

Vestas[®]

V236-15.0 MW[™]

Wind. It means the world to us.[™]

Determined to lead **offshore** **wind** forward

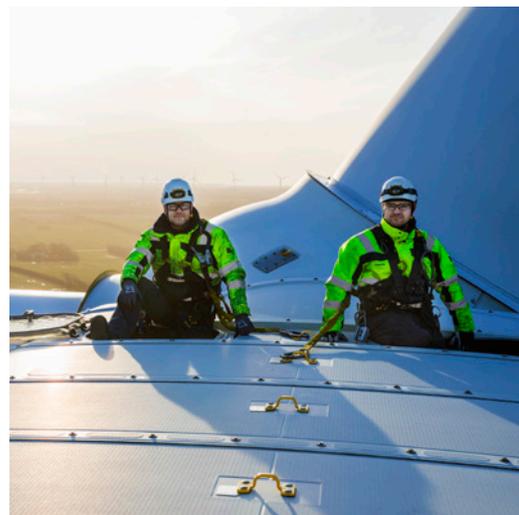
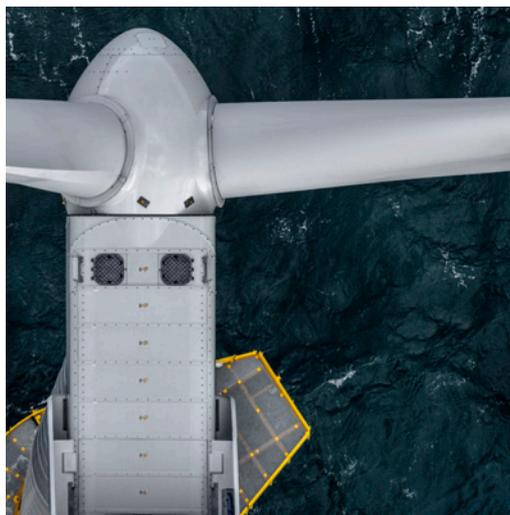
We are driven by an ambition to power the clean energy future of our world. Offshore wind is pivotal to hitting that target. So we have been busy innovating, for the future of our industry and the future of our world.

The V236-15.0 MW™ is the culmination of that innovation. World-class technology shaped by industry-leading experience, onshore and offshore. It is built for a ground-breaking world: efficiently designed, globally applicable and engineered for peak performance. It is Vestas powering the future.

A strong foundation

We are battle-hardened. Over 40 years of turbine development expertise and over 25 years delivering projects offshore has given us some hard-earned lessons. Together with our partners,

we have installed and maintained turbines in frozen tundras, in tropical trade winds, and in tsunami-stricken waters. From the installment of 500 kW turbines at Tunoe Knob in 1995 to the 9 MW platform turbines in operation today, we have been pushing boundaries offshore for more than 25 years. This experience has enabled us to hand-pick what works. It takes experience to know, and our lessons learned are fused into the core of Vestas' next-generation offshore platform.





We've
installed
over 5 GW
of turbines,
offshore.

Introducing the **V236-15.0 MW™**

Advanced platform based on proven system designs

The V236-15.0 MW™ is built on proven, world-class technology. Drawing the best from our EnVentus and 9 MW platforms, the V236-15.0 MW™ is a continuation of proven results. Advanced system designs, such as our efficient geared drivetrain, our CubePower converter, and our Control System 8000, are integrated and optimised for our next-generation offshore platform. Due to the common technical design principles, V236-15.0 MW™ benefits directly from accumulated experience, development and scale synergies of the onshore and offshore business.

Designed for competitive project development

We are collaborative by nature, working with partners to offer a turbine made for the realities of project development, where every component matters. V236-15.0 MW™ is configured to strike the balance between energy production performance and number of turbines required at park level, while utilising advanced control and damping systems to optimise foundation requirements. The gearbox-based drivetrain offers a balanced, scalable, and efficient technology platform from which to enable the future growth of offshore wind.

Leading energy production at scale

Powered by the industry's largest swept area of 43,742 m², the V236-15.0 MW™ moves the boundaries of offshore wind energy production forward. A single turbine is capable of producing up

to 80GWh/year depending on site-specific conditions, enough energy for over 20,000 households. The 115.5m blades drive a capacity factor of over 60%, ensuring that fewer turbines enable greater annual energy production than ever before. Globally applicable, the turbine is designed for high wind conditions and rated to withstand IEC 1 extreme wind conditions up to 50 m/s and IEC T up to 57 m/s. A 13.6 MW operational mode is also available if required for project optimisation.

Safe and certain throughout project lifetimes

Vestas' rigorous testing standards guides the development of all of our turbines. The V236-15.0 MW™ is subject to the same stringent testing protocol. The V236-15.0 MW™ has a design lifetime of 25 years with the option to extend depending on project specific conditions. Strict quality control and life testing processes identify potential failure modes and mechanisms before they occur. The nacelle is ergonomically designed to make it easier for maintenance crews to gain access, reducing time spent offshore on service while maximising turbine uptime. Our understanding of service needs, including in nascent segments such as floating offshore wind, has informed our design of the V236-15.0 MW™.

Vestas offshore portfolio

V236-15.0 MW™ expands the existing Vestas offshore portfolio of turbines, increasing the ability to optimise for project specific conditions

	V117-4.2 MW™	V164-9.5 MW™	V164-10.0 MW™	V174-9.5 MW™
POWER REGULATION	Pitch regulated with variable speed	Pitch regulated with variable speed	Pitch regulated with variable speed	Pitch regulated with variable speed
OPERATING DATA				
Rated power	4,000/4,200 kW	9,500 kW	10,000 kW	9,500 kW
Cut-in wind speed	3 m/s	3 m/s	3 m/s	3 m/s
Cut-out wind speed	25 m/s	25 m/s	25 m/s	25 m/s
Wind class	IEC IB-T/IEC IIA-T/IEC S-T	IEC S	IEC S or S,T	IEC IB or IB,T adapted to offshore conditions
Standard operating temperature range	from -20°C to +45°C* with a de-rating from above 30°C <small>*high ambient temperature variant available</small>	from -15°C to +25°C with a de-rating interval from +25°C to +35°C <small>*high ambient temperature variant available</small>	from -15°C to +25°C* with a de-rating interval from +25°C to +35°C <small>*high ambient temperature variant available</small>	from -15°C to +25°C* with a de-rating interval from +25°C to +35°C <small>*high ambient temperature variant available</small>
SOUND POWER Maximun	106 dB <small>Sound Optimised Modes dependent on site and country</small>	112.9 dB(A)	112.9 dB(A)	112.9 dB(A)
ROTOR				
Rotor diameter	117 m	164 m	164 m	174 m
Swept area	10,751 m ²	21,124 m ²	21,124m ²	10,751 m ²
Aerodynamic brake	full blade feathering with three pitch cylinders	three blades full feathering	three blades full feathering	three blades full feathering
ELECTRICAL				
Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Converter	full scale	full scale	full scale	full scale
GEARBOX				
Type	two planetary stages and one helical stage	medium speed	Medium speed	medium speed
TOWER				
Hub heights	84 m (IEC IIA) and 91.5 m (IEC IB)	site-specific	site-specific	site-specific

*Depending on site specific conditions

V236-15.0 MW™

Facts & figures

POWER REGULATION

Pitch regulated with variable speed

OPERATING DATA

Rated power	15,000 kW
Cut-in wind speed	3 m/s
Cut-out wind speed	30 m/s
Wind class	IEC S or S,T
Standard operating temperature range	from -15°C to +25°C* with a de-rating interval from +25°C to +45°C

*high ambient temperature variant available

SOUND POWER

Maximum 118dB(A)

ROTOR

Rotor diameter	236 m
Swept area	43,742 m ²
Aerodynamic brake	three blades full feathering

ELECTRICAL

Frequency	50/60Hz
Converter	full scale

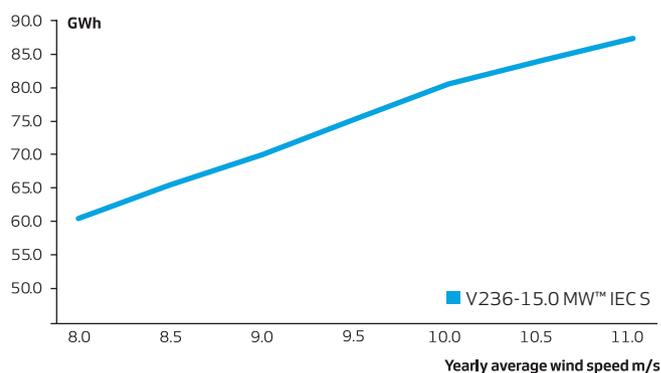
GEARBOX

Type three planetary stages

TOWER

Hub height site-specific

ANNUAL ENERGY PRODUCTION



Assumptions

One wind turbine, 100% availability, 0% losses, k factor = 2, Standard air density = 1.225, wind speed at hub height

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