Elektrische Eigenschaften gemäß IEC / Electrical Properties according to IEC

[MM/92/50Hz]

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Elektrische Eigenschaften gemäß IEC 61400-21 / 1
Electrical Properties according to IEC 61400-21 / 1

In diesem Dokument sind die garantierten Elektrischen Eigenschaften des nachfolgend aufgeführten REpower Windkraftanlagentyps definiert:

Within this document the guaranteed Electrical Properties are defined for REpower WEC Type:

- Typ Windkraftanlage / Wind turbine type: MM
- Rotordurchmesser / Rotor diameter: 92 m
- Frequenz / Frequency: 50 Hz

Type:	MM92	Manufacturers specification:	
Manufacturer:	REpower Systems AG	Kind of installation:	Pitch, speed variable
	Hollesenstrasse 15	Rated power P_{nG}:	2000 kW
	D-24768 Rendsburg	Rated wind speed V_{nG}:	12 m/s
Test standard: IEC 61400-21/1		Rated apparent power S_n:	2001 kVA
		Rated reactive power Q_n:	-55 kvar
		Rated Current I_n:	1674 A
		Rated voltage U_n:	690 V

Performance:

P_{mc} [kW]	2222	P_{60} [kW]	2134,13	$P_{0,2}$ [kW]	2234,12
$p_{mc} = P_{mc}/P_{rated}$	1,11	$p_{60} = P_{60}/P_{rated}$	1,07	$p_{0,2} = P_{0,2}/P_{rated}$	1,12
Output Power [% of P_r]		Output power [kW]		Reactive power [kvar] (*)	
0...10		103,1		-5,9	
10...20		281,1		-10,9	
20...30		492,3		-15,1	
30...40		688,6		-18,2	
40...50		913,7		-23,1	
50...60		1083,2		-27	
60...70		1281,8		-31,8	
70...80		1483,1		-37	
80...90		1693,6		-42,7	
90...100		1918,6		-49,9	
100...110		2049		-54,6	
Reactive power at p_{mc} [kvar]		-62,70			
Reactive power at p_{60} [kvar]		-54,23			
Reactive power at $p_{0,2}$ [kvar]		-55,00			

(*) Values for reactive power supply are measured by using the standard power factor setting cos φ = 1. Values in table above may change with a tolerance ±50 kvar.

Flicker:

Network impedance phase angle, ψ_k	30°	50°	70°	85°
Annual average wind speed, v_a (m/s)	Flicker coefficient, c (ψ_k,v_a)			
v_a = 6,0m/s	3,498	3,828	4,147	4,268
v_a = 7,5m/s	3,388	3,696	3,949	4,026
v_a = 8,5m/s	3,223	3,542	3,806	3,927
v_a = 10m/s	3,157	3,52	3,784	3,872

Switching operations:

Case of switching operation	Start-up at cut-in wind speed			
Max. number of switching operation, N_{10}	2			
Max. number of switching operation, N_{120}	8			
Grid impedance angle	30°	50°	70°	85°
Flicker step factor, $k_f(\psi_k)$	0,084	0,084	0,0735	0,0735
Voltage step factor, $k_u(\psi_k)$	0,1785	0,1365	0,105	0,0945

Case of switching operation	Start-up at rated wind speed			
Max. number of switching operation, N_{10}	2			
Max. number of switching operation, N_{120}	8			
Grid impedance angle	30°	50°	70°	85°
Flicker step factor, $k_f(\psi_k)$	0,105	0,095	0,084	0,074
Voltage step factor, $k_u(\psi_k)$	0,977	0,735	0,420	0,168

Harmonics:

Order	output power	Harmonic current (**)	Order	output power	Harmonic current (**)
	[kW]	[% from I_n]		[kW]	[% from I_n]
2	1851,8	0,6	3	1875	0,6
4	284,9	0,1	5	1034,9	2,3
6	1851,8	0,4	7	33,3	0,9
8	1851,8	0,2	9	0	0
10	0	0	11	1443,4	0,1
12	0	0	13	1744,8	0,1
14	0	0	15	1744,8	0,1
16	0	0	17	0	0
18	0	0	19	0	0
20	0	0	21	0	0
22	85,5	0,1	23	123,2	0,1
24	85,5	0,1	25	153,8	0,1
26	0	0	27	231,1	0,1
28	258,3	0,1	29	284,9	0,1
30	315,2	0,1	31	375,1	0,1
32	421,2	0,1	33	444,6	0,1
34	0	0	35	569	0,1
36	0	0	37	0	0
38	0	0	39	0	0
40	0	0	41	519,5	0,1
42	0	0	43	48,6	0,1
44	0	0	45	568,5	0,1
46	0	0	47	28,9	0,1
48	0	0	49	519,5	0,1
50	0	0	-		

Maximum THD [% from rated current]	2,542
Power at maximum THD [kW]	51,064

(**) Valid if transformer according to REpower specification is used!