


W9x						
Technical data W90						
Doc. No.	W0402-G01-DASH-304-W2E-001-5-E					
Dok. Nr.						
Date	3.2.2010	Rev.	5			
Datum		Überarbgt.				

Operating data

Design wind class	GL / IEC 2a
Nominal power	2.500 kW
Cut-in wind speed	4 m/s
Nominal wind speed	13 m/s
Cut-out wind speed	25 m/s
Survival wind speed at hub height (3-sec-mean)	59.5 m/s
Operation temperature range (ambient)	-20 bis +40 °C
Noise prediction (10 m/s)	104.5 dB(A)

Rotor

Number of blades	3
Rotor blade	LM 43.8
Rotor orientation	up-wind
Rotor diameter	90 m
Swept area	6,362 m ²
Speed range	10.4 to 18.1 rpm
Tilt	5°
Blade coning	5°

Brake system

Pitch	elektric, triple-redundant, fail-safe
Pitch backup power supply	Lithium-Ion Battery
Mechanical brake	Disk brake, hydraulic, active

Drive train

Main bearing	Rigid moment bearing, three-row roller
Gearbox	Two-stage planetary gear, one spur gear stage
Gearbox support	Circular torque bracket
Nominal power gearbox	2,671 kW
Gearbox cooling	Oil-water heat exchanger
Gearbox ratio	1 : 72.3
Generator coupling	Steel disc coupling w/ overload protection

Generator

Type	asynchronous w/ slipring
Type of protection	IP 54
Nominal power	2,560 kW
Nominal voltage	690 V 3~
Frequency	50 Hz
Power factor	0.95 capacitive to 0.95 inductive
Cooling	Mounted air-water heat exchanger
IEC-size	560

Inverter

Typ	Indirect DC link converter
IGBT class	1,700 V
Degree of protection	IP 54
Max. current grid side	ca. 650 A 3~
Max. current generator side	ca. 1.000 A 3~
Nominal voltage	690 V 3~
Frequency (grid side)	50 / 60 Hz
Cooling	Water
Arrangement	Nacelle

Transformer

Type	Silicone-oil immersed
Nominal power	2,700 kVA
Nominal voltage	690 V 3~ / 20 kV 3~
Vector group	Dyn 5
Nominal impedance voltage	6%
Cooling	Air
Arrangement	Nacelle

Medium voltage unit

Insulation- and switch medium	SF6
Nominal voltage	24 kV
Nominal current	400 A
Rated peak withstand current	40 kA
Protective relay	Overcurrent protection with DEFT characteristics
Arrangement	Tower base (tubular tower) / compact station (lattice tower)

Yaw system

Bearing	Ball bearing
Motor	Three-phase asynchronous motors w/ short-circuit rotor
Gearbox	4-step planetary gear
Number of drives	4
Yawing speed	0.5 °/s
Brake	Hydraulic disc brake
Material brake lining	organic
Number of brake calipers	4

Towers

Classes	GL/IEC 2a [1], DIBt 3a [2], GL/IEC 3a [3], DIBt 2a [4]
Tubular	85 m [1,2], 100 m [1,2]
Lattice	117 m [1,2], 141 m [1,4], 160 m [1,4]

Condition monitoring

Monitored components	Main bearing, main gearbox, generator, tower
Evaluation method	Envelope spektra, amplitude spectra, and others

Control

Typ of control	WP4000
Ambient temperature	-20°C to 60°C
Speed control	active torque control, variable pitch
Communication between I/O-moduls	CAN (close range), Ethernet (remote)
Data interfaces	RS 232, RS 485, Ethernet
Protocols	M-Net, T.C. 88, smtp, http
Bus coupling	CANOpen

Power curve*

* Prediction, based on simulation data

Blade type	LM43.8
Simulation software	Flex5
Nominal speed	15.9 rpm
Air density	1.225 kg/m ³
Terrain slope	5°
Turbulence intensity	10%
Wind gradient	0.16
Calculation standard	IEC 61400-12

Wind speed in hub height in m/s	Electrical power in kW
4,0	37,6
5,0	160,4
6,0	333,3
7,0	559,2
8,0	869,4
9,0	1.260,0
10,0	1.678,3
11,0	2.113,8
12,0	2.411,8
13,0	2.500,0
14,0	2.500,0
25,0	2.500,0

Calculated annual energy output**

** Norm conditions acc. to IEC 61400-12

Wind speed in hub height (annual average) in m/s	Calculated annual production in MWh
5,00	3.150
5,50	4.093
6,00	5.083
6,50	6.088
7,00	7.081
7,50	8.039
8,00	8.950
8,50	9.800
9,00	10.581
9,50	11.289