Vestas®

Product description Vestas Wind Turbines

Model V17/75 kW

17 m rotor diameter

The Vestas V17/75 kW is a three bladed horizontal axis wind turbine that features a 17 mtr. diameter rotor and a 90 kW nominal output generator. Based on the successful design of the V16/55 kW model, the V17/75 kW's predecessor, the V17/75 kW was introduced to commercial markets in August 1984 and has subsequently gained a leading position on the world market.

The machine will be described according to the following main areas:

1. Rotor
2. Transmission system and generators
3. Yawing system
4. Microprocessor control unit
5. Main data
6. Power curve

1. Rotor

Three aerodynamically designed rotor blades are connected to the main shaft by a rigid hub. The rotor blades are made of reinforced polyester fiberglass. As an up-wind wind turbine, the rotor is positioned in front of the tower with respect to the wind's direction. This design feature allows the wind turbine to extract maximum power immediately from the wind while avoiding interference from the tower.

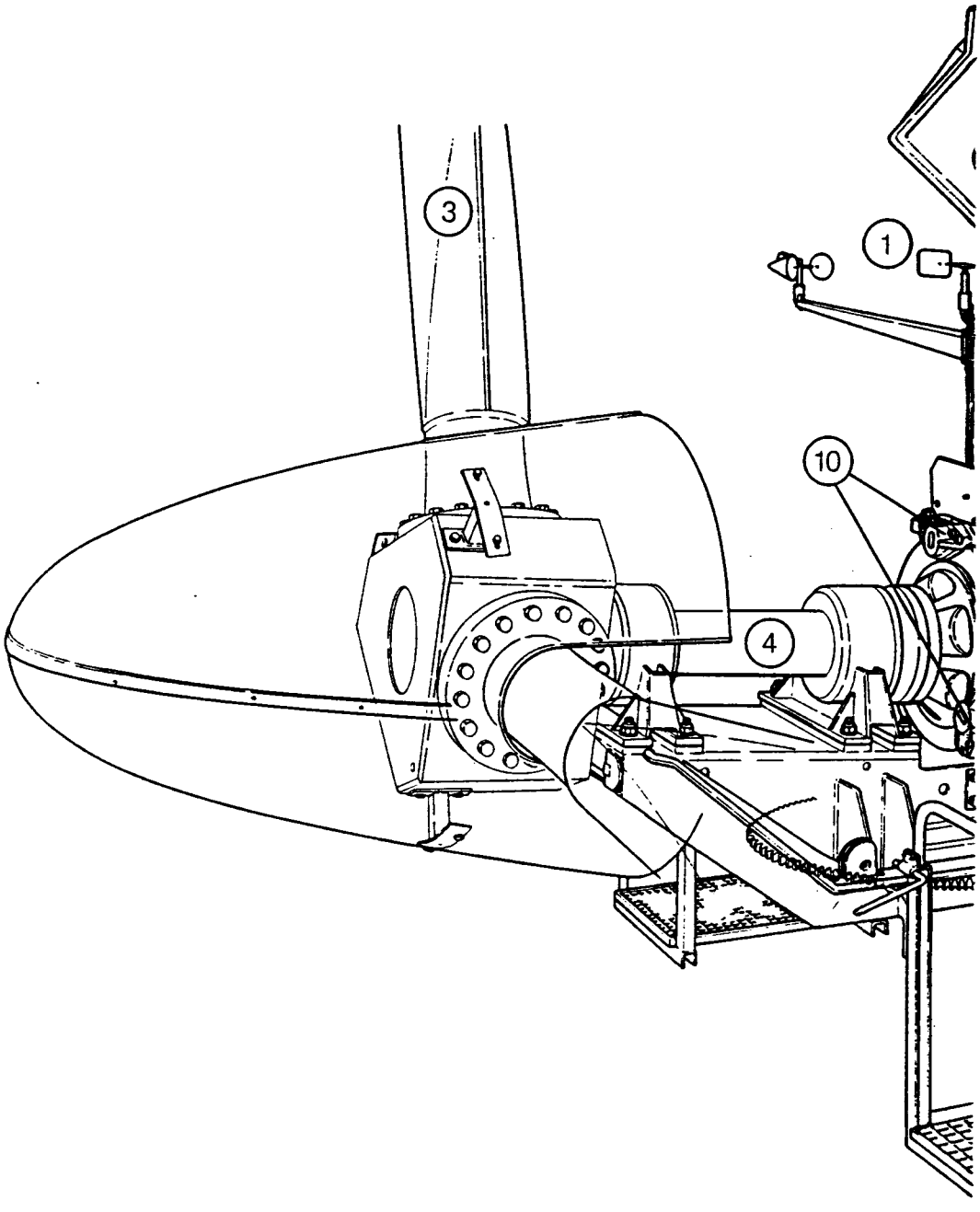
For overspeed protection, the rotor is equipped with centrifugally activated blade tips which pivot 90 degrees and act as an aerodynamic brake.

2. Transmission system and generators

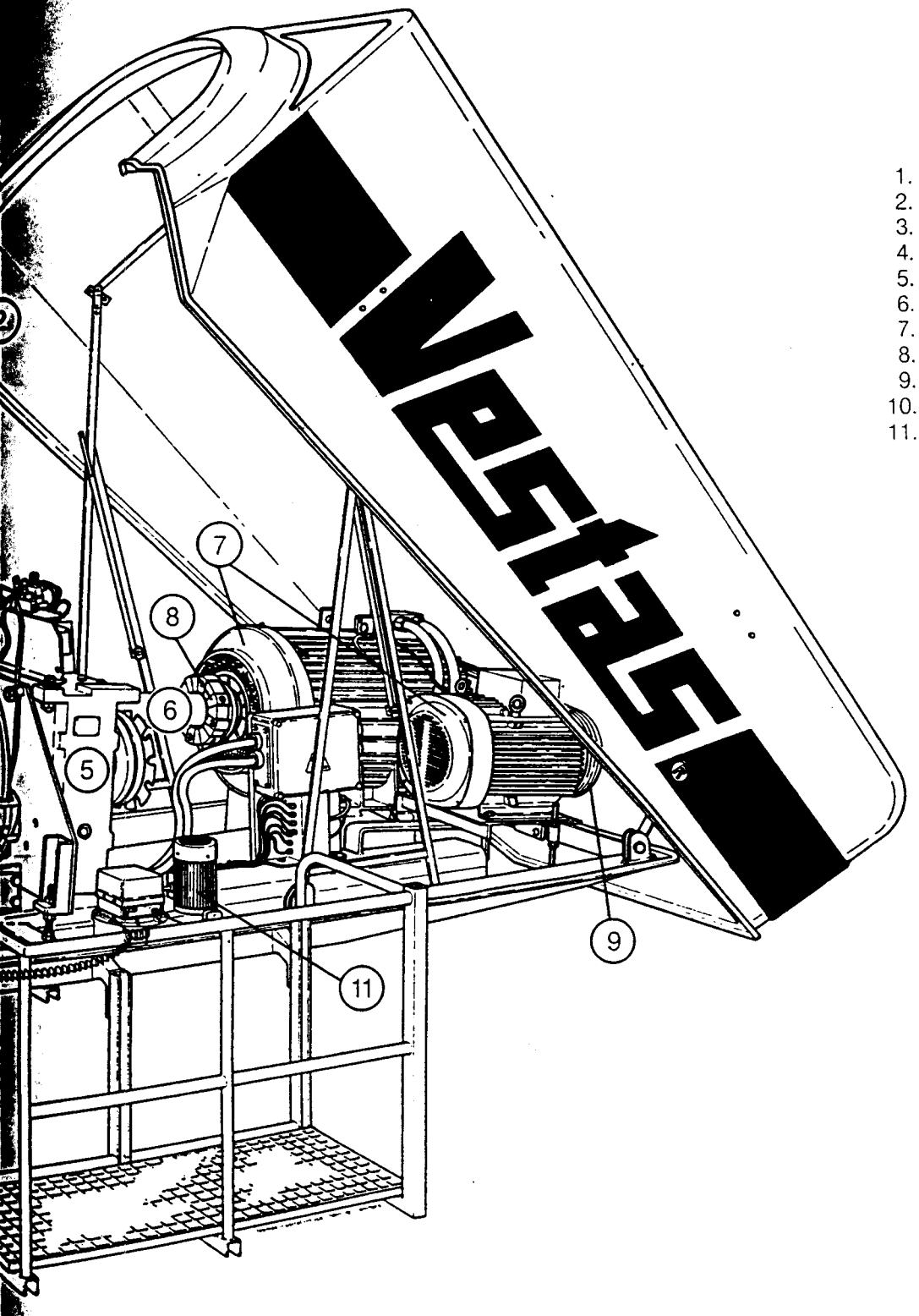
The torque from the rotor is transmitted through the main shaft to the gear box and then through a high speed shaft to the asynchronous generators. The main shaft is supported by two sets of specially designed roller bearings that absorb both axial and radial forces and provide an extended life with minimum maintenance. A flex-coupling at either end of the high speed shaft ensures precision alignment and maximum torque transmission from the gear box to the generator.

Two generators - one for low and one for high wind speeds - provide the basis for efficient electricity production across the full range of available wind speeds. At low wind speeds, the small generator remains connected and operable. However, once prevailing wind speeds reach the main generator's efficient production level, the small generator automatically disconnects and the main generator takes over.

Machine structure



A disc brake is located directly on the main shaft to stop the rotor when necessary and to lock the rotor when wind speeds reach a certain level. Positioned to ensure that the braking load effect is not transferred to the gear box, the disc brake is equipped with hydraulic applied brake calipers which close firmly onto the disc when the brake system is activated. - As a fail-safe brake system, an accumulator maintains a resevoir of hydraulic pressure so that sufficient braking pressure is always available.



1. Electronic wind vane
2. Nacelle cover
3. Rotor blade
4. Main shaft
5. Gear box
6. High speed shaft
7. Generators
8. Flexible coupling
9. V-belt drive
10. Disc brake calipers
11. Electric yawing motor

3. Yawing system

The active electric drive yawing system receives its signal from the electronic wind vane mounted on the nacelle. This impulse is fed through a time delay circuit to the electric yawing motor which slowly pivots the entire nacelle into the wind until the wind vane returns to a neutral position.

As an additional safety feature the yawing system automatically pivots the nacelle 90 degrees out of the wind to prevent damage in the event that excess wind, overspeed due to grid failure, etc. activates one of the wind turbine's safety functions.

4. Microprocessor control unit

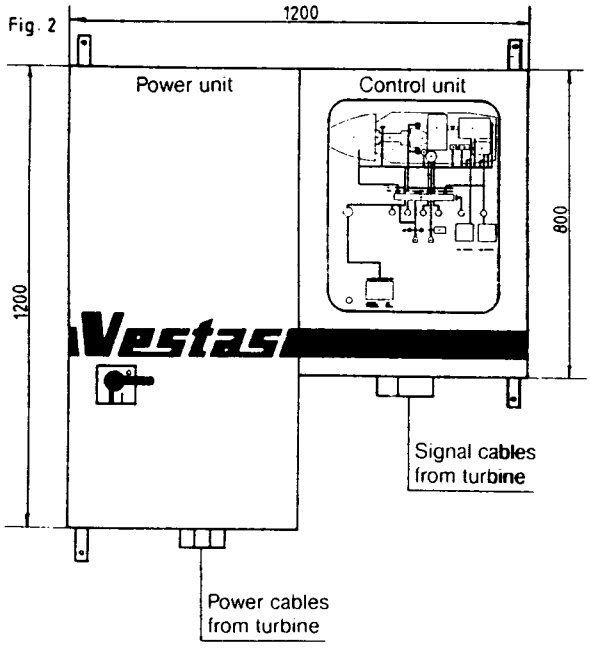
All of the wind turbine's functions are managed and regulated by an electronic control unit that has been specially designed and programmed by Vestas. This control unit is microprocessor based and thus, offer a significantly wider range of control features.

The control unit itself consists of a power unit and an operating and control unit. As the junction between the wind turbine and the utility grid, the power unit receives the electricity produced by the wind turbine through one set of cables and then releases that electricity into the utility grid through another set of cables.The operating and control unit, however, houses the microprocessor which coordinates the wind turbine's productive and safety functions with the current conditions in the external environment. This unit is placed on a flow diagram and protected by a door of transparent acrylic. The flow diagram indicates the location of all vital instruments and includes a display of rotor speed, wind speed and kilowatt production plus the current status of the yawing and brake systems.

The entire electronic control unit is normally placed in a waterproof cabinet at the base of the tower or some other location which is in the immediate vicinity of the wind turbine. However, for multi-unit installations (wind parks) or installations in remote areas, the control unit can be accessed from another location via a modem.

Control panel

Fig. 2



5. Main Data

Vestas 17/75 kW	
Rotor diameter	17,0 mtrs.
Swept area	227 m²
Blade type	Vestas 8.5 mtrs.
Rotor speed (synchronic)	45.0/35.5 r.p.m.
Generator speed	1000 r.p.m.
Gear ratio	1:22.2
Generator name plate	90/19 kW
Wind vane	Electronic Vestas

6. Power curve for Vestas 17/75 kW