



WES³⁰ Hybrid

TECHNICAL SPECIFICATIONS

GENERAL

cut in wind speed	< 3 m/sec.
rated wind speed	13 m/sec.
cut out wind speed	25 m/sec.
survival wind speed	60 m/sec.
nominal power	250 kW
specific power	354 W/m ²
Life expectancy	Minimum 20 years

HYBRID CONNECTIVITY

voltage	400V ± 10%, 3 phase + neutral
frequency	50Hz ± 10Hz or 60Hz ± 10Hz
Main primary mover	Any source with synchronous generator
Additional possible prime movers	Any source
Supervisory controller	Integrated, wireless
Soot burning timer	Integrated, flexible programming
Power factor compensation	Adjustable, relative to power output wind turbines
Wind power penetration	Up to 100%

GRID ASSISTANCE

Power factor compensation	Adjustable, relative to power output wind turbines
Frequency Assist Control [®]	Adjustable

MONITORING

Local	User friendly Human Machine Interface
Remote	By internet or PSTN / Cellular connection

ROTOR

number of blades	2
rotor position	upwind
angle of the main shaft	7° with horizon
diameter	30 m
swept area	707 m ²
speed	variable 35 – 70 rpm
power regulation	passive: blade-angle adjustment active: fully variable back-to-back system
min. blade-angle	1.0
cone-angle	183° – 170.5° (flapping range)
direction	clockwise
location main bearing	attached to gearbox



BLADES

blade length	13.4 meter
weight one blade	327 kg
shape	linear taper
chord	500 – 1,200 mm
twist	15°
material	carbon fibre reinforced epoxy
mounted	flexible

GEARBOX

number of stages	2
weight	1850 kg
ratio	1:26.6

GENERATOR

type	asynchronous
nominal output	250 kW
number of poles	4
nominal voltage	230/400 V
frequency	variable 25 - 75 Hz
weight	1550 kg
protection	IP 54

TOWER

type	conical tubular steel
number of sections	2, 3 or 4
hub height	30 m, 39 m or 48 m
material	Steel
location ascent	Internal
type	Tubular/conical tower & lattice tower, four-legged
hub height	Depending on tower height.
material	Hot dip galvanized steel
location ascent	Internal ladder

CONTROLLER

control by	IPC
remote monitoring & control	Included

YAW-SYSTEM

system	Active
driven by	2 x e-motor with worm wheel reduction
power yaw-motor	2 x 1.5 kW
yaw speed	0.77°/sec.
yaw bearing	crown-bearing; externally geared
yaw-break	constant friction break; 8 pcs.

SAFETY

first safety system activation	passive blade pitch rotor speed (70 rpm)
second safety system activation	yawing out of the wind rotor speed (90 rpm)
brake and blocking system	
brake	parking disk brake on high speed shaft of gearbox; for service purposes
rotor blocking system activation	pin in high speed shaft both manual

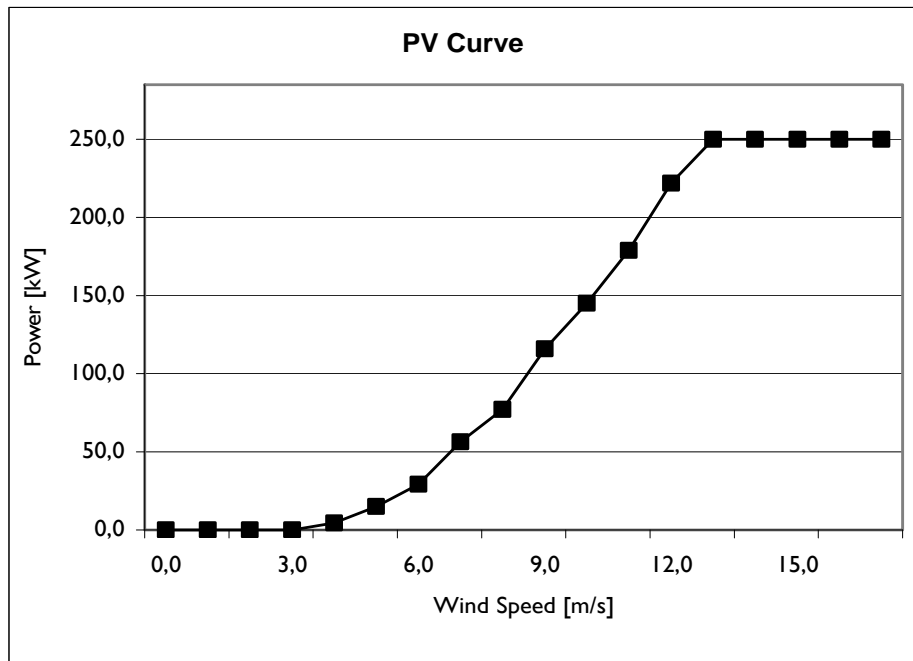
WEIGHTS

rotor	2500 kg
nacelle including rotor	7500 kg
tower excluding nacelle	14800 + 8500 kg

Measured power curve.

The curve data are valid for standard atmospheric conditions of 15° C air temperature, 1013 mbar air pressure and 1.225 kg/m³ air density, clean rotor blades and horizontal undisturbed air flow.

Wind speed [m/s]	Power [kW]
0,0	0,0
1,0	0,0
2,0	0,0
3,0	0,0
4,0	4,4
5,0	14,9
6,0	29,3
7,0	56,3
8,0	77,2
9,0	115,8
10,0	145,0
11,0	179,0
12,0	222,0
13,0	250,0
14,0	250,0
15,0	250,0
16,0	250,0
17,0	250,0



Measured production.

The annual energy production data for different annual mean wind speeds at hub height are calculated from the above power curve data assuming a Rayleigh wind speed distribution, 100% availability and no reductions due array losses, grid losses, or other external factors effecting the production.

Wind speed [m/s]	Energy [MWh]
4.5	207
5.0	285
5.5	372
6.0	464
6.5	560
7.0	656
7.5	750
8.0	841
8.5	928

