



Potencia Industrial

HUMMINGBIRD

WINDPOWERED ELECTRIC GENERATING SYSTEMS
U.S. Patent 4,136,096

Upwind, horizontal,
3 bladed fixed pitch rotor,
direct drive generator

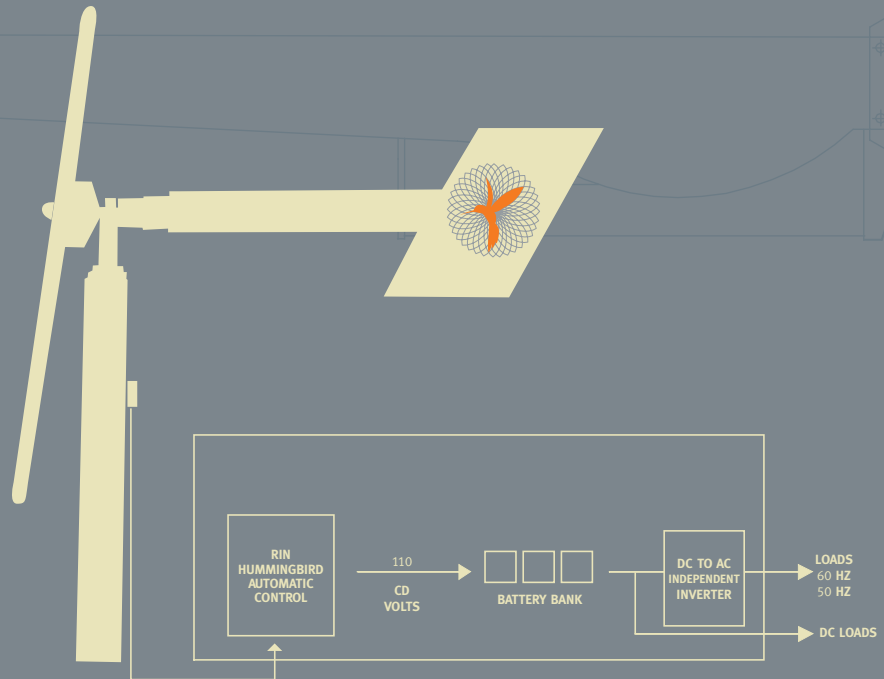


ADVANTAGES

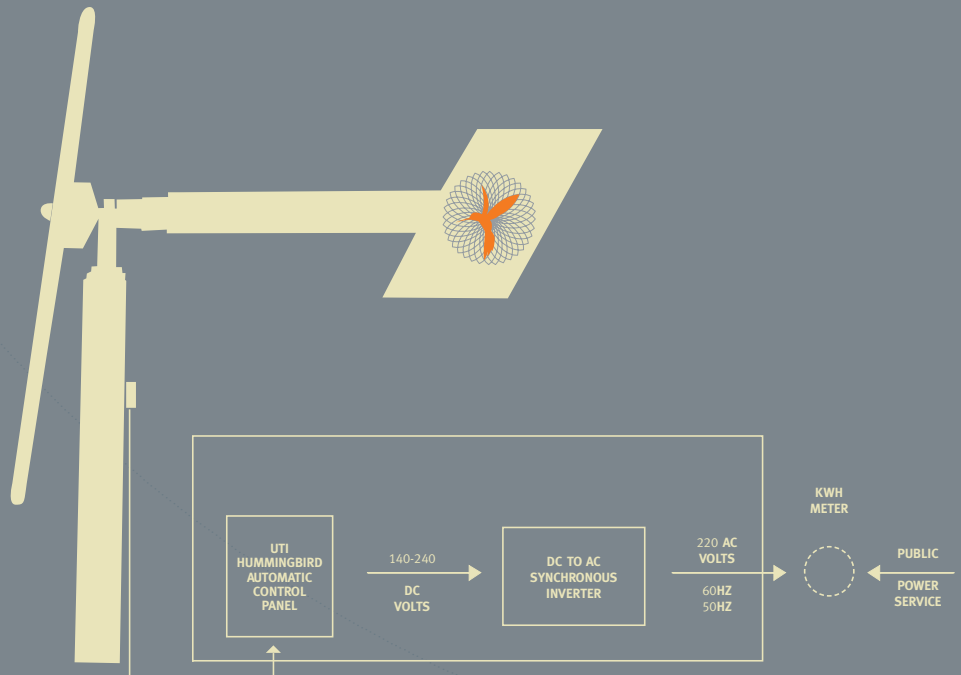
- Self-protecting passive wind-gravity
- Actuated yaw control
- Direct drive, no gears, and no belts
- No routine maintenance
- No operational costs
- High efficiency
- Dynamic breaking
- Heavy-duty construction
- Quiet operation
- High reliability
- Corrosion resistant
- Long life

AVAILABLE MODELS

- RIN - Remote Independent

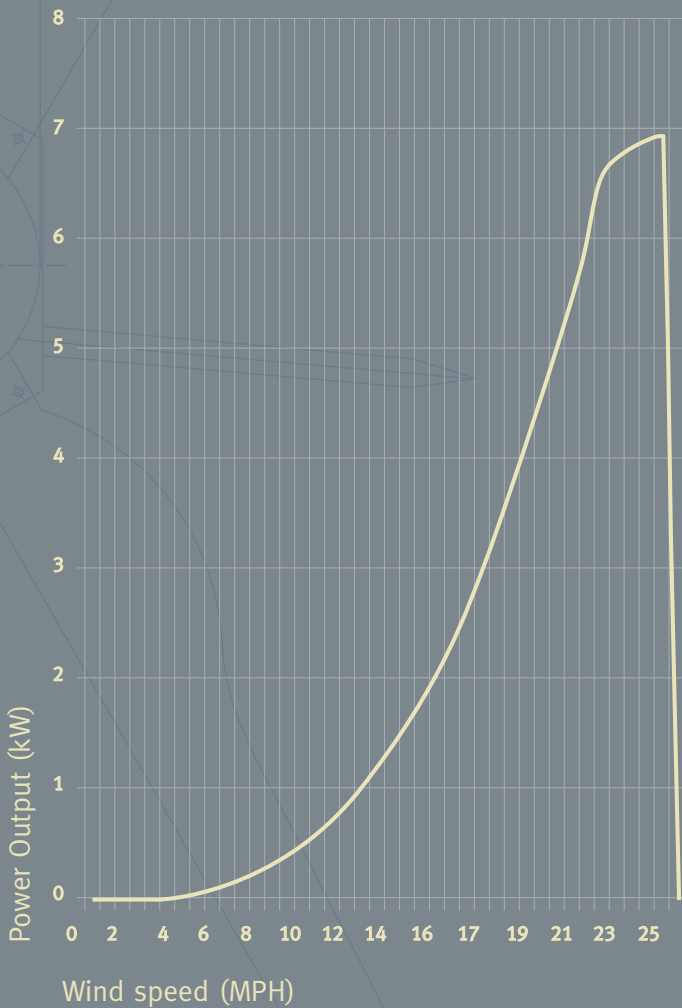


- UTI - Utility Tie-In

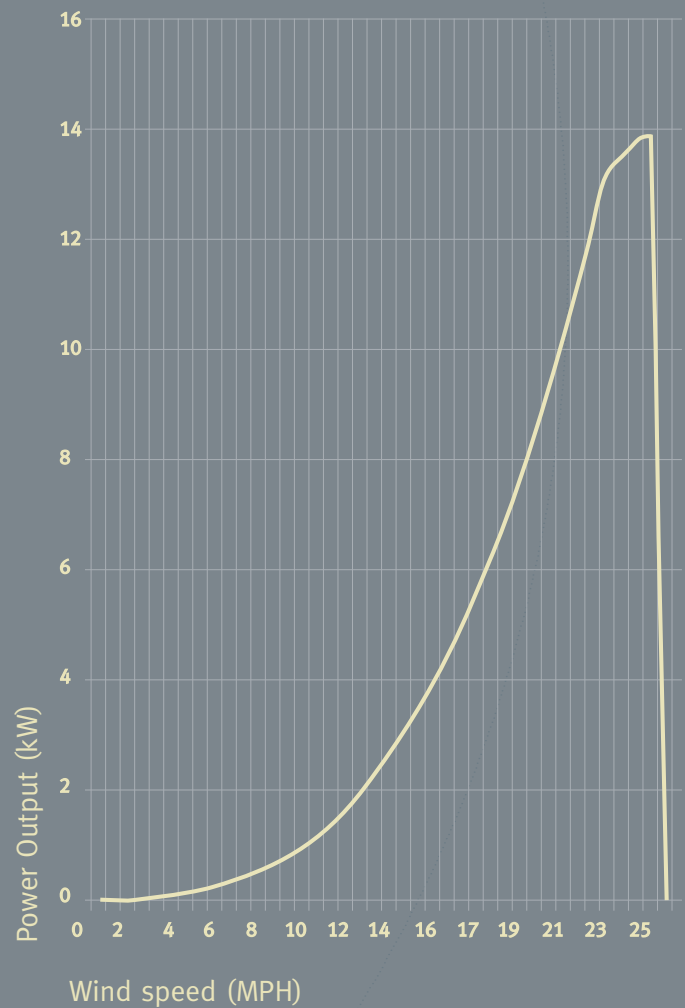


PERFORMANCE DATA

Power Curve 5kW Model



Power Curve 10kW Model



The power curves were verified by the Alternative Energy Institute, an internationally recognized testing facility at Canyon, Texas. Since 1983 The **Hummingbird** systems have been continuously field tested at the AEI facilities.

The **Hummingbird** has also been field tested at the internationally recognized “El Gavillero” testing facility by the IIE, The Electrical Research Institute, at Cuernavaca, Morelos, Mexico.

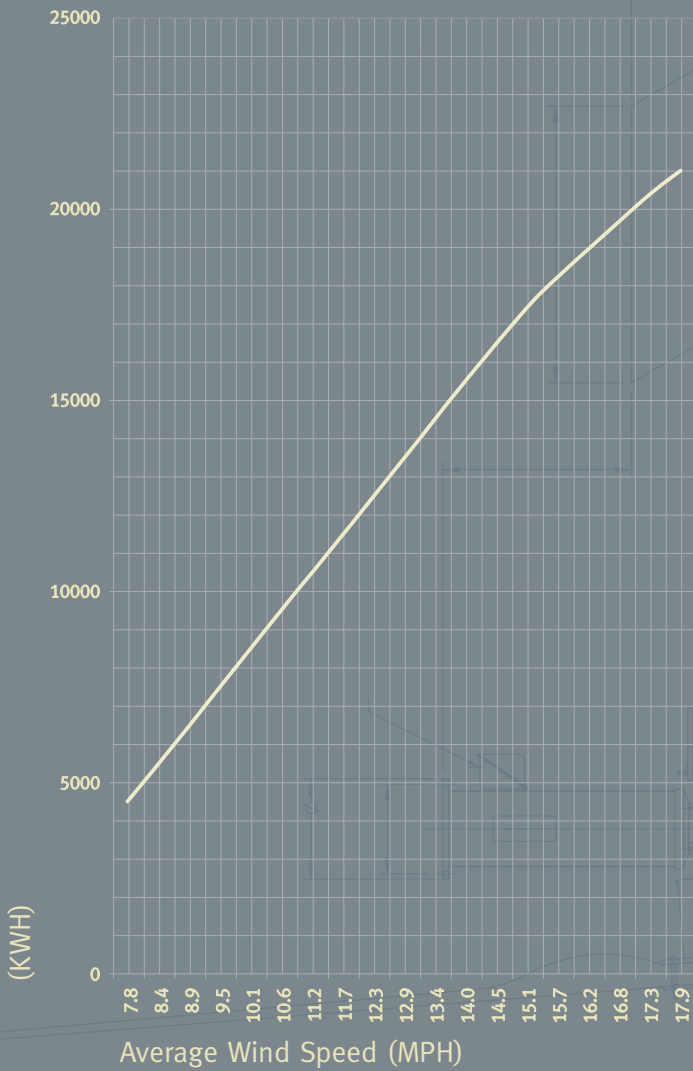




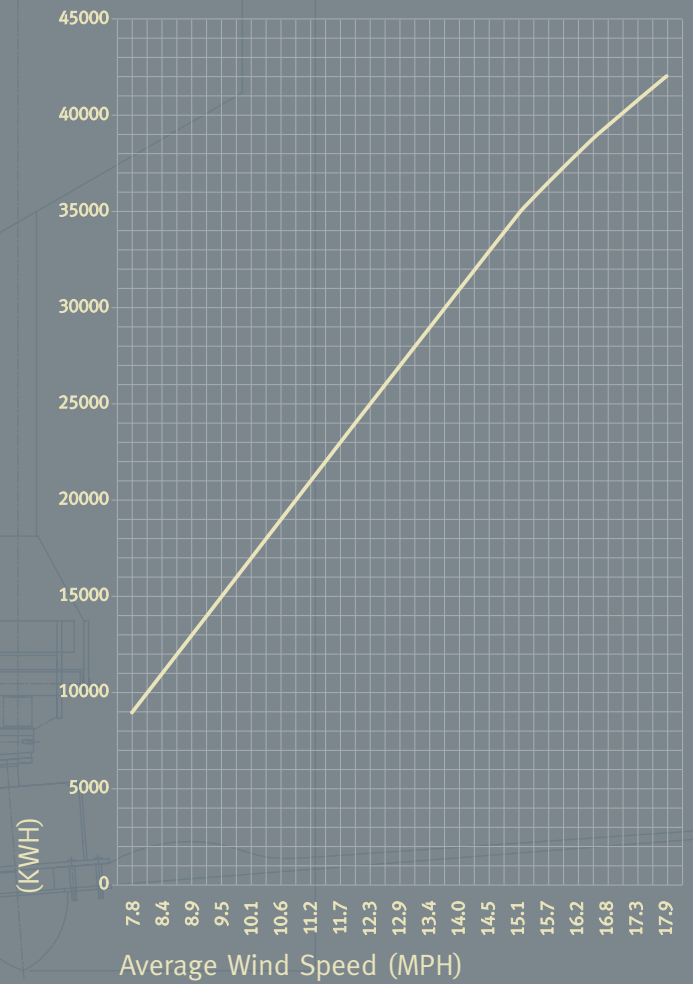
ANNUAL ENERGY OUTPUT

Assuming Raleigh wind distribution

5kW Model



10kW Model



VARIABLE	MODEL	
	5kW	10kW
START UP WIND SPEED	3m/s	
Cut-in wind speed	3.5m/s	
Cut-out wind speed	25m/s	
Rated power	5kW	10kW
Maximum power	6.5kW	14kW
Maximum wind speed	54m/s	
Design - 54m/s (120MPH)	31 m/s	
Tested above 31m/s (70MPH)		
Over speed control		
Automatic passive rotor YAW	14-25m/s (31-60MPH)	
Rated rotor speed	160-250 rpm	

- Values are adjustable depending on customer site requirements.

GENERATOR:

AC synchronous direct driven, low speed, permanent magnet, 3 phase, continuous duty. (Variable power and frequency with varying winds).

CONTROL PANEL:

REMOTE INDEPENDENT OPERATION (RIN).

- Full wave rectified DC power for battery charging.
- 110-120 Volts DC, control cut-out.

Utility tie-in (UTI).

- Full wave rectified DC power.
- Synchronous inverter.

Improving since 1973, the **Hummingbird** systems are offered as advanced developing technology.

Manufactured by **Potencia Industrial S.A.**



NECESSARY AUXILIARY EQUIPMENT:

- **Steel tower** – 60 feet minimum tower height recommended.
- **Battery bank** – for RIN model, size depends on wind and load conditions. Deep cycle type batteries recommended (not as the ones used in automobiles).
- If AC power is required with a RIN model an independent type static DC-AC inverter is required.



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Member of AWEA, The American Wind Energy Association, U.S.A.
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Member of AMDEE, The Mexican Wind Energy Association, Mexico.