

Manufacture Declaration for RD1699

Micro-generator Type reference	SK-TL3000E SK-TL3000E-S SK-TL3000C SK-TL3000C-S SK-TL3000R SK-TL3000R-S SK-SU3000E SK-SU3000E-S SK-SU3000C SK-SU3000C-S	SK-TL3700E SK-TL3700C SK-TL3700R SK-SU3700E SK-SU3700C	SK-TL5000E SK-TL5000C SK-TL5000R SK-SU5000E SK-SU5000C
Maximum continuous rating	3000VA	3680VA	4600VA
Voltage (nominal)	MAX. PV input: 550Vdc Nominal AC voltage: 230Vac		
Rated power	According to model: 3.0KW, 3.68KW, 4.6KW		
Manufacturer	Solax power Co., Ltd		
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Tel	+86(0571)-56260011		
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Email	info@solaxpower.com		
Web site	www.solaxpower.com		
Reference standard No.	RD1699:2011 with modification according to RD413:2014 for RD1699		
Signed		On behalf of	Solax power Co., Ltd
<p>SSEG manufacturer/supplier declaration.</p> <p>I certify on behalf of the company named above as a manufacturer/supplier of Small Scale Embedded Generators, that all products manufactured/supplied by the company with the above SSEG Type reference number will be manufactured and tested to ensure that they perform as stated in this Type Verification Test Report, prior to shipment to site and that no site modifications are required to ensure that the product meets all the requirements of RD1699:2011</p> <p>These inverters incorporate a residual current monitoring unit (RCMU: Residual Current, RCMU: Residual Current Monitoring Unit), sensitive to all leakage currents, which acts with a response threshold of 30 mA.</p> <p>Alternating current relays safely disconnect the mains in the event of a fault. They also have an insulation monitoring device and an earth detector on the direct current side before connection to the mains</p> <p>These functions have been tested and certified according to DIN V V VDE V 0126-1-1: 2006:02</p> <p>The direct current fed into the distribution network by the inverter is less than 0.5% of</p>			

the RMS value of the inverter. nominal output current, measured as indicated in the "Separation Equivalence Interpretation Note galvanic"

The reconnection time of the inverters is at least 3 minutes according to IEC 61727:2001, once the inverter has been reconnected. that the network parameters are again within the allowed margins. There is no possibility that the users can modify the setting values of the protections by means of software. The equipment has protection against island operation

Under/over frequency

Parameter	Under frequency		Over frequency	
	Frequency	Time	Frequency	Time
Protection limit (RD1699)	48.0Hz	$\geq 3.0s$	50.5Hz	$\leq 0.5s$
Actual Setting	48.0Hz		50.5Hz	
Trip value (test result)	47.98Hz	3.12s	50.5Hz	0.469s

Under /Over voltage

Parameter	Under Voltage (stage 2)		Over Voltage (stage 1)		Over Voltage (stage 2)	
	Voltage	Time	Voltage	Time	Voltage	Time
Protection limit	195.5V	$\leq 1.5s$	253.0V	$\leq 1.5s$	264.5V	$\leq 0.2s$
Actual Setting	195.5V		253.0V		264.5V	
Trip value (test result)	195.4V	0.155s	253.0V	1.07s	264.4V	0.16s

DC injection

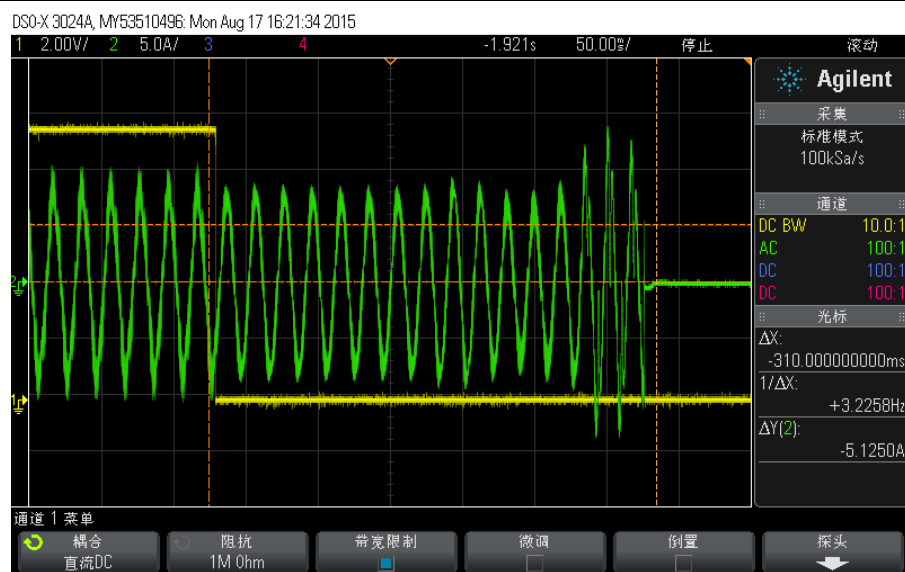
P _E max in %		33% $\pm 5\%$	66% $\pm 5\%$	100% $\pm 5\%$
4.6KW	+1A	186ms	178ms	185ms
	-1A	178ms	177ms	189ms
3.68KW	+1A	175ms	184ms	176ms
	-1A	187ms	177ms	188ms
3.0KW	+1A	185ms	177ms	185ms
	-1A	189ms	188ms	175ms

Power factor

Output power model	25%Pn	50% Pn	75% Pn	100% Pn
3.0KW	0.992	0.998	0.999	0.999
3.68KW	0.996	0.999	0.999	0.999
4.6KW	0.997	0.999	0.999	0.999

Active anti-islanding protection

Udc(V)	360V	Uac(V)	230V
F(Hz)	50Hz	Quality: Qf	>2
Measurements (ms)			
	25%	50%	100%
-5%	324.0	608.0	440.0
-4%	474.0	602.0	364.0
-3%	350.0	410.0	466.0
-2%	218.0	339.0	344.0
-1%	329.0	598.0	308.0
0%	310.0	300.0	318.0
+1%	281.0	702.0	390.0
+2%	305.0	504.0	462.0
+3%	310.0	387.0	498.0
+4%	293.0	372.0	420.0
+5%	401.0	312.0	428.0

 Power:25%
 Parameter:0%




Harmonic

Harmonic	At 100% of rated output		At 50% of rated output		3KW Limit in BS EN 61000-3-2 in Amps	Limit of percent (%)
	Measured Value (MV) in Amps	Measured Value in Ihdf (%)	Measured Value (MV) in Amps	Measured Value in Ihdf (%)		
2	0.078	0.591	0.044	0.661	1.080	1
3	0.121	0.918	0.135	2.058	2.300	4
4	0.016	0.123	0.01	0.15	0.430	1
5	0.019	0.144	0.065	0.99	1.140	4
6	0.011	0.081	0.008	0.116	0.300	1
7	0.039	0.298	0.061	0.927	0.770	4
8	0.005	0.04	0.005	0.074	0.230	1
9	0.025	0.188	0.052	0.783	0.400	4
10	0.003	0.026	0.003	0.045	0.184	1
11	0.031	0.238	0.041	0.621	0.330	2

12	0.002	0.018	0.003	0.04	0.153	0.5
13	0.025	0.193	0.04	0.618	0.210	2
14	0.003	0.025	0.003	0.042	0.131	0.5
15	0.023	0.175	0.028	0.43	0.150	2
16	0.002	0.017	0.002	0.033	0.115	0.5
17	0.024	0.181	0.035	0.53	0.132	1.5
18	0.003	0.02	0.002	0.034	0.102	0.375
19	0.015	0.115	0.018	0.277	0.118	1.5
20	0.003	0.022	0.002	0.033	0.092	0.375
21	0.02	0.156	0.028	0.42	0.107	1.5
22	0.002	0.013	0.002	0.029	0.084	0.375
23	0.011	0.087	0.016	0.236	0.098	0.6
24	0.002	0.014	0.002	0.026	0.077	0.15
25	0.017	0.134	0.022	0.326	0.090	0.6
26	0.002	0.019	0.002	0.029	0.071	0.15
27	0.01	0.079	0.015	0.225	0.083	0.6
28	0.002	0.015	0.002	0.027	0.066	0.15
29	0.013	0.101	0.016	0.24	0.078	0.6
30	0.002	0.013	0.001	0.022	0.061	0.15
31	0.011	0.082	0.014	0.213	0.073	0.6
32	0.002	0.015	0.002	0.024	0.058	0.15
33	0.011	0.082	0.011	0.173	0.068	0.6
34	0.002	0.014	0.001	0.021	0.054	0.15
35	0.011	0.081	0.013	0.195	0.064	0.3
36	0.002	0.014	0.002	0.023	0.051	0.075
37	0.008	0.062	0.009	0.129	0.061	0.3
38	0.002	0.015	0.001	0.022	0.048	0.075
39	0.01	0.078	0.012	0.175	0.058	0.3
40	0.002	0.015	0.001	0.02	0.046	0.075
lthd		1.208		2.978	5	5

Harmonic	At 100% of rated output		At 50% of rated output		3.68KW Limit in BS EN 61000-3-2 in Amps	Limit of percent (%)
	Measured Value (MV) in Amps	Measured Value in lhdf (%)	Measured Value (MV) in Amps	Measured Value in lhdf (%)		
2	0.088	0.552	0.052	0.642	1.080	1
3	0.133	0.837	0.124	1.531	2.300	4
4	0.017	0.107	0.011	0.138	0.430	1
5	0.017	0.106	0.052	0.647	1.140	4
6	0.011	0.072	0.008	0.095	0.300	1
7	0.044	0.275	0.052	0.644	0.770	4
8	0.006	0.04	0.005	0.058	0.230	1
9	0.019	0.121	0.045	0.555	0.400	4
10	0.004	0.027	0.003	0.038	0.184	1

11	0.035	0.221	0.035	0.436	0.330	2
12	0.003	0.018	0.002	0.027	0.153	0.5
13	0.023	0.146	0.036	0.449	0.210	2
14	0.003	0.019	0.003	0.036	0.131	0.5
15	0.026	0.161	0.026	0.32	0.150	2
16	0.003	0.018	0.003	0.032	0.115	0.5
17	0.022	0.141	0.032	0.395	0.132	1.5
18	0.003	0.016	0.002	0.028	0.102	0.375
19	0.017	0.108	0.017	0.206	0.118	1.5
20	0.002	0.014	0.002	0.025	0.092	0.375
21	0.02	0.126	0.026	0.321	0.107	1.5
22	0.003	0.017	0.002	0.021	0.084	0.375
23	0.013	0.082	0.014	0.171	0.098	0.6
24	0.002	0.014	0.002	0.019	0.077	0.15
25	0.017	0.105	0.02	0.245	0.090	0.6
26	0.003	0.017	0.002	0.026	0.071	0.15
27	0.011	0.067	0.013	0.166	0.083	0.6
28	0.002	0.014	0.002	0.021	0.066	0.15
29	0.015	0.091	0.015	0.187	0.078	0.6
30	0.002	0.012	0.001	0.017	0.061	0.15
31	0.01	0.061	0.013	0.164	0.073	0.6
32	0.002	0.013	0.001	0.018	0.058	0.15
33	0.011	0.072	0.011	0.137	0.068	0.6
34	0.002	0.014	0.001	0.018	0.054	0.15
35	0.01	0.064	0.012	0.153	0.064	0.3
36	0.002	0.012	0.001	0.018	0.051	0.075
37	0.009	0.054	0.008	0.1	0.061	0.3
38	0.002	0.012	0.002	0.02	0.048	0.075
39	0.01	0.065	0.012	0.143	0.058	0.3
40	0.002	0.012	0.002	0.022	0.046	0.075
lthd		1.119		2.153	5	5

Harmonic	At 100% of rated output		At 50% of rated output		4.6KW Limit in BS EN 61000-3-2 in Amps	Limit of percent (%)
	Measured Value (MV) in Amps	Measured Value in lhdf (%)	Measured Value (MV) in Amps	Measured Value in lhdf (%)		
2	0.103	0.531	0.059	0.594	1.080	1
3	0.167	0.857	0.11	1.113	2.300	4
4	0.016	0.084	0.013	0.13	0.430	1
5	0.029	0.148	0.034	0.346	1.140	4
6	0.012	0.062	0.009	0.092	0.300	1
7	0.05	0.255	0.041	0.41	0.770	4
8	0.006	0.03	0.004	0.045	0.230	1
9	0.025	0.128	0.034	0.34	0.400	4

10	0.005	0.025	0.003	0.033	0.184	1
11	0.042	0.217	0.03	0.298	0.330	2
12	0.003	0.014	0.002	0.024	0.153	0.5
13	0.024	0.126	0.03	0.305	0.210	2
14	0.002	0.011	0.003	0.027	0.131	0.5
15	0.033	0.17	0.022	0.218	0.150	2
16	0.003	0.015	0.002	0.022	0.115	0.5
17	0.024	0.123	0.027	0.276	0.132	1.5
18	0.002	0.012	0.003	0.026	0.102	0.375
19	0.023	0.117	0.014	0.143	0.118	1.5
20	0.003	0.015	0.002	0.02	0.092	0.375
21	0.023	0.119	0.023	0.234	0.107	1.5
22	0.002	0.011	0.002	0.02	0.084	0.375
23	0.018	0.09	0.012	0.121	0.098	0.6
24	0.003	0.014	0.002	0.02	0.077	0.15
25	0.019	0.1	0.018	0.177	0.090	0.6
26	0.003	0.017	0.002	0.018	0.071	0.15
27	0.014	0.071	0.012	0.123	0.083	0.6
28	0.002	0.011	0.002	0.019	0.066	0.15
29	0.017	0.086	0.014	0.145	0.078	0.6
30	0.003	0.015	0.002	0.018	0.061	0.15
31	0.013	0.066	0.012	0.123	0.073	0.6
32	0.002	0.012	0.002	0.019	0.058	0.15
33	0.014	0.073	0.01	0.105	0.068	0.6
34	0.002	0.012	0.002	0.019	0.054	0.15
35	0.01	0.054	0.012	0.12	0.064	0.3
36	0.002	0.012	0.002	0.017	0.051	0.075
37	0.011	0.059	0.007	0.075	0.061	0.3
38	0.002	0.012	0.001	0.015	0.048	0.075
39	0.012	0.062	0.012	0.119	0.058	0.3
40	0.002	0.008	0.002	0.017	0.046	0.075
lthd		1.09		1.525	5	5

Residual current monitoring test

Test for detection of excessive continuous residual current										P
Tracker No.	PV (+ or -)	Input (Vd.c.)	Output (Va.c)	Baseline trigger current (mA)	Measured trigger time (ms), shall < 300ms(repeat 5 times)					
1	+	480	253V	120	153,2	169,2	150,1	160,1	139,4	
1	-	480	253V	160	166,2	175,1	175,2	159,8	166,8	
Test for detection of sudden changes in residual current										P

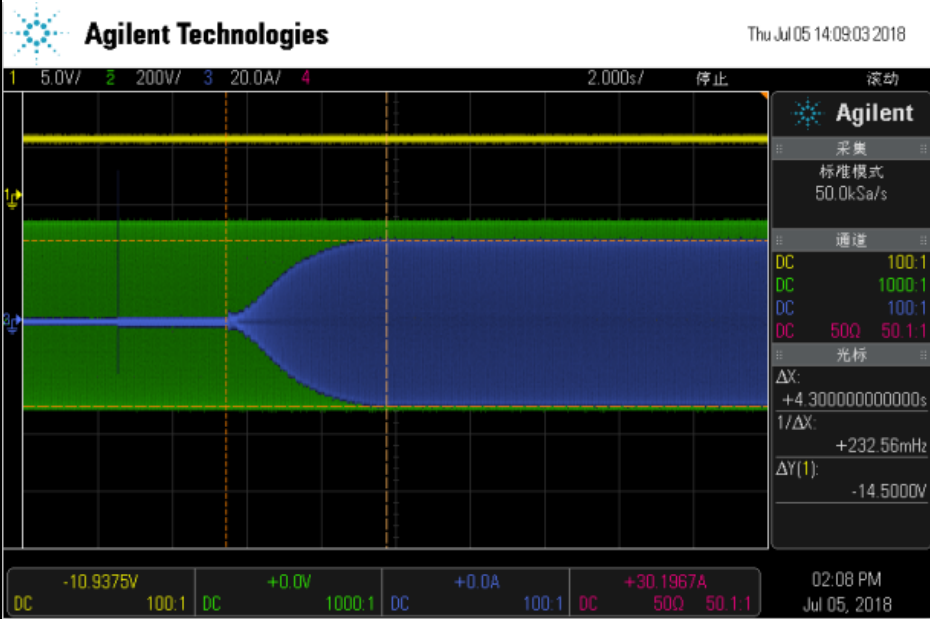
Tracker No.	PV (+ or -)	Input (Vd.c.)	Output (Va.c)	Baseline trigger current (mA)	Measured trigger time (ms), shall < 0,3 s for (30 mA); <0,15 s for (60 mA); <0,04 s for (150 mA) (repeat 5 times)				
30 mA sudden changes in residual current									
1	+	480	253V	30mA	113,07	120,53	120,0	73,60	121,1
1	-	480	253V	30mA	120,80	102,0	133,2	103,3	120,4
60 mA sudden changes in residual current									
1	+	480	253V	60mA	53,23	38,93	65,87	48,27	63,47
1	-	480	253V	60mA	47,47	54,40	42,13	52,27	34,40
150 mA sudden changes in residual current									
1	+	480	253V	150mA	28,87	33,33	19,73	19,20	18,67
1	-	480	253V	150mA	13,33	26,67	20,80	36,27	13,07

Isolation measurement

DC Voltage for inverter begin operation (V)	Resistance between ground and PV input terminal (Ω)	Required Insulation resistance $R = (V_{pvmax} * 1K \Omega / V) (\Omega)$	Result
PV1+			
530	600K	550K	Isolation fault
120	600K	550K	Isolation fault
PV2+			
530	600K	550K	Isolation fault
120	600K	550K	Isolation fault
PV-			
530	600K	550K	Isolation fault
120	600K	550K	Isolation fault

Reconnection

Reconnection generate electrical power	
Setting value	Min.voltage for connected to grid.....: 195.5V
	Max.voltage for connected to grid.....: 253.0 V
	Min.Frequency for connected to grid.....: 48.0Hz
	Max.Frequency for connected to grid.....: 50.0Hz
	Observation time($\geq 180s$).....: 180S
Test:	

Voltage conditions				
In voltage range after voltage failure	$\geq 85\%U_n$ for twice of setting observation time		$\leq 110\%U_n$ for twice of setting observation time	
Reconnection time[s]	196.0V	195.5s	252.0V	195.5s
Limit:	Reconnection after setting observation time($\geq 180s$)			
Frequency conditions				
In frequency range after frequency failure	$\geq 48,0Hz$ for twice of setting observation time		$\leq 50,00Hz$ for twice of setting observation time	
Reconnection time[s]	48.02Hz	190.0s	49.99Hz	193.0s
Limit:	Reconnection after setting observation time($\geq 180s$)			
Recover power gradient 4.3s				

Additional comments