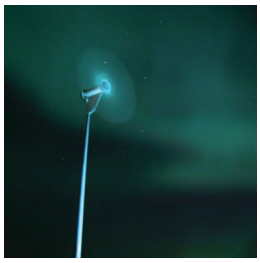
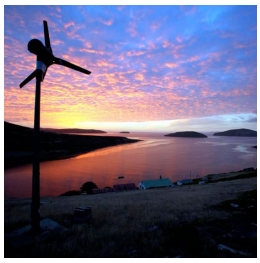
KingspanWIND

The World's Most Robust Small Scale Wind Turbines





Kingspan®
Renewables

Kingspan Renewables introduces the latest addition to the renewables portfolio – Small Scale Wind Turbines.

Climate Change is now a generally accepted fact which has increased our focus on alternative energy solutions; the introduction of Kingspan wind turbines further enhances our already impressive product portfolio which incorporates, Solar Thermal Heating and Cooling, Air Source Heat Pumps and Hot Water Storage.

Our range of Small-Scale Wind Turbines is the result of over 30 year's research, development and innovation – rigorously tested in some of the harshest and most extreme wind conditions around the globe.

Kingspan Wind turbines have been installed in over 60 countries, covering every continent and accumulating over 40 million run hours.

Our wind turbines are designed to offer energy solutions from grid tied to battery charging and direct heating systems – hybrid systems are also available which allows integrators the benefit of installing multi-technology solutions in their homes, businesses, farms and rural dwellings.

Along with manufacturing wind turbines, Kingspan Wind has a specialist team and portfolio of services for end-users and accredited installers alike, offering the complete package from site assessment, system design through to installation, commissioning and on-going turbine servicing packages.

Why Kingspan Wind?

Kingspan Wind's sole focus is the delivery of market leading technologies, solutions and customer service.

Our product range is designed to international standards, which is demonstrated in our global fleet of market leading products as well as our Accredited Installer networks who are certified to industry standards, offering a 'best in class' service to customers the world over.

With Kingspan Wind, customer benefits include:

- Market Leading wind energy products
- Independently tested and certified technology*
- 5 Year product warranty (parts & labour)
- Installation Warranty**
- Full range of tower size options
- Industry Certified Installers (MCS or equivalent)
- Site Assessment & Feasibility
- System Design
- Planning Permission Support
- Grid Connection Support
- Installation & Commissioning
- Turbine Servicing Contracts
- In-house Customer Service

*refers to KW6 turbine system **offered from Accredited Installers

Product Overview

Unique Over-Speed Protection System

The regulation system consists of two mechanisms:

1. **Centrifugally regulated 'base hinge' which sets the base pitch of the blade**
2. **A 'coning hinge'** (delta-3 hinge)

As the wind turbine increases its rotational speed (RPM) the centrifugal forces created by the blade tensions the hinge. The hinge position is regulated by damper springs. The more the blade pulls on the hinge the further it pitches towards stall. At a certain point the turbine reaches equilibrium – rotating fast enough to keep the hinge pulled into stall but stalled enough not to speed up any further.

The blade coning reduces any stresses on the rotor (blades adjust themselves) and smoothes the turbine's response to gusty conditions. It also decreases the load on the turbine by decreasing its rotor disc size in very high winds. This is only the peak power regulation; at all times when the turbine is connected to the grid the RPM is also regulated by the amount of load applied by an inverter (power taken from the generator).

This unique design ensures continued generation in all wind speeds, unlike alternative wind turbines on the market which are require to brake themselves in high wind conditions.

Accredited Installers

Kingspan wind turbines are supplied and installed via a network of Accredited Installers - all of whom are carefully selected wind professionals who offer the complete range of services.

- Desktop Surveys
- Site Assessment
- Project Feasibility
- System Design
- Planning Support
- Grid Connection Support
- Procurement & Ground-Works
- Installation & Commissioning
- Servicing & Maintenance
- Certified to Industry Standards
- Individually trained and approved by the Kingspan Wind team

Kingspan Wind Accredited Installer

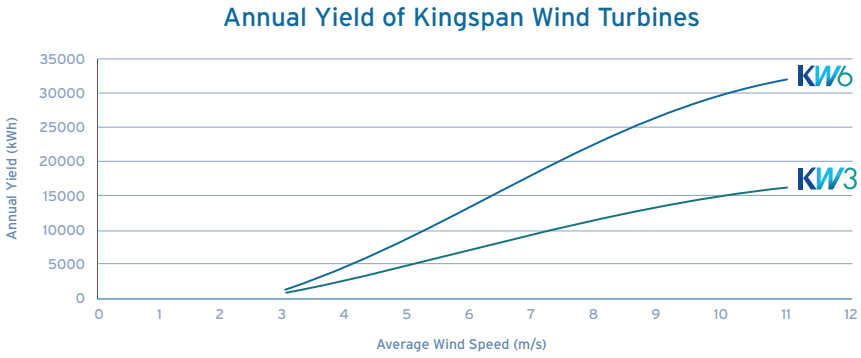
Please email **info@kingspanwind.com** to find your nearest installer.

Product Specification

	KW6	KW3
Rated Power	5.2kW (1min average at 11m/s)	2.5kW
Peak Power	6.1kW	3.2kW
Reference Annual Energy (RAE)*	8,949 kWh	4,700kWh at 5m/s
Applications	Rural Domestic, Small Holding, Agricultural, Commercial, Telecoms, Public Sector, Remote Islands	Telecoms, Rural Domestic, Off-Shore Oil Platforms
Solutions	Grid Tied, Battery Charging, 48V DC - 300V DC, Direct Heating	Grid Tied, Battery Charging, 24V DC,
Voltages Available	48V DC / 300V DC	48V DC - 300V DC
Grid connection options	Single / Dual / Three phase	Single / Dual / Three phase Downwind, 3 bladed, Self
Architecture	Downwind, 3 Bladed, Self Regulating	Regulating
Rotor	5.6m diameter, 200RPM at Rated Power. Thrust 10kN	3.8m diameter, 300RPM at Rated Power. Thrust 5 kN
Blade Material	Glass Thermoplastic Composite	Glass Thermoplastic Composite / Polypropylene
Generator Type	Brushless Direct Drive Permanent Magnet	Brushless Direct Drive Permanent Magnet.
Tower Heights	9m / 11.6m / 15m / 20m (Flange Bolted / Taper Fit Monopole - Hydraulic options available)	6.5m/11m (Flange Bolted/Taper Fit Monopole - Hydraulic options available)
Foundation Options	Pad / Root / Rock Anchor options	Pad/Root/Rock Anchor options
Cut In Speed	3.5 m/s	3m/s
Cut Out Speed	None - continuous operation	None - Continuous operation
Survival Wind Speed	Designed to Class 1 (70m/s) Independently tested to Class 2 (59.5m/s)	Designed to Class 1 (70m/s)
Warranty	5 year standard	5 year standard
Cold Climate Options	Available on request	Available on request

* RAE is annual energy production at 5m /s measured at 10m hub height.

Annual Energy Production



The AEP Curve (Annual Energy Production) demonstrates the energy the turbines will generate on sites with the wind speeds indicated. The ability to calculate kWh per annum allows for estimations of financial viability and payback. Energy performance estimates are based upon a standardised method using publicly available information. It is given as guidance only. Performance of wind turbine systems varies from location to location and from year to year. Your chosen installer will advise of site specific performance characteristics.

Based on a 9m Tower, 9m Anemometer Height,
Ambient Temperature of 15deg C, Rayleigh Wind Speed Distribution

KW3EX

Off-shore Turbines

The KW3EX turbine is based on the KW3, but is optimised for the harsh environment experienced off-shore.

Developed for use in the North Sea, it has been installed for several years on un-manned gas platforms. The unique design works at safe operating temperatures and will not generate sparks, even in environments where there are highly flammable materials.

The KW3EX is the only turbine of this kind in the world.

Case Studies

Smallholding

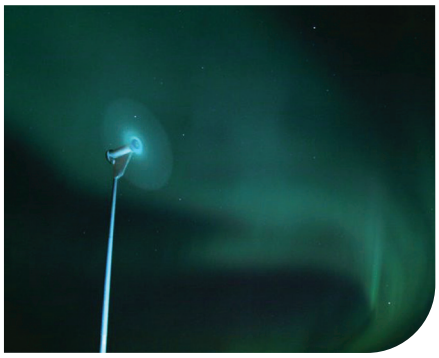
- Ripponden, West Yorkshire
- Two KW6 Kingspan Wind turbines
- Application: To provide off-grid electricity and hot water

Installers and engineers of small wind turbines Eagle Power Energy are so impressed by the capabilities of the KW6 model that the company has installed two turbines at its own offices at a Yorkshire smallholding. The turbines generate up to 27,000 kWh annually – meeting up to 90% of the offices' electricity requirements. They also feed into a unique divert system that provides hot water and central heating, meeting around 70% of hot water requirements and delivering savings of up to £3,000 each year.

Community Project

- Island of Westray, Orkney
- Five KW6 Kingspan Wind turbines installed by local cooperative Orkney Business Ring Renewables at two nearby sites
- Application: To help eradicate fuel poverty on island of Westray and contribute to the island's ambition to provide 100% of its energy requirements from Renewables by 2012

Local community organisation Energy Action Westray secured funding to set up Energy Cooperative Care4Energy and installed five KW6 wind turbines to generate a new income stream from Feed-In Tariff (FiT) payments. The income is being used to help aid the fuel poor on the island of Westray. The wind croft is generating approximately 85,000 kWh of renewable energy each year with a net annual income of around £25k, which is being used to provide local residents in fuel poverty with energy saving and renewable energy measures for their homes, such as insulation and renewable heating.



Cold Climate

- Nikiski, Alaska
- KW6 Kingspan Wind turbine
- Application: To power a grid-connected home and combat high energy costs

Resident Bill Lynch wanted to find a renewable energy source to significantly cut energy bills and power his grid-connected home. Despite a low average annual wind speed, his site sees sporadic large wind storms and heavy gusts. Bill needed a robust system that could harvest these winds and generate an abundance of energy. The KW6 turbine was the perfect choice, providing uninterrupted optimum performance even in the fiercest of storms.

Telecoms

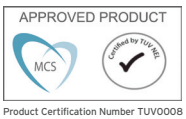
- The Falkland Islands
- Single and double KW3 turbines deployed in remote areas around the Falkland Islands
- Application: To provide a reliable, cost-effective and environmentally sound power source for the Cable & Wireless telephone network covering the rural community

The KW3 Kingspan Wind turbine is a key component of the upgraded Cable & Wireless telephone and broadband network serving the rural community on the Falkland Islands. A series of KW3 turbines are operating at remote sites across the islands to provide charging current for the telecoms equipment. The turbines were chosen for their durability, making them able to cope with the strong south westerly winds and frequent gales. They also require minimum maintenance (a significant benefit for remote locations).

Agricultural Business

- Sparth Top Cottage, Holmfirth
- KW6 turbine installed by Yorkshire installer Eagle Power Energy
- Application: To generate renewable electricity and offset CO^2 emissions at a rural smallholding business

Since its installation in 2007 by Eagle Power Energy, the KW6 turbine at Sparth Top Cottage has generated some 77,000 kWh from an average wind speed of 6.1m/s. As a result, the grid-tied smallholding has benefited from annual savings of around £1,000 on electricity bills – offsetting 43.3 tonnes of carbon in the process.



Product Certification Number TUV0008

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