What Virogen can do for you ...

Virogen can provide a turn-key response to your project needs

- Site survey & feasibility Studies
- Planning Application
- Grid connection application
- Project management
- Civils Works
- Electrical connection
- System Installation
- Ongoing operation & maintainance
- Project financing

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RRB ENERGY V27 225KW TURBINE

Introduction

Over this past number of years we at Virogen Ltd have been researching and evaluating the Meduim Wind Turbine Market. Through this research, we have always returned back to the design of the Vestas V27 Turbine. There has been thousands of Vestas V27 Turbines installed worldwide which have a proven track record of well over 20 years active service, and an unbeaten track recordof well over 20years active service, and an unbeaten track record in avaliabilty . RRB Energy Ltd which was formely known as Vestas RRB , signed a settlement agreement allowing RRB Energy the technology and intellectual property rights with the respect to the V27 -225kw and V39 - 500kw wind turbines.

We feel that in offering this technology, it will provide the confidence that our customers are seeking when purchasing a Wind Turbine in the 225kw range. Our Business approach provides honesty , confidence of supply and after sales service. Our Optional service contracts which are avaliable, will offer fully trained engineers that will provide assurance of production of power.

Virogen

RRB Energy also manufacture the class leading V39 - 500KW Turbine

Welcome To RRB Energy

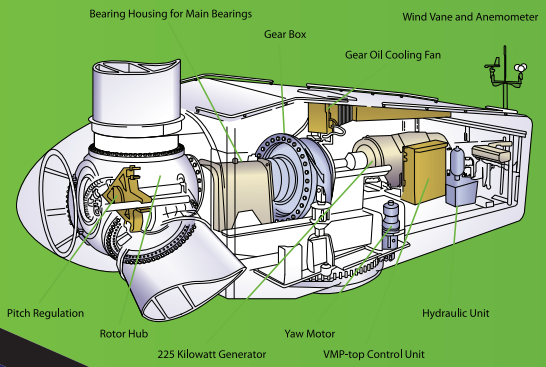
RRB Energy Ltd., formerly known as Vestas RRB India Ltd. was created in 1987 as a joint venture between RRB Consultants and Engineers Private Ltd. of India and Vestas Wind Systems A/S of Denmark. The two founding partners combined their talents and resources to develop Turbines for the Indian Market. The V27- 225kW Wind Turbine Generator with a 27m rotor diameter wasa Turbine that was utilized by Vestas/RRB for this specific market.
There have been over 700 V27-225kW Wind Turbines manufactured by RRB Energy and until recently this tried and tested Turbine has been reserved for the Domestic Indian Market. In responseto high international demand. RRB Energy has made this exceptional Turbine available in the UK in a partnership with Free Breeze Energy Systems UK.

RRB Energy Ltd. is committed to the highest levels of Quality Control and has earned Certificates from respected organizations such as Germanischer Lloyd Industrial Services GmbH, Det Norske Veritas and the Centre for Wind Energy Technology. All manufacturing and testing is performed under aggressive levels of Quality Control and procedures. ISO achievements include 9001:2000 and 14001:2004.

The Turbine

The V27 -225kw is a 225kw Wind Turbine Generator equipped with components from German Manufacturers Siemens Ltd and Jake, who supply the Generator and Gearbox respectively. RRB Energy also offer the V27 - 225KW with 29m rotor blades that provide the turbine with the V29 capability giving a swept area of 661 metre square. The main advantage of the V27 turbine over its competitors is in this output range is the blade pitch regulation which is controlled by a micro processor (VMP)

The advantages of blade pitch regulation over the older stall regulated system are better power production at lower windspeeds as well as maintaining its optimum power in higher wind speeds. Pitch regulation on the blade causes less stresses onto the turbine and would have a much higher degree of safety. should there be grid failure. This is why there is so many V27turbines in action after 20 years service.



Technical Specifications

Overall Data

Cut in wind speed	3.5 m/s
Cut out wind speed	25 m/s
Survival wind speed	56 m/s
Rotor speed	43 rpm @ 225kW 33rpm @ 50kW
Hub Height	40m / 50m
Nacelle tilt angle	4°

Gearbox

Type	Two Stage, parallel shafts
Gear Ratio	(approx) 1:23.4
No. of Steps	2

Generator

Rated power output	225kw
Type	Dual Wound Asynchronous
Voltage	400V 3 phase
Revolutions	1000 / 750 rpm
Frequency	50 Hz

Tower

Type	Tubular
Height (optional)	40m / 50m
Material	Steel

Nacelle Cover

Type	Fiber glass / reinforced polyester

Rotor

No. of Blades	3	3
Diameter	27m	29m
Swept Area	573m2	661m2

Power Regulation

Type	Pitch
	Regulated

Brake System

Aerodynamics	Full feathering of blade
Mechanical	Disc Brake
Yaw System	Slewing system with gear motors yawing

Controls

Type	Microprocessor based (vmp)