFIGURATIONS

**CONFIGURATION H1**

**CONFIGURATION H2**


## DIMENSIONAL DRAWING



## DIMENSIONS AND WEIGHTS

MODEL	010	015	020	030	040	060	080
<b>L</b> (mm)	2010	2010	2160	2310	2310	2610	2760
<b>W</b> (mm)	810	810	960	1110	1410	1410	1710
<b>H</b> (mm)	1080	1080	1230	1380	1380	1530	1830
<b>Weight</b> (kg)	274	279	338	425	479	586	789

Dimensions and weights refer to standard version without accessories