

V90-3.0 MW

Exceptional performance and
reliability at high-wind-speed sites



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Vestas





WE DELIVER
ON THE PROMISE
OF WIND POWER



SUPERIOR YIELD AT HIGH-WIND-SPEED SITES

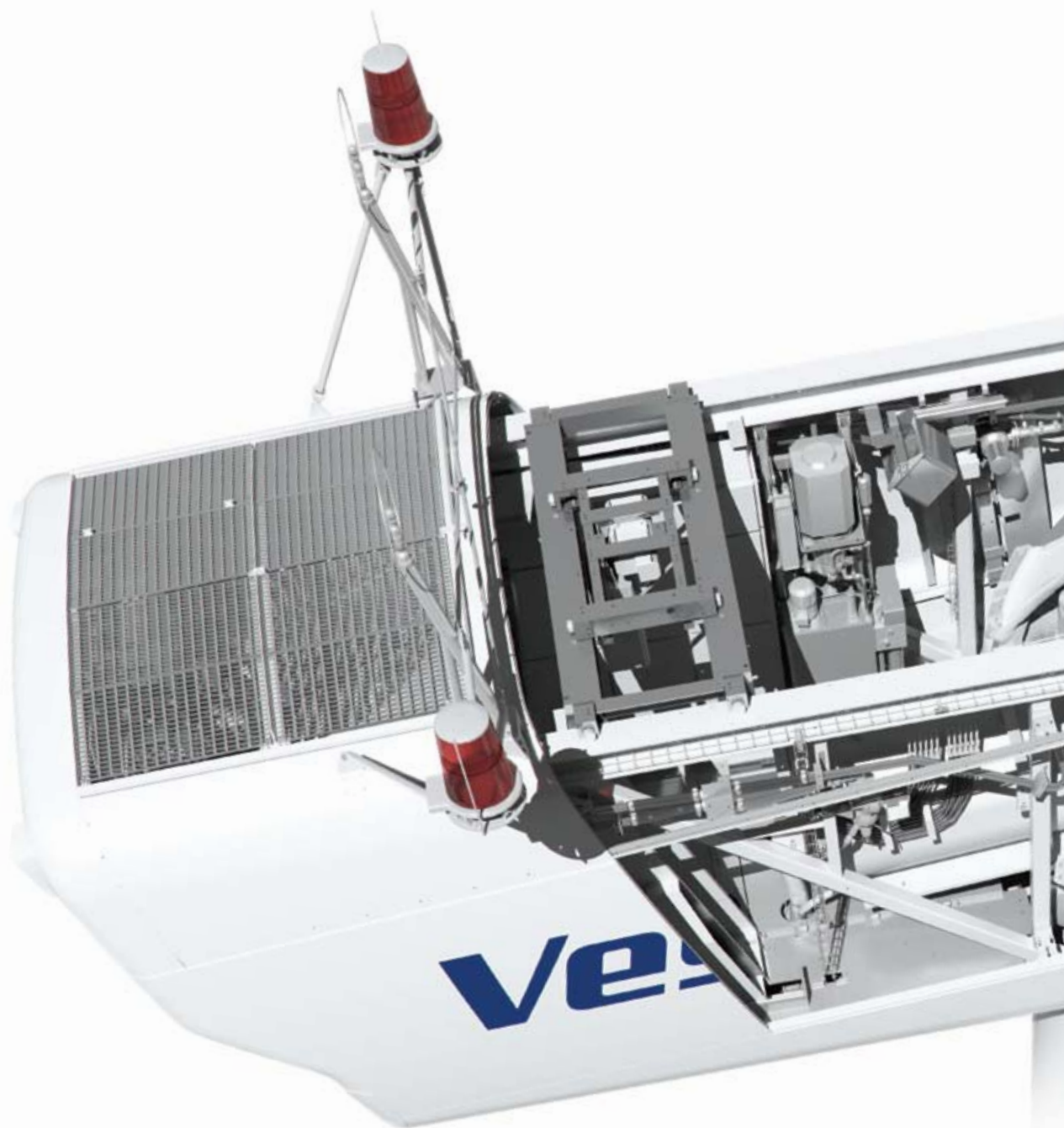
High standards for weight and performance

The V90-3.0 MW is a compact, high-performance turbine designed to deliver optimal yield at high-wind-speed sites (IEC IA) and medium-wind-speed sites (IEC IIA).

Designed for both onshore and offshore sites, it's built on a well-tested and reliable design platform – and few other turbines can match it when it comes to performance.

Thanks to its light-weight tower and blades, along with the high-efficiency integrated drive train, the V90-3.0 MW sets the standard for low-weight performance.

The market has responded very favourably, and Vestas has installed more than 1,100 V90-3.0 MW turbines since the launch in 2003.



GROUNDBREAKING DESIGN AND EASY MAINTENANCE

3x44 meters of cutting edge

The V90-3.0 MW features revolutionary blades that are made from carbon fibre and other lightweight materials. Even though these blades sweep a 27% greater area than V80 blades, their weight is virtually the same. What's more, the shape of the blades has been refined to deliver the greatest possible output while minimising the load on the turbine.

The shape also makes these blades less sensitive to dirt, providing better performance at sites affected by salt, insects or other particles in the air.

Innovative solutions for lubrication

The V90-3.0 MW offers a number of features that boost reliability and serviceability, including innovative solutions for lubricating key components such as the blade-bearing system and the yaw system.



Safety first and easy maintenance

Like all Vestas turbines, the V90-3.0 MW is designed for safe, convenient installation and maintenance. The improved nacelle design leaves more space in the nacelle, where rotating parts are shielded, and all components are positioned to minimise service time and manpower.

Service and maintenance can be carried out using standard tools and equipment, but Vestas has also developed special equipment and methods that reduce service time and costs.

Next-generation control system

The V90-3.0 MW is equipped with the latest turbine control and operation software, a state-of-the-art modular software platform developed to run the next generation of Vestas turbines. This software ensures reliable, automatic management of the V90-3.0 MW around the clock.

The Vestas service department also uses this software for monitoring the wind turbines and troubleshooting problems on site and remotely.

THOROUGHLY TESTED TO ENSURE HIGH AVAILABILITY

Thoroughly tested technology ensures stable revenue

The V90-3.0 MW features a rugged 6-gear yaw system and a 50 Hz/60 Hz 4-pole asynchronous generator. But what really sets this turbine apart is the well-tested integrated drive train, which eliminates the need for a traditional main shaft.

Finally, the V90-3.0 MW is designed around a large number of standard components that several suppliers can provide.

Flexible grid integration and stable output

Vestas turbines such as the V90-3.0 MW are designed to make your wind power plant fully compliant with applicable grid codes at the point of common coupling.

How this is achieved may differ from country to country, but in general, our advanced grid compliance system provides active and reactive power regulation, frequency regulation and fault ride-through capabilities to support grid levels and stability in the event of disturbances.

Can be installed virtually anywhere

The V90-3.0 MW is designed for fast, easy transport by truck, barge or rail to virtually any site in the world.

The weight, height and width of all components are designed to accommodate local and international transport limits.



OPTIONS AND ADVANTAGES FOR A PROFITABLE PLANT

Special options

The V90-3.0 MW is available with a number of special options that can be ordered as desired. These options include:

- Condition monitoring system
- VestasOnline®, Compact or Business
- Switchgear
- Aviation markings on the blades
- Aviation lights
- Company logo
- Ice detection system
- Low temperature package allowing operation in temperatures as low as -30°C.

Towering advantages

When we designed the tower for the V90-3.0 MW, we invented a completely new turbine tower design. One new approach was to fasten components such as ladders to the tower wall using magnets instead of weldings.

We also use stronger steel and have reduced the weight considerably, while also reducing fatigue and extreme loads.

Project management for effective plants

The better your turbines fit your wind site, the more profitable your plant will be. That's why Vestas offers to take on project management from the initial wind measurements to complete installation of the wind power plant.

More than 30 years of international experience and local expertise enable us to complete:

- Wind and site studies
- Designing the wind power project
- Selecting wind turbine types
- Installing the wind farm
- Servicing and maintenance throughout the turbine's service life
- Monitoring and remote troubleshooting





VESTAS TAKES CARE OF YOUR INVESTMENT ROUND THE CLOCK

Verified component lifetime

At our Vestas Technology R&D testing centres, engineering experts and technicians use state-of-the-art testing methods to ensure that all components and systems meet our standards for safety, performance and reliability throughout the turbine's 20-year service life.

These tests push the components beyond their specifications. One method is known as Highly Accelerated Life Testing, where some of the testing is conducted in a HALT chamber. Extreme fluctuations in temperatures combined with heavy vibrations is just one of the stress tests the components are subjected to

here. This enables Vestas to eliminate design flaws long before the turbines reach the market.

Surveillance 24/7/365

Our surveillance services are manned 24/7 all year round to provide real-time surveillance, remote troubleshooting and other services. These services can also detect potential errors and disruptions before they occur, as data from your turbines is gathered and analysed. This enables us to prepare a plan for preventative maintenance, saving you from unexpected production stops and costly downtime.



Vestas has service centres around the globe and we are able to cover your every need, from simple cleaning and planned maintenance to emergency call-outs and on-site inventories customised for your turbines.

Asset management and operation risk mitigation

Your wind turbines have to be maintained with great care to avoid exposing your investment to unnecessary risks. And that is exactly what Active Output Management (AOM) is designed to ensure – that you get the greatest possible return on your investment in a Vestas wind turbine.

AOM provides a number of advantages, such as detailed plans for service and maintenance, online monitoring, optimization and troubleshooting, and a competitive insurance optimisation.

We even offer a full availability guarantee, where Vestas pays compensation if the turbine fails to meet the agreed availability targets.

TECHNICAL DATA FOR V90-3.0 MW

Power regulation	pitch regulated with variable speed
Operating data	
Rated power	3,000 kW
Cut-in wind speed	3.5 m/s
Rated wind speed	15 m/s
Cut-out wind speed	25 m/s
Wind Class - IEC	IEC IA (high wind) and IEC IIA (medium wind)
Operating temperature range	standard range -20°C to 40°C. low temperature option -30°C to 40°C
Sound power (10 m above ground, hub height 80 m, standard air density 1,225 kg/m ³)	
4 m/s	97.9 dB(A)
5 m/s	100.9 dB(A)
6 m/s	104.2 dB(A)
7 m/s	106.1 dB(A)
8 m/s	107.0 dB(A)
9 m/s	106.9 dB(A)
Rotor	
Rotor diameter	90 m
Swept area	6,362 m ²
Nominal revolutions	16.1 rpm
Operational interval	8.6 - 18.4 rpm
Air brake	full blade feathering with three pitch cylinders
Tower	
Type	tubular steel tower
Hub heights	80 m and 90 m (IEC IA) 105 m (IEC IIA)
Electrical	
Frequency	50 Hz/60 Hz
Generator type	4-pole asynchronous with variable speed
Gearbox	
Type	two planetary stages and one helical stage

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Main dimensions

Blade

Length	44 m
Max. chord	3.5 m
Weight	6,700 kg

Nacelle

Height for transport	4 m
Length	9.65 m
Width	3.65 m (3.85 m installed)
Weight	70 metric tonnes

Hub incl. nose cone

Diameter	3.6 m
Max. width	4.2 m
Length	4.4 m
Weight	22 metric tonnes

Tower

80 m (IEC IA)

Weight (50 Hz)	145 metric tonnes
Weight (60 Hz)	155 metric tonnes

90 m (IEC IA)

Weight (50 Hz)	205 metric tonnes
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105 m (IEC IIA)

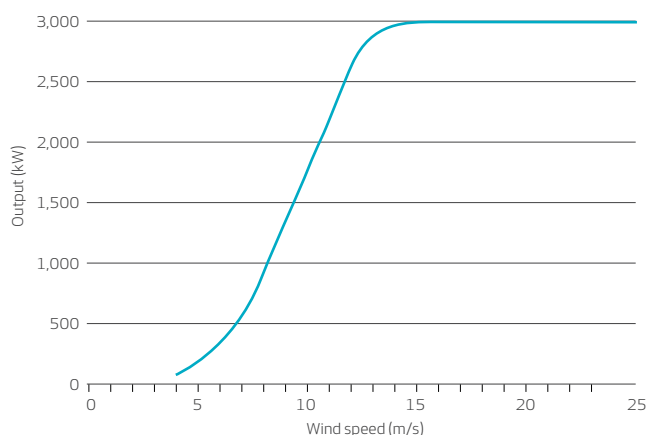
Weight (50 Hz/60 Hz)	255 metric tonnes
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Offshore

site specific towers

Power curve V90-3.0 MW

Noise reduced sound power modes are available.



No. 1 in Modern Energy

The world needs ever-greater supplies of clean, sustainable energy. Modern energy that promotes sustainable development and greater prosperity for all our planet's inhabitants. Vestas wind turbines are already generating more than 60 million MWh of electricity every year – enough to power all of Spain, for example - and we are ready to go even further.

After more than 30 years, Vestas continues to pioneer the wind energy business, with technological breakthroughs that have transformed our industry. The V90-3.0 MW turbine is an important step forward for modern energy.



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