Catalogue of European Urban Wind Turbine Manufacturers












July 2005

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Aircon

HAWT - 10 kW

Contact name: Aircon GmbH & Co.KG
Address: Nessestraße 27, 26789 Leer
Telephone: +49 491 454 44 84
Country : **Germany**

Aircon 10 references

Site	Use	Country
Nordhausen	University	Germany
Bremerhaven	University	Germany
Hamburg	Greenpeace building	Germany
Warnungs	Solartechn. Hubert Kuhn	Austria
Sopelana	Zero CO2/ Environmental assoc	Spain

Aircon 10/ 10 kW

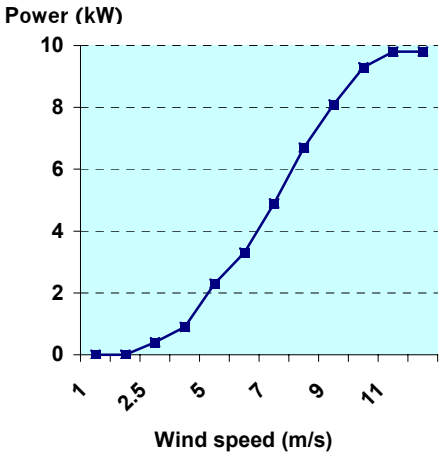
Technical information

POWER		Unit
1) Rated power	10	kW
2) Rated wind speed	11	m/s
3) Cut-in wind speed	2,5	m/s
4) Cut-out wind speed	32	m/s
5) Maximum wind speed the turbine can withstand	190	Km/h
DIMENSIONS		
6) Rotor weight	144	kg
7) Rotor diameter	7,1	m
8) Rotor height (for VAWT only)		m
9) Swept area	39,6	m^2
10) Height of the mast	12/18/24/30	m
OTHER INFORMATION		
11) Maximum rpm	130	At rated wind speed
12) Gear box type	Gearless	
13) Brake system	Pitch-control + generator overload regulation	
14) Number of blades	3	
15) Blades material	Composite fibre glass	
16) Output voltage	400	V
17) Minimum operation temperature	- 20	°C
18) Maximum operation temperature	+ 40	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	< 40	DB
20) Lifetime	> 20	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Azimut motor	
24) Upwind or downwind	Upwind turbine	

Calculated power curve

Wind speed (m/s)	Power (kW)
1	0
2	0
2,5	0,4
4	0,9
5	2,3
6	3,3
7	4,9
8	6,7
9	8,1
10	9,3
11	9,8
11,5- 25	9,8

Power curve:



Ampair

HAWT – 0,1 to 0,3 kW

Contact name: George Durrant
Address: The Doughty Building, Crow Arch Lane, Ringwood, Hampshire, BH24 1NZ
Telephone: +44 (0) 1425 480 780
Country: **United Kingdom**

Ampair 0,1 kW references

Site	Use	Country
Regis Road Recycling Centre, Camden, London	Electricity generation	UK

Ampair Pacific Hawk / 0,1 kW

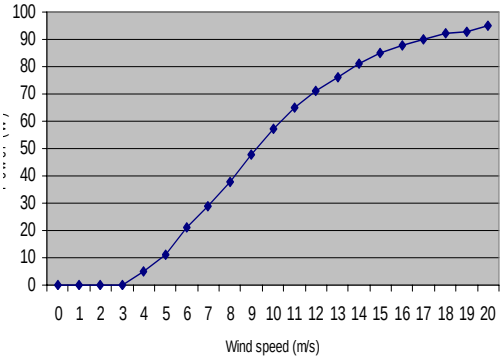
Technical information

POWER		Unit
1) Rated power	0,1	kW
2) Rated wind speed	20	m/s
3) Cut-in wind speed	3,5	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	Storm-proof	km/h
DIMENSIONS		
6) Nacelle and rotor weight	12,6	kg
7) Rotor diameter	0,928	m
8) Rotor height (for VAWT only)	-	m
9) Swept area	0,68	m^2
10) Height of the mast	Variable	m
OTHER INFORMATION		
11) Maximum rpm	DK	At rated wind speed
12) Gear box type	None	
13) Brake system	Inductors	
14) Number of blades	6	
15) Blades material	Glass filled polypropylene	
16) Output voltage	12 / 24	V
17) Minimum operation temperature	- 30	°C
18) Maximum operation temperature	High temperatures not a problem	°C
19) Acoustic levels at a distance of 20 m? at nacelle? (wind = 5 m/s)	20 at nacelle in strong winds	DB
20) Lifetime	10	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Wind vane, free yaw	
24) Upwind or downwind	Upwind	

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	0
4	05
5	11
6	21
7	29
8	38
9	48
10	57
11	65
12	71
13	76
14	81
15	85
16	88
17	90
18	92
19	93
20	95

Power curve



Ampair

HAWT – 0,1 to 0,3 kW

Contact name: George Durrant
Address: The Doughty Building, Crow Arch Lane, Ringwood, Hampshire, BH24 1NZ
Telephone: +44 (0) 1425 480 780
Country: **United Kingdom**

Ampair 0,3 kW references

Site	Use	Country
None available yet		

Ampair Pacific Hawk / 0,3 kW

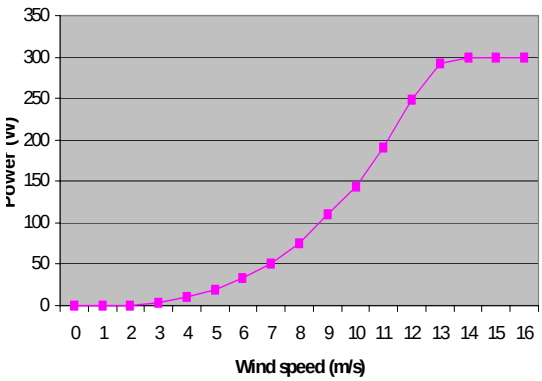
Technical information

POWER		Unit
1) Rated power	0,3	kW
2) Rated wind speed	12,6	m/s
3) Cut-in wind speed	3	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	180	km/h
DIMENSIONS		
6) Nacelle and rotor weight	12	kg
7) Rotor diameter	1,2	m
8) Rotor height (for VAWT only)	-	m
9) Swept area	1.13	m^2
10) Height of the mast	Variable	m
OTHER INFORMATION		
11) Maximum rpm	DK	At rated wind speed
12) Gear box type	None	
13) Brake system	Blade pitch control	
14) Number of blades	3	
15) Blades material	Glass filled polypropylene	
16) Output voltage	12 / 24, or grid-connected	V
17) Minimum operation temperature	Perhaps - 20	°C
18) Maximum operation temperature	Perhaps + 35	°C
19) Acoustic levels at a distance of 20 m? at nacelle ? (wind = 5 m/s)	Not dB tested yet	DB
20) Lifetime	10	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Wind vane, free yaw	
24) Upwind or downwind	Upwind	

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	4
4	10
5	20
6	34
7	51
8	76
9	110
10	144
11	192
12	248
13	293
14	300
15	300
16	300

Power curve



ATLANTIS Windkraft

HAWT from 0,3 kW to 0,6 kW.

WB 15 / 0,3 kW

Contact name: Kottwitz Raimund
Address: Holzstr. 10, 31556 Wölpinghausen
Telephone: +49 5037 988 03
Country : **Germany**

Atlantis WB 15 references

Site	Use	Country
Berlin	About 20 projects in Berlin (7 schools, 1 high school, 4 practical education centres, ...).	Germany

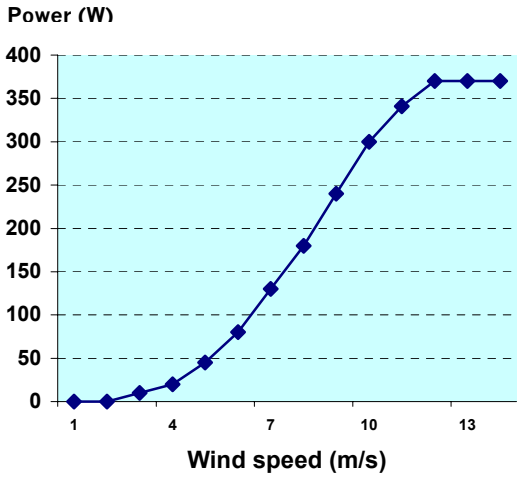
Technical information

		Unit
1) Rated power	0,3	kW
2) Rated wind speed	10	m/s
3) Cut-in wind speed	3	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	No limit	Km/h
DIMENSIONS		
6) Rotor weight	23	kg
7) Rotor diameter	1,5	m
8) Rotor height (for VAWT only)		m
9) Swept area	1,8	m^2
10) Height of the mast	3/6/ 9/12	m
OTHER INFORMATION		
11) Maximum rpm		At rated wind speed
12) Gear box type		
13) Brake system		
14) Number of blades		3
15) Blades material		Composite fibre glass
16) Output voltage	12 – 24	V
17) Minimum operation temperature	Tested in arctic	°C
18) Maximum operation temperature	+ 90	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	78	DB
20) Lifetime	20	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		Wind vane
24) Upwind or downwind		

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	10
4	20
5	
6	80
7	
8	180
9	
10	300
11	
12	370
13	
14	370

Power curve:



ATLANTIS Windkraft

HAWT from 0,3 kW to 0,6 kW.

Contact name: Kottwitz Raimund
Address: Holzstr. 10, 31556 Wölpinghausen
Telephone: +49 5037 988 03
Country : **Germany**

Atlantis WB 20 references

Site	Use	Country
Berlin	About 20 projects in Berlin: 7 schools, 1 high school, 4 practical education centres, ...	Germany

WB 20/ 0,6 kW

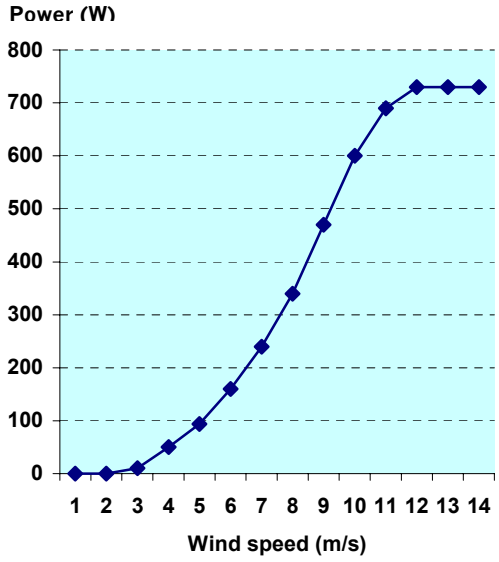
Technical information

POWER		Unit
1) Rated power	0,6	kW
2) Rated wind speed	10	m/s
3) Cut-in wind speed	3	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	No limit	Km/h
DIMENSIONS		
6) Rotor weight	37	kg
7) Rotor diameter	2	m
8) Rotor height (for VAWT only)		m
9) Swept area	3,14	m^2
10) Height of the mast	3/6/ 9/12	m
OTHER INFORMATION		
11) Maximum rpm		At rated wind speed
12) Gear box type		
13) Brake system		
14) Number of blades		4
15) Blades material		Carbon fibre
16) Output voltage	24- 48	V
17) Minimum operation temperature	Tested in arctic	°C
18) Maximum operation temperature	+ 90	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	78	DB
20) Lifetime	20	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		Wind vane
24) Upwind or downwind		

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	10
4	50
5	
6	160
7	
8	340
9	
10	600
11	
12	730
13	
14	730

Power curve:



Eclectic Energy

HAWT – 0,4 kW

Contact name:	Peter Anderson
Address:	Edwinstowe House, High Street, Edwinstowe, Nottinghamshire NG21 9PR
Telephone:	+44 (0) 162 382 15 35

D400 – 0,4 kW references

Site	Use	Country
Nottingham University	Testing / monitoring	UK
Building Research Establishment (BRE), Watford	Testing / Monitoring	UK

Stealth Gen D400 / 0,4 kW

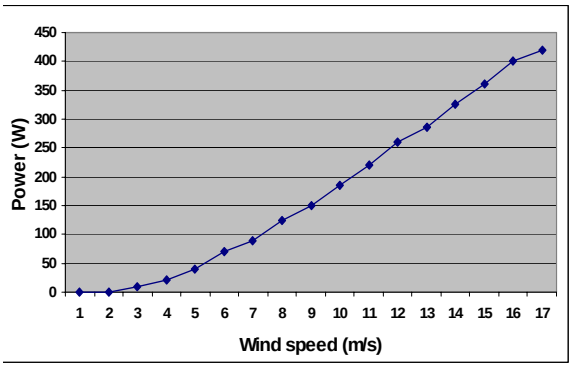
Technical information

POWER		Unit
1) Rated power	0,4	kW
2) Rated wind speed	16	m/s
3) Cut-in wind speed	2	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	130	km/h
DIMENSIONS		
6) Nacelle and rotor weight	15	kg
7) Rotor diameter	1,1	m
8) Rotor height (for VAWT only)	-	m
9) Swept area	0,95	m^2
10) Height of the mast	Variable	m
OTHER INFORMATION		
11) Maximum rpm	1 200	At rated wind speed
12) Gear box type	None	
13) Brake system	Electrical	
14) Number of blades	5	
15) Blades material	Glass reinforced nylon	
16) Output voltage	12/24/48/150	V
17) Minimum operation temperature	-20	°C
18) Maximum operation temperature	120	°C
19) Acoustic levels at a distance of 20 m? at nacelle? (wind = 5 m/s)	3 above background	DB
20) Lifetime	20	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Wind vane, free yaw	
24) Upwind or downwind	Upwind	

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	10
4	20
5	40
6	70
7	90
8	125
9	150
10	185
11	220
12	260
13	285
14	325
15	360
16	400

Power curve:



Ecofys

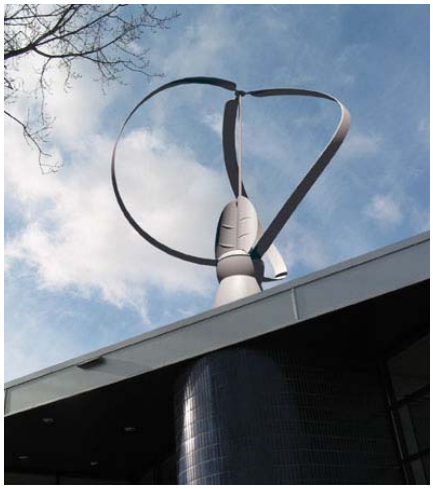
VAWT 3 kW.

Contact name: Geert Timmers
Address: PO Box 8408, 3503 RK Utrecht
Telephone: +31-30 3808300
Country : Netherlands

Neoga references: no references

Site	Use	Country

Neoga 3 kW



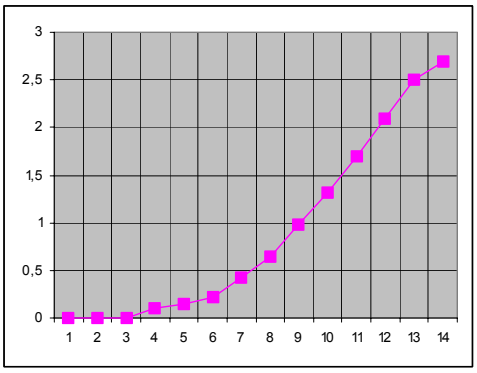
Technical information

POWER		Unit
1) Rated power	3	kW
2) Rated wind speed	14	m/s
3) Cut-in wind speed	3,5	m/s
4) Cut-out wind speed	20	m/s
5) Maximum wind speed the turbine can withstand	Not available	Km/h
DIMENSIONS		
6) Rotor weight	200	kg
7) Rotor diameter	2,8	m
8) Rotor height (for VAWT only)	4	m
9) Swept area	5,5	m^2
10) Height of the mast	Variable 1-12	m
OTHER INFORMATION		
11) Maximum rpm	300	At rated wind speed
12) Gear box type	No gear box	
13) Brake system	Electrical brake + disc brake	
14) Number of blades	5	
15) Blades material	Aluminium	
16) Output voltage	230	V
17) Minimum operation temperature	- 30	°C
18) Maximum operation temperature	+ 50	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	Not available	DB
20) Lifetime	20	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Independent of wind direction	
24) Upwind or downwind	Not applicable	

Calculated power curve

Wind speed (m/s)	Power* (W)
1	0
2	0
3	0
4	100
5	
6	220
7	420
8	650
9	980
10	1320
11	1700
12	2100
13	2500
14	2700
15	

Power curve



Eoltec

HAWT from 6 kW to 250 kW.

Contact name: Thomas Schulthess
Address: 455, promenade des Anglais, 06299 Nice
Telephone: +33 6 85 30 35 05
Country : **France**

Eoltec Sirocco 6 kW references

Site	Use	Country
Nice	Demonstration turbine connected to the grid	France
Orkney Island	Extreme winds test site	UK
	Hybrid electrification stand-alone or grid-tied, water pumping, heating,...	4 continents

Sirocco/ 6 kW

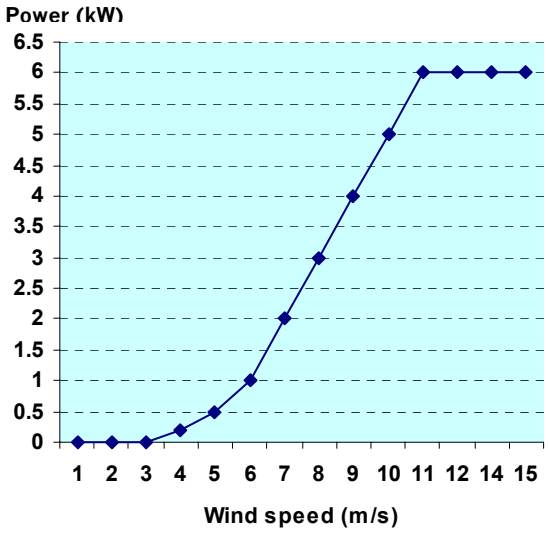
Technical information

POWER		Unit
1) Rated power	6	kW
2) Rated wind speed	12	m/s
3) Cut-in wind speed	4	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	216	Km/h
DIMENSIONS		
6) Rotor weight (+ generator)	202	kg
7) Rotor diameter	5,6	m
8) Rotor height (for VAWT only)		m
9) Swept area	24,7	m^2
10) Height of the mast	18/24/30	m
OTHER INFORMATION		
11) Maximum rpm	245	At rated wind speed
12) Gear box type		
13) Brake system	Optional remote control at tower base	
14) Number of blades	2	
15) Blades material	Composite fibre glass	
16) Output voltage	230	V
17) Minimum operation temperature	- 40	°C
18) Maximum operation temperature	+ 50	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	65	DB
20) Lifetime	25	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Wind vane	
24) Upwind or downwind	Upwind turbine	

Calculated power curve

Wind speed (m/s)	Power (kW)
1	0
2	0
3	0
4	0,2
5	0.5
6	1.1
7	1.8
8	2.7
9	3.8
10	5
11	5.7
12	6
13	6
14	6
15	6
Inland site, altitude 300 m, 18 m tower Rayleigh distribution (k= 2) Shear ratio 0,143 / Turbulence factor 10 %	

Power curve:



Eoltec

HAWT from 6 kW to 250 kW.

Contact name: Thomas Schulthess
Address: 455, promenade des Anglais, 06299 Nice
Telephone: +33 6 85 30 35 05
Country : **France**

Eoltec Wind runner 25 kW references

Site	Use	Country
Orkney Island	Prototype	UK

Wind Runner/ 25 kW

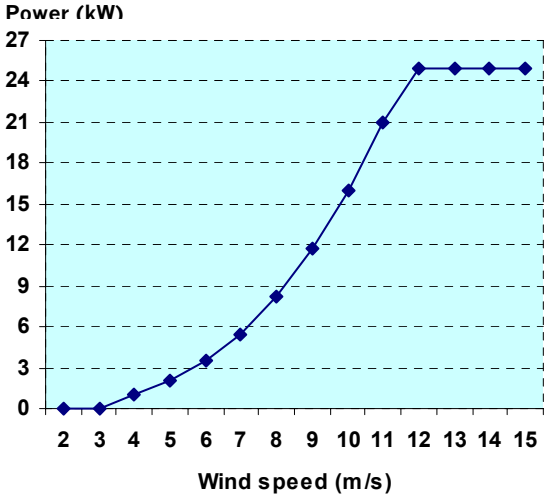
Technical information

POWER		Unit
1) Rated power	25	kW
2) Rated wind speed	12	m/s
3) Cut-in wind speed	3	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	216	Km/h
DIMENSIONS		
6) Rotor weight (+ generator)	620	kg
7) Rotor diameter	10	m
8) Rotor height (for VAWT only)		m
9) Swept area	78,6	m^2
10) Height of the mast	18/24/32	m
OTHER INFORMATION		
11) Maximum rpm	140	At rated wind speed
12) Gear box type	none – direct drive	
13) Brake system	Optional remote control (blades stalling)	
14) Number of blades	2	
15) Blades material	Composite fiber glass	
16) Output voltage	400	V
17) Minimum operation temperature	- 40	°C
18) Maximum operation temperature	+ 50	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	65	DB
20) Lifetime	25	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Wind vane	
24) Upwind or downwind	Upwind turbine	

Calculated power curve

Wind speed (m/s)	Power (kW)
1	0
2	0
3	0.5
4	1
5	2
6	3.5
7	5.5
8	8.2
9	11.7
10	16
11	21
12	25
13	25
14	25
15	25

Power curve:



Eurowind Small Turbines Ltd

VAWT – from 1,3 kW to 30 kW

Contact name: Steven Peace
Address: 38 Kings Avenue, Newhaven, East Sussex BN9 0NA
Telephone: +44 (0) 12 73 61 23 83
Country: **United Kingdom**

Eurowind 1,3 kW references

Site	Use	Country
Unknown	Prototype	UK

Eurowind / 1,3 kW

Technical information

POWER		Unit
1) Rated power	1,3	kW
2) Rated wind speed	12	m/s
3) Cut-in wind speed	3 to 4	m/s
4) Cut-out wind speed	28 to 32	m/s
5) Maximum wind speed the turbine can withstand	255	km/h
DIMENSIONS		
6) Nacelle and rotor weight	DK	kg
7) Rotor diameter	2,25	m
8) Rotor height (for VAWT only)	2	m
9) Swept area	4,5	m^2
10) Height of the mast	Site dependent	m
OTHER INFORMATION		
11) Maximum rpm	DK	At rated wind speed
12) Gear box type		DK
13) Brake system		DK
14) Number of blades		3
15) Blades material		Composite fibre glass
16) Output voltage	24 – 240	V
17) Minimum operation temperature	Not known	°C
18) Maximum operation temperature	Not known	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	Dk	DB
20) Lifetime	20	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		Not necessary
24) Upwind or downwind		N/a

Calculated power curve

Not available

Wind speed (m/s)	Power (kW)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Power curve

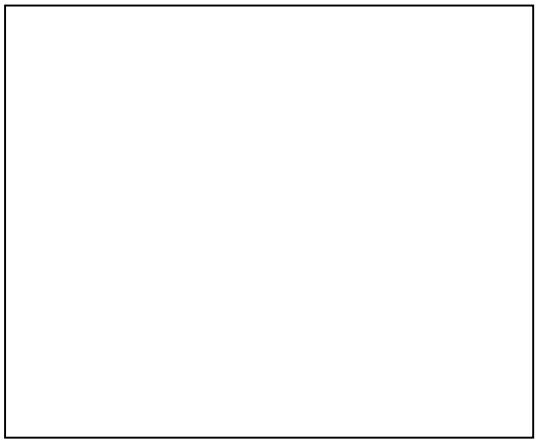
Not available

Eurowind Small Turbines Ltd

VAWT – from 1,3 kW to 30 kW

Contact name: Steven Peace
Address: 38 Kings Avenue, Newhaven, East Sussex BN9 0NA
Telephone: +44 (0) 12 73 61 23 83
Country : **United Kingdom**

Eurowind / 5 kW



Eurowind 5 kW references

Site	Use	Country

Technical information

POWER		Unit
1) Rated power	5	kW
2) Rated wind speed	12	m/s
3) Cut-in wind speed	3 to 4	m/s
4) Cut-out wind speed	28 to 32	m/s
5) Maximum wind speed the turbine can withstand	255	km/h
DIMENSIONS		
6) Nacelle and rotor weight	DK	kg
7) Rotor diameter	4,25	m
8) Rotor height (for VAWT only)	4	m
9) Swept area	17	m^2
10) Height of the mast	Site dependent	m
OTHER INFORMATION		
11) Maximum rpm	DK	At rated wind speed
12) Gear box type	DK	
13) Brake system	DK	
14) Number of blades	3	
15) Blades material	Composite fibre glass	
16) Output voltage	24 – 240	V
17) Minimum operation temperature	Not known	°C
18) Maximum operation temperature	Not known	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)		DB
20) Lifetime	20	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Not necessary	
24) Upwind or downwind	N/a	

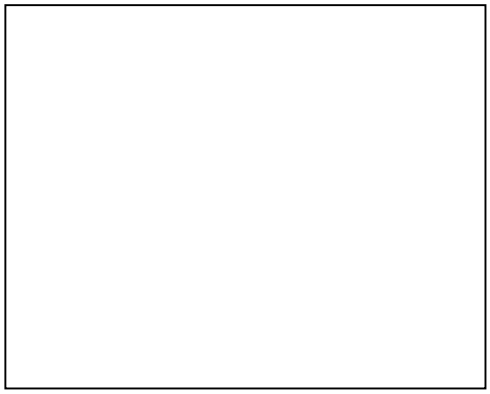
Calculated power curve

Not available

Wind speed (m/s)	Power (kW)
1	
2	
2,5	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Power curve

Not available

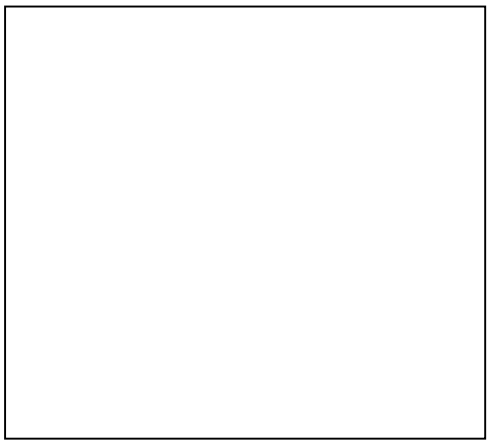


Eurowind Small Turbines Ltd

VAWT – from 1,3 kW to 30 kW

Contact name: Steven Peace
Address: 38 Kings Avenue, Newhaven, East Sussex BN9 0NA
Telephone: +44 (0) 12 73 61 23 83
Country: **United Kingdom**

Eurowind / 10,8 kW



Eurowind 10,8 kW references

Site	Use	Country

Technical information

POWER		Unit
1) Rated power	10,8	kW
2) Rated wind speed	12	m/s
3) Cut-in wind speed	3 to 4	m/s
4) Cut-out wind speed	28 to 32	m/s
5) Maximum wind speed the turbine can withstand	255	Km/h
DIMENSIONS		
6) Nacelle and rotor weight	DK	kg
7) Rotor diameter	6,26	m
8) Rotor height (for VAWT only)	5	m
9) Swept area	37	m^2
10) Height of the mast	Site dependent	m
OTHER INFORMATION		
11) Maximum rpm	DK	At rated wind speed
12) Gear box type	DK	
13) Brake system	DK	
14) Number of blades	3	
15) Blades material	Composite fibre glass	
16) Output voltage	24 – 240	V
17) Minimum operation temperature	DK	°C
18) Maximum operation temperature	DK	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	DK	DB
20) Lifetime	20	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Not necessary	
24) Upwind or downwind	N/a	

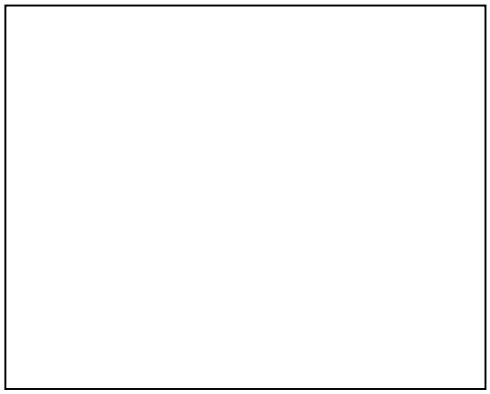
Calculated power curve

Not available

Wind speed (m/s)	Power (kW)
1	
2	
2,5	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Power curve

Not available



Eurowind Small Turbines Ltd

VAWT – from 1,3 kW to 30 kW

Contact name: Steven Peace
Address: 38 Kings Avenue, Newhaven, East Sussex BN9 0NA
Telephone: +44 (0) 12 73 61 23 83
Country: **United Kingdom**

Eurowind 19 kW references

Site	Use	Country
No references available yet		

Eurowind / 19 kW

Photo Montage

Technical information

POWER		Unit
1) Rated power	19	kW
2) Rated wind speed	12	m/s
3) Cut-in wind speed	3 to 4	m/s
4) Cut-out wind speed	28 to 32	m/s
5) Maximum wind speed the turbine can withstand	255	Km/h
DIMENSIONS		
6) Nacelle and rotor weight	DK	kg
7) Rotor diameter	8,25	m
8) Rotor height (for VAWT only)	8	m
9) Swept area	66	m^2
10) Height of the mast	Site dependent	m
OTHER INFORMATION		
11) Maximum rpm	DK	At rated wind speed
12) Gear box type	DK	
13) Brake system	DK	
14) Number of blades	3	
15) Blades material	Composite fibre glass	
16) Output voltage	24 – 240	V
17) Minimum operation temperature	DK	°C
18) Maximum operation temperature	DK	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	DK	DB
20) Lifetime	20	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Not necessary	
24) Upwind or downwind	N/a	

Calculated power curve

Not available

Wind speed (m/s)	Power (kW)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Power curve

Not available

Eurowind Small Turbines Ltd

VAWT – from 1,3 kW to 30 kW

Contact name: Steven Peace
Address: 38 Kings Avenue, Newhaven, East Sussex BN9 0NA
Telephone: +44 (0) 12 73 61 23 83
Country: **United Kingdom**

Eurowind 30 kW references

Site	Use	Country
No references available yet		

Eurowind / 30 kW

Photo Montage

Technical information

POWER		Unit
1) Rated power	30	kW
2) Rated wind speed	12	m/s
3) Cut-in wind speed	3 to 4	m/s
4) Cut-out wind speed	28 to 32	m/s
5) Maximum wind speed the turbine can withstand	255	Km/h
DIMENSIONS		
6) Nacelle and rotor weight	DK	kg
7) Rotor diameter	10,25	m
8) Rotor height (for VAWT only)	10	m
9) Swept area	102,5	m^2
10) Height of the mast	Site dependent	m
OTHER INFORMATION		
11) Maximum rpm	DK	At rated wind speed
12) Gear box type	DK	
13) Brake system	DK	
14) Number of blades	3	
15) Blades material	Composite fibre glass	
16) Output voltage	24 – 240	V
17) Minimum operation temperature	DK	°C
18) Maximum operation temperature	DK	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	DK	DB
20) Lifetime	20	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Not necessary	
24) Upwind or downwind	N/a	

Calculated power curve

Not available

Wind speed (m/s)	Power (kW)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Power curve

Not available

Fortis Wind Energy

HAWT from 0,8 kW to 10 kW.

Contact name: Johan Kuikman
Address: Botanicuslaan 14, 9751 AC Haren
Telephone: +31 – 50 5340104
Country : **Netherlands**

Espada / 0,8 kW

Espada references

Site	Use	Country
Xingang Nat. Machinery Corp.	Technology transfer	China
Windsund, Sunderland	Offshore application	UK
Brussel	Ecole Royale Miltaire	Belgium
Galeforce	Stand alone application	UK

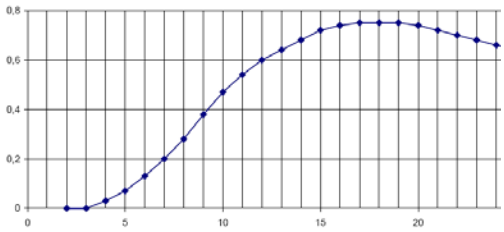
Technical information

POWER		Unit
1) Rated power	0,8	kW
2) Rated wind speed	14	m/s
3) Cut-in wind speed	3	m/s
4) Cut-out wind speed	No	m/s
5) Maximum wind speed the turbine can withstand	60	Km/h
DIMENSIONS		
6) Rotor weight	52	kg
7) Rotor diameter	2,2	m
8) Rotor height (for VAWT only)	---	m
9) Swept area	3,80	m^2
10) Height of the mast	12 – 18	m
OTHER INFORMATION		
11) Maximum rpm	1000	At rated wind speed
12) Gear box type	No brake system	
13) Brake system	Short circuit in generator	
14) Number of blades	2	
15) Blades material	Composite fibre glass	
16) Output voltage	12 - 240	V (DC)
17) Minimum operation temperature	- 30	°C
18) Maximum operation temperature	+ 50	°C
19) Acoustic levels at a distance of 20 m ? (wind = 10 m/s)	< 60	DB
20) Lifetime	20	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Wind vane	
24) Upwind or downwind	Upwind	

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	0
4	0,03
5	0,07
6	0,13
7	0,20
8	0,28
9	0,38
10	0,47
11	0,57
12	0,66
13	0,74
14	0,78
15	0,8

Power curve



Fortis Wind Energy

HAWT from 0,8 kW to 10 kW.

Contact name: Johan Kuikman
Address: Botanicuslaan 14, 9751 AC Haren
Telephone: +31-50 5340104
Country : Nethrelands

Passaat references

Site	Use	Country
Dieren	Stand alone electricity	Netherlands
Split	Roof university building	Croatia
Lapan	Rural electrification	Indonesia
Trontheim	Radio repeaters	Norway

Passaat 1,4 kW

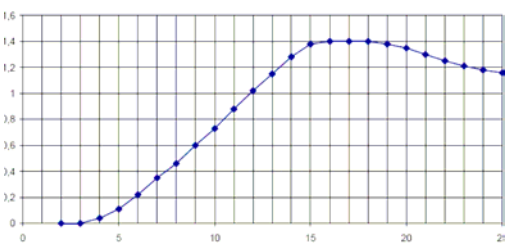
Technical information

POWER		Unit
1) Rated power	1,4	kW
2) Rated wind speed	16	m/s
3) Cut-in wind speed	2,5	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	60	Km/h
DIMENSIONS		
6) Rotor weight	75	kg
7) Rotor diameter	3,12	m
8) Rotor height (for VAWT only)	---	m
9) Swept area	7,65	m^2
10) Height of the mast	12 - 24	m
OTHER INFORMATION		
11) Maximum rpm	775	At rated wind speed
12) Gear box type		No gear box
13) Brake system		Short circuit of generator
14) Number of blades		3
15) Blades material		Composite fibre glass
16) Output voltage	24-240	V (DC)
17) Minimum operation temperature	- 30	°C
18) Maximum operation temperature	+ 50	°C
19) Acoustic levels at a distance of 20 m ? (wind = 10 m/s)	< 60	DB
20) Lifetime	20	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		Wind vane
24) Upwind or downwind		Upwind

Calculated power curve

Wind speed (m/s)	Power* (W)
1	0
2	0
3	0,001
4	0,040
5	0,110
6	0,220
7	0,350
8	0,460
9	0,600
10	0,730
11	0,880
12	1,020
13	1,150
14	1,280
15	1,400
*power on axis, sea level, temp. 15°C	

Power curve



Fortis Montana

HAWT from 0,8 kW to 10 kW.

Contact name: Johan Kuikman
Address: Botanicuslaan 14, 9751 AC Haren
Telephone: +31 – 50 5340104
Country : Netherlands

Montana references

Site	Use	Country
Stompetoren	Demonstration at installation company	Netherlands
Waregem	On the roof of industrial building	Belgium
Perugia	Plasto Work and Wind Engineering	Italy
CREST	Stand alone electricity	Greece

Montana 5,6 kW

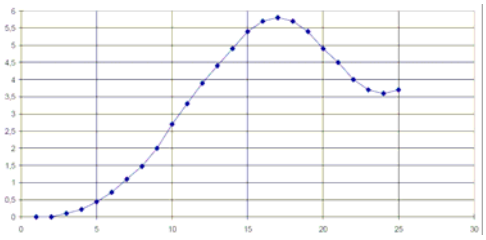
Technical information

POWER		Unit
1) Rated power	5,6	kW
2) Rated wind speed	17	m/s
3) Cut-in wind speed	2,5	m/s
4) Cut-out wind speed	No	m/s
5) Maximum wind speed the turbine can withstand	60	Km/h
DIMENSIONS		
6) Rotor weight	170	kg
7) Rotor diameter	5	m
8) Rotor height (for VAWT only)	---	m
9) Swept area	19,6	m^2
10) Height of the mast	18	m
OTHER INFORMATION		
11) Maximum rpm	450	At rated wind speed
12) Gear box type		No gear box
13) Brake system		Short circuit at generator
14) Number of blades		3
15) Blades material		Composite fibre glass
16) Output voltage	24 - 400	V (DC)
17) Minimum operation temperature	- 30	°C
18) Maximum operation temperature	+ 50	°C
19) Acoustic levels at a distance of 20 m ? (wind = 10 m/s)	< 60	DB
20) Lifetime	20	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		Wind vane
24) Upwind or downwind		Upwind

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	0,10
4	0,22
5	0,44
6	0,72
7	1,10
8	1,43
9	2,00
10	2,70
11	3,30
12	3,90
13	4,40
14	4,90
15	5,40

Power curve



Fortis Wind Energy

HAWT from 0,8 kW to 10 kW.

Contact name: Johan Kuikman
Address: Botanicuslaan 14, 9751 AC Haren
Telephone: +31-50 5340104
Country : Netherlands

Alize, 10 kW

Alize references

Site	Use	Country
Dronrijp	Farm	Netherlands
Lutjegast	Farm	Netherlands
Opende	Farm	Netherlands
St. Cruz de la Palma	Desalination plant	Spain, Canary Islands

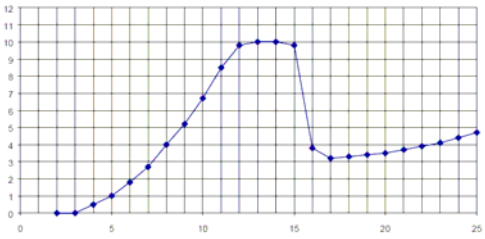
Technical information

POWER		Unit
1) Rated power	10	kW
2) Rated wind speed	12	m/s
3) Cut-in wind speed	3	m/s
4) Cut-out wind speed	No	m/s
5) Maximum wind speed the turbine can withstand	60	Km/h
DIMENSIONS		
6) Rotor weight	285	kg
7) Rotor diameter	7	m
8) Rotor height (for VAWT only)	---	m
9) Swept area	38,5	m^2
10) Height of the mast	18 – 36	m
OTHER INFORMATION		
11) Maximum rpm	300	At rated wind speed
12) Gear box type	No gear box	
13) Brake system	Short circuit of generator	
14) Number of blades	3	
15) Blades material	Composite fibre glass	
16) Output voltage	120 - 400	V (DC)
17) Minimum operation temperature	- 30	°C
18) Maximum operation temperature	+ 50	°C
19) Acoustic levels at a distance of 20 m ? (wind = 10 m/s)	< 60	DB
20) Lifetime	20	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Wind vane	
24) Upwind or downwind	Upwind	

Calculated power curve

Wind speed (m/s)	Power* (W)
1	0
2	0
3	0
4	0,4
5	1,0
6	1,8
7	2,8
8	3,9
9	5,2
10	6,8
11	8,5
12	9,8
13	10,0
14	10,0
15	10,0

Power curve



Fuhrländer

HAWT from 30 kW to 2 700 kW.

Contact name: Carina Demuth / A. Kloos
Address: Auf der Höhe 4, 56477 Waigandshain
Telephone: +49 266 49 96 60
Country : **Germany**

Fürländer FL30 references

Site	Use	Country
Zistersdorf	Government	Austria
Cody / Wyoming	Privat Ranch	USA
Köln	Public Services	Germany

FL 30/ 30 kW

Technical information

POWER		Unit
1) Rated power	30	kW
2) Rated wind speed	12	m/s
3) Cut-in wind speed	2,5	m/s
4) Cut-out wind speed	25	m/s
5) Maximum wind speed the turbine can withstand	55	m/s
DIMENSIONS		
6) Rotor weight	640	kg
7) Rotor diameter	13	m
8) Rotor height (for VAWT only)		m
9) Swept area	133	m^2
10) Height of the mast	18/27	m
OTHER INFORMATION		
11) Maximum rpm	70	At rated wind speed
12) Gear box type	Spur gear/planet gears	
13) Brake system	Disk brake+ Mech tip brake	
14) Number of blades	3	
15) Blades material	Glass Fibre Composite	
16) Output voltage	400	V
17) Minimum operation temperature	-20°C	°C
18) Maximum operation temperature	+ 50°C	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	93	DB
20) Lifetime		Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	Yes	
23) Yaw control system	1 gearbox motors	
24) Upwind or downwind		

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	

Power curve

Fuhrländer

HAWT from 30 kW to 2 700 kW.

Contact name: Carina Demuth / A. Kloos
Address: Auf der Höhe 4, 56477 Waigandshain
Telephone: +49 266 49 96 60
Country : **Germany**

Fuhrländer FL 100 references

Site	Use	Country
Rennerod	Company " Spedition Pracht"	Germany
Iwata /Shizuoka	Iwata Factory	Japan
Vilemov	Orthodox Akademie	Czech Republic
Boston	IBEW Local	USA

FL 100/ 100 kW

Technical information

POWER		Unit
1) Rated power	100	kW
2) Rated wind speed	13	m/s
3) Cut-in wind speed	2,5	m/s
4) Cut-out wind speed	25	m/s
5) Maximum wind speed the turbine can withstand	67	m/s
DIMENSIONS		
6) Rotor weight (incl. hub)	2 300	kg
7) Rotor diameter	21	m
8) Rotor height (for VAWT only)		m
9) Swept area	346	m^2
10) Height of the mast	35	m
OTHER INFORMATION		
11) Maximum rpm	47	At rated wind speed
12) Gear box type	Combined spur gear/planet gears	
13) Brake system	Disc brake + rotor tip brake + parking brake system + aerodynamic safety system "stall"	
14) Number of blades	3	
15) Blades material	Glass Fibre Composite	
16) Output voltage	400	V
17) Minimum operation temperature	-20°C	°C
18) Maximum operation temperature	+ 50°C	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	95	DB
20) Lifetime	25	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	Yes	
23) Yaw control system	Wind vane	
24) Upwind or downwind	Upwind	

Calculated power curve

Wind speed (m/s)	Power (W)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	

Power curve

Gaia-Wind A/S

HAWT 11 kW.

Contact name: Jesper Andersen
Address: Håndværkervej 1, 8840 Rødkærsbro
Telephone: +45 87 76 22 00
Country : **Denmark**

Gaia 11 kW references: have not provided any references

Site	Use	Country

Gaia/ 11 kW

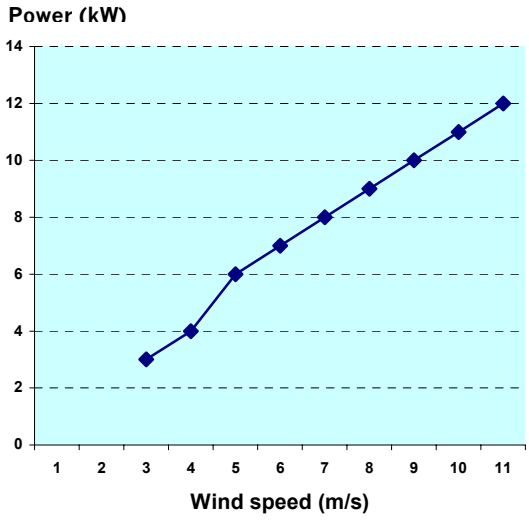
Technical information

POWER		Unit
1) Rated power	11	kW
2) Rated wind speed	10	m/s
3) Cut-in wind speed	3	m/s
4) Cut-out wind speed	25	m/s
5) Maximum wind speed the turbine can withstand	65	Km/h
DIMENSIONS		
6) Rotor weight	208-248	kg
7) Rotor diameter	13	m
8) Rotor height (for VAWT only)	Not relevant	m
9) Swept area	132	m^2
10) Height of the mast	18	m
OTHER INFORMATION		
11) Maximum rpm	56	At rated wind speed
12) Gear box type	Compact shaft mounted gear	
13) Brake system	Disc brake	
14) Number of blades	2	
15) Blades material	Composite fiber glass	
16) Output voltage	380-400	V
17) Minimum operation temperature	- 20	°C
18) Maximum operation temperature	+ 50	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	45 Db at 59 meters	DB
20) Lifetime	20	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	Yes	
23) Yaw control system	Wind vane	
24) Upwind or downwind	Downwind turbine	

Calculated power curve

Wind speed (m/s)	Power(kW)
1	
2	
3	3
4	4
5	6
6	7
7	8
8	9
9	10
10	11
11	12

Power curve:



Gazelle Wind Turbines Ltd

HAWT – 20 kW

Contact name: Ken Chaplin
Address: Stargate Ind Est, Ryton, Tyne & Wear, NE40 3 EX
Telephone: +44 (0) 191 413 00 12
Country: **United Kingdom**

Gazelle / 20 kW

Gazelle 20 kW references

Site	Use	Country
Southport Eco Centre,	Electricity generation for building	UK
Montagne Jeunesse Eco Factory, Swansea	Electricity generation for building	UK
Sunderland Enterprise Park, Sunderland	Electricity generation for building	UK

Technical information

POWER		Unit
1) Rated power	20	kW
2) Rated wind speed	13	m/s
3) Cut-in wind speed	4	m/s
4) Cut-out wind speed	20	m/s
5) Maximum wind speed the turbine can withstand	DK	km/h
DIMENSIONS		
6) Nacelle and rotor weight	1600	kg
7) Rotor diameter	11	m
8) Rotor height (for VAWT only)	-	m
9) Swept area	95	m^2
10) Height of the mast	12,5 to 20	m
OTHER INFORMATION		
11) Maximum rpm	106	At rated wind speed
12) Gear box type		None
13) Brake system		-
14) Number of blades		3
15) Blades material		Carbon fibre epoxy
16) Output voltage	400	V
17) Minimum operation temperature	DK	°C
18) Maximum operation temperature	DK	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	DK	DB
20) Lifetime	20 to 25	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		Yes
23) Yaw control system		Free yaw
24) Upwind or downwind		Downwind

Calculated power curve

Not available

Wind speed (m/s)	Power (kW)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Power curve

Not available

Iskra Wind Turbines

HAWT – 5 kW

Contact name: John Balson
Address: 261, Woodborough Road, St Anns, Nottingham, NG3 4 JZ
Telephone: +44 (0) 115 841 32 83
Country: **United Kingdom**

Iskra 5 kW references

Site	Use	Country
The Turbine, Shireoaks Business Innovation Centre, Worksop	Electricity generation for building	UK
Westergate Business Centre, Brighton	Electricity generation for building	UK
Hockerton Housing Project, Hockerton	Electricity generation for homes and visitor centre	UK

Iskra / 5 kW

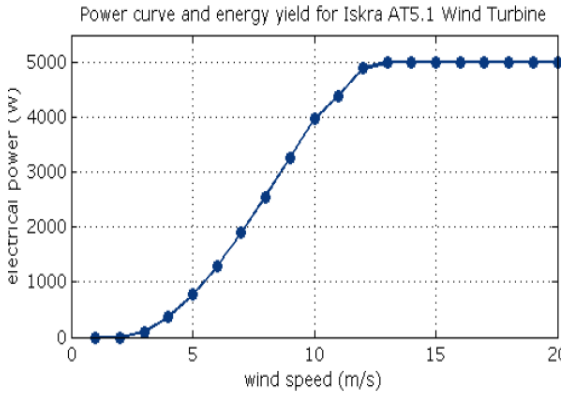
Technical information

POWER		Unit
1) Rated power	5	kW
2) Rated wind speed	11	m/s
3) Cut-in wind speed	3	m/s
4) Cut-out wind speed	60	m/s
5) Maximum wind speed the turbine can withstand	216	km/h
DIMENSIONS		
6) Nacelle and rotor weight	280	kg
7) Rotor diameter	5.4	m
8) Rotor height (for VAWT only)	-	m
9) Swept area	22.9	m^2
10) Height of the mast	12 to 30	m
OTHER INFORMATION		
11) Maximum rpm	200	At rated wind speed
12) Gear box type		None
13) Brake system		Electro-dymamic
14) Number of blades		3
15) Blades material		Composite fibre glass
16) Output voltage	Variable	V
17) Minimum operation temperature	-20	°C
18) Maximum operation temperature	+50	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	DK	DB
20) Lifetime	20	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		Tail vane
24) Upwind or downwind		Upwind

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	96
4	367
5	771
6	1284
7	1901
8	2547
9	3253
10	3965
11	4397
12	4888
13	5000
14	5000
15	5000

Power curve:



Jonica Impianti

HAWT of 20 kW.

Contact name: Nicola De Luca
Address: Via Poerio 226, 74020 Lizzano
Telephone: +39 099 955 12 08
Country : **Italy**

Jonica Impianti 20 kW references

City (Province)	Use	Country
Lizzano (Taranto)	Jonica Impianti factory	Italy
Perarolo di Cadore (Belluno)	Industrial area	Italy
Pos al Pago (Belluno)	Industrial area	Italy
Quero (Belluno)	Industrial area	Italy
Colle Salvetti (Livorno)	AGIP Service station	Italy

Jonica Impianti/ 20 kW

Technical information

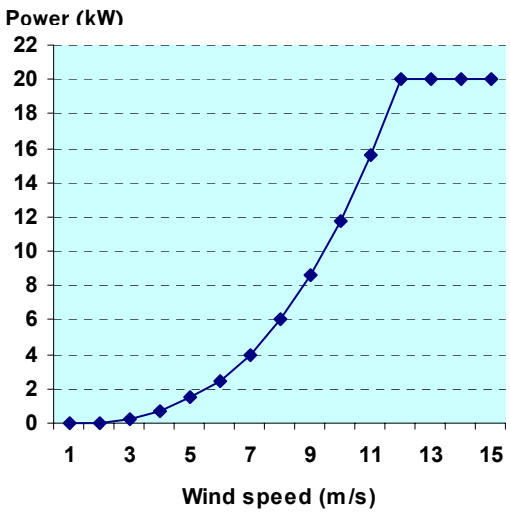
POWER		Unit
1) Rated power	20	KW
2) Rated wind speed	12,5	m/s
3) Cut-in wind speed	3,5	m/s
4) Cut-out wind speed	37,5	m/s
5) Maximum wind speed the turbine can withstand	153	Km/h
DIMENSIONS		
6) Rotor weight (blades)	100	Kg
7) Rotor diameter	8	m
8) Rotor height (for VAWT only)		m
9) Swept area	50,3	m^2
10) Height of the mast	12/18	m
OTHER INFORMATION		
11) Maximum rpm	200	At rated wind speed
12) Gear box type		Not present
13) Brake system		Aerodynamic with pitch control
14) Number of blades		3
15) Blades material		Composite fiber glass
16) Output voltage	380	V
17) Minimum operation temperature	- 20	°C
18) Maximum operation temperature	+ 50	°C
19) Acoustic levels at a distance of 50 m (wind = 9 m/s)	50	DB
20) Lifetime	20	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		Wind vane
24) Upwind or downwind		Upwind turbine

Calculated power curve

Wind speed (m/s)	Power (kW)
1	0
2	0
3	0,.25
4	0,.50
5	1, 5
6	2, 5
7	4
8	6
9	8, 6
10	11, 8
11	15, 6
12	20
13	20
14	20
15	20

Sea level, Raleygh distrib k = 2
Tower height= 18 m, Shear coef = 0,14
Turbulence factor = 15%

Power curve:



Marlec Engineering Co Ltd

HAWT – From 0,025 kW to 0,34 kW

Contact name: Teresa Auciello
Address: Rutland House, Trevithick Rd, Corby, Northants NN17 5XY
Telephone: +44 (0) 1536 201 588
Country: **United Kingdom**

Rutland 503 – 0,025 kW references

Site	Use	Country
Elliott Durham Comprehensive School, Nottingham	Educational	UK
Sandy Upper School and Community Sports College	Educational	UK
Cromwell Park Primary School, Huntingdon	Educational	UK

Rutland 503 / 0,025 kW

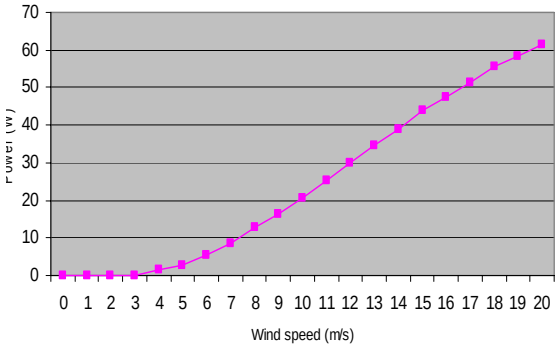
Technical information

POWER		Unit
1) Rated power	0, 025	kW
2) Rated wind speed	10	m/s
3) Cut-in wind speed	2,6	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	> 137	km/h
DIMENSIONS		
6) Nacelle and rotor weight	3	kg
7) Rotor diameter	0,500	m
8) Rotor height (for VAWT only)	-	m
9) Swept area	0,196	m^2
10) Height of the mast	Variable up to 6,5	m
OTHER INFORMATION		
11) Maximum rpm	DK	At rated wind speed
12) Gear box type		None
13) Brake system		DK
14) Number of blades		6
15) Blades material		Glass reinforced plastic
16) Output voltage	12 or 24	V
17) Minimum operation temperature	-25	°C
18) Maximum operation temperature	DK	°C
19) Acoustic levels at a distance of 20 m? at nacelle? (wind = 5 m/s)	DK	DB
20) Lifetime	15	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		Wind vane
24) Upwind or downwind		Upwind

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	1
4	2
5	4
6	6
7	10
8	14
9	20
10	26
11	28
12	36
13	39
14	44
15	56

Power curve:



Marlec Engineering Co Ltd

HAWT – From 0,025 kW to 0,34 kW

Contact name: Teresa Auciello
Address: Rutland House, Trevithick Rd, Corby, Northants NN17 5XY
Telephone: +44 (0) 1536 201 588
Country : **United Kingdom**

Rutland 910-3 – 0,09 kW references

Site	Use	Country
Hagbourne Primary School, Oxon	Educational and Electricity generation	UK
A43 roadside	Traffic signals	UK
Tokyo	Street lighting	Japan

Rutland 910-3 / 0,09 kW

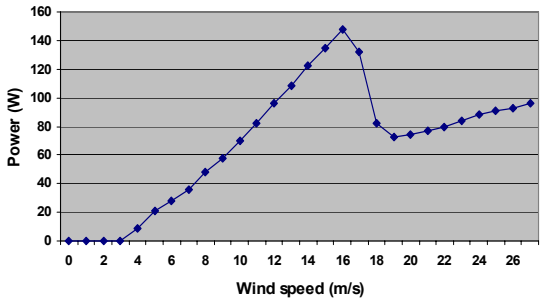
Technical information

POWER		Unit
1) Rated power	0,09	kW
2) Rated wind speed	10	m/s
3) Cut-in wind speed	2,6	m/s
4) Cut-out wind speed	It furls at 15 m/s but no real cut out	m/s
5) Maximum wind speed the turbine can withstand	> 137	km/h
DIMENSIONS		
6) Nacelle and rotor weight	17	kg
7) Rotor diameter	0,910	m
8) Rotor height (for VAWT only)	-	m
9) Swept area	0,655	m^2
10) Height of the mast	Up to 6,5	m
OTHER INFORMATION		
11) Maximum rpm	DK	At rated wind speed
12) Gear box type		None
13) Brake system		DK
14) Number of blades		6
15) Blades material		Glass reinforced plastic
16) Output voltage	12 or 24	V
17) Minimum operation temperature	Artic	°C
18) Maximum operation temperature	Sahara	°C
19) Acoustic levels at a distance of 20 m? at nacelle? (wind = 5 m/s)	DK	DB
20) Lifetime	15	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		Wind vane
24) Upwind or downwind		Upwind

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	2
4	14
5	21
6	28
7	44
8	50
9	66
10	83
11	87
12	92
13	121
14	138
15	159

Power curve:



Marlec Engineering Co Ltd

HAWT – From 0,025 kW to 0,34 kW

Contact name: Teresa Auciello
Address: Rutland House, Trevithick Rd, Corby, Northants NN17 5XY
Telephone: +44 (0) 1536 201 588
Country : **United Kingdom**

Rutland 913 – 0,09 kW references

Site	Use	Country
Rutland Water	Water level monitoring	UK
Southampton	Sailing boat	UK
	Street lighting	Taiwan
A6006 road sign	Safety sign	UK

Rutland 913/ 0,09 kW

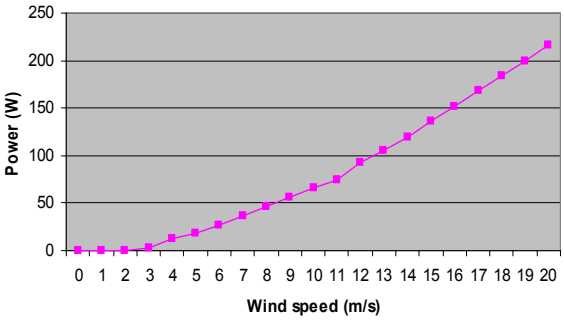
Technical information

POWER		Unit
1) Rated power	0,09	kW
2) Rated wind speed	10	m/s
3) Cut-in wind speed	2,6	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	> 137	Km/h
DIMENSIONS		
6) Nacelle and rotor weight	13	Kg
7) Rotor diameter	0,913	m
8) Rotor height (for VAWT only)	-	m
9) Swept area	0,655	m^2
10) Height of the mast	Variable up to 6,5	m
OTHER INFORMATION		
11) Maximum rpm	DK	At rated wind speed
12) Gear box type	None	
13) Brake system	DK	
14) Number of blades	6	
15) Blades material	Glass reinforced plastic	
16) Output voltage	12 or 24	V
17) Minimum operation temperature	-25	°C
18) Maximum operation temperature	DK	°C
19) Acoustic levels at a distance of 20 m? at nacelle? (wind = 5 m/s)	DK	DB
20) Lifetime	15	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Wind vane	
24) Upwind or downwind	Upwind	

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	2
4	14
5	21
6	28
7	44
8	50
9	66
10	83
11	87
12	92
13	121
14	138
15	159

Power curve:



OY Windside Production Ltd

VAWT from 1 kW to 8 kW.

WS-4B & 4C/ 1-2 kW

Contact name: Risto Joutsiniemi
Address: Niemenharjuntie 85, 44800 Pihtipudas
Telephone: +358 208 350 700
Country : **Finland**

Oy Windside WS-4B/4C references

Site	Use	Country
Doncaster	Earth Centre	England
Helsinki	Arabianranta	Finland
Chicago	Millenium Park	U.S.A
Yurigaoka, Fukuoka	Sports centre	Japan
Oulu	In a Park wind art work Synergia	Finland

Technical information

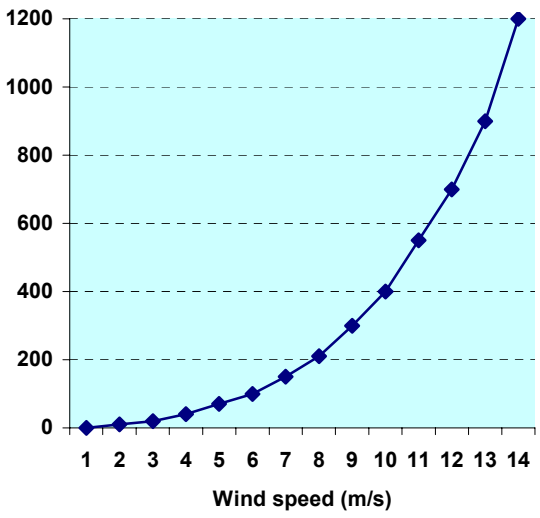
POWER		Unit
1) Rated power	1	KW
2) Rated wind speed	18	m/s
3) Cut-in wind speed	2	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	144	Km/h
DIMENSIONS		
6) Rotor weight	400	Kg
7) Rotor diameter	1	m
8) Rotor height (for VAWT only)	4	m
9) Swept area	4	m^2
10) Height of the mast	Not relevant	m
OTHER INFORMATION		
11) Maximum rpm	170 - 400	At rated wind speed
12) Gear box type		No gear box
13) Brake system		Disk brake
14) Number of blades		2
15) Blades material		Composite fibre glass
16) Output voltage	0 - 200	V
17) Minimum operation temperature	- 60	°C
18) Maximum operation temperature	+ 80	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	0	DB
20) Lifetime	100	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		Yes
23) Yaw control system		Not needed
24) Upwind or downwind		

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	10
3	20
4	40
5	70
6	100
7	150
8	210
9	300
10	400
11	550
12	700
13	900
14	1 200

In battery charging the electricity production will be changing according to the voltage level chosen by the client. 3-phase Generator 25 Ampers

Power curve



OY Windside Production Ltd

VAWT from 1 kW to 8 kW.

Contact name: Risto Joutsiniemi
Address: Niemenharjuntie 85, 44800 Pihtipudas
Telephone: +358 208 350 700
Country : **Finland**

Oy Windside WS-12 references

Site	Use	Country
Raisio	Shopping centre	Finland

WS-12/ 8 kW

Technical information

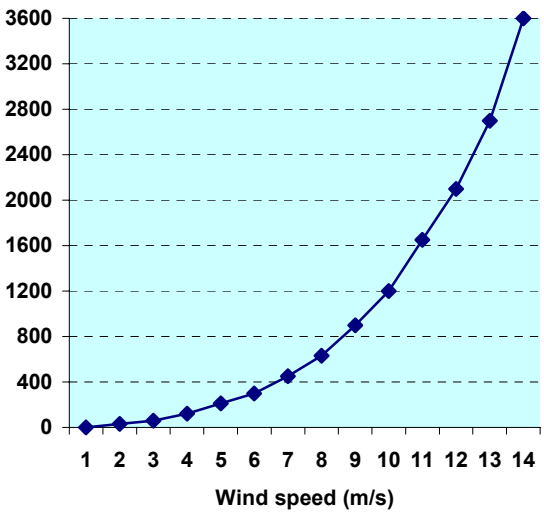
POWER		Unit
1) Rated power	8	kW
2) Rated wind speed	20	m/s
3) Cut-in wind speed	2	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	216	Km/h
DIMENSIONS		
6) Rotor weight	3000	kg
7) Rotor diameter	2	m
8) Rotor height (for VAWT only)	6	m
9) Swept area	12	m^2
10) Height of the mast	Not relevant	m
OTHER INFORMATION		
11) Maximum rpm	100 - 300	At rated wind speed
12) Gear box type		No gear box
13) Brake system		Disk brake
14) Number of blades		2
15) Blades material		Aluminium
16) Output voltage	0 - 200	V
17) Minimum operation temperature	- 60	°C
18) Maximum operation temperature	+ 80	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	0	DB
20) Lifetime	100	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		Yes
23) Yaw control system		Not needed
24) Upwind or downwind		

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	30
3	60
4	120
5	211
6	300
7	450
8	630
9	900
10	1 200
11	1 650
12	2 100
13	2 700
14	3 600

In battery charging the electricity production will be changing according to the voltage level chosen by the client.

Power curve



Pitchwind Systems AB

HAWT from 20 kW to 30 kW

Contact name: Lars Akeson
Address: PO Box 89, 44 322 Lerum
Telephone: +46 708 237 219
Country : **Sweden**

Pitchwind 30 kW Grid connected references

Site	Use	Country

Pitchwind/ 30 kW Grid

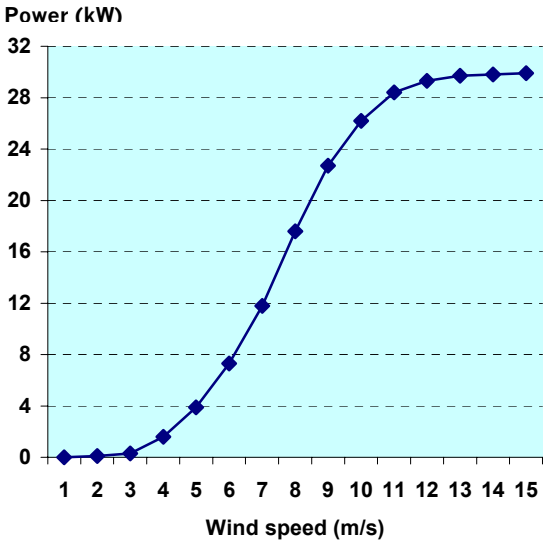
Technical information

POWER		Unit
1) Rated power	30	kW
2) Rated wind speed	15	m/s
3) Cut-in wind speed	2	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	250	Km/h
DIMENSIONS		
6) Rotor weight	550	kg
7) Rotor diameter	14	m
8) Rotor height (for VAWT only)		m
9) Swept area	154	m^2
10) Height of the mast	20 / 62	m
OTHER INFORMATION		
11) Maximum rpm	81	At rated wind speed
12) Gear box type		None
13) Brake system		Pitch by electrical actuator at service parking brake
14) Number of blades		2
15) Blades material		Steel polyster
16) Output voltage	380 – 500	V
17) Minimum operation temperature	- 40	°C
18) Maximum operation temperature	+ 40	°C
19) Acoustic levels at a distance of 30m from tower base (wind speed 5 m/s & rotor speed = 48 rpm)	50	DB
20) Lifetime	20	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		Wind wheels
24) Upwind or downwind		Upwind

Calculated power curve

Wind speed (m/s)	Power (kW)
1	0
2	0,1
3	0,3
4	1,6
5	3,9
6	7,3
7	11,8
8	17,6
9	22,7
10	26,2
11	28,4
12	29,3
13	29,7
14	29,8
15	29,9

Power curve:



Proven Energy Products Ltd

HAWT – From 0,6 kW to 15 kW

Contact name: David Watson
Address: Wardhead Park, Stewarton, Ayrshire, KA3 5 LH, Scotland
Telephone: +44 (0) 1560 485 570
Country : **United Kingdom**

Proven WT 600 references

Site	Use	Country

Proven WT 600/ 0,6 kW

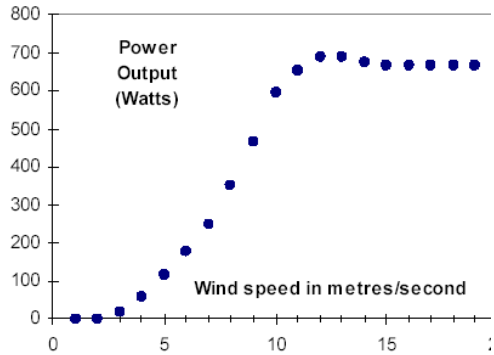
Technical information

POWER		Unit
1) Rated power	0,6	KW
2) Rated wind speed	10	m/s
3) Cut-in wind speed	2,5	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	234	Km/h
DIMENSIONS		
6) Rotor weight	70	Kg
7) Rotor diameter	2,55	m
8) Rotor height (for VAWT only)		m
9) Swept area	5,11	m^2
10) Height of the mast	5,5	m
OTHER INFORMATION		
11) Maximum rpm		At rated wind speed
12) Gear box type		
13) Brake system		
14) Number of blades		3
15) Blades material		Polypropylene / P.U.
16) Output voltage	14 / 24/ 48	V
17) Minimum operation temperature	Artic circle	°C
18) Maximum operation temperature	South America	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	21 at 20 m 35 at mast	DB
20) Lifetime	20-25	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		
24) Upwind or downwind		Downwind

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	15
4	60
5	110
6	190
7	260
8	350
9	480
10	600
11	660
12	700
13	700
14	700

Power curve:



Proven Energy Products Ltd

HAWT – From 0,6 kW to 15 kW

Contact name: David Watson
Address: Wardhead Park, Stewarton, Ayrshire, KA3 5 LH, Scotland
Telephone: +44 (0) 1560 485 570
Country : **United Kingdom**

Proven WT 6 000/ 6 kW

Proven WT 6 000 references

Site	Use	Country

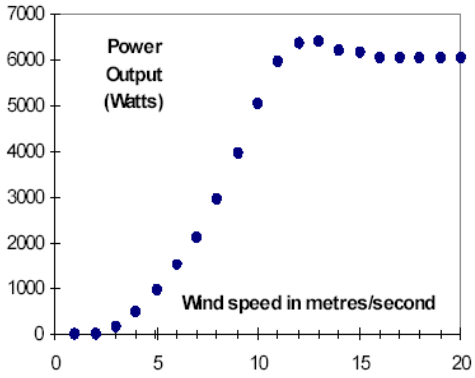
Technical information

POWER		Unit
1) Rated power	6	KW
2) Rated wind speed	12	m/s
3) Cut-in wind speed	2,5	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	234	Km/h
DIMENSIONS		
6) Rotor weight	539	Kg
7) Rotor diameter	5,5	m
8) Rotor height (for VAWT only)		m
9) Swept area	23,76	m^2
10) Height of the mast	9 / 15	m
OTHER INFORMATION		
11) Maximum rpm		At rated wind speed
12) Gear box type		
13) Brake system		
14) Number of blades		3
15) Blades material		Wood/ Epoxy / P.U.
16) Output voltage	48 to 300	V
17) Minimum operation temperature	Artic circle	°C
18) Maximum operation temperature	South America	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	45 dB at mast 36 dB at 20 m	DB
20) Lifetime	20-25	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		
24) Upwind or downwind		Downwind

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	100
4	450
5	1 000
6	1 500
7	2 050
8	3 000
9	4 000
10	5 000
11	6 000
12	6 200
13	6 250
14	6 150

Power curve:

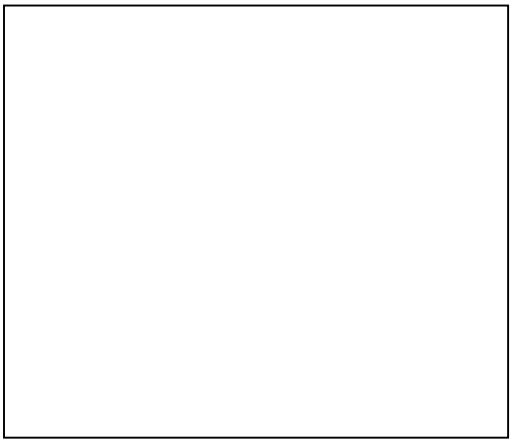


Proven Energy Products Ltd

HAWT – From 0,6 kW to 15 kW

Contact name: David Watson
Address: Wardhead Park, Stewarton, Ayrshire, KA3 5 LH, Scotland
Telephone: +44 (0) 1560 485 570
Country : **United Kingdom**

Proven WT 15 000/ 15 kW



Proven WT 15 000 references

Site	Use	Country

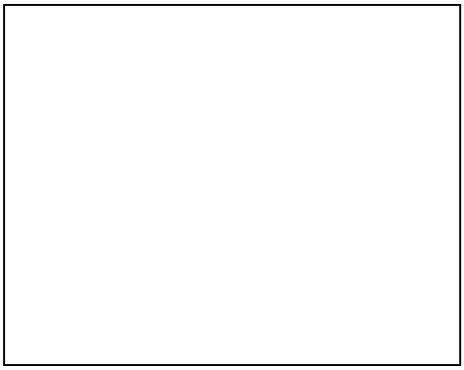
Technical information

POWER		Unit
1) Rated power	15	KW
2) Rated wind speed	12	m/s
3) Cut-in wind speed	2,5	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	234	Km/h
DIMENSIONS		
6) Rotor weight	1 100	Kg
7) Rotor diameter	9	m
8) Rotor height (for VAWT only)		m
9) Swept area	63,62	m^2
10) Height of the mast	15 /20	m
OTHER INFORMATION		
11) Maximum rpm		At rated wind speed
12) Gear box type		
13) Brake system		
14) Number of blades		3
15) Blades material		Glass Epoxy
16) Output voltage	48 DC or 230 AC or 240 AC	V
17) Minimum operation temperature	Artic circle	°C
18) Maximum operation temperature	South America	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	65 dB at mast 48 dB at 20 m	DB
20) Lifetime	20-25	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		
24) Upwind or downwind		Downwind

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	300
4	1 200
5	2 200
6	4 000
7	5 500
8	7 500
9	10 000
10	12 500
11	15 000
12	16 000
13	16 000
14	16 500

Power curve:



Renewable Devices Swift Turbines

HAWT – 1,5 kW

Contact name:
Address: Bush Estate, Edinburgh, EH26 OPH
Telephone: +44 (0) 131 535 33 01
Country : **United Kingdom**

Swift Rooftop/ 1,5 kW

Swift Rooftop 1,5 kW references

Site	Use	Country
Fife School / Collidean	Primary school (rooftop)	England

Technical information

POWER		Unit
1) Rated power	1,5	KW
2) Rated wind speed	12	m/s
3) Cut-in wind speed	4	m/s
4) Cut-out wind speed	17	m/s
5) Maximum wind speed the turbine can withstand	223	Km/h
DIMENSIONS		
6) Rotor weight	15	Kg
7) Rotor diameter	2	m
8) Rotor height (for VAWT only)		m
9) Swept area	3,14	m^2
10) Height of the mast	5	m
OTHER INFORMATION		
11) Maximum rpm		At rated wind speed
12) Gear box type		
13) Brake system		
14) Number of blades		5
15) Blades material		Moulded carbon fibre
16) Output voltage	60 DC	V
17) Minimum operation temperature	DK	°C
18) Maximum operation temperature	DK	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	DK	DB
20) Lifetime	20	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		Wind vane
24) Upwind or downwind		Upwind

Calculated power curve

Wind speed (m/s)	Power (W)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Power curve:

Ropatec S.p.a.

VAWT from 0,75 kW to 6 kW.

Contact name: Hannes Riegler
Address: Via Siemens 19
Telephone: +39 0471 568 180
Country : **Italy**

Ropatec WRE.007 references

Site	Use	Country
Near Bristol	Battery charging for a LNG-station	England
	Demonstration unit on a rooftop	Korea
Ihoshy	Energy supply for a radio station	Madagascar
Hammerfest	Battery charging	Norway

WRE.007 / 0,75 kW

Technical information

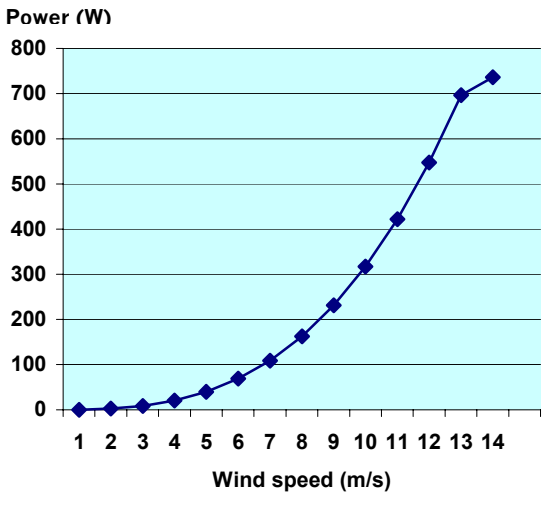
		Unit
1) Rated power	0,75	kW
2) Rated wind speed	14	m/s
3) Cut-in wind speed	2	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	> 150	Km/h
DIMENSIONS		
6) Rotor weight	150	kg
7) Rotor diameter	1,5	m
8) Rotor height (for VAWT only)	1,5	m
9) Swept area	2,25	m^2
10) Height of the mast	Not relevant	m
OTHER INFORMATION		
11) Maximum rpm	350	At rated wind speed
12) Gear box type	No gear box – direct driven	
13) Brake system	None	
14) Number of blades	2	
15) Blades material	Aluminium	
16) Output voltage	200	V
17) Minimum operation temperature	- 30	°C
18) Maximum operation temperature	+ 50	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	Not audible	DB
20) Lifetime	15/20	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Independent of wind direction	
24) Upwind or downwind	Upwind turbine	

Calculated power curve

Wind speed (m/s)	Power* (W)
1	0,32
2	2,54
3	8,56
4	20,28
5	39,62
6	68,46
7	108,71
8	162,28
9	231,05
10	316,94
11	421,85
12	547,68
13	696,33
14	736,27
15	

*power on axis, sea level, temp. 15°C

Power curve:



Ropatec S.p.a.

VAWT from 0,75 kW to 6 kW.

Contact name: Hannes Riegler
Address: Via Siemens 19
Telephone: +39 0471 568 180
Country : **Italy**

Ropatec WRE.30 references

Site	Use	Country
Monte Cimone	Research station	Italy
Foggia	Support for electrical pumps	Italy
Sennes	Refuge	Italy
Marchetti	Refuge	Italy

WRE.030 / 3 kW

Technical information

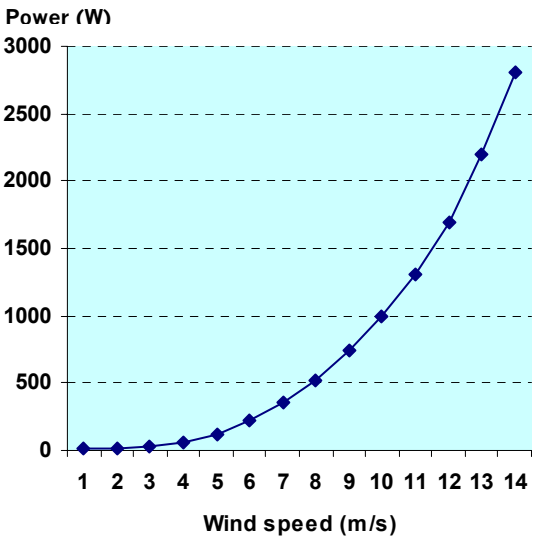
POWER		Unit
1) Rated power	3	kW
2) Rated wind speed	14	m/s
3) Cut-in wind speed	2	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	> 150	Km/h
DIMENSIONS		
6) Rotor weight	~430	kg
7) Rotor diameter	3,3	m
8) Rotor height (for VAWT only)	2,2	m
9) Swept area	7,26	m^2
10) Height of the mast	Not relevant	m
OTHER INFORMATION		
11) Maximum rpm	100 to 120	At rated wind speed
12) Gear box type	No gear box – direct driven	
13) Brake system	Not required	
14) Number of blades	2	
15) Blades material	Aluminium	
16) Output voltage	0 - 220	V
17) Minimum operation temperature	- 30	°C
18) Maximum operation temperature	+ 50	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	Not audible	DB
20) Lifetime	15/20	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Independent of wind direction	
24) Upwind or downwind	Upwind turbine	

Calculated power curve

Wind speed (m/s)	Power* (kW)
1	0,01
2	0,02
3	0,03
4	0,06
5	0,12
6	0,22
7	0,35
8	0,52
9	0,74
10	1
11	1,3
12	1,7
13	2,2
14	2,8
15	

* electrical output, sea level, temp. 15°C

Power curve:



Ropatec S.p.a.

VAWT from 0,75 kW to 6 kW.

Contact name: Hannes Riegler
Address: Via Siemens 19
Telephone: +39 0471 568 180
Country : **Italy**

Ropatec WRE.060 references

Site	Use	Country
Valley of Aoste	Water heating system	Italy
Hallau	On-grid system	Switzerland
Townsville	Demonstration unit	Australia

WRE.060 / 6 kW

Technical information

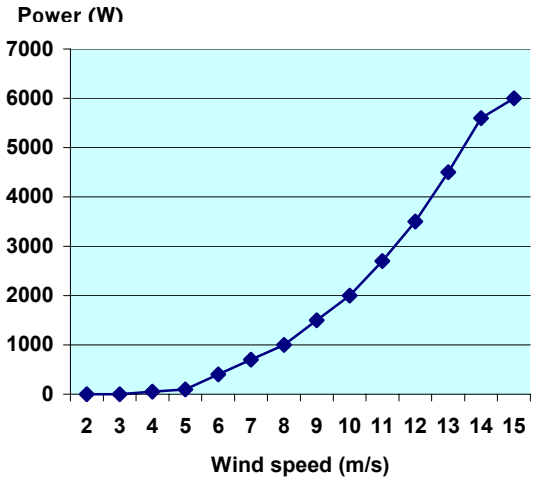
POWER		Unit
1) Rated power	6	kW
2) Rated wind speed	14	m/s
3) Cut-in wind speed	2	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	> 150	Km/h
DIMENSIONS		
6) Rotor weight	750	kg
7) Rotor diameter	3,3	m
8) Rotor height (for VAWT only)	4,4	m
9) Swept area	14,52	m^2
10) Height of the mast	Not relevant	m
OTHER INFORMATION		
11) Maximum rpm	110	At rated wind speed
12) Gear box type	No gear box – direct driven	
13) Brake system	None	
14) Number of blades	2	
15) Blades material	Aluminium	
16) Output voltage	220	V
17) Minimum operation temperature	- 30	°C
18) Maximum operation temperature	+ 50	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	Not audible	DB
20) Lifetime	15/20	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Independent of wind direction	
24) Upwind or downwind	Upwind turbine	

Calculated power curve

Wind speed (m/s)	Power*(kW)
1	0
2	0
3	0.05
4	0.10
5	0.25
6	0.40
7	0.70
8	1
9	1.5
10	2
11	2.7
12	3.5
13	4.5
14	5.6
15	6

* electrical output, sea level, temp. 15°C

Power curve:



Rugged renewables

VAWT – 0,4 kW

Contact name: Ken England

Address: Gear House, unit 3, Saltmeadows road, Gateshead, NE8 3 AH

Telephone: +44 (0) 191 478 51 11

Country : **England**

EMAT references

Site	Use	Country

0,4 kW

Technical information

POWER		Unit
1) Rated power	0,4	kW
2) Rated wind speed	12	m/s
3) Cut-in wind speed	~4,5	m/s
4) Cut-out wind speed	DK	m/s
5) Maximum wind speed the turbine can withstand	170	Km/h
DIMENSIONS		
6) Rotor weight	50	kg
7) Rotor diameter	0,8	m
8) Rotor height (for VAWT only)	2,5	m
9) Swept area	n/a	m^2
10) Height of the mast		m
OTHER INFORMATION		
11) Maximum rpm		At rated wind speed
12) Gear box type		
13) Brake system		
14) Number of blades		2
15) Blades material		Aluminium
16) Output voltage		V
17) Minimum operation temperature	- 40	°C
18) Maximum operation temperature	+ 100	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	Silent	DB
20) Lifetime	20 to 30	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		n/a
24) Upwind or downwind		n/a

Calculated power curve

Wind speed (m/s)	Power (kW)
1	
2	
2,5	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Power curve

Surface Power Technologies

HAWT – 0,46 kW

Contact name: John Quinn
Address: Castlebar, Co.Mayo
Telephone: +353 (0) 8795 45117
Country: **Ireland**

SP 460W / 0,46 kW

SP 460 – 0,46 kW references

Site	Use	Country
Dorset	Home Electricity	England
Cork	Home Electricity	Ireland
Orkney Island	Home Electricity	Scotland
Donegal	Home Electricity	Ireland

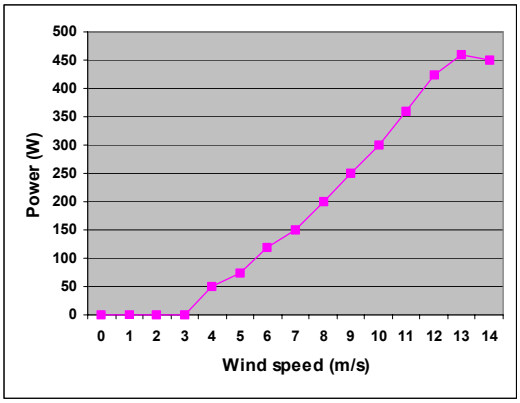
Technical information

POWER		Unit
1) Rated power	0,46	kW
2) Rated wind speed	12,5	m/s
3) Cut-in wind speed	3	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	216	km/h
DIMENSIONS		
6) Nacelle and rotor weight	17	kg
7) Rotor diameter	1,4	m
8) Rotor height (for VAWT only)	-	m
9) Swept area	1,96	m^2
10) Height of the mast	7+	m
OTHER INFORMATION		
11) Maximum rpm	DK	At rated wind speed
12) Gear box type	None	
13) Brake system	Electromagnetic	
14) Number of blades	3	
15) Blades material	Composite fibre glass	
16) Output voltage	12	V
17) Minimum operation temperature	DK	°C
18) Maximum operation temperature	DK	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	Silent	DB
20) Lifetime	30	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Wind vane	
24) Upwind or downwind	Upwind	

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	0
4	50
5	75
6	120
7	150
8	200
9	250
10	300
11	360
12	425
13	460
14	450

Power curve:



Sviab

HAWT of 0,75 kW

Contact name: Lars Wikberg
Address: Vettershaga, 76010 Bergshamra
Telephone: +46 176 26 42 24
Country : **Sweden**

Sviab VK 240 references

Site	Use	Country
Orraids Ltd	Radio communication	Canada
Phuket	Test station	Thaïland
National Swedish Building Research	Test station	Antarctic
ASEA/ABB	Test station	New Zealand

Sviab VK 240 / 0,75 kW

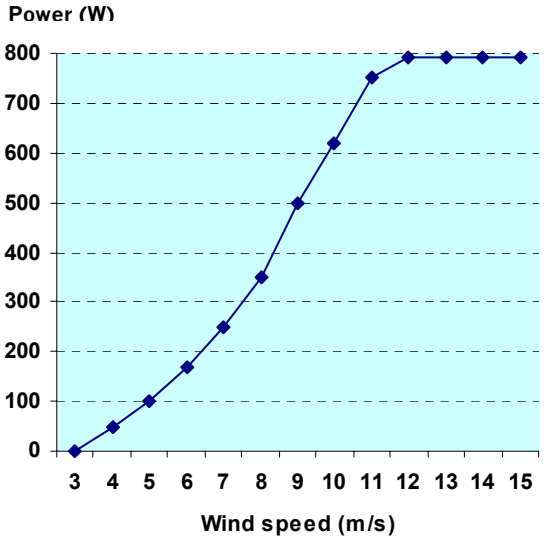
Technical information

POWER		Unit
1) Rated power	0,75	kW
2) Rated wind speed	12	m/s
3) Cut-in wind speed	2,5	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	216	Km/h
DIMENSIONS		
6) Rotor weight	18	kg
7) Rotor diameter	2,4	m
8) Rotor height (for VAWT only)		m
9) Swept area	4,91	m^2
10) Height of the mast	7 / 11	m
OTHER INFORMATION		
11) Maximum rpm	270-1000	At rated wind speed
12) Gear box type	Answer not provided	
13) Brake system	Answer not provided	
14) Number of blades	3	
15) Blades material	Polyuréthane	
16) Output voltage	12 – 24	V
17) Minimum operation temperature	- 40	°C
18) Maximum operation temperature	+ 50	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	Answer not provided	DB
20) Lifetime	Answer not provided	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Answer not provided	
24) Upwind or downwind	Answer not provided	

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	0
4	50
5	100
6	170
7	250
8	350
9	500
10	620
11	750
12	790
13	790
14	790
15	790

Power curve:



TH Rijswijk, University of Applied Sciences

HAWT 5 – 5,5 kW

Contact name: Eize de Vries
Address: Lange Kleiweg 80, 2288 GK Rijswijk
Telephone: +31· 70 3401516
Country : Netherlands

No references

Site	Use	Country

TH Rijswijk / 5 kW

Technical information

POWER		Unit
1) Rated power	5	kW
2) Rated wind speed	10,5	m/s
3) Cut-in wind speed	2,75	m/s
4) Cut-out wind speed	>10,5	m/s
5) Maximum wind speed the turbine can withstand	Not available	Km/h
DIMENSIONS		
6) Rotor weight	175	kg
7) Rotor diameter	5	m
8) Rotor height (for VAWT only)	---	m
9) Swept area	19,6	m^2
10) Height of the mast	6 – 18	m
OTHER INFORMATION		
11) Maximum rpm	Not available	At rated wind speed
12) Gear box type		No gear box
13) Brake system		Not available
14) Number of blades		3
15) Blades material		Glass fibre reinforced epoxy composite
16) Output voltage	400	V
17) Minimum operation temperature	· 20	°C
18) Maximum operation temperature	+ 50	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	Not available	DB
20) Lifetime	20	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		Yes
23) Yaw control system		Wind vane
24) Upwind or downwind		Upwind

Calculated power curve n.a.

Wind speed (m/s)	Power* (W)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Power curve

Travere Industries

HAWT from 0,9 kW to 50 kW.

Contact name: Adrien Orieux
Address: 27 bis imp. Pichon, 83 140 Six Fours
Telephone: +33 4 94 10 10 29
Country : **France**

Travere 0,9 kW references

Site	Use	Country
Corsica	Radio station	France
Guadeloupe	Dwelling	Overseas Departments
South of France	Dwelling	France
	Dwelling	Morocco

TI/2.4/0.9 *(0.9Kw/h)*

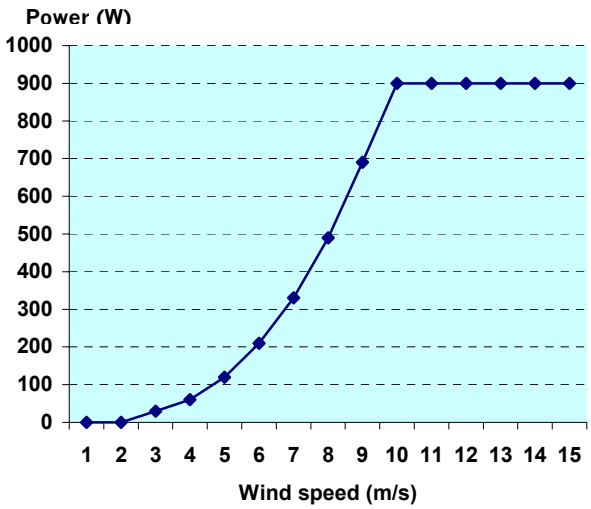
Technical information

POWER		Unit
1) Rated power	0.9	kW
2) Rated wind speed	10	m/s
3) Cut-in wind speed	2.3	m/s
4) Cut-out wind speed	60	m/s
5) Maximum wind speed the turbine can withstand	216	Km/h
DIMENSIONS		
6) Rotor weight (+ generator)	50	kg
7) Rotor diameter	2.4	m
8) Rotor height (for VAWT only)	0.2	m
9) Swept area	4.52	m^2
10) Height of the mast	12	m
OTHER INFORMATION		
11) Maximum rpm	750	At rated wind speed
12) Gear box type	None	
13) Brake system	Electronic	
14) Number of blades	2	
15) Blades material	Carbon composite	
16) Output voltage	55	V
17) Minimum operation temperature	-20	°C
18) Maximum operation temperature	80	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	<40	DB
20) Lifetime	25	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	Yes	
23) Yaw control system	*"Variable stall"* commanded centrifugal system / Rudder	
24) Upwind or downwind	Upwind	

Calculated power curve

Wind speed (m/s)	Power (kW)
1	0
2	0
3	0,03
4	0.60
5	0,12
6	0,21
7	0,33
8	0,49
9	0,69
10	0,90
11	0,90
12	0,90
13	0,90
14	0,90
15	0,90
Altitude 300 m, Tower height = 10 m Shear coeff = 0,11 ; Weibull K = 2 Turbulence factor = 10 %	

Power curve:



Travere Industries

HAWT from 0,9 kW to 50 kW.

Contact name: Adrien Orieux
Address: 27 bis imp. Pichon, 83 140 Six Fours
Telephone: +33 4 94 10 10 29
Country : **France**

Travere 1.6 kW references

Site	Use	Country
Ciotat	University	France
	University	India
South of France	Dwellings + pumping	France
South Pacific	Dwellings	Overseas Departments

TI/3.2/1.6 *(1.6Kw/h)*

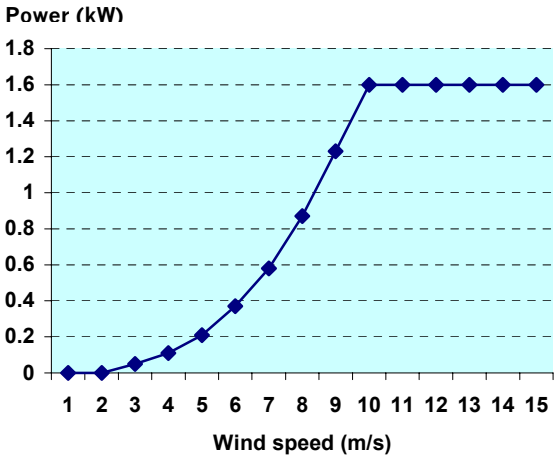
Technical information

POWER		Unit
1) Rated power	1.6	kW
2) Rated wind speed	10	m/s
3) Cut-in wind speed	2.5	m/s
4) Cut-out wind speed	60	m/s
5) Maximum wind speed the turbine can withstand	216	Km/h
DIMENSIONS		
6) Rotor weight (+ generator)	60	kg
7) Rotor diameter	3.2	m
8) Rotor height (for VAWT only)	0.3	m
9) Swept area	8.04	m^2
10) Height of the mast	12	m
OTHER INFORMATION		
11) Maximum rpm	600	At rated wind speed
12) Gear box type		No
13) Brake system		Electronic
14) Number of blades		2
15) Blades material		Carbon composit
16) Output voltage	220 to 380	V
17) Minimum operation temperature	-20	°C
18) Maximum operation temperature	80	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	<40	DB
20) Lifetime	25	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		Yes
23) Yaw control system		*"Variable stall"* commanded centrifugal system / Rudder
24) Upwind or downwind		Upwind

Calculated power curve

Wind speed (m/s)	Power (kW)
1	0
2	0
3	0,05
4	0,11
5	0,21
6	0,37
7	0,58
8	0,87
9	1,23
10	1,60
11	1,60
12	1,60
13	1,60
14	1,60
15	1,60
Altitude 300 m ; Tower height = 10 m	
Shear coeff = 0,11 ; Weibull K = 2	
Turbulence factor = 10 %	

Power curve:



Travere Industries

HAWT from 0,9 kW to 50 kW.

Contact name: Adrien Orieux
Address: 27 bis imp. Pichon, 83 140 Six Fours
Telephone: +33 4 94 10 10 29
Country : **France**

TI/3.6/3 *(3Kw/h)*

Travere 3 kW references

Site	Use	Country
North	Grid connection	France
	Direct heating	Turkey
North	Grid connection	France
North	Grid connection	France

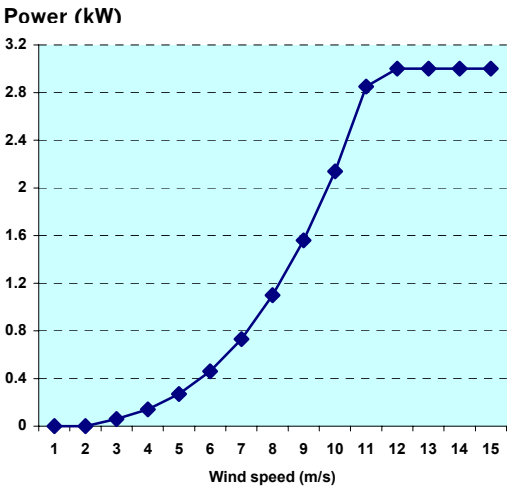
Technical information

POWER		Unit
1) Rated power	3	kW
2) Rated wind speed	12	m/s
3) Cut-in wind speed	2.8	m/s
4) Cut-out wind speed	60	m/s
5) Maximum wind speed the turbine can withstand	216	Km/h
DIMENSIONS		
6) Rotor weight (+ generator)	60	kg
7) Rotor diameter	3.6	m
8) Rotor height (for VAWT only)	0.6	m
9) Swept area	10.18	m^2
10) Height of the mast	12	m
OTHER INFORMATION		
11) Maximum rpm	550	At rated wind speed
12) Gear box type		No
13) Brake system		Electronic
14) Number of blades		2
15) Blades material		Carbon composit
16) Output voltage	220 to 380	V
17) Minimum operation temperature	-20	°C
18) Maximum operation temperature	80	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	<40	DB
20) Lifetime	25	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		Yes
23) Yaw control system		*"Variable stall"* commanded centrifugal system / Rudder
24) Upwind or downwind		Upwind

Calculated power curve

Wind speed (m/s)	Power (kW)
1	0
2	0
3	0.06
4	0.14
5	0.27
6	0.46
7	0.73
8	1.10
9	1.56
10	2.14
11	2.85
12	3.00
13	3.00
14	3.00
15	3.00
Altitude = 300 m ; Tower height = 10 m	
Shear coeff = 0,11 ; Weibull K = 2	
Turbulence factor = 10 %	

Power curve:



Travere Industries

HAWT from 0,9 kW to 50 kW.

Contact name: Adrien Orieux
Address: 27 bis imp. Pichon, 83 140 Six Fours
Telephone: +33 4 94 10 10 29
Country : **France**

Travere 2.1 kW references

Site	Use	Country
Off shore	Platform Total Energie	Nigeria
Center	Habitation	France
South	Pumping + Dwelling	France
Center	Grid connexion	France

TI/6/2.1 *(2.1Kw/h)*

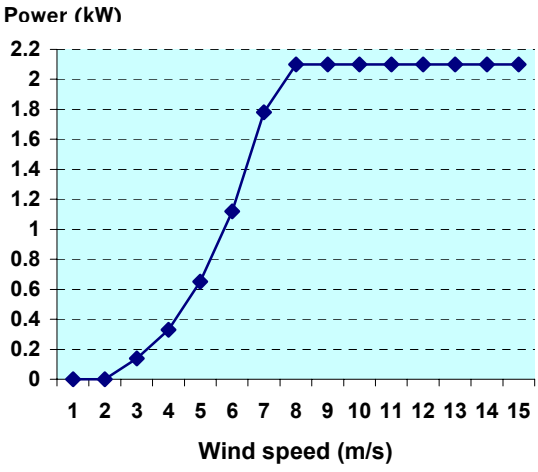
Technical information

POWER		Unit
1) Rated power	2.1	kW
2) Rated wind speed	8	m/s
3) Cut-in wind speed	2.5	m/s
4) Cut-out wind speed	60	m/s
5) Maximum wind speed the turbine can withstand	216	Km/h
DIMENSIONS		
6) Rotor weight (+ generator)	60	kg
7) Rotor diameter	6	m
8) Rotor height (for VAWT only)	0.9	m
9) Swept area	28.27	m^2
10) Height of the mast	12	m
OTHER INFORMATION		
11) Maximum rpm	440	At rated wind speed
12) Gear box type		No
13) Brake system		Electronic
14) Number of blades		2
15) Blades material		Carbon composite
16) Output voltage	220 to 380	V
17) Minimum operation temperature	-20	°C
18) Maximum operation temperature	80	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	<40	DB
20) Lifetime	25	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		Yes
23) Yaw control system		*"Variable stall"* commanded centrifugal system / Rudder
24) Upwind or downwind		Upwind

Calculated power curve

Wind speed (m/s)	Power (kW)
1	0
2	0
3	0,14
4	0,33
5	0,65
6	1,12
7	1,78
8	2,10
9	2,10
10	2,10
11	2,10
12	2,10
13	2,10
14	2,10
15	2,10
Altitude = 300 m ; Tower height = 10 m	
Shear coeff = 0,11 ; Weibull K = 2	
Turbulence factor = 10 %	

Power curve:



Travere Industries

HAWT from 0,9 kW to 50 kW.

Contact name: Adrien Orieux
Address: 27 bis imp. Pichon, 83 140 Six Fours
Telephone: +33 4 94 10 10 29
Country : **France**

TI/6/5.5 *(5.5Kw/h)*

Travere 5.5 kW references

Site	Use	Country
Aude	EDF-GDF	France
Pacific	Dwelling	Overseas Departments
	CETMEF/ Ligth House	France
South/Addrar	Pumping	Algéria

Technical information

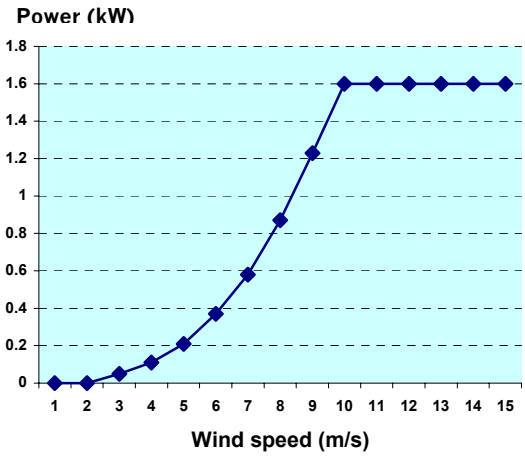
POWER		Unit
1) Rated power	5.5	kW
2) Rated wind speed	10	m/s
3) Cut-in wind speed	3	m/s
4) Cut-out wind speed	60	m/s
5) Maximum wind speed the turbine can withstand	216	Km/h
DIMENSIONS		
6) Rotor weight (+ generator)	60	kg
7) Rotor diameter	6	m
8) Rotor height (for VAWT only)	0.9	m
9) Swept area	28.27	m^2
10) Height of the mast	12	m
OTHER INFORMATION		
11) Maximum rpm	240	At rated wind speed
12) Gear box type		No
13) Brake system		Electronic
14) Number of blades		2
15) Blades material		Carbon composite
16) Output voltage	220 to 380	V
17) Minimum operation temperature	-30	°C
18) Maximum operation temperature	80	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	<40	DB
20) Lifetime	25	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		Yes
23) Yaw control system		*"Variable stall"* commanded centrifugal system / Rudder
24) Upwind or downwind		Upwind

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	0.16
4	0.38
5	0.74
6	1.29
7	2.04
8	3.05
9	4.34
10	5.50
11	5.50
12	5.50
13	5.50
14	5.50
15	5.50

Altitude = 300 m ; Tower height = 10 m ; Shear coeff = 0,11 ; Weibull K = 2 ; Turbulence factor = 10 %.

Power curve:



Tulipower

HAWT 2,5 kW

Contact name: Hans Duivenvoorden
Address: Van der Palmkade 44, 1051 RE Amsterdam
Telephone: +31 – 6 19618369
Country : Netherlands

Tulipower references

Site	Use	Country
Boxtel	Environmental Information Centre	Netherlands
Elst	Installer company, demonstration	Netherlands
Zevenbergen	Turbine distributor, demonstration	Netherlands

Tulipower / 2,5 kW

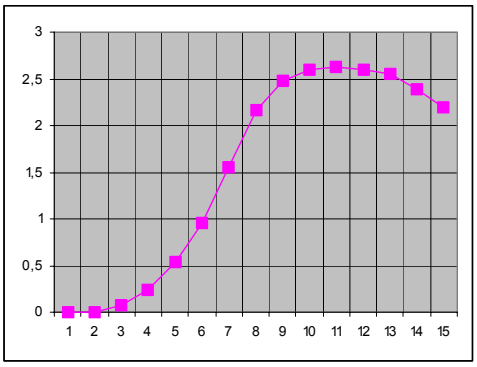
Technical information

POWER		Unit
1) Rated power	2,5	KW
2) Rated wind speed	10	m/s
3) Cut-in wind speed	3	m/s
4) Cut-out wind speed	18	m/s
5) Maximum wind speed the turbine can withstand	42,5	m/s
DIMENSIONS		
6) Total weight	200	Kg
7) Rotor diameter	5	M
8) Rotor height (for VAWT only)	...	M
9) Swept area	19,6	m^2
10) Height of the mast	12,5	M
OTHER INFORMATION		
11) Maximum rpm	140	At rated wind speed
12) Gear box type		No gear box
13) Brake system		spring powered electro magnetic brake
14) Number of blades		3
15) Blades material		Composite fibre glass
16) Output voltage	230	V
17) Minimum operation temperature	- 20	°C
18) Maximum operation temperature	+ 40	°C
19) Acoustic levels at a distance of 20 m ? (wind = 5 m/s)	< 35	DB
20) Lifetime	15	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		Yes
23) Yaw control system		Independent of wind direction
24) Upwind or downwind		Upwind

Calculated power curve

Wind speed (m/s)	Power* (W)
1	0
2	0
3	68
4	243
5	530
6	958
7	1553
8	2159
9	2474
10	2595
11	2625
12	2598
13	2552
14	2382
15	2192

Power curve



Turby B.V.

VAWT 2,5 kW

Contact name: Dick Sidler
Address: Heuvelenweg 18, 7241 HZ Lochem
Telephone: +31 · 6·55822169
Country : Netherlands

Turby 2,5 kW references

Site	Use	Country
Amsterdam	Proof public building (former school)	Netherlands
TIburg	Roof flat building	Netherlands
Den Haag	Roof town hall	Netherlands
Delft	Technical University	Netherlands

Turby 2,5 kW

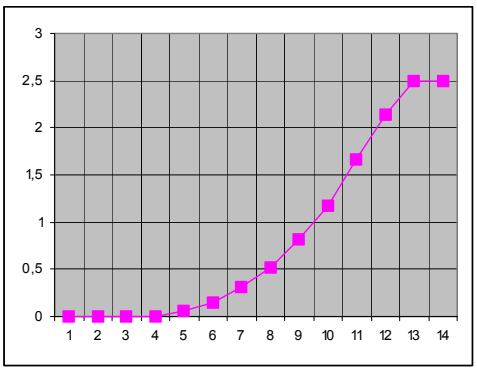
Technical information

POWER		Unit
1) Rated power	2,5	kW
2) Rated wind speed	14	m/s
3) Cut-in wind speed	4	m/s
4) Cut-out wind speed	14	m/s
5) Maximum wind speed the turbine can withstand	55	m/s
DIMENSIONS		
6) Rotor weight	135	kg
7) Rotor diameter	1,99	m
8) Rotor height (for VAWT only)	2,88	m
9) Swept area	5,3	m^2
10) Height of the mast	6 – 7,5	m
OTHER INFORMATION		
11) Maximum rpm	400	At rated wind speed
12) Gear box type		No gears
13) Brake system		Electrical brake system
14) Number of blades		3
15) Blades material		Carbon epoxy composite
16) Output voltage	230	V
17) Minimum operation temperature	· 20	°C
18) Maximum operation temperature	+ 40	°C
19) Acoustic levels at a distance of 20 m ? wind = 10 m/s)	45	DB
20) Lifetime	20	Years
21) Is the machine self-starting		No
22) Use of an asynchronous generator		No
23) Yaw control system		Independent
24) Upwind or downwind		Both

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	0
4	6
5	56
6	155
7	310
8	527
9	812
10	1171
11	1659
12	2136
13	2500
14	2500
15	--

Power curve



Venturi Wind b.v.(i.o.)

VAWT from 0,11 kW to 0,50 k W

Contact name: D.P. Elzinga
Address: Stationsweg 18–7429 AD Deventer-Colmschate
Telephone: +31 0570-510246
Country : Netherlands

Venturi 110-500 references

Site	Use	Country
Waalwijk	Test battery charging	Netherlands
Beek & Donk	Test battery charging	Netherlands
Deventer	Test battery charging + grid con.	Netherlands

Venturi 110-500

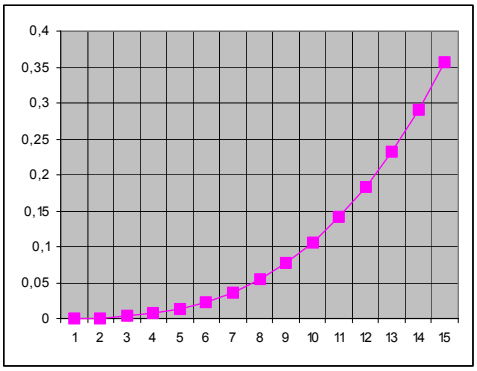
Technical information

POWER		Unit
1) Rated power	0,5	kW
2) Rated wind speed	17	m/s
3) Cut-in wind speed	2	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	>145	km/h
DIMENSIONS		
6) Rotor weight	30	Kg
7) Rotor diameter	1,1	m
8) Rotor height (for VAWT only)	1,3	m
9) Swept area	1	m^2
10) Height of the mast	11	m
OTHER INFORMATION		
11) Maximum rpm	803	At rated wind speed
12) Gear box type		None
13) Brake system		Electrical
14) Number of blades		6
15) Blades material		Flat blade polyester
16) Output voltage	100	V
17) Minimum operation temperature	-25	-°C
18) Maximum operation temperature	50	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	Not audible	DB
20) Lifetime	15	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		Vane
24) Upwind or downwind		Upwind

Calculated power curve

Wind speed (m/s)	Power* (W)
1	0
2	0,7
3	3
4	7
5	13
6	23
7	36
8	54
9	77
10	106
11	141
12	183
13	232
14	290
15	357

Power curve



VR & Tech

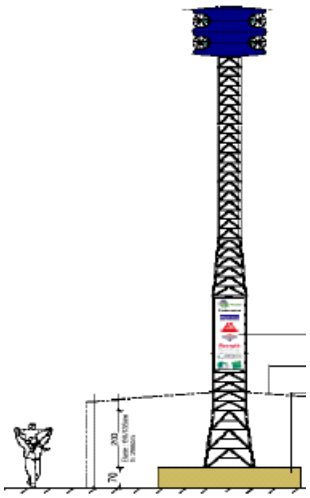
VAWT from 2,5 kW to 100 kW.

Contact name: Alain Van Ranst
Address: Rue Trou du Sart 5 C-D 5 380 Fernelmont
Telephone: +32 (0) 81 22 42 14
Country : **Belgium**

VR & Tech Telecom tower / 2 m references

Site	Use	Country
Namur	Industrial use in the field of telecom	Belgium

Telecom Tower / 2 m



Technical information

POWER		Unit
1) Rated power	Minimum 2,5*	kW
2) Rated wind speed	8	m/s
3) Cut-in wind speed	4	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	No limit	Km/h
DIMENSIONS		
6) Rotor weight (+ generator)	Variable *	kg
7) Rotor diameter	2	m
8) Rotor height (for VAWT only)	~2 or 3	m
9) Swept area	Variable *	m^2
10) Height of the mast	Not relevant	m
OTHER INFORMATION		
11) Maximum rpm	800	At rated wind speed
12) Gear box type		Direct drive
13) Brake system		Electronic constant braking
14) Number of blades		9
15) Blades material		Fibre glass and Epoxy
16) Output voltage	400	V
17) Minimum operation temperature	n.a	°C
18) Maximum operation temperature	100	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	40	DB
20) Lifetime	15	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		None
24) Upwind or downwind		Not applicable

Calculated power curve

Wind speed (m/s)	Power (W)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Each project is different because the manufacturer stick several TARP to create a single WARP tower and integrate a mix of renewable energies (solar, CHP) in the same WARP tower.

Power curve :

* The rated power and the rotor weight vary accordingly with the number of stacked “TARP” modules vertically piled along the tower. 1 TARP corresponds to ~2,5 kW and a same tower can be designed with more than 10 TARPS depending on the energy needs.

VR & Tech

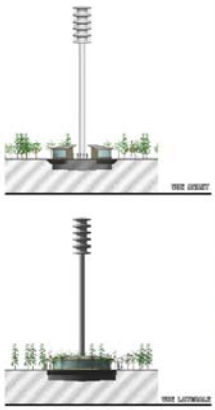
VAWT from 2,5 kW to 100 kW.

Contact name: Alain Van Ranst
Address: Rue Trou du Sart 5 C-D 5 380 Fernelmont
Telephone: +32 (0) 81 22 42 14
Country : **Belgium**

VR & Tech House tower/ 4 m references

Site	Use	Country
Bastogne	Training centre in renewable energies	Belgium

House tower / 4 m



Technical information

POWER		Unit
1) Rated power	Minimum 10*	kW
2) Rated wind speed	8	m/s
3) Cut-in wind speed	4	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	No limit	Km/h
DIMENSIONS		
6) Rotor weight (+ generator)	Variable *	kg
7) Rotor diameter	4	m
8) Rotor height (for VAWT only)	~4 or 5	m
9) Swept area	Variable	m^2
10) Height of the mast		m
OTHER INFORMATION		
11) Maximum rpm	800	At rated wind speed
12) Gear box type		Direct drive
13) Brake system		Electronic constant braking
14) Number of blades		9
15) Blades material		Fibre glass and Epoxy
16) Output voltage	400	V
17) Minimum operation temperature	n.a	°C
18) Maximum operation temperature	100	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	40	DB
20) Lifetime	15	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		None
24) Upwind or downwind		Not applicable

Calculated power curve

Wind speed (m/s)	Power (W)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Each project is different because the manufacturer stick several TARP to create a single WARP tower and integrate a mix of renewable energies (solar, CHP) in the same WARP tower.

Power curve:

* The rated power and the rotor weight vary accordingly with the number of stacked “TARP” modules vertically piled along the tower.

VR & Tech

VAWT from 2,5 kW to 100 kW.

Contact name: Alain Van Ranst
Address: Rue Trou du Sart 5 C-D 5 380 Fernelmont
Telephone: +32 (0) 81 22 42 14
Country : **Belgium**

VR & Tech House tower/6 m references

Site	Use	Country
Andenne	Food industry (Interagri)	Belgium

House tower / 6 m

Technical information

POWER		Unit
1) Rated power	Minimum 25*	kW
2) Rated wind speed	8	m/s
3) Cut-in wind speed	4	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	No limit	Km/h
DIMENSIONS		
6) Rotor weight (+ generator)	Variable*	kg
7) Rotor diameter	6	m
8) Rotor height (for VAWT only)	Minimum 6	m
9) Swept area	Variable*	m^2
10) Height of the mast		m
OTHER INFORMATION		
11) Maximum rpm	800	At rated wind speed
12) Gear box type		Direct drive
13) Brake system		Electronic constant braking
14) Number of blades		9
15) Blades material		Fibre glass and epoxy
16) Output voltage	400	V
17) Minimum operation temperature	n.a	°C
18) Maximum operation temperature	100	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	40	DB
20) Lifetime	15	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		None
24) Upwind or downwind		Not applicable

Calculated power curve

Wind speed (m/s)	Power (W)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Each project is different because the manufacturer stick several TARP to create a single WARP tower and integrate a mix of renewable energies (solar, CHP) in the same WARP tower.

Power curve :

* The rated power and the rotor weight vary accordingly with the number of stacked “TARP” modules vertically piled along the tower.

Wind Energy Solutions (WES)

HAWT from 2 kW to 250 kW

Contact name: Marcel Kloesmeijer
Address: De Weel, 1736 KB Zijdewind
Telephone: +31 – 226 425150
Country : Netherlands

WES^5 Tulipo references

Site	Use	Country
Elst	Installer company, demonstration	Netherlands
Zevenbergen	Turbine distributor, demonstration	Netherlands

WES^5 Tulipo / 2,5 kW

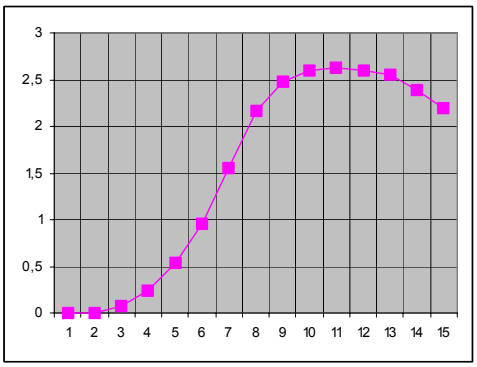
Technical information

POWER		Unit
1) Rated power	2,5	kW
2) Rated wind speed	8,5	m/s
3) Cut-in wind speed	3	m/s
4) Cut-out wind speed	20	m/s
5) Maximum wind speed the turbine can withstand	35	m/s
DIMENSIONS		
6) Total weight	200	kg
7) Rotor diameter	5	m
8) Rotor height (for VAWT only)	---	m
9) Swept area	19,6	m^2
10) Height of the mast	6 or 12	m
OTHER INFORMATION		
11) Maximum rpm	140	At rated wind speed
12) Gear box type		No gear box
13) Brake system		spring powered electro magnetic brake
14) Number of blades		3
15) Blades material		Glass reinforced epoxy
16) Output voltage	400	V
17) Minimum operation temperature	- 20	°C
18) Maximum operation temperature	+ 40	°C
19) Acoustic levels at a distance of 20 m ? (wind = 5 m/s)	< 35	DB
20) Lifetime	20	Years
21) Is the machine self-starting		Y
22) Use of an asynchronous generator		Y
23) Yaw control system		Active yaw control
24) Upwind or downwind		Upwind

Calculated power curve

Wind speed (m/s)	Power* (W)
1	0
2	0
3	68
4	243
5	530
6	958
7	1553
8	2159
9	2474
10	2595
11	2625
12	2598
13	2552
14	2382
15	2192

Power curve



Winddam

VAWT – 2 kW

Contact name:	Julie Trevithick
Address:	1 Riverside House, Heron Way, Truro,TR1 2 XN
Telephone:	+44 (0) 180 387 39 56
Country:	**United Kingdom**

Winddam 2 kW references

Site	Use	Country
Moss Side Industrial Estate	Testing	UK

AWT(1)2000/ 2 kW

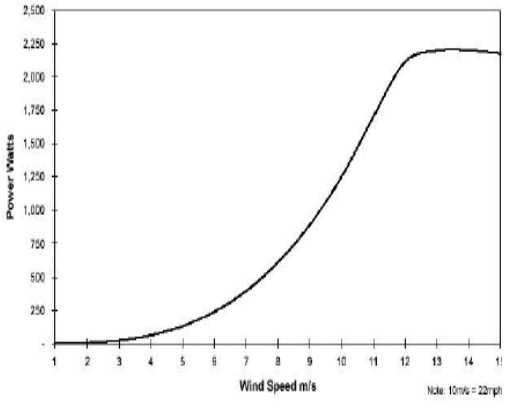
Technical information

POWER		Unit
1) Rated power	2	kW
2) Rated wind speed	12	m/s
3) Cut-in wind speed	2	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	234	Km/h
DIMENSIONS		
6) Nacelle and Rotor weight	DK	Kg
7) Rotor diameter	2.56	m
8) Rotor height (for VAWT only)	2	m
9) Swept area	5.12	m^2
10) Height of the mast	DK	m
OTHER INFORMATION		
11) Maximum rpm	108	At rated wind speed
12) Gear box type		None
13) Brake system		Mechanical
14) Number of blades		5
15) Blades material		Resin Composite
16) Output voltage	12/24/48/120/ 240	V
17) Minimum operation temperature	DK	°C
18) Maximum operation temperature	DK	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	Silent	DB
20) Lifetime	25+	Years
21) Is the machine self-starting		DK
22) Use of an asynchronous generator		No
23) Yaw control system		N/A
24) Upwind or downwind		N/A

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	35
4	75
5	110
6	250
7	400
8	600
9	850
10	1250
11	1750
12	2100
13	2200
14	2200
15	2150

Power curve:



Winddam

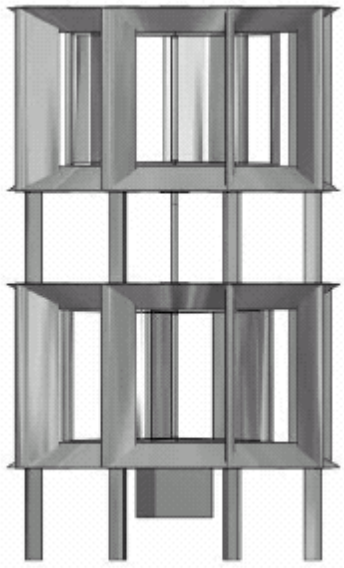
VAWT – 4 kW

Contact name:	Julie Trevithick
Address:	1 Riverside House, Heron Way, Truro,TR1 2 XN
Telephone:	+44 (0) 180 387 39 56
Country:	**United Kingdom**

Winddam 2 kW references

Site	Use	Country
DK		

AWT(2)2x2000/ 4 kW



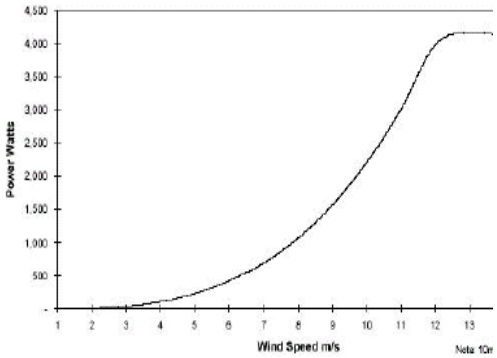
Technical information

POWER		Unit
1) Rated power	4	kW
2) Rated wind speed	12	m/s
3) Cut-in wind speed	2.5	m/s
4) Cut-out wind speed	None	m/s
5) Maximum wind speed the turbine can withstand	234	Km/h
DIMENSIONS		
6) Nacelle and Rotor weight	DK	Kg
7) Rotor diameter	2.56	m
8) Rotor height (for VAWT only)	2 x 2	m
9) Swept area	2 x 5.12	m^2
10) Height of the mast	DK	m
OTHER INFORMATION		
11) Maximum rpm	200	At rated wind speed
12) Gear box type		None
13) Brake system		Mechanical
14) Number of blades		2 x 3
15) Blades material		Resin Composite
16) Output voltage	12/24/48/120/240	V
17) Minimum operation temperature	DK	°C
18) Maximum operation temperature	DK	°C
19) Acoustic levels at a distance of 20 m ? at nacelle ? (wind = 5 m/s)	Whisper	DB
20) Lifetime	25+	Years
21) Is the machine self-starting		DK
22) Use of an asynchronous generator		No
23) Yaw control system		N/A
24) Upwind or downwind		N/A

Calculated power curve

Wind speed (m/s)	Power (W)
1	0
2	0
3	Tiny
4	100
5	205
6	400
7	665
8	1000
9	1540
10	2205
11	3000
12	4000
13	4150
14	4110
15	4000

Power curve:



Windsave

HAWT – 1 kW

Contact name: Anya Gordon
Address: 27 Woodside place, Glasgow G3 7QL
Telephone: +44 (0) 141 353 68 41
Country: **United Kingdom**

WS 1000 1 kW references

Site	Use	Country
Burbank		UK
Livingston		UK
Teesside		UK
Glasgow	Domestic electricity	UK

WS 1000 / 1 kW

Technical information

POWER		Unit
1) Rated power	1	kW
2) Rated wind speed	12	m/s
3) Cut-in wind speed	3-4	m/s
4) Cut-out wind speed	15	m/s
5) Maximum wind speed the turbine can withstand	216	km/h
DIMENSIONS		
6) Nacelle and rotor weight	6.5	kg
7) Rotor diameter	1,75	m
8) Rotor height (for VAWT only)	-	m
9) Swept area	2,41	m^2
10) Height of the mast	Variable up to 3,3m	m
OTHER INFORMATION		
11) Maximum rpm	800	At rated wind speed
12) Gear box type	None	
13) Brake system	Integral control, electrical	
14) Number of blades	3	
15) Blades material	Polyamide Glass Reinforced	
16) Output voltage	240	V
17) Minimum operation temperature	-15	°C
18) Maximum operation temperature	+40	°C
19) Acoustic levels at a distance of 20 m? at nacelle ? (wind = 5 m/s)	30 DB at 4 m/s	DB
20) Lifetime	10	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	No	
23) Yaw control system	Wind vane	
24) Upwind or downwind	Upwind	

Calculated power curve

Not available

Wind speed (m/s)	Power (W)
1	0
2	0
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	1000
13	
14	
15	

Power curve:

Not available

WindWall B.V.

VAWT from 2,9 kW to 60 kW.

Contact name: Rob Roelofs
Address: De Eiken 5D, 7491 HP Delden
Telephone: +31 – 74 2434885
Country : Netherlands

WW2000 references

Site	Use	Country
Zwolle	Roof high school	Netherlands
Den Haag	Office building (Siemens)	Netherlands
Den Haag	Office building (government)	Netherlands
Rotterdam	Erasmus MC (University Medical Centre)	Netherlands

WW2000 / 2,9 kW

Technical information

POWER		Unit
1) Rated power	2,9	kW
2) Rated wind speed	10,5	m/s
3) Cut-in wind speed	4	m/s
4) Cut-out wind speed	20	m/s
5) Maximum wind speed the turbine can withstand	55	m/s
DIMENSIONS		
6) Rotor weight	3000	kg
7) Rotor diameter	2	m
8) Rotor height (for VAWT only)	5 (horizontal) – 15 (vertical)	m
9) Swept area	10	m^2
10) Height of the mast	n.a.	m
OTHER INFORMATION		
11) Maximum rpm	500	At rated wind speed
12) Gear box type	No gears	
13) Brake system	Electrical + disc brake system	
14) Number of blades	6	
15) Blades material	Aluminium	
16) Output voltage	400	V
17) Minimum operation temperature	- 20	°C
18) Maximum operation temperature	+ 40	°C
19) Acoustic levels at nacelle ? (wind = 5 m/s)	74	DB
20) Lifetime	20	Years
21) Is the machine self-starting	Yes	
22) Use of an asynchronous generator	Yes	
23) Yaw control system	Independent	
24) Upwind or downwind	Downwind	

Calculated power curve

Wind speed (m/s)	Power* (W)
1	0
2	0
3	0
4	1%
5	
6	
7	
8	50%
9	
10	100%
11	100%
12	100%
13	100%
14	100%
15	100%

Power curve

XCO2

VAWT – 6 kW

Contact name: Richard Cochrane
Address: 1-5 Offord Street, London, N1 1DH
Telephone: +44 (0) 207 700 1000
Country : **United Kingdom**

EMAT references

Site	Use	Country
Southwark Bridge Rd, London	Pilot installation – due 12 / 2005	UK
Temple Meads Roundabout, Bristol	Pilot installation – due 1 / 2006	UK

XCO2 / 6 kW

Technical information

POWER		Unit
1) Rated power	6	kW
2) Rated wind speed	~ 12,5	m/s
3) Cut-in wind speed	4,5	m/s
4) Cut-out wind speed	16	m/s
5) Maximum wind speed the turbine can withstand	DK	Km/h
DIMENSIONS		
6) Nacelle and rotor weight	DK	kg
7) Rotor diameter	3,1	m
8) Rotor height (for VAWT only)	5	m
9) Swept area	15,5	m^2
10) Height of the mast	5-10	m
OTHER INFORMATION		
11) Maximum rpm	DK	At rated wind speed
12) Gear box type		None
13) Brake system		DK
14) Number of blades		3
15) Blades material		Carbon fibre
16) Output voltage	48 dc or 240 ac	V
17) Minimum operation temperature	-40	°C
18) Maximum operation temperature	100	°C
19) Acoustic levels at a distance of 20 m? at nacelle ? (wind = 5 m/s)	Silent	DB
20) Lifetime	20	Years
21) Is the machine self-starting		Yes
22) Use of an asynchronous generator		No
23) Yaw control system		n/a
24) Upwind or downwind		n/a

Calculated power curve

Not available

Wind speed (m/s)	Power (kW)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Power curve