



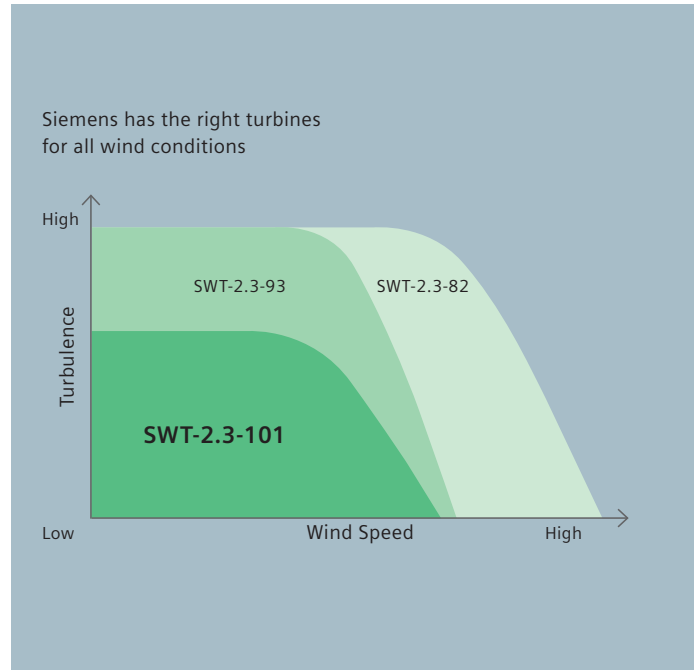
# The new standard for moderate wind conditions

Siemens Wind Turbine SWT-2.3-101

Answers for energy.

**SIEMENS**





## Your trusted partner

Siemens has been a major driver of innovation in the wind power industry since the early 1980s when wind turbine technology was still in its infancy.

Technology has changed with the times, but Siemens' commitment to providing its customers with proven wind turbine solutions remains the same.

The combination of robust and reliable turbines, highly efficient solutions for power transmission and distribution and a deep understanding of the entire energy market ensures that Siemens will continue to be a leading supplier.

Siemens' record, when it comes to on-time delivery, is impeccable. Long-lasting customer relationships, based on the successful installation of wind turbines, provide for a sound, sustainable and profitable investment.

Drawing on 140 years of experience in the energy sector, a strong focus on renewables and a global network of highly skilled and trained employees, Siemens has proven itself to be a trustworthy and reliable business partner. And will continue to be in the future.

## Harvest more energy from sites with moderate wind conditions

The Siemens SWT-2.3-101 turbine is designed to deliver unparalleled performance and reliability, making it especially suited to areas with moderate wind conditions.

The SWT-2.3-101 turbine offers low energy production costs and joins Siemens' 2.3-MW product family, which has proven availability that is among the highest in the industry. The 101-meter rotor is specifically designed to optimize the energy output in areas with moderate wind conditions. The turbine is also ideal for all types of grid connections in most major markets.

The SWT-2.3-101 is designed to last. The robust and reliable design offers a high yield with low maintenance costs. The turbine is backed by advanced condition monitoring and diagnostics, which constantly examine the turbine. Any change in a turbine's performance is promptly addressed by an experienced after-sales service team either remotely or in the field.

If you desire a better return on investment and superior availability, take a closer look at the SWT-2.3-101 turbine.



## Superior performance gives higher yields

### Optimum energy at moderate wind conditions

#### Harvesting more energy

The SWT-2.3-101 wind turbine is designed to increase the energy returns from sites with moderate wind conditions. Advanced blade technology also allows for quieter operation. The B49 blade with a rotor diameter of 101 meters and pitch regulation optimizes power output and increases control over the energy output.

#### High availability

Currently, the Siemens fleet of 2.3-MW wind turbines sets the industry standard for availability. The SWT-2.3-101 will build on the reputation for reliability that the market has come to expect from a Siemens Wind turbine.

#### High yield with minimal maintenance

Siemens optimizes the return on investment in its wind turbines through intelligent maintenance that ensures the turbine to deliver high yield with low operational costs.

The rugged structural design, combined with an automatic lubrication system, internal climate control and a generator system without slip rings contributes to exceptional reliability. The innovative design of the SWT-2.3-101 allows for longer service intervals.

### Superior grid compliance

The Siemens NetConverter® system is designed for maximum flexibility in the turbine's response to voltage and frequency variations, fault ride-through capability and output adjustment. The advanced wind farm control system provides state-of-the-art fleet management.

### Proven track record

Siemens has a proven track record of providing reliable turbines that last. The world's first offshore wind farm in Vindeby, Denmark, was installed in 1991 and is still fully operational. In California, Siemens installed over 1,100 turbines between 1983 and 1990, with 97% still in operation today. Siemens takes its commitment to reliability seriously and prides itself on the long lifespan that its turbines have demonstrated.





## No compromise on reliability

### SWT-2.3-101: Newest member of the extremely reliable product family

#### Designed for life

Siemens turbines are designed to last. The robust design of the SWT-2.3-101 allows for trouble-free output throughout the complete lifecycle of the turbine.

The blades are made of fiberglass-reinforced epoxy in Siemens' proprietary IntegralBlade® manufacturing process. The blades are cast in one piece in a closed process, which eliminates the traditional weaknesses found at glue joints in other manufacturers' blades. Like the turbine itself, the blades are designed to last.

Climate control within the turbine protects vital equipment from the outside environment. The turbine also offers controlled-wear strategies for critical components, which results in a further reduction of maintenance costs.

#### Safety first

Safety is at the heart of all Siemens operations. From production to installation, operation and service, Siemens strives to set the standard in safety.

The fail-to-safe capabilities within a turbine, combined with Siemens' superior lightning protection system, are designed to enhance security for the turbine.

#### Advanced operations support

Given the logistical challenges associated with servicing wind farms, Siemens has equipped its turbines with a Turbine Condition Monitoring (TCM) system that reduces the need for on-site servicing.

Continuous monitoring of turbines allows for the discovery of small faults before they become major problems.

The TCM system continuously checks the external and internal condition of the wind turbine. Twenty-four hours a day, seven days a week precise measurements are taken of vibrations in the gearbox, the generator and the main shaft bearings. The system instantly detects deviations from normal operating conditions.

Using the knowledge gained from monitoring thousands of turbines over the years, Siemens' experts are exceptionally skilled at analyzing and predicting faults within a turbine. This allows Siemens to proactively plan the service and maintenance of the turbines as each fault can be categorized and prioritized based on the severity of the fault. Siemens can then determine the most appropriate course of action to keep the turbine running at its best.

# Technical specifications



## Rotor

Diameter	101 m
Swept area	8,000 m <sup>2</sup>
Rotor speed	6-16 rpm
Power regulation	Pitch regulation with variable speed

## Blades

Type	B49
Length	49 m

## Aerodynamic brake

Type	Full-span pitching
Activation	Active, hydraulic

## Transmission system

Gearbox type	3-stage planetary/helical
Gearbox ratio	1:91
Gearbox oil filtering	Inline and offline
Gearbox cooling	Separate oil cooler
Oil volume	Approximately 400 l

## Mechanical brake

Type	Hydraulic disc brake
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## Generator

Type	Asynchronous
Nominal power	2,300 kW
Voltage	690 V
Cooling system	Integrated heat exchanger

## Yaw system

Type	Active
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## Monitoring system

SCADA system	WebWPS
Remote control	Full turbine control

## Tower

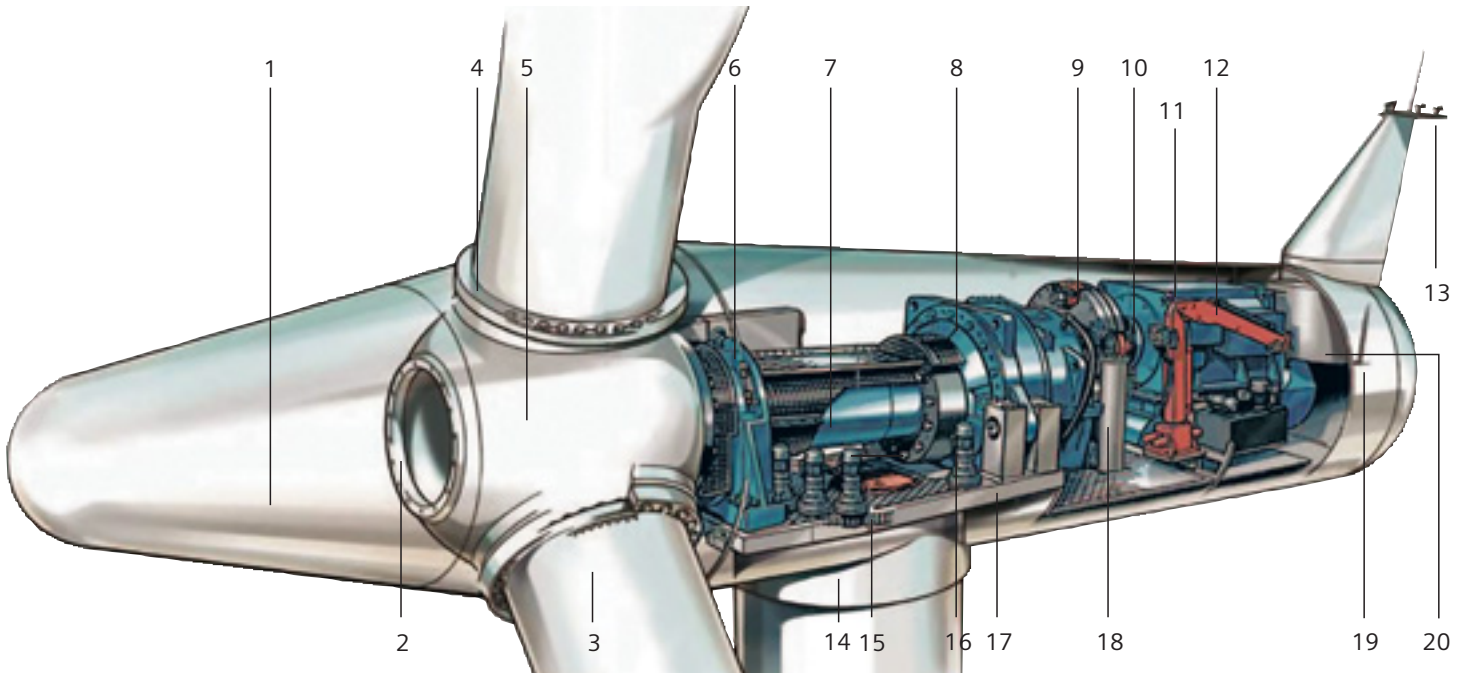
Type	Cylindrical and/or tapered tubular
Hub height	80 m or site-specific

## Operational data

Cut-in wind speed	3-4 m/s
Rated power at	12-13 m/s
Cut-out wind speed	25 m/s
Maximum 3 s gust	55 m/s (standard version) 60 m/s (IEC version)

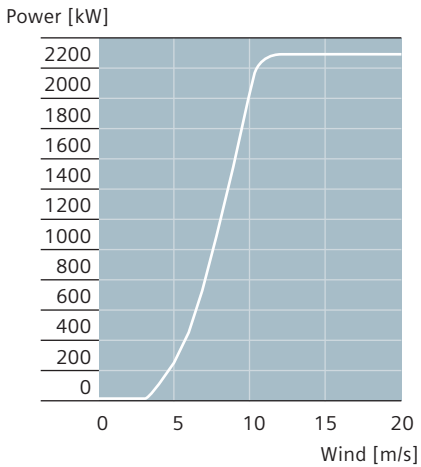
## Weights

Rotor	62 tons
Nacelle	82 tons
Tower for 80-m hub height	162 tons



### Sales power curve

The calculated power curve data are valid for standard conditions of 15 degrees Celsius air temperature, 1013 hPa air pressure and 1.225 kg/m<sup>3</sup> air density, clean rotor blades and horizontal, undisturbed air flow. The calculated curve data are preliminary.



### Nacelle arrangement

- |                    |                            |
|--------------------|----------------------------|
| 1. Spinner         | 10. Coupling               |
| 2. Spinner bracket | 11. Generator              |
| 3. Blade           | 12. Service crane          |
| 4. Pitch bearing   | 13. Meteorological sensors |
| 5. Rotor hub       | 14. Tower                  |
| 6. Main bearing    | 15. Yaw ring               |
| 7. Main shaft      | 16. Yaw gear               |
| 8. Gearbox         | 17. Nacelle bedplate       |
| 9. Brake disc      | 18. Oil filter             |
|                    | 19. Canopy                 |
|                    | 20. Generator fan          |

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