V47-660 kW
Pitch regulated wind turbine with OptiTip® and OptiSlip®
One or two generators

The standard V47-660 kW is delivered with a single generator, which is highly efficient in the vast majority of wind conditions. A two-generator version is also available, containing a second, smaller generator for use in wind speeds as low as 7 m/s. The result is a lower sound level where it is most needed, as well as more efficient exploitation of modest wind conditions.

Optimal pitch with OptiTip®

As with all other Vestas turbines, the V47-660 kW turbine is equipped with microprocessor-controlled OptiTip® pitch regulation, ensuring continuous and optimal adjustment of the angles of the blades in relation to the prevailing wind. The OptiTip® system makes it possible to find the best solution to the often contradictory requirements for high output and low sound levels, depending on the location.

OptiSlip®

The V47-660 kW turbine features the unique generator principle OptiSlip®, which allows both the rotor and the generator to vary their RPM by up to 10% to cope with violent gusts of wind. In addition to reducing the load on various parts of the turbine, the OptiSlip® system also ensures an appreciably better power quality.

Lightning protection

The V47-660 kW turbine is equipped with Vestas Lightning Protection, to protect the entire turbine from the tips of the blades to the foundation.

Flexible blades

Vestas always measures and tests all new products down to the smallest detail before releasing them to the market. The flexible blades underwent a 6-month dynamic distortion test under extreme loads – more than they would normally be exposed to in their 20-year service lives. The maximum loads and outward distortion of the blades were then checked in a static test. The blades passed all the tests and now make an appreciable contribution to the efficient production of the V47-660 kW turbine.

Proven Performance

We spend many months testing and documenting the performance of the Vestas turbines. When we are finally satisfied, we run one last check by allowing an independent organisation to verify the results. This is standard practice at Vestas – a procedure we call Proven Performance. It is our guarantee that your Vestas turbine meets the very highest requirements for energy production, availability factor, power quality and sound levels.
1. Blade
2. Blade hub
3. Blade bearing
4. Main shaft
5. Secondary generator (V47-660/200 kW)
6. Gearbox
7. Disc brake
8. Oil cooler
9. Cardan shaft
10. Primary generator
11. Service crane
12. Pitch cylinder
13. Machine foundation
14. Tower
15. Yaw control
16. Gear tie rod
17. Yaw ring
18. Yaw gears
19. VMP top control unit
20. Hydraulic unit
### Rotor

<table>
<thead>
<tr>
<th>V47-660 kW</th>
<th>V47-660/200 kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter: 47 m</td>
<td>47 m</td>
</tr>
<tr>
<td>Area swept: 1,735 m²</td>
<td>1,735 m²</td>
</tr>
<tr>
<td>Revolution speed: 28.5</td>
<td>26/20</td>
</tr>
<tr>
<td>Number of blades: 3</td>
<td>3</td>
</tr>
<tr>
<td>Power regulation: Pitch/OptiSlip®</td>
<td>Pitch/OptiSlip®</td>
</tr>
<tr>
<td>Air brake: Feathered</td>
<td>Feathered</td>
</tr>
</tbody>
</table>

### Tower

| Hub height (approx.): 40 - 45 - 50 - 55 m | 40 - 45 - 50 - 55 - 60 - 65 m |

### Operational data

| Cut-in wind speed: 4 m/s | 4 m/s |
| Nominal wind speed (660 kW): 15 m/s | 16 m/s |
| Stop wind speed: 25 m/s | 25 m/s |

### Generator

| Large generator: Asynchronous | Asynchronous |
| Nominal output: 660 kW | 660 kW |
| Operational data: 50/60 Hz | 50 Hz |
| 690 V | 690 V |
| 1,515–1,650 rpm | 1,515–1,650 rpm |
| 1,818–1,980 rpm | |
| Small generator: Asynchronous | |
| Nominal output: 200 kW | |
| Operational data: 50 Hz | |
| 690 V | |
| 1,500–1,516 rpm | |

### Gearbox

| Type: Planet /parallel axles | Planet /parallel axles |

### Control

| Type: Microprocessor-based control of all turbine functions with the option of remote monitoring, OptiSlip® output regulation and OptiTip® pitch regulation of the blades. |

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**OptiSlip®** allows the revolution speeds of both the rotor and the generator to vary by approx. 10%. This reduces both unwanted fluctuations in the grid supply and the loads on the vital parts of the construction.

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### V47-660 kW power curves

**Air density 1.225 kg/m³**

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If you stand next to one of these turbines and look up, it is tempting to think that the V47-660 kW model must be the largest turbine Vestas has ever built. It is not, although it is no more than a few years since this turbine was launched as the Vestas flagship.

A genuine innovation when it was introduced in 1997, the V47-660 kW blade design set new standards, but the turbine as a whole, with its futuristic design and innovative technology, became a model for the giant turbines that have since begun to roll off the production lines.

Today, the V47-660 kW model remains a popular turbine that exploits the power of the wind reliably and efficiently. Turbines of this model currently operate in locations as diverse as New Zealand, California, Spain, Germany and South Korea – and in many other places where there is a demand for profitable wind power.
Contact

Subsidiaries

Vestas - Danish Wind Technology A/S
Smed Sørensens Vej 1
0950 Ringkøbing
Denmark
Tel. +45 96 75 25 75
Fax +45 97 30 62 50
vestas-dwt@vestas.com

Vestas - Scandinavian Wind Technology A/S
Smed Sørensens Vej 1
0950 Ringkøbing
Denmark
Tel. +45 96 75 25 75
Fax +45 97 30 62 64
vestas-swt@vestas.com

Vestas - International Wind Technology A/S
Smed Sørensens Vej 1
0950 Ringkøbing
Denmark
Tel. +45 96 75 25 75
Fax +45 97 30 62 25
vestas-int@vestas.com

Vestas - American Wind Technology, Inc.
111 SW Columbia Street, Suite 480
Portland, OR 97201
USA
Tel. +1 503 327 2000
Fax +1 503 327 2001
vestas-awt@vestas-awt.com

Vestas Deutschland GmbH
Otto-Hahn-Strasse 2 - 4
2813 Husum/Nordsee
Germany
Tel. +49 4841 971 0
Fax +49 4841 971 360
vestas@vestas.de

Vestasvind Svenska AB
Åkarevägen 17
31352 Falkenberg
Sweden
Tel. +46 346 713500
Fax +46 346 713525
info@vestasvind.se

Vestas - Nederland Windtechnologie B.V.
Dr. Langemijerweg 1 a
Postbus 63 · 6990 AB Rheden
The Netherlands
Tel. +31 264971500
Fax +31 264971555
vestas@vestas.nl

IWT - Italian Wind Technology S.r.l.
Via Ariosto 12 - Zona Industriale
74100 Taranto
Italy
Tel. +39 099 4 606 111
Fax +39 099 4 606 333
vestas@vestas-iwt.it

Sales companies

Vestas Hellas Wind Technology S.A.
150, A. Papandreou Ave. 2nd Floor
165 61 Glyfada, Athens
Greece
Tel. +30 10 96 46 251
Fax +30 10 96 46 252

Vestas France SAS
Le Millénium – Bâtiment A
501, rue Denis Papin
F-34000 Montpellier
France
Tel. +33 4 67 202 202
Fax +33 4 67 207 899
vestas-france@vestas.com

Vestas - Australian Wind Technology Pty. Ltd.
33 Coventry Street, Southbank
Melbourne, Victoria 3006
Australia
Tel. +61 3 9645 0999
Fax +61 3 9645 0111

Beijing Vestas Wind Technology Ltd.
29A2, China Merchants Tower, Jangguo Rd.
Chaoyang District
Beijing 100022
China
Tel: +86 10 65667330 31 32
Fax: +86 10 65667335

Vestas - Canadian Wind Technology, Inc.
R.R No. 5
1475 Concession 5
Kincardine, Ontario
N2Z 2X6
Canada
Tel. +1 519 396 6922
Fax +1 519 396 6158

Associated company

Vestas RRB India Ltd.
189, Sukhdev Vihar
New Delhi 110 025
India
Tel. +91 11 26327711
Fax +91 11 26327733
vrrb@gndel.global.net.in

Vestas Wind Systems A/S
Smed Sørensens Vej 5
6950 Ringkøbing
Denmark
Tel. +45 96 75 25 75
Fax +45 97 30 24 36
vestas@vestas.com
www.vestas.com