Machine Design
The Bonus 600 kW Mk IV has the most recent type of machine arrangement developed by Bonus. The nacelle bedplate is a one-piece steel structure with no welds. The main shaft is long, thereby reducing the reaction forces on the nacelle structure, and the reaction supports are located symmetrically around the tower axis. The result is a simple, rugged, and attractive machine structure.

The transmission system consists of a three-stage planetary/helical gearbox and a two-speed, asynchronous generator. Gearbox cooling is provided by a separate oil cooler, and the generator has a special air cooling system, combining generator and nacelle ventilation with an efficient exhaust blower. Both the low speed and the high speed windings of the generator have been optimized to provide maximum efficiency at low and medium power levels.

The turbine has two independent safety systems, the aerodynamic brakes and a mechanical disc brake. Both systems are fail-safe, and each system is capable of shutting down the turbine even in the unlikely situation that the other system should fail. The disc brake has two-level braking, using a moderate torque for ordinary stops and a high torque for emergency situations only.

Features which have been characteristic for Bonus for years are applied in the 600 kW Mk IV turbine also: Consistent attention to noise control, a heavy-duty structure with ample design margins, and a uniform high level of quality maintained throughout the machine, from the overall concept to minute details.

Controller
The 600 kW Mk IV turbine has a microprocessor control with liquid crystal display and a portable hand terminal. All controller activities for operation, service and statistics are provided both at the tower base and in the nacelle.

Optional remote monitoring is Windows-based and offers operational status, statistics and changes of operating parameters from the owner’s facilities.

Tower
The 600 kW Mk IV turbine is mounted on a tubular steel tower. Internal tower platforms are spaced sufficiently close to allow ascent without additional safety harness (under typical European safety regulations).

Rotor
Rotor diameter ..................... 44 m
Swept area ........................ 1520 m²
Rotor speed ...................... 18/27 rpm
Power regulation ................ Stall
Blade length ...................... 19 m
Blade type ...................... LM 19.1

Generator
Type .............................. Asynchronous
Nominal power .................. 120/600 kW
Speed ........................... 1000/1500 rpm
Voltage .......................... 690 V
Protection ........................ IP 54
Supplier .......................... ABB

Transmission
Gearbox type ..................... Planetary/helical
Gearbox supplier .................. Flender

Brake Systems
Air brakes ......................... Pivoting tips
Mechanical brake ............... Dual disk brake
Activation ...................... Fail-safe (both)

Wind (m/s)
0 5 10 15 20 25
Power (kW)
0 100 200 300 400 500 600 700