



TEST REPORT PPP 59014A:2013 TÜV SÜD Test Report for Recommendations for the Connection of Type Tested Small-scale Embedded Generators (Up to 16A per Phase) in Parallel with Low-Voltage Distribution Systems	
Report reference No	64.290.13.01830.01
Date of issue	31 July 2013
Project handler.....	Richard Li
Testing Laboratory Name	Jiangsu TÜV Product Service Ltd. Guangzhou Branch
Testing laboratory	Jiangsu TÜV Product Service Ltd. Guangzhou Branch
Address	5F, Communication Building, 163 Pingyun Rd, Huangpu Ave. West, Guangzhou 510656, P. R. China
Testing location	as above
Client	GUANGZHOU SANJING ELECTRIC CO., LTD
Client number	77831
Address.....	No.17, Xiangshan Road, 510663 Guangzhou Science City, Guangdong, PEOPLE'S REPUBLIC OF CHINA
Standard	This TÜV SÜD test report is based on the following requirements: PPP 59014A:2013 Rev. 00:2013-01 Engineering Recommendation G83, Issue 2:2012
TRF originated by	Jiangsu TÜV SÜD Product Service Co. Ltd., Mr. Frank Zhu
Copyright blank test report.....	This test report is based on the content of the standard (see above). The test report considered selected clauses of the a.m. standard(s) and experience gained with product testing. It was prepared by TÜV SUD Product Service GmbH. TUV SUD Group takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.
Test procedure	<input type="checkbox"/> GS, <input type="checkbox"/> TÜV Mark, <input type="checkbox"/> EU-Directive, <input type="checkbox"/> without certification <input checked="" type="checkbox"/> Type verification of conformity
Non-standard test method	N/A
National deviations.....	N/A
Number of pages(report)	18 Pages
Number of pages (Attachments)	8 Pages(Photo documentation)
Compiled by: Richard Li (+ signature)	Approved by: Billy Qiu (+ signature).....





Test sample.....	PV Grid-connected inverter	
Type of test object	Photovoltaic	
Trademark		
Model and/or type reference	Suntrio-TL6K, Suntrio-TL8K, Suntrio-TL10K	
Rating(s)	See page 5	
Manufacturer.....	GUANGZHOU SANJING ELECTRIC CO., LTD	
Manufacturer number.....	77831	
Address.....	No.17, Xiangshan Road, 510663 Guangzhou Science City, Guangdong, PEOPLE'S REPUBLIC OF CHINA	
Sub-contractors/ tests (clause)	N/A	
Name	N/A	
Order description... ..	<input checked="" type="checkbox"/>	Complete test according to TRF
	<input type="checkbox"/>	Partial test according to manufacturer's specifications
	<input type="checkbox"/>	Preliminary test
	<input type="checkbox"/>	Spot check
	<input type="checkbox"/>	
Date of order.....	1 July 2013	
Date of receipt of test item	2 July 2013	
Date(s) of performance of test	2 July 2013 – 31 July 2013	
Test item particulars:		
Clause	Requirement	
5.4.1	Power Quality. Harmonics	
5.4.2	Power Quality. Voltage fluctuations and flicker	
5.5	Power Quality. DC injection	
5.6	Power Quality. Power factor	
5.3.1	Protection. Frequency tests	
5.3.1	Protection. Voltage tests	
5.3.2	Protection. Loss of mains test	
5.3.3	Protection. Frequency change, Stability test	
5.3.4	Protection. Re-connection timer	
5.7	Fault level contribution	
Attachments:		
This test report shall be also used in conjunction with 8 pages of photo document.		
General remarks:		
"(see remark #)" refers to a remark appended to the report.		
"(see appended table)" refers to a table appended to the report.		
Throughout this report a comma is used as the decimal separator.		
The test results presented in this report relate only to the object tested.		
This report shall not be reproduced except in full without the written approval of the testing laboratory.		



Summary of testing:

- / deviation(s) found
- / no deviation(s) found

Copy of marking plate:

SAJ Solar Inverter Guangzhou Sanjing Electric Co., Ltd.
 Tel: (+86)20-66608619 Fax: (+86)20-66608589
 Web: www.saj-solar.com E-mail: service@sajelec.com

Suntrio-TL6K

PV input ratings	
Max. DC Voltage	1000 d.c.V
DC Nominal Voltage	640 d.c.V
Vdc MPPT(full load)	320-800 d.c.V
Isc PV ^a (maximum absolu)	12/12 d.c.A
Pdc Max.	6.3 kW
Max. Number of Parallel Strings(PV1/PV2)	2/2

AC output ratings	
Voltage (nominal)	3/N/PE 230/400 a.c.V
Current (nominal)	8.7 a.c.A
Current(Maximum continuous)	9.7 a.c.A
Frequency (nominal)	50 Hz
Power (nominal continuous)	6 kW
Power (maximum continuous)	6 kW
Power Factor	0.9i...1...0.9c

Operating Temperature Range	-20°C~+60°C
IP Protection	IP65
Protection Class	I

S/N

P/C

MADE IN CHINA

SAJ Solar Inverter Guangzhou Sanjing Electric Co., Ltd.
 Tel: (+86)20-66608619 Fax: (+86)20-66608589
 Web: www.saj-solar.com E-mail: service@sajelec.com

Suntrio-TL8K

PV input ratings	
Max. DC Voltage	1000 d.c.V
DC Nominal Voltage	640 d.c.V
Vdc MPPT(full load)	340-800 d.c.V
Isc PV ^a (maximum absolu)	12/12 d.c.A
Pdc Max.	8.2 kW
Max. Number of Parallel Strings(PV1/PV2)	2/2

AC output ratings	
Voltage (nominal)	3/N/PE 230/400 a.c.V
Current (nominal)	11.6 a.c.A
Current(Maximum continuous)	12.9 a.c.A
Frequency (nominal)	50 Hz
Power (nominal continuous)	8 kW
Power (maximum continuous)	8 kW
Power Factor	0.9i...1...0.9c


Operating Temperature Range	-20°C~+60°C
IP Protection	IP65
Protection Class	I

S/N

P/C

MADE IN CHINA












SAJ
solar inverter

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Suntrio-TL10K

PV input ratings	
Max. DC Voltage	1000 d.c.V
DC Nominal Voltage	640 d.c.V
Vdc MPPT(full load)	430-800 d.c.V
Isc PV ^a (maximum absolu)	12/12 d.c.A
Pdc Max.	10.4 kW
Max. Number of Parallel Strings(PV1/PV2)	2/2
AC output ratings	
Voltage (nominal)	3/N/PE 230/400 a.c.V
Current (nominal)	14.5 a.c.A
Current(Maximum continuous)	16.2 a.c.A
Frequency (nominal)	50 Hz
Power (nominal continuous)	10 kW
Power (maximum continuous)	10 kW
Power Factor	0.9i...1...0.9c
Operating Temperature Range	-20°C~+60°C
IP Protection	IP65
Protection Class	I

S/N

P/C

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Picture of the product:

Refer to Photo documentation.

**Characteristic data:**

Model	Suntrio-TL6K	Suntrio-TL8K	Suntrio-TL10K
Vmax. PV	1000 Vd.c.	1000 Vd.c.	1000 Vd.c.
Isc PV	2x12 Ad.c.	2x12 Ad.c.	2x12 Ad.c.
Max. continuous a.c. output current	9,7 Aa.c.	12,9 Aa.c.	16,2 Aa.c.
Max. continuous output power	6 kW	8 kW	10 kW
Frequency	50 Hz	50 Hz	50 Hz
Nominal AC voltage	3/N/PE, 230/400 V	3/N/PE, 230/400 V	3/N/PE, 230/400 V
Power factor range(Cos phi, adjustable)	0,9 _{under-excited} to 0,9 _{over-excited}	0,9 _{under-excited} to 0,9 _{over-excited}	0,9 _{under-excited} to 0,9 _{over-excited}
Protective Class	I	I	I
Ingress protection	IP65	IP65	IP65



Test item particulars	
Equipment mobility	<input type="checkbox"/> movable <input type="checkbox"/> hand-held <input type="checkbox"/> stationary <input checked="" type="checkbox"/> fixed <input type="checkbox"/> transportable <input type="checkbox"/> for building-in
Connection to the mains.....	<input type="checkbox"/> pluggable equipment <input type="checkbox"/> direct plug-in <input checked="" type="checkbox"/> permanent connection <input type="checkbox"/> for building-in
Environmental category.....	<input checked="" type="checkbox"/> outdoor <input type="checkbox"/> indoor unconditional <input type="checkbox"/> indoor conditional
Over voltage category Mains	<input type="checkbox"/> OVC I <input type="checkbox"/> OVC II <input checked="" type="checkbox"/> OVC III <input type="checkbox"/> OVC IV
Over voltage category PV.....	<input type="checkbox"/> OVC I <input checked="" type="checkbox"/> OVC II <input type="checkbox"/> OVC III <input type="checkbox"/> OVC IV
Mains supply tolerance (%).....	-90 / +110 %
Tested for power systems	TN and TT system
IT testing, phase-phase voltage (V).....	N/A
Class of equipment.....	<input checked="" type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III <input type="checkbox"/> Not classified
Mass of equipment (kg).....	35 kg
Pollution degree	3 (External), 2 (Internal)
IP protection class	IP65
General product information:	
<p>(1) The units are non-isolated PV grid-interactive inverters, for outdoor use; (2) The inverter is intended to be mounted on the concrete wall with screws and expansion tube; (3) There are two independent MPP trackers and each tracker have two independent strings. (4) For grid code of G83/2, the inverter is designed to be operated with a fixed Cos phi=1 settings inside. (5) Firmware version of the control: V1.04 (Master), V1.03 (Slave)</p>	
Model differences:	
<p>The three models have same enclosure construction, same input and output connections, same PCB layout, same electronic control circuit and have similar software designed, with difference is the software settings of output power for different models.</p>	
Possible test case verdicts:	
- test case does not apply to the test object.....	N/A / not included in the order
- test object does meet the requirement	P / (pass)
- test object does not meet the requirement	F. / (fail)
Possible suffixes to the verdicts:	
- suffix for detailed information for the client.....	- C / (comment)
- suffix for important information for factory inspection....	- M / (manufacturing)



ER G83/2			
Clause	Requirement – Test	Result – Remark	Verdict
5	Connection, protection & testing requirements		P
5.1	Connection procedure		N/A
5.1.1	Single premises connection procedure		N/A
5.1.2	Multiple premises connection procedure		N/A
5.2	Installation wiring and isolation	Specified in user instructions	P
5.3	Interface protection		P
5.3.1	Interface protection setting and test requirements	(see appended table)	P
5.3.2	Loss of mains protection	Active method of frequency shift is used. (see appended table)	P
5.3.3	Frequency drift and step change stability test	(see appended table)	P
5.3.4	Automatic reconnection	(see appended table)	P
5.4	Quality of supply	(see appended table)	P
5.4.1	Testing for harmonic emissions	(see appended table)	P
5.4.2	Testing for flicker	(see appended table)	P
5.5	DC injection	(see appended table)	P
5.6	Power factor	(see appended table)	P
5.7	Short circuit current contribution	Inverter type method used (see appended table)	P
5.7.1	Directly coupled generation		N/A
5.7.2	Inverter connected generation	(see appended table)	P
5.8	Voltage unbalance	balance phases	N/A
5.9	Certification Requirements		P
5.9.1	General		P
5.9.2	Compliance		P
5.9.3	Verification test report	Test results are recorded in appended table	P
6	Operation and safety		P
6.1	Operational requirements		N/A
6.2	Labelling	Considered for plant by installer	N/A
6.3	Maintenance & Routine testing	Stated in user instruction	P
6.4	Earthing	Stated in user instruction	P
7	Commissioning / Decommissioning and acceptance testing		N/A
7.1	General		N/A
7.2	Installation and commissioning		N/A



ER G83/2			
Clause	Requirement – Test	Result – Remark	Verdict
7.3	Notification of commissioning		N/A
7.4	Notification of changes		N/A
7.5	Notification of Decommissioning		N/A
Appendix 1	Connection procedure flow chart		N/A
Appendix 2	Application for connection		N/A
Appendix 3	SSEG Installation commissioning confirmation		N/A
Appendix 4	Type verification test report		P
Appendix 5	SSEG Decommissioning confirmation		N/A
Appendix 6	Relaxation of commissioning notification timescales for SSEG: HSE certificate of exemption (August 2008)		N/A
Annex A-C	Guidance on type testing requirements		P
Annex A1	Common inverter connected SSEG requirement		P
Annex B1	Common directly coupled connected SSEG requirement		N/A
Annex C1	Separate specific SSEG technology requirements		N/A
C 1.1	Domestic CHP		N/A
C 1.2	Photovoltaic		P
C 1.3	Fuel cells		N/A
C 1.4	Hydro		N/A
C 1.5	Wind		N/A
C 1.6	Energy storage device		N/A



Suntrio-TL6K, L1 phase						
Power Quality. Harmonics. The requirement is specified in section 5.4.1, test procedure in Annex A or B 1.4.1						
SSEG rating per phase (rpp)			2	kW	NV=MV*3.68/rpp	
Harmonic	At 45-55% of rated output		100% of rated output		Limit in BS EN 61000-3-2 in Amps	Higher limit for odd harmonics 21 and above
	Measured Value (MV) in Amps	Normalised Value (NV) in Amps	Measured Value (MV) in Amps	Normalised Value (NV) in Amps		
2	0,014	0,025	0,010	0,019	1,080	
3	0,012	0,022	0,022	0,040	2,300	
4	0,002	0,004	0,005	0,009	0,430	
5	0,062	0,114	0,085	0,156	1,140	
6	0,011	0,020	0,009	0,017	0,300	
7	0,036	0,066	0,060	0,111	0,770	
8	0,033	0,060	0,033	0,061	0,230	
9	0,102	0,188	0,002	0,004	0,400	
10	0,015	0,027	0,025	0,046	0,184	
11	0,014	0,026	0,026	0,049	0,330	
12	0,006	0,011	0,005	0,009	0,153	
13	0,018	0,032	0,031	0,056	0,210	
14	0,013	0,024	0,016	0,029	0,131	
15	0,003	0,006	0,003	0,005	0,150	
16	0,005	0,010	0,010	0,018	0,115	
17	0,011	0,020	0,018	0,032	0,132	
18	0,003	0,006	0,003	0,006	0,102	
19	0,018	0,034	0,027	0,049	0,118	
20	0,006	0,011	0,008	0,014	0,092	
21	0,004	0,008	0,004	0,006	0,107	0,160
22	0,008	0,015	0,011	0,021	0,084	
23	0,010	0,019	0,017	0,031	0,098	0,147
24	0,001	0,002	0,001	0,002	0,077	
25	0,011	0,021	0,020	0,036	0,090	0,135
26	0,006	0,011	0,007	0,014	0,071	
27	0,003	0,005	0,001	0,001	0,083	0,124
28	0,004	0,008	0,008	0,014	0,066	
29	0,014	0,025	0,016	0,030	0,078	0,117
30	0,001	0,003	0,002	0,003	0,061	
31	0,012	0,023	0,016	0,030	0,073	0,109
32	0,004	0,008	0,007	0,012	0,058	
33	0,002	0,004	0,002	0,004	0,068	0,102
34	0,004	0,008	0,008	0,016	0,054	
35	0,015	0,027	0,014	0,026	0,064	0,096
36	0,001	0,003	0,003	0,005	0,051	
37	0,012	0,022	0,012	0,021	0,061	0,091
38	0,005	0,009	0,006	0,012	0,048	
39	0,001	0,002	0,002	0,003	0,058	0,087
40	0,004	0,007	0,006	0,012	0,046	

Note the higher limits for odd harmonics 21 and above are only allowable under certain conditions, if these higher limits are utilised please state the exemption used as detailed in part 6.2.3.4 of BS EN 61000-3-2 in the box below.



Suntrio-TL6K, L2 phase						
Power Quality. Harmonics. The requirement is specified in section 5.4.1, test procedure in Annex A or B 1.4.1						
SSEG rating per phase (rpp)			2	kW	NV=MV*3.68/rpp	
Harmonic	At 45-55% of rated output		100% of rated output		Limit in BS EN 61000-3-2 in Amps	Higher limit for odd harmonics 21 and above
	Measured Value (MV) in Amps	Normalised Value (NV) in Amps	Measured Value (MV) in Amps	Normalised Value (NV) in Amps		
2	0,007	0,013	0,023	0,044	1,080	
3	0,015	0,028	0,017	0,031	2,300	
4	0,031	0,057	0,035	0,065	0,430	
5	0,072	0,133	0,110	0,204	1,140	
6	0,030	0,054	0,030	0,055	0,300	
7	0,034	0,063	0,061	0,113	0,770	
8	0,026	0,047	0,023	0,044	0,230	
9	0,005	0,010	0,034	0,064	0,400	
10	0,021	0,039	0,034	0,063	0,184	
11	0,001	0,002	0,028	0,051	0,330	
12	0,011	0,021	0,012	0,022	0,153	
13	0,013	0,023	0,029	0,054	0,210	
14	0,012	0,021	0,016	0,029	0,131	
15	0,004	0,008	0,005	0,010	0,150	
16	0,011	0,021	0,012	0,022	0,115	
17	0,008	0,015	0,013	0,024	0,132	
18	0,005	0,010	0,005	0,008	0,102	
19	0,017	0,031	0,021	0,039	0,118	
20	0,007	0,012	0,012	0,022	0,092	
21	0,004	0,007	0,001	0,001	0,107	0,160
22	0,012	0,022	0,012	0,023	0,084	
23	0,003	0,006	0,011	0,020	0,098	0,147
24	0,001	0,003	0,003	0,006	0,077	
25	0,009	0,016	0,016	0,030	0,090	0,135
26	0,008	0,014	0,011	0,021	0,071	
27	0,012	0,022	0,002	0,003	0,083	0,124
28	0,006	0,011	0,009	0,017	0,066	
29	0,010	0,019	0,013	0,023	0,078	0,117
30	0,002	0,003	0,004	0,008	0,061	
31	0,010	0,019	0,014	0,026	0,073	0,109
32	0,008	0,016	0,009	0,016	0,058	
33	0,002	0,004	0,002	0,003	0,068	0,102
34	0,005	0,009	0,009	0,018	0,054	
35	0,014	0,025	0,011	0,021	0,064	0,096
36	0,006	0,011	0,003	0,005	0,051	
37	0,011	0,020	0,011	0,020	0,061	0,091
38	0,006	0,011	0,009	0,016	0,048	
39	0,003	0,006	0,002	0,003	0,058	0,087
40	0,005	0,010	0,008	0,015	0,046	

Note the higher limits for odd harmonics 21 and above are only allowable under certain conditions, if these higher limits are utilised please state the exemption used as detailed in part 6.2.3.4 of BS EN 61000-3-2 in the box below.



Suntrio-TL6K, L3 phase						
Power Quality. Harmonics. The requirement is specified in section 5.4.1, test procedure in Annex A or B 1.4.1						
SSEG rating per phase (rpp)			2	kW	NV=MV*3.68/rpp	
Harmonic	At 45-55% of rated output		100% of rated output		Limit in BS EN 61000-3-2 in Amps	Higher limit for odd harmonics 21 and above
	Measured Value (MV) in Amps	Normalised Value (NV) in Amps	Measured Value (MV) in Amps	Normalised Value (NV) in Amps		
2	0,031	0,058	0,022	0,040	1,080	
3	0,012	0,023	0,006	0,011	2,300	
4	0,034	0,063	0,033	0,061	0,430	
5	0,102	0,187	0,072	0,132	1,140	
6	0,039	0,071	0,041	0,076	0,300	
7	0,065	0,119	0,031	0,058	0,770	
8	0,015	0,028	0,016	0,029	0,230	
9	0,024	0,044	0,110	0,203	0,400	
10	0,031	0,057	0,027	0,050	0,184	
11	0,024	0,044	0,012	0,022	0,330	
12	0,018	0,032	0,016	0,030	0,153	
13	0,036	0,066	0,017	0,031	0,210	
14	0,006	0,011	0,005	0,009	0,131	
15	0,008	0,014	0,008	0,014	0,150	
16	0,009	0,016	0,008	0,014	0,115	
17	0,015	0,027	0,000	0,000	0,132	
18	0,007	0,012	0,006	0,012	0,102	
19	0,028	0,051	0,019	0,035	0,118	
20	0,004	0,007	0,003	0,006	0,092	
21	0,004	0,008	0,008	0,014	0,107	0,160
22	0,009	0,016	0,008	0,014	0,084	
23	0,015	0,027	0,005	0,010	0,098	0,147
24	0,002	0,004	0,003	0,006	0,077	
25	0,021	0,039	0,012	0,022	0,090	0,135
26	0,007	0,013	0,005	0,010	0,071	
27	0,004	0,007	0,004	0,007	0,083	0,124
28	0,008	0,014	0,004	0,007	0,066	
29	0,016	0,030	0,012	0,022	0,078	0,117
30	0,002	0,004	0,004	0,007	0,061	
31	0,015	0,028	0,012	0,023	0,073	0,109
32	0,007	0,013	0,004	0,008	0,058	
33	0,003	0,006	0,003	0,006	0,068	0,102
34	0,007	0,013	0,003	0,005	0,054	
35	0,014	0,027	0,013	0,024	0,064	0,096
36	0,002	0,004	0,002	0,004	0,051	
37	0,011	0,021	0,014	0,027	0,061	0,091
38	0,008	0,014	0,005	0,009	0,048	
39	0,001	0,002	0,002	0,004	0,058	0,087
40	0,005	0,010	0,004	0,008	0,046	

Note the higher limits for odd harmonics 21 and above are only allowable under certain conditions, if these higher limits are utilised please state the exemption used as detailed in part 6.2.3.4 of BS EN 61000-3-2 in the box below.



Suntrio-TL10K, L1 phase						
Power Quality. Harmonics. The requirement is specified in section 5.4.1, test procedure in Annex A or B 1.4.1						
SSEG rating per phase (rpp)			3,333	kW	NV=MV*3.68/rpp	
Harmonic	At 45-55% of rated output		100% of rated output		Limit in BS EN 61000-3-2 in Amps	Higher limit for odd harmonics 21 and above
	Measured Value (MV) in Amps	Normalised Value (NV) in Amps	Measured Value (MV) in Amps	Normalised Value (NV) in Amps		
2	0,011	0,012	0,011	0,012	1,080	
3	0,020	0,022	0,003	0,003	2,300	
4	0,005	0,006	0,014	0,015	0,430	
5	0,080	0,088	0,214	0,236	1,140	
6	0,009	0,010	0,006	0,006	0,300	
7	0,050	0,055	0,151	0,166	0,770	
8	0,030	0,033	0,040	0,044	0,230	
9	0,028	0,031	0,008	0,009	0,400	
10	0,025	0,027	0,045	0,049	0,184	
11	0,023	0,026	0,081	0,089	0,330	
12	0,005	0,005	0,001	0,001	0,153	
13	0,023	0,025	0,061	0,068	0,210	
14	0,015	0,017	0,015	0,017	0,131	
15	0,001	0,001	0,002	0,002	0,150	
16	0,008	0,009	0,007	0,007	0,115	
17	0,012	0,013	0,040	0,044	0,132	
18	0,005	0,006	0,003	0,004	0,102	
19	0,017	0,019	0,032	0,035	0,118	
20	0,008	0,008	0,007	0,008	0,092	
21	0,004	0,004	0,004	0,005	0,107	0,160
22	0,010	0,011	0,012	0,013	0,084	
23	0,010	0,011	0,026	0,029	0,098	0,147
24	0,001	0,001	0,003	0,003	0,077	
25	0,013	0,014	0,019	0,021	0,090	0,135
26	0,009	0,010	0,009	0,010	0,071	
27	0,008	0,009	0,004	0,005	0,083	0,124
28	0,006	0,007	0,008	0,009	0,066	
29	0,011	0,012	0,020	0,022	0,078	0,117
30	0,001	0,001	0,003	0,004	0,061	
31	0,012	0,013	0,021	0,023	0,073	0,109
32	0,008	0,009	0,008	0,008	0,058	
33	0,001	0,001	0,013	0,014	0,068	0,102
34	0,006	0,007	0,015	0,017	0,054	
35	0,011	0,012	0,021	0,023	0,064	0,096
36	0,001	0,001	0,003	0,003	0,051	
37	0,009	0,010	0,022	0,024	0,061	0,091
38	0,007	0,008	0,011	0,012	0,048	
39	0,002	0,002	0,008	0,009	0,058	0,087
40	0,006	0,006	0,016	0,017	0,046	

Note the higher limits for odd harmonics 21 and above are only allowable under certain conditions, if these higher limits are utilised please state the exemption used as detailed in part 6.2.3.4 of BS EN 61000-3-2 in the box below.



Suntrio-TL10K, L2 phase						
Power Quality. Harmonics. The requirement is specified in section 5.4.1, test procedure in Annex A or B 1.4.1						
SSEG rating per phase (rpp)			3,333	kW	NV=MV*3.68/rpp	
Harmonic	At 45-55% of rated output		100% of rated output		Limit in BS EN 61000-3-2 in Amps	Higher limit for odd harmonics 21 and above
	Measured Value (MV) in Amps	Normalised Value (NV) in Amps	Measured Value (MV) in Amps	Normalised Value (NV) in Amps		
2	0,016	0,018	0,069	0,077	1,080	
3	0,019	0,021	0,024	0,027	2,300	
4	0,034	0,037	0,006	0,007	0,430	
5	0,102	0,113	0,222	0,245	1,140	
6	0,032	0,036	0,008	0,009	0,300	
7	0,051	0,056	0,140	0,154	0,770	
8	0,019	0,021	0,039	0,043	0,230	
9	0,061	0,067	0,010	0,011	0,400	
10	0,034	0,037	0,048	0,053	0,184	
11	0,022	0,025	0,076	0,084	0,330	
12	0,012	0,013	0,001	0,001	0,153	
13	0,024	0,026	0,069	0,076	0,210	
14	0,013	0,015	0,017	0,019	0,131	
15	0,007	0,008	0,002	0,003	0,150	
16	0,011	0,012	0,006	0,007	0,115	
17	0,010	0,011	0,038	0,042	0,132	
18	0,003	0,003	0,001	0,002	0,102	
19	0,018	0,020	0,036	0,040	0,118	
20	0,009	0,010	0,007	0,008	0,092	
21	0,005	0,006	0,006	0,006	0,107	0,160
22	0,010	0,011	0,008	0,009	0,084	
23	0,010	0,011	0,029	0,032	0,098	0,147
24	0,002	0,002	0,002	0,002	0,077	
25	0,015	0,017	0,024	0,027	0,090	0,135
26	0,008	0,008	0,010	0,011	0,071	
27	0,005	0,005	0,007	0,008	0,083	0,124
28	0,006	0,007	0,002	0,003	0,066	
29	0,012	0,014	0,021	0,023	0,078	0,117
30	0,001	0,001	0,004	0,005	0,061	
31	0,014	0,016	0,025	0,027	0,073	0,109
32	0,007	0,008	0,008	0,008	0,058	
33	0,003	0,004	0,014	0,016	0,068	0,102
34	0,007	0,008	0,007	0,008	0,054	
35	0,011	0,013	0,019	0,021	0,064	0,096
36	0,001	0,001	0,004	0,005	0,051	
37	0,013	0,014	0,016	0,017	0,061	0,091
38	0,006	0,007	0,009	0,009	0,048	
39	0,003	0,003	0,020	0,022	0,058	0,087
40	0,006	0,007	0,011	0,012	0,046	

Note the higher limits for odd harmonics 21 and above are only allowable under certain conditions, if these higher limits are utilised please state the exemption used as detailed in part 6.2.3.4 of BS EN 61000-3-2 in the box below.



Suntrio-TL10K, L3 phase						
Power Quality. Harmonics. The requirement is specified in section 5.4.1, test procedure in Annex A or B 1.4.1						
SSEG rating per phase (rpp)			kW		NV=MV*3.68/rpp	
Harmonic	At 45-55% of rated output		100% of rated output		Limit in BS EN 61000-3-2 in Amps	Higher limit for odd harmonics 21 and above
	Measured Value (MV) in Amps	Normalised Value (NV) in Amps	Measured Value (MV) in Amps	Normalised Value (NV) in Amps		
2	0,032	0,035	0,068	0,075	1,080	
3	0,013	0,014	0,014	0,016	2,300	
4	0,032	0,036	0,017	0,019	0,430	
5	0,095	0,105	0,208	0,230	1,140	
6	0,038	0,041	0,015	0,017	0,300	
7	0,055	0,060	0,158	0,175	0,770	
8	0,011	0,012	0,038	0,042	0,230	
9	0,026	0,029	0,006	0,007	0,400	
10	0,030	0,033	0,053	0,059	0,184	
11	0,019	0,021	0,076	0,084	0,330	
12	0,017	0,018	0,006	0,007	0,153	
13	0,029	0,032	0,067	0,074	0,210	
14	0,005	0,006	0,015	0,016	0,131	
15	0,008	0,009	0,004	0,005	0,150	
16	0,007	0,008	0,009	0,010	0,115	
17	0,010	0,011	0,036	0,040	0,132	
18	0,006	0,006	0,003	0,004	0,102	
19	0,021	0,024	0,036	0,039	0,118	
20	0,005	0,005	0,006	0,006	0,092	
21	0,005	0,006	0,004	0,004	0,107	0,160
22	0,007	0,008	0,012	0,014	0,084	
23	0,012	0,013	0,022	0,025	0,098	0,147
24	0,003	0,003	0,004	0,004	0,077	
25	0,016	0,018	0,029	0,032	0,090	0,135
26	0,007	0,008	0,007	0,008	0,071	
27	0,016	0,018	0,005	0,005	0,083	0,124
28	0,005	0,005	0,006	0,007	0,066	
29	0,013	0,015	0,016	0,018	0,078	0,117
30	0,005	0,005	0,003	0,003	0,061	
31	0,013	0,015	0,025	0,027	0,073	0,109
32	0,004	0,004	0,005	0,006	0,058	
33	0,014	0,015	0,005	0,005	0,068	0,102
34	0,007	0,008	0,011	0,012	0,054	
35	0,013	0,014	0,016	0,017	0,064	0,096
36	0,002	0,002	0,005	0,005	0,051	
37	0,012	0,013	0,025	0,028	0,061	0,091
38	0,006	0,007	0,009	0,010	0,048	
39	0,001	0,001	0,010	0,011	0,058	0,087
40	0,004	0,005	0,014	0,016	0,046	

Note the higher limits for odd harmonics 21 and above are only allowable under certain conditions, if these higher limits are utilised please state the exemption used as detailed in part 6.2.3.4 of BS EN 61000-3-2 in the box below.



Suntrio-TL10K									
Power Quality. Voltage fluctuations and Flicker. The requirement is specified in section 5.4.2, test procedure in Annex A or B 1.4.3									
		Starting			Stopping			Running	
		d _{max}	d _c	d _(t)	d _{max}	d _c	d _(t)	P _{st}	P _{It} 2 hours
Measured Values	L1	0,82	0,67	0	1,05	0,67	0	0,242	0,180
	L2	0,78	0,64	0	1,03	0,64	0	0,322	0,232
	L3	0,78	0,64	0	1,05	0,72	0	0,250	0,182
Normalised to standard impedance and 3,68 kW for multiple units	L1	0,91	0,74	0	1,16	0,74	0	0,267	0,199
	L2	0,86	0,71	0	1,14	0,71	0	0,356	0,256
	L3	0,86	0,71	0	1,16	0,79	0	0,276	0,201
Limits set under BS EN 61000-3-3		4%	3.3%	3.3% 500ms	4%	3.3%	3.3% 500ms	1.0	0.65

Suntrio-TL6K									
Power quality. DC injection. The requirement is specified in section 5.5, test procedure in Annex A or B 1.4.4									
Test power level	10%			55%			100%		
	L1	L2	L3	L1	L2	L3	L1	L2	L3
Recorded Value (A)	0,0195	0,0113	0,0211	0,0090	0,0024	0,0023	0,0062	0,0011	0,0100
As % of Rated AC current	0,219%	0,127%	0,237%	0,101%	0,027%	0,026%	0,070%	0,012%	0,112%
Limit	0,25%			0,25%			0,25%		

Suntrio-TL10K									
Power quality. DC injection. The requirement is specified in section 5.5, test procedure in Annex A or B 1.4.4									
Test power level	10%			55%			100%		
	L1	L2	L3	L1	L2	L3	L1	L2	L3
Recorded Value (A)	0,0098	0,0187	0,0047	0,0019	0,0011	0,0107	0,0098	0,0187	0,0047
As % of Rated AC current	0,068%	0,129%	0,032%	0,013%	0,008%	0,074%	0,068%	0,129%	0,032%
Limit	0,25%			0,25%			0,25%		



Suntrio-TL6K										
Power Quality. Power factor. The requirement is specified in section 5.6, test procedure in Annex A or B 1.4.2										
	216,2 V			230 V			253 V			Measured at three voltage levels and at full output. Voltage to be maintained within $\pm 1.5\%$ of the stated level during the test.
	L1	L2	L3	L1	L2	L3	L1	L2	L3	
Measured value	0,988	0,988	0,989	0,989	0,988	0,986	0,985	0,988	0,986	
Limit	>0,95			>0,95			>0,95			

Suntrio-TL10K						
Protection. Frequency tests. The requirement is specified in section 5.3.1, test procedure in Annex A or B 1.3.3						
Function	Setting		Trip test		"No trip tests"	
	Frequency	Time delay	Frequency	Time delay	Frequency /time	Confirm no trip
U/F stage 1	47,5 Hz	20 s	47,5 Hz	20,4 s	47,7 Hz 25 s	No trip
U/F stage 2	47 Hz	0,5 s	47,0 Hz	863,0 ms	47,2 Hz 19,98 s	No trip
					46,8 Hz 0,48 s	No trip
O/F stage 1	51,5 Hz	90 s	51,5 Hz	90,2 s	51,3 Hz 95s	No trip
O/F stage 2	52 Hz	0,5 s	52,0 Hz	753,0 ms	51,8 Hz 89,98s	No trip
					52,2 Hz 0,48 s	No trip



Suntrio-TL10K							
Protection. Voltage tests. The requirement is specified in section 5.3.1, test procedure in Annex A or B 1.3.3							
Function		Setting		Trip test		"No trip tests"	
		Voltage	Time delay	Voltage	Time delay	Voltage /time	Confirm no trip
U/V stage 1	L1 -- N	200,1 V	2,5 s	201,0 V	2,780 s	204,1 V 3,5 s	No trip
	L2 -- N	200,1 V	2,5 s	201,0 V	2,764 s		
	L3 -- N	200,1 V	2,5 s	201,0 V	2,784 s		
U/V stage 2	L1 -- N	184 V	0,5 s	184,5 V	761,8 ms	188 V 2,48 s	No trip
	L2 -- N	184 V	0,5 s	184,6 V	752,0 m s		
	L3 -- N	184 V	0,5 s	184,5 V	758,0 m s		
						180 V 0,48 s	No trip
O/V stage 1	L1 -- N	262,2 V	1,0 s	263,5 V	1,263 s	258,2 V 2,0 s	No trip
	L2 -- N	262,2 V	1,0 s	264,0 V	1,248 s		
	L3 -- N	262,2 V	1,0 s	263,5 V	1,228 s		
O/V stage 2	L1 -- N	273,7 V	0,5 s	274,2 V	763,0 m s	269,7 V 0,98 s	No trip
	L2 -- N	273,7 V	0,5 s	274,3 V	755,0 ms		
	L3 -- N	273,7 V	0,5 s	274,5 V	754,0 ms		
						277,7 V 0,48 s	No trip
Note for Voltage tests the Voltage required to trip is the setting $\pm 3.45V$. The time delay can be measured at a larger deviation than the minimum required to operate the protection. The No trip tests need to be carried out at the setting $\pm 4V$ and for the relevant times as shown in the table above to ensure that the protection will not trip in error.							



Suntrio-TL10K						
Protection. Loss of Mains test.						
Note: inverter tested according to BS EN 62116.						
Test Power and imbalance	33% -5% Q Test 22	66% -5% Q Test 12	100% -5% P Test 5	33% +5% Q Test 31	66% +5% Q Test 21	100% +5% P Test 10
Trip time. Limit is 0,5 s	0,213 s	0,180 s	0,112 s	0,282 s	0,213 s	0,313 s

Suntrio-TL10K				
Protection. Frequency change, Stability test. The requirement is specified in section 5.3.3, test procedure in Annex A or B 1.3.6				
	Start Frequency	Change	End Frequency	Confirm no trip
Positive Vector Shift	49.5Hz	+9 degrees		No trip
Negative Vector Shift	50.5Hz	- 9 degrees		No trip
Positive Frequency drift	49.5Hz	+0.19Hz/sec	51.5Hz	No trip
Negative Frequency drift	50.5Hz	-0.19Hz/sec	47.5Hz	No trip

Suntrio-TL10K					
Protection. Re-connection timer. The requirement is specified in section 5.3.4, test procedure in Annex A or B 1.3.5					
Test should prove that the reconnection sequence starts after a minimum delay of 20 seconds for restoration of voltage and frequency to within the stage 1 settings of table 1.					
Time delay setting	Measured delay	Checks on no reconnection when voltage or frequency is brought to just outside stage 1 limits of table 1.			
20 s	36,20 s / 36,03 s / 36,15 s / 36,17 s	At 266,2 V	At 196,1 V	At 47,4 Hz	At 51,6 Hz
Confirmation that the SSEG does not re-connect.		No connection	No connection	No connection	No connection

Suntrio-TL10K					
Fault level contribution. The requirement is specified in section 5.7, test procedure in Annex A or B 1.4.6					
For a directly coupled SSEG			For a Inverter SSEG		
Parameter	Symbol	Value	Time after fault	Volts	Amps
Peak Short Circuit current	i_p	--	20 ms	$30 V_{r.m.s}$	0,5 A
Initial Value of aperiodic current	A	--	100 ms	$30 V_{r.m.s}$	0
Initial symmetrical short-circuit current*	I''_k	--	250 ms	$30 V_{r.m.s}$	0
Decaying (aperiodic) component of short circuit current*	i_{DC}	--	500 ms	$30 V_{r.m.s}$	0
Reactance/Resistance Ratio of source*	X / R	--	Time to trip	0,089	In seconds

..... End of test report.....