



eoltec

Scirocco E5.6-6

**Best Wind Technology
for
Highest performance**

- ▶ **optimised 5.6 m rotor diameter**
- ▶ **high efficiency / low noise**
- ▶ **6.6 kW direct drive PM generator**
- ▶ **variable speed MPPT operation**
- ▶ **overspeed centrifugal stall control**
- ▶ **fully sealed design**
- ▶ **DC standalone, AC grid or direct pumping applications**

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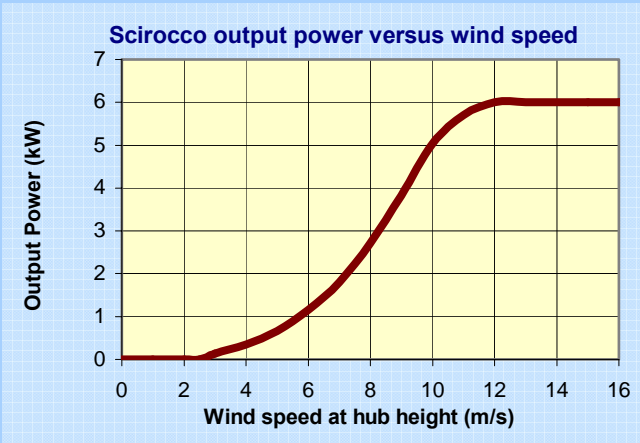
V02d – updated 01-2008

Eoltec's technology integrates all necessary features to achieve the best possible energy yield out from the wind, especially in the prevailing low and medium wind speed conditions. The variable speed concept applies maximum power point tracking controls resulting in an increased production of up to 150% compared of conventional equipment.

The direct drive generator reduces the amount of critical mechanical components, ensuring high reliability and low maintenance. The variable speed and centrifugal overspeed control drastically reduces material stress for increased lifetime and quiet operation.

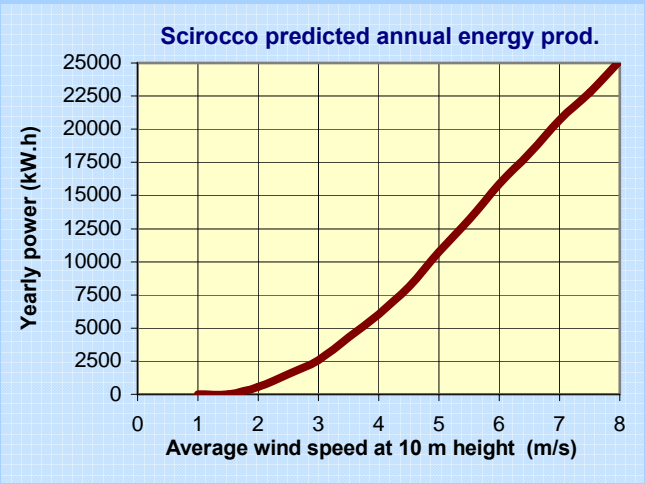
The wind turbine is connected to the AC grid through a unique AC/DC/AC inverter delivering high quality power. Other options include direct heating or battery charging (off-grid) using AC/DC converter with micro-controlled PWM technology.

Last but not least, Eoltec's Scirocco WT is designed and built without compromise, using state of the art components and in accordance to IEC 61400-2 design rules (IEC 61400-1 for class II maximum wind speed)

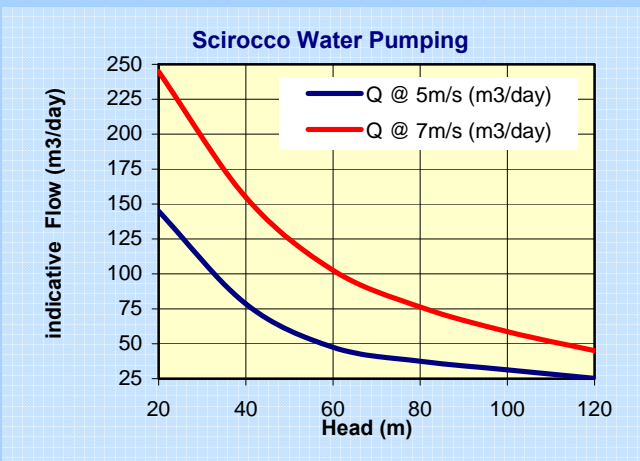


The Scirocco wind turbine is characterised by a very high efficiency in the lower to medium wind speed range which is prevailing most of the time (>80%). This is achieved through the combination of an optimised 2 blade rotor, efficient direct drive PM generator and maximum power point tracking control following the constantly varying wind speed. At high wind speeds, the WT continues to operate at its nominal output, the overspeed being controlled by the centrifugal full span stall control device. These unique features make the Scirocco unit the most powerful WT of its class.

The high availability of Scirocco WT power production makes it a reliable source of cost effective renewable energy throughout the years and weather conditions. Its superior low/medium wind performances opens new possibilities for the application of medium size wind power in distributed power production with minimal environmental impact. The various available configurations of the Scirocco WT respond to a very wide range of applications as battery charging, stand-alone AC distribution, island AC grid, public grid intertie, water pumping and direct heating. It offers a real alternative or complement to photovoltaic or diesel generation.



Assumptions for predicted energy calculation: Inland site, altitude 300m, Rayleigh distribution (k=2), 18m tower
Shear ratio 0.143 , turbulence factor 10%

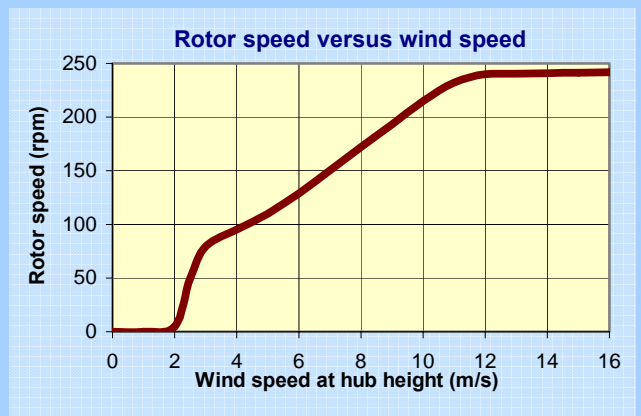


In run-of-the-wind water pumping applications, the Scirocco WT sets new standards by its direct electrical pumping concept coupled to Maximal Power Point Tracking controlled pump motor drive. Wind electric pumping permits to exploit well heads over 120m depth for drinking or irrigation water purposes. On typical remote water pumping sites with average wind speed as low as 5m/s, the Scirocco WT will saves up to 5'000 l/year of fuel, thus enabling excellent payback.

Unlike most of its competitors, Scirocco's WT rotation speed is always under control of both electronics and overspeed centrifugal device.

Due to that uncompromising design, maximum rotation speed is limited to 245rpm, involving a maximum tip speed of 70m/s. That's one of the requisites to achieve quiet running over the entire wind range, low noise, low blade wearing, low mechanical stress.

For comparison, a current competitor's 7m diam. furling WT exhibits about 400rpm nominal speed, involving a huge 145m/s tip speed.



- Scirocco E5.6-6 performances and specifications-

Performances

Rated output power : 6.0kW @ 11.5 m/s
 Cut in wind speed : 2.7 m/s
 Cut out wind speed : None
 Survival wind speed : 60 m/s (design according to IEC 61400-1, class II wind site)

Wind speed at hub height (m/s)	3	4	5	6	7	8	9	10	11
Output Power (kW)	0.140	0.343	0.665	1.16	1.81	2.71	3.82	5.05	5.70
Average wind speed (m/s @ 10m)	3	4	5	6	7	8	9		
Average power (kW)	0.30	0.69	1.23	1.81	2.38	2.87	3.29		
Daily energy production (kW.h)	7.1	16.6	29.4	43.5	57.0	69.0	78.9		
Monthly energy production (kW.h)	215	504	895	1323	1734	2098	2398		
Yearly energy production (MW.h)	2.58	6.05	10.74	15.88	20.81	25.17	28.78		

Estimated for inland site, altitude 300m, Rayleigh distribution (k=2), 18m tower, shear ratio 0.143 , turbulence factor 10%

Rotor

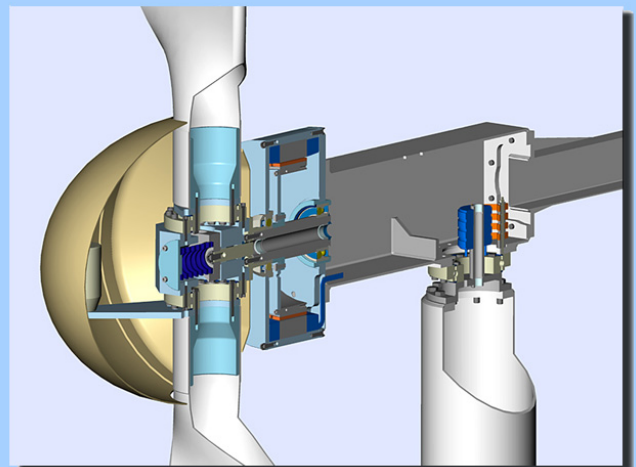
Diameter/swept area : 5.6 m / 24.7m²
 Blades : 2 fiberglass blades, AU4G aluminum root insert
 Blades bearing : 2 sealed slewing rings
 Rotational speed : 80 to 245 rpm, variable speed
 Power regulation : Full span stall control (sealed centrifugal system)
 Overspeed control : Aerodynamic full blades stalling (sealed centrifugal system)

Generator

Type : Synchronous multiple poles permanent magnets, direct drive
 Rated output power : 6.6 kW at 240 rpm
 Protection : Totally enclosed, fully sealed
 Cooling : Passive air flow

Miscellaneous

Yawing system : Passive, upwind tail (sealed slewing ring), electric rotating collector
 Power regulation : Centrifugal stall control, electronic optimal power point tracking
 Overspeed control : Aerodynamic full blades stalling (centrifugal system, pitch bearings on blade root)
 Brake : Optional remote control at tower base (forced stalling, mechanical patented system), operational on full wind speed range (0 to 60 m/s)



Weight : 202 kg (complete nacelle with rotor and generator)
Towers : 12 – 24 m (galvanized steel)
Battery charger : 48 battery bank, 6kW nominal output, PWM with μ C management technology floating mode for optimal battery charging and lifetime, optimal power point tracking
Grid inverter : 6kW nominal output grid inverter with optimal power point tracking. (230V-50 or 60hz, comply with VDE grid feeding regulations)
Maintenance : Annual inspection and lubrication