

Extended specification free VIRYA windmills for battery charging.

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	VIRYA-1	VIRYA-1.04 + -0.98	VIRYA-1.25AF	VIRYA-1.36	VIRYA-1.66	VIRYA-1.81
Rotor diameter	D = 1 m	D = 1.04 m	D = 1.25 m	D = 1.36 m	D = 1.66 m	D = 1.81 m
Number of blades	B = 2	B = 3	B = 2	B = 2	B = 3	B = 2
Design tip speed ratio	$\lambda_d = 4.25$	$\lambda_d = 3.5$	$\lambda_d = 4.75$	$\lambda_d = 5$	$\lambda_d = 4.5$	$\lambda_d = 5$
Generator	axial flux 8-pole, 3-phase	hub dynamo 28-pole, 1-phase	axial flux 8-pole, 3-phase	axial flux 8-pole, 3-phase	axial flux 12-pole, 3-phase	axial flux 8-pole, 3-phase
Material rotor blades	aluminium	aluminium	stainless steel	stainless steel	stainless steel	stainless steel
Material head	stainless steel	stainless steel	stainless steel	stainless steel	stainless steel	stainless steel
Material and thickness vane blade	aluminium 2 mm	aluminium 1.5 mm	aluminium 2 mm	aluminium 2 mm	aluminium 2 mm	stainless steel 1 mm
Gear ratio	i = 1	i = 1	i = 1	i = 1	i = 1	i = 1
Rotor eccentricity	e = 0.09 m	e = 0.09 m	e = 0.11 m	e = 0.12 m	e = 0.15 m	e = 0.15 m
Height tower pipe	H = 1 m	H = 1 m	H = 2 m	H = 2 m	H = 2 m	H = 2 m
Total tower height	$H_{tot} = 3.7$ m	$H_{tot} = 3.7$ m	$H_{tot} = 4.7$ m	$H_{tot} = 4.7$ m	$H_{tot} = 4.7$ m	$H_{tot} = 7.5$ m
Number of legs and material lower tower part	one square wooden pole	one square wooden pole	one square wooden pole	one square wooden pole	one square wooden pole	free standing tubular tower
Mass with tower pipe only	m = 4.8 kg	m = 4.85 kg	m = 12.1 kg	m = 13.6 kg	m = 22 kg	m = 25 kg
Starting wind speed	$V_{start} = 2.5$ m/s	$V_{start} = 2.6$ m/s	$V_{start} = 2.5$ m/s	$V_{start} = 2.4$ m/s	$V_{start} = 2.3$ m/s	$V_{start} = 2.6$ m/s
Cut in wind speed (if started)	$V_{cut\ in} = 2.5$ m/s	$V_{cut\ in} = 2$ m/s	$V_{cut\ in} = 2.5$ m/s	$V_{cut\ in} = 2.5$ m/s	$V_{cut\ in} = 3$ m/s	$V_{cut\ in} = 3$ m/s
Rated wind speed	$V_{rated} = 9$ m/s	$V_{rated} = 8$ m/s	$V_{rated} = 9$ m/s	$V_{rated} = 9$ m/s	$V_{rated} = 9$ m/s	$V_{rated} = 11$ m/s
Survival wind speed	$V_{surv} = 30$ m/s	$V_{surv} = 30$ m/s	$V_{surv} = 30$ m/s	$V_{surv} = 30$ m/s	$V_{surv} = 30$ m/s	$V_{surv} = 35$ m/s
Nominal battery voltage	U = 12 V DC	U = 12 V DC	U = 12 V DC	U = 12 V DC	U = 12 V DC	U = 12 or 24 V DC
Rectification generator	3-phase star	1-phase	3-phase star	3-phase star	3-phase star	3-phase star
Power at rated wind speed	$P_{rated} = 33$ W	$P_{rated} = 6$ W	$P_{rated} = 50$ W	$P_{rated} = 71$ W	$P_{rated} = 130$ W	$P_{rated} = 206$ W
Report rotor calculations	KD 608	KD 518 + 615	KD 626	KD 571	KD 596	KD 631
Generator measurements	not yet performed	in KD 518	not yet performed	in KD 571	not yet performed	not yet performed
Licence fee excluding VAT	free via website	free via website	free via website	free via website	free via website (only rotor + generator)	free via website (only rotor + generator)

table 1 VIRYA windmills with hub dynamo or axial flux generator and a free licence. For manual and drawings VIRYA-1.04, -1.36, -1.66 and -1.81 see website menu KD-reports at the bottom. For drawings VIRYA-1 see report KD 574. For drawings VIRYA-0.98 see report KD 615. For drawings VIRYA-1.25AF see report KD 626.