



广州三晶电气股份有限公司

Guangzhou Sanjing Electric Co., Ltd.

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Add: SAJ Innovation Park, No.9, Lizhishan Road, Science City, Guangzhou High-tech Zone, Guangdong, P.R.China.

Certificate EN 50549-1:2019 with Ireland deviations

European Standard

Manufacturer	Guangzhou Sanjing Electric Co., Ltd.
Address	No.9, Lizhishan Road, Science City, Guangzhou High-tech Zone, Guangdong, P.R.China

Product Name	PV Grid-tied Inverter						
Product Type	R5-3K-S2	R5-3.6K-S2	R5-4K-S2	R5-5K-S2	R5-6K-S2	R5-7K-S2	R5-8K-S2
Max. AC Current [A]	14.4	16.0	19.2	24.0	26.1	33.5	34.8
Maximum Apparent Power [VA]	3300	3680	4400	5500	6000	7700	8000
Generating Unit technology	Single phase, transformerless, PV Grid-connected inverter						
Type Tested	Base on requirements EN 50549-1:2019						
Test Location	Guangzhou Sanjing Electric Co., Ltd. No.9, Lizhishan Road, Science City, Guangzhou High-tech Zone, Guangdong, P.R.China						
Test Date	2021-7-15 to 2021-7-18						
Compliant to	-Requirements to Type A Generation Unit. -Commistion Regulation (EU) 2016/631 (NC RfG).						

Date:

2021.7.19

Signature:





Type Test Verification Report

Models R5-3K-S2, R5-3.6K-S2, R5-4K-S2, R5-5K-S2, R5-6K-S2, R5-7K-S2 and R5-8K-S2 have the same structure, software logic and hardware structure, Except for the different model names, all tests are performed in R5-8K-S2.

Power Quality - Harmonics: These tests should be carried out as specified in EN 61000-3-12. The chosen test should be undertaken with a fixed source of energy at two power levels:

a) between 45 and 55%, b) at 100% of Registered Capacity.

Micro-generator rating per phase (rpp)		8	kW			
Harmonic	At 45-55% of Registered Capacity		100% of Registered Capacity			
	Measured Value MV in Amps	--	Measured Value MV in Amps	--	Limit in EN 61000-3-12	
					1 phase	3 phase
2	0.066	0.188	0.188	0.541	8%	--
3	0.094	0.271	0.101	0.290	21.6%	--
4	0.015	0.044	0.034	0.099	4%	--
5	0.058	0.167	0.101	0.290	10.7%	--
6	0.035	0.101	0.043	0.124	2.67%	--
7	0.085	0.245	0.070	0.200	7.2%	--
8	0.034	0.098	0.033	0.096	2%	--
9	0.113	0.326	0.111	0.318	3.8%	--
10	0.018	0.050	0.011	0.031	1.6%	--
11	0.110	0.316	0.207	0.594	3.1%	--
12	0.021	0.060	0.019	0.053	1.33%	--
13	0.070	0.202	0.137	0.393	2%	--
THD ¹	--	1.728	--	1.380	23%	--
PWHD ²	--	2.489	--	2.279	23%	--

¹ THD = Total Harmonic Distortion

² PWHD = Partial Weighted Harmonic Distortion



Power Quality – Voltage fluctuations and Flicker:

Element	3		Element3	Judgement	Pass
Volt Range	300 V/50Hz		Total	Judgement	Pass
Un (U3)	230.425V		(Element1,2,3)		
Freq (U3)	50.004Hz				
Dmin	0.10%				

	dc[%]	dmax[%]	d(t)[ms]	Pst	Plt
Limit	3.30	4.00	500 3.30%	1.00	0.65 N:12
No. 1	0.056 Pass	0.157 Pass	0.0 Pass	0.141 Pass	
2	0.073 Pass	0.169 Pass	0.0 Pass	0.138 Pass	
3	0.041 Pass	0.182 Pass	0.0 Pass	0.135 Pass	
4	0.034 Pass	0.142 Pass	0.0 Pass	0.155 Pass	
5	0.049 Pass	0.182 Pass	0.0 Pass	0.150 Pass	
6	0.060 Pass	0.156 Pass	0.0 Pass	0.144 Pass	
7	0.026 Pass	0.189 Pass	0.0 Pass	0.132 Pass	
8	0.046 Pass	0.156 Pass	0.0 Pass	0.144 Pass	
9	0.037 Pass	0.181 Pass	0.0 Pass	0.143 Pass	
10	0.045 Pass	0.156 Pass	0.0 Pass	0.137 Pass	
11	0.053 Pass	0.174 Pass	0.0 Pass	0.146 Pass	
12	0.055 Pass	0.155 Pass	0.0 Pass	0.149 Pass	
Result	Pass	Pass	Pass	Pass	0.143 Pass

Plt	0.143	Limit	0.65			
Test Impedance	R	0.4	Ω	X	0.25	Ω
Standard Impedance	R	0.24 * 0.4 ^	Ω	X	0.15 * 0.25 ^	Ω
Maximum Impedance	R	--	Ω	X	--	Ω

Applies to three phase and split single phase **Micro-generators**.

^ Applies to single phase **Micro-generators** and **Micro-generators** using two phases on a three phase system.

For voltage change and flicker measurements the following formula is to be used to convert the measured values to the normalised values where the power factor of the generation output is 0.98 or above.

Normalised value = Measured value*reference source resistance/measured source resistance at test point.

Single phase units reference source resistance is 0.4 Ω

Two phase units in a three phase system reference source resistance is 0.4 Ω .

Two phase units in a split phase system reference source resistance is 0.24 Ω .

Three phase units reference source resistance is 0.24 Ω .

Where the power factor of the output is under 0.98 then the X to R ratio of the test impedance should be close to that of the Standard Impedance.

The stopping test should be a trip from full load operation.

The duration of these tests need to conform to the particular requirements set out in the testing notes for the technology under test. Dates and location of the test need to be noted below.



Power quality – DC injection				
Test power level	20%	50%	75%	100%
Recorded value in Amps	0.156	0.112	0.136	0.118
as % of rated AC current	0.45	0.32	0.39	0.34
Limit	0.5%	0.5%	0.5%	0.5%
Power Quality – Power factor				
	207 V	230 V	253 V	
20% of Registered Capacity	0.996	0.998	0.998	
50% of Registered Capacity	0.998	0.998	0.999	
75% of Registered Capacity	0.997	0.997	0.997	
100% of Registered Capacity	0.999	0.999	0.999	
Limit	>0.95	>0.95	>0.95	
Protection - Grid monitoring and reconnection time				
	Under frequency:			
Step for trip value [Hz to Hz]:	Setting threshold +1%Fn -> decrease by max 0.02Hz steps			
Step trip time [Hz to Hz]:	Trip value +0.1Hz -> Trip value -0.1Hz			
Setting value for trip value:	48.00 Hz			
Measurement accuracy of the tripping value [Hz]:	48.00 Hz	47.98 Hz	48.01 Hz	
Setting value for trip time:	500 ms			
Measurement the trip time [ms]:	494 ms	496 ms	496 ms	
	Over frequency:			
Step for trip value [Hz to Hz]:	Setting threshold +1%Fn -> increase by max. 0.02Hz steps			
Step trip time [Hz to Hz]:	Trip value +0.1Hz -> Trip value -0.1Hz			
Limit [Hz]:	50.50 Hz			
Measurement accuracy of the tripping value [Hz]:	50.51 Hz	50.52 Hz	50.50 Hz	
Setting value for trip time:	500ms			
Measurement the trip time [ms]:	496 ms	496 ms	496 ms	



		Under voltage:		
Step for trip value [V to V]:		Setting threshold +5%Vn -> decrease by max 1V steps		
Step for trip time [V to V]:		Trip value +2%Vn -> Trip value -2%Vn		
Setting value for trip value:		207V		
Measurement accuracy of the tripping value [V]:	L1:	207.2 V	207.0 V	207.2 V
	L2:	--	--	--
	L3:	--	--	--
Setting value for trip time:		500 ms		
Measurement the trip time [ms]:	L1:	498 ms	496 ms	498 ms
	L2:	--	--	--
	L3:	--	--	--
		Over voltage:		
Step for trip value [V to V]:		Setting threshold +5%Vn -> increase by max 1V steps		
Step for trip time [V to V]:		Trip value -2%Vn -> Trip value +2%Vn		
Setting value for trip value:		253V		
Measurement accuracy of the tripping value [V]:	L1:	253.2 V	253.0 V	253.2 V
	L2:	--	--	--
	L3:	--	--	--
Setting value for trip time:		500		
Measurement the trip time [ms]:	L1:	498 ms	498 ms	496 ms
	L2:	--	--	--
	L3:	--	--	--
<p>Note:</p> <p>The above test result just for evaluation the interface protection system measure the voltage, frequency and trip time tolerance. If the product installation on the position should need confirmed the grid protection value with located DSO.</p> <p>The interface protection system with voltage tolerance: $\pm 1\%V_n$.</p> <p>The interface protection system with frequency tolerance: $\pm 0.05\text{Hz}$.</p> <p>The reset time shall be $\leq 50\text{ms}$.</p>				



U [Vac] Set Value	Limit [Vac]	f [Hz] Set Value	Limits [Hz]	Input Power [%]	Connect/Reconnection Time [sec]	Active power increase gradient [%/min.]	Acceptability criteria
Start-up for UV:							
85%Un	U < 90%	50,00 Hz	48,00 Hz <F< 50,50 Hz	100 %	---	---	No connection
100%Un	90% <U< 110%	50,00 Hz	48,00 Hz <F< 50,50 Hz	100 %	64 s	--	Delay for reconnection >60 s; Gradient: No requires.
80%Un	U < 90%	50,00 Hz	48,00 Hz <F< 50,50 Hz	Disconnect			
Re-connected for UV:							
85%Un	U < 90%	50,00 Hz	48,00 Hz <F< 50,50 Hz	100 %	---	---	No connection
95%Un	90% <U< 110%	50,00 Hz	48,00 Hz <F< 50,50 Hz	100 %	63 s	9.43%	Delay for reconnection >60 s; Gradient:10%/min.
Start-up for OV:							
112%Un	U>110%	50,00 Hz	48,00 Hz <F< 50,50 Hz	100 %	---	---	No connection
108%Un	90% <U< 110%	50,00 Hz	48,00 Hz <F< 50,50 Hz	100 %	66 s	--	Delay for reconnection >60 s; Gradient: No requires.
115%Un	U>110%	50,00 Hz	48,00 Hz <F< 50,50 Hz	Disconnect			
Re-connected for OV:							
112%Un	U>110%	50,00 Hz	48,00 Hz <F< 50,50 Hz	100 %	---	---	No connection
108%Un	90% <U< 110%	50,00 Hz	48,00 Hz <F< 50,50 Hz	100 %	64 s	9.65%	Delay for reconnection >60 s; Gradient:10%/min.
Start-up for UF:							
Un	90% <U< 110%	47,50 Hz	F< 48,00Hz	100 %	---	---	No connection
Un	90% <U< 110%	49,60 Hz	48,00 Hz <F< 50,50 Hz	100 %	64 s	9.65%	Delay for reconnection >60 s; Gradient: No requires.



Un	90% <U< 110%	47,40 Hz	F< UF	Disconnect			
Re-connected for UF:							
Un	90% <U< 110%	47,50 Hz	F< 48,00Hz	100 %	---	---	No connection
Un	90% <U< 110%	49,60 Hz	48,00 Hz <F< 50,50 Hz	100 %	63 s	9.66%	Delay for reconnection >60 s; Gradient:10%/min.
Start-up for OF:							
Un	90% <U< 110%	50,80 Hz	F>50.50Hz	100 %	---	---	No connection
Un	90% <U< 110%	50,00 Hz	48,00 Hz <F< 50,50 Hz	100 %	64 s	9.66%	Delay for reconnection >60 s; Gradient: No requires.
Un	90% <U< 110%	51,00 Hz	F>50,50 Hz	Disconnect			
Re-connected for OF:							
Un	90% <U< 110%	50,60 Hz	F > 50,50 Hz	100 %	---	---	No connection
Un	90% <U< 110%	50,10 Hz	48,00 Hz <F< 50,50 Hz	100 %	63 s	9.88%	Delay for reconnection >60 s; Gradient:10%/min.
Protection - Loss of Mains test							
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 2s	0.200 s	0.224 s	0.248s	0.216 s	0.224 s	0.244 s	