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# Certificate of compliance

**Applicant:** Shenzhen Sosen Innovation Technology Co Ltd  
601, Pengzhanhui, Building 1, No.233, Xinqiao Community Center Road, Xinqiao Street, Bao'an District, Shenzhen, China

**Product:** Photovoltaic (PV) and battery inverter

**Model:** SSE-HH6K-P1-EU  
SSE-HH5K-P1-EU  
SSE-HH4K6-P1-EU  
SSE-HH3K7-P1-EU  
SSE-HH3K-P1-EU

## Use in accordance with regulations:

Automatic disconnection device with single-phase mains surveillance in accordance with Engineering Recommendation G99/1 for photovoltaic systems with a single-phase parallel coupling via an inverter in the public mains supply. The automatic disconnection device is an integral part of the aforementioned inverter. This serves as a replacement for the disconnection device with isolating function, which can be accessed the distribution network provider at any time.

## Applied rules and standards:

### Engineering Recommendation G99/1-9:2022

Requirements for the connection of generation equipment in parallel with public distribution networks

### DIN VDE V 0124-100:2020 (5.5.2.1 Functional safety of network and system protection)

Grid integration of generator plants - Low-voltage - Test requirements for generator units to be connected to and operated in parallel with low-voltage distribution networks

At the time of issue of this certificate the safety concept of an aforementioned representative product corresponds to the valid safety specifications for the specified use in accordance with regulations.

**Report number:** ASAP-ESH-P23030281

**Certification program:** NSOP-0032-DEU-ZE-V01

**Certificate number:** U23-0828

**Date of issue:** 2023-09-29

**Certification body**



Domenik Koll

*Certification body Bureau Veritas Consumer Products Services Germany GmbH accredited according to DIN EN ISO/IEC 17065*

*Testing laboratory accredited according to DIN EN ISO/IEC 17025*

*A partial representation of the certificate requires the written approval of Bureau Veritas Consumer Products Services Germany GmbH*

**Appendix A2-3 Compliance Verification Report for Inverter Connected Power Generating Modules**

Extract from test report according to the Engineering Recommendation G99

Nr. ASAP-ESH-P23030281

**Type Approval and declaration of compliance with the requirements of Engineering Recommendation G99.**

<b>PGM Technology:</b>	Photovoltaic (PV) and battery inverter		
<b>Manufacturer / applicant:</b>	<b>Shenzhen Sosen Innovation Technology Co Ltd</b>		
<b>Address:</b>	601, Pengzhanhui, Building 1, No.233, Xinqiao Community Center Road, Xinqiao Street, Bao'an District, Shenzhen, China		
<b>Tel</b>	--	<b>Fax:</b>	--
<b>Email:</b>	--	<b>Website:</b>	--

Rated values	SSE-HH3K-P1-EU	SSE-HH3K7-P1-EU	SSE-HH4K6-P1-EU	SSE-HH5K-P1-EU	SSE-HH6K-P1-EU
<b>Max. Input DC voltage [V]</b>	600				
<b>Input DC voltage range [V]</b>	80-550				
<b>Max. Input DC current [A]</b>	16/16				
<b>Battery DC voltage range [V]</b>	85-460				
<b>Max. battery DC voltage [V]</b>	460				
<b>Max. battery DC current per DC input [A]</b>	35				
<b>Output AC voltage [V] :</b>	L/N/PE, 230V, 50Hz				
<b>Max. Output AC current [A]</b>	14,3	17,6	20,0	23,9	28,7
<b>Nominal Output power [W]</b>	3000	3680	4600	5000	6000
<b>Max. Output power [VA]</b>	3300	4048	4600	5500	6600

<b>Firmware version</b>	V3.01
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**Description of the structure of the power generation unit:**

The power generation unit is equipped with a PV and line-side EMC filter. The power generation unit has no galvanic isolation between DC input and AC output. Output switch-off is performed with single-fault tolerance based on two series-connected relays in (each) line and neutral. This enables a safe disconnection of the power generation unit from the network in case of error.

**Differences between Generating Units:**

The tests had been performed on model SSE-HH6K-P1-EU are also valid for models SSE-HH5K-P1-EU, SSE-HH4K6-P1-EU, SSE-HH3K7-P1-EU, SSE-HH3K-P1-EU since it is identical in hardware except AC side outgoing lines mode and just power derated by software.

The above stated Generating Units are tested according to the requirements in the Engineering Recommendation G99/1. Any modification that affects the stated tests must be named by the manufacturer/supplier of the product to ensure that the product meets all requirements of the Engineering Recommendation G99/1.



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## Annex to the G99/1 certificate of compliance No. U23-0828

### Appendix A2-3 Compliance Verification Report for Inverter Connected Power Generating Modules

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Recommendation G99

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#### Operating Range.

Test 1	Voltage = 85% of nominal (195,5V) Frequency = 47Hz Power Factor = 1 Period of test 20 s
Connection:	Always connected
Limit:	Always connected
Test 2	Voltage = 85% of nominal (195,5V) Frequency = 47,5Hz Power Factor = 1 Period of test 90 minutes
Connection:	Always connected
Limit:	Always connected
Test 3	Voltage = 110% of nominal (253V) Frequency = 51,5Hz Power Factor = 1 Period of test 90 minutes
Connection:	Always connected
Limit:	Always connected
Test 4	Voltage = 110% of nominal (253V) Frequency = 52,0Hz Power Factor = 1 Period of test 15 minutes
Connection:	Always connected
Limit:	Always connected
Test 5	Voltage = 100% of nominal (230 V) Frequency = 50,0 Hz Power Factor = 1 Period of test 90 minutes
Connection:	Always connected
Limit:	Always connected
Test 6	Confirm that the Power Generating Module is capable of staying connected to the Distribution Network and operate at rates of change of frequency up to 1 Hzs-1 as measured over a period of 500ms. Note that this is not expected to be demonstrated on site.
Connection:	Always connected
Limit:	Always connected



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#### Protection. Voltage tests.

##### Phase 1

Function	Setting		Trip test		No trip test	
	Voltage [V]	Time delay [s]	Voltage [V]	Time delay [s]	Voltage / time	Confirm no trip
U/V	184	2,5	182,8	2,53	188V / 5,0s	No trip
					180V / 2,45s	No trip
O/V stage 1	262,2	1,0	261,7	1,02	258,2V 5,0s	No trip
O/V stage 2	273,7	0,5	272,9	0,53	269,7V 0,95s	No trip
					277,7V 0,45s	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.

#### Protection. Frequency tests.

Function	Setting		Trip test		No trip test	
	Frequency [Hz]	Time delay [s]	Frequency [Hz]	Time delay [s]	Frequency / time	Confirm no trip
U/F stage 1	47,5	20	47,45	20,01	47,7Hz / 30s	No trip
U/F stage 2	47	0,5	46,97	0,524	47,2Hz / 19,5s	No trip
					46,8Hz / 0,45s	No trip
O/F stage 2	52	0,5	52,06	0,512	51,8Hz / 120s	No trip
					52,2Hz / 0,45s	No trip

Note. For Frequency Trip tests the Frequency required to trip is the setting  $\pm 0,1Hz$ . In order to measure the time delay a larger deviation than the minimum required to operate the projection can be used. The "No-trip tests" need to be carried out at the setting  $\pm 0,2Hz$  and for the relevant times as shown in the table above to ensure that the protection will not trip in error.



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#### Protection. Loss of Mains.

Inverters tested according to BS EN 62116.

Balancing load on islanded network	33% of -5% Q Test 22	66% of -5% Q Test 12	100% of -5% P Test 5	33% of +5% Q Test 31	66% of +5% Q Test 21	100% of +5% P Test 10
<b>Trip time. Ph1 fuse removed [s]</b>	187	187	298	241	178	166

Note. Trip time limit is 0,5s.

#### Protection. Re-connection timer.

Test should prove that the reconnection sequence starts in no less than 20 seconds for restoration of voltage and frequency to within the stage 1 settings of table 10.1.

##### Over Voltage (258,2 V)

Time delay setting	Measured delay
20s	55,6s

##### Under Voltage (188,0 V)

Time delay setting	Measured delay
20s	61,2s

##### Over Frequency (51,9 Hz)

Time delay setting	Measured delay
20s	55,6s

##### Under Frequency (47,6 Hz)

Time delay setting	Measured delay
20s	61,8s

	Checks on no reconnection when voltage or frequency is brought to just outside stage 1 limits of table 1.			
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At 266,2V	At 180,0V	At 47,4Hz	At 52,1Hz
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<b>Confirmation that the Generating Unit does not re-connect.</b>	No reconnection	No reconnection	No reconnection	No reconnection
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#### Protection. Frequency change, Stability test.

	Start Frequency [Hz]	Change	Test Duration	Confirm no trip
<b>Positive Vector Shift</b>	49,5	+50 degrees		No trip
<b>Negative Vector Shift</b>	50,5	-50 degrees		No trip
<b>Positive Frequency drift</b>	49,0 to 51,0	+0,95Hz/sec	2,1s	No trip
<b>Negative Frequency drift</b>	51,0 to 49,0	-0,95Hz/sec	2,1s	No trip

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**Limited Frequency Sensitive Mode – Over Frequency**

1-min mean value [Hz]:	a) 50,00	b) 50,45	c) 50,70	d) 51,15	e) 50,70	f) 50,45	g) 50,00
<b>1. Measurement a) to g): Active power output &gt; 80% P<sub>n</sub></b>							
Frequency [Hz]:	50,00	50,45	50,7	51,15	50,7	50,45	50,00
P <sub>expected</sub> [W]:	N/A	5940	5640	5100	5640	5940	N/A
P <sub>measured</sub> [W]:	6004	5942	5649	5114	5644	5941	6005
<b>2. Measurement a) to g): Active power output 40% and 60% P<sub>n</sub></b>							
Frequency [Hz]:	50,00	50,45	50,7	51,15	50,7	50,45	50,00
P <sub>expected</sub> [W]:	N/A	2940	2640	2100	2640	2940	N/A
P <sub>measured</sub> [W]:	3001	2940	2634	2236	2644	2939	6008

**Output Power with falling Frequency**

Frequency setpoint [Hz]:	50,00	49,50	49,00	48,00	47,60	47,10
Frequency [Hz]:	50,00	49,50	49,00	48,00	47,60	47,10
Active power [kW]:	6213,24	6192,53	6190,05	6194,39	6194,66	6195,28
ΔP/P <sub>max</sub> [%]:		0,35	0,39	0,31	0,31	0,30

Note.

For a CHP the test point a) at 50,00Hz is taken as Registered capacity (P<sub>max</sub>) due to limited discrete operating points of the CHP's thermal process.

No power reduction takes place for electronic inverter



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### Appendix A2-3 Compliance Verification Report for Inverter Connected Power Generating Modules

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Recommendation G99

Nr. ASAP-ESH-P23030281

#### Power Quality. Harmonics.

##### SSE-HH6K-P1-EU

Generating Unit rating per phase (rpp)			6000 W		Limit in BS EN61000-3-12 in %	
At 45-55% of rated output 3034 W			100% of rated output 6031 W			
Harmonic	Measured Value (MV) in [A]	Measured Value (MV) in [%]	Measured Value (MV) in [A]	Measured Value (MV) in [%]		
2nd	0,059	0,225	0,186	0,715	8%	8%
3rd	0,335	1,283	0,339	1,300	21,6%	N/A
4th	0,023	0,087	0,105	0,402	4%	4%
5th	0,254	0,973	0,280	1,075	10,7%	10,7%
6th	0,011	0,040	0,042	0,161	2,67%	2,67%
7th	0,143	0,549	0,146	0,559	7,2%	7,2%
8th	0,007	0,029	0,029	0,113	2%	2%
9th	0,094	0,360	0,113	0,432	3,8%	N/A
10th	0,006	0,024	0,052	0,200	1,6%	1,6%
11th	0,078	0,299	0,049	0,188	3,1%	3,1%
12th	0,005	0,021	0,040	0,154	1,33%	1,33%
13th	0,061	0,234	0,101	0,388	2%	2%
14th	0,005	0,018	0,029	0,112	N/A	N/A
15th	0,047	0,180	0,062	0,239	N/A	N/A
16th	0,005	0,018	0,015	0,057	N/A	N/A
17th	0,032	0,123	0,073	0,280	N/A	N/A
18th	0,004	0,016	0,018	0,068	N/A	N/A
19th	0,033	0,125	0,028	0,107	N/A	N/A
20th	0,004	0,017	0,024	0,090	N/A	N/A
21th	0,024	0,091	0,062	0,239	N/A	N/A
22th	0,004	0,016	0,018	0,068	N/A	N/A
23th	0,022	0,085	0,037	0,142	N/A	N/A
24th	0,004	0,016	0,029	0,113	N/A	N/A
25th	0,022	0,084	0,061	0,235	N/A	N/A
26th	0,005	0,020	0,013	0,051	N/A	N/A
27th	0,015	0,058	0,036	0,139	N/A	N/A
28th	0,005	0,019	0,025	0,097	N/A	N/A
29th	0,022	0,083	0,036	0,138	N/A	N/A
30th	0,005	0,019	0,010	0,036	N/A	N/A
31th	0,015	0,056	0,031	0,119	N/A	N/A
32th	0,005	0,020	0,014	0,052	N/A	N/A
33th	0,020	0,075	0,023	0,089	N/A	N/A
34th	0,006	0,022	0,006	0,022	N/A	N/A
35th	0,013	0,049	0,031	0,120	N/A	N/A
36th	0,010	0,038	0,011	0,040	N/A	N/A
37th	0,012	0,045	0,021	0,081	N/A	N/A
38th	0,005	0,020	0,009	0,034	N/A	N/A
39th	0,010	0,037	0,025	0,096	N/A	N/A
40th	0,004	0,013	0,012	0,045	N/A	N/A
THD40 [%]	--	1,830	--	2,178	23%	13%
PWHD [%]	--	1,584	--	3,140	23%	22%

**Appendix A2-3 Compliance Verification Report for Inverter Connected Power Generating Modules**

Extract from test report according to the Engineering Recommendation G99

Nr. ASAP-ESH-P23030281

**Power Quality. Harmonics.**

**SSE-HH5K-P1-EU**

Generating Unit rating per phase (rpp)			5000 W			
	At 45-55% of rated output 2440 W		100% of rated output 5026 W			
Harmonic	Measured Value (MV) in [A]	Measured Value (MV) in [%]	Measured Value (MV) in [A]	Measured Value (MV) in [%]	Limit in BS EN61000-3-12 in %	
					1 phase	3 phase
2nd	0,039	0,181	0,111	0,512	8%	8%
3rd	0,314	1,443	0,315	1,449	21,6%	N/A
4th	0,013	0,062	0,025	0,115	4%	4%
5th	0,218	1,003	0,239	1,099	10,7%	10,7%
6th	0,007	0,030	0,040	0,185	2,67%	2,67%
7th	0,118	0,542	0,144	0,662	7,2%	7,2%
8th	0,007	0,033	0,022	0,099	2%	2%
9th	0,078	0,361	0,106	0,487	3,8%	N/A
10th	0,010	0,045	0,017	0,077	1,6%	1,6%
11th	0,060	0,274	0,072	0,333	3,1%	3,1%
12th	0,003	0,015	0,010	0,047	1,33%	1,33%
13th	0,037	0,170	0,084	0,384	2%	2%
14th	0,005	0,021	0,006	0,027	N/A	N/A
15th	0,030	0,136	0,058	0,269	N/A	N/A
16th	0,003	0,014	0,007	0,031	N/A	N/A
17th	0,026	0,120	0,053	0,242	N/A	N/A
18th	0,003	0,015	0,008	0,036	N/A	N/A
19th	0,028	0,131	0,067	0,307	N/A	N/A
20th	0,003	0,016	0,008	0,037	N/A	N/A
21th	0,027	0,123	0,043	0,200	N/A	N/A
22th	0,005	0,025	0,006	0,027	N/A	N/A
23th	0,027	0,124	0,052	0,240	N/A	N/A
24th	0,004	0,017	0,009	0,040	N/A	N/A
25th	0,021	0,098	0,024	0,109	N/A	N/A
26th	0,005	0,025	0,005	0,024	N/A	N/A
27th	0,022	0,102	0,038	0,175	N/A	N/A
28th	0,004	0,018	0,006	0,026	N/A	N/A
29th	0,015	0,068	0,032	0,146	N/A	N/A
30th	0,004	0,018	0,008	0,038	N/A	N/A
31th	0,012	0,053	0,022	0,101	N/A	N/A
32th	0,003	0,015	0,005	0,021	N/A	N/A
33th	0,012	0,055	0,031	0,143	N/A	N/A
34th	0,004	0,018	0,004	0,020	N/A	N/A
35th	0,006	0,027	0,015	0,068	N/A	N/A
36th	0,004	0,019	0,005	0,021	N/A	N/A
37th	0,009	0,042	0,020	0,092	N/A	N/A
38th	0,004	0,016	0,004	0,017	N/A	N/A
39th	0,009	0,043	0,015	0,070	N/A	N/A
40th	0,002	0,011	0,006	0,028	N/A	N/A
THD40 [%]	--	1,943	--	2,239	23%	13%
PWHD [%]	--	1,626	--	3,118	23%	22%





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Nr. ASAP-ESH-P23030281

#### Power Quality. Harmonics.

##### SSE-HH4K6-P1-EU

Generating Unit rating per phase (rpp)			4600 W		Limit in BS EN61000-3-12 in %	
At 45-55% of rated output 2353 W			100% of rated output 4643 W			
Harmonic	Measured Value (MV) in [A]	Measured Value (MV) in [%]	Measured Value (MV) in [A]	Measured Value (MV) in [%]		
2nd	0,117	0,671	0,025	0,142	8%	8%
3rd	0,270	1,555	0,296	1,700	21,6%	N/A
4th	0,041	0,238	0,009	0,054	4%	4%
5th	0,210	1,207	0,172	0,987	10,7%	10,7%
6th	0,020	0,116	0,009	0,053	2,67%	2,67%
7th	0,148	0,853	0,077	0,443	7,2%	7,2%
8th	0,005	0,028	0,006	0,036	2%	2%
9th	0,071	0,407	0,047	0,273	3,8%	N/A
10th	0,007	0,041	0,004	0,021	1,6%	1,6%
11th	0,084	0,482	0,031	0,176	3,1%	3,1%
12th	0,008	0,046	0,004	0,021	1,33%	1,33%
13th	0,055	0,316	0,038	0,216	2%	2%
14th	0,009	0,052	0,004	0,021	N/A	N/A
15th	0,060	0,342	0,040	0,232	N/A	N/A
16th	0,005	0,026	0,003	0,017	N/A	N/A
17th	0,052	0,301	0,038	0,216	N/A	N/A
18th	0,009	0,050	0,005	0,031	N/A	N/A
19th	0,054	0,311	0,030	0,175	N/A	N/A
20th	0,005	0,031	0,003	0,019	N/A	N/A
21th	0,029	0,170	0,023	0,134	N/A	N/A
22th	0,006	0,036	0,003	0,019	N/A	N/A
23th	0,041	0,236	0,016	0,091	N/A	N/A
24th	0,005	0,031	0,003	0,018	N/A	N/A
25th	0,023	0,131	0,010	0,057	N/A	N/A
26th	0,003	0,019	0,003	0,017	N/A	N/A
27th	0,036	0,207	0,015	0,084	N/A	N/A
28th	0,003	0,020	0,003	0,019	N/A	N/A
29th	0,017	0,099	0,012	0,068	N/A	N/A
30th	0,004	0,021	0,003	0,017	N/A	N/A
31th	0,021	0,122	0,013	0,077	N/A	N/A
32th	0,003	0,015	0,003	0,016	N/A	N/A
33th	0,018	0,103	0,009	0,052	N/A	N/A
34th	0,005	0,027	0,003	0,018	N/A	N/A
35th	0,012	0,071	0,006	0,035	N/A	N/A
36th	0,003	0,018	0,003	0,016	N/A	N/A
37th	0,014	0,081	0,007	0,041	N/A	N/A
38th	0,003	0,017	0,003	0,016	N/A	N/A
39th	0,010	0,055	0,009	0,053	N/A	N/A
40th	0,005	0,029	0,002	0,013	N/A	N/A
THD40 [%]	--	2,478	--	2,105	23%	13%
PWHD [%]	--	3,244	--	1,938	23%	22%



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#### Power Quality. Harmonics.

##### SSE-HH3K7-P1-EU

Generating Unit rating per phase (rpp)			3700 W		Limit in BS EN61000-3-12 in %	
At 45-55% of rated output 1826 W			100% of rated output 3660 W			
Harmonic	Measured Value (MV) in [A]	Measured Value (MV) in [%]	Measured Value (MV) in [A]	Measured Value (MV) in [%]		
2nd	0,027	0,167	0,075	0,577	8%	8%
3rd	0,296	1,837	0,316	2,422	21,6%	N/A
4th	0,009	0,053	0,040	0,308	4%	4%
5th	0,172	1,067	0,248	1,901	10,7%	10,7%
6th	0,008	0,051	0,016	0,125	2,67%	2,67%
7th	0,077	0,478	0,154	1,179	7,2%	7,2%
8th	0,006	0,039	0,008	0,063	2%	2%
9th	0,047	0,295	0,095	0,731	3,8%	N/A
10th	0,004	0,023	0,011	0,087	1,6%	1,6%
11th	0,030	0,187	0,081	0,620	3,1%	3,1%
12th	0,004	0,023	0,008	0,058	1,33%	1,33%
13th	0,037	0,230	0,066	0,507	2%	2%
14th	0,004	0,024	0,004	0,032	N/A	N/A
15th	0,040	0,251	0,065	0,498	N/A	N/A
16th	0,003	0,018	0,006	0,049	N/A	N/A
17th	0,038	0,234	0,053	0,403	N/A	N/A
18th	0,005	0,031	0,004	0,033	N/A	N/A
19th	0,030	0,188	0,032	0,245	N/A	N/A
20th	0,003	0,019	0,005	0,035	N/A	N/A
21th	0,023	0,144	0,046	0,352	N/A	N/A
22th	0,003	0,018	0,005	0,036	N/A	N/A
23th	0,016	0,097	0,027	0,204	N/A	N/A
24th	0,003	0,020	0,006	0,049	N/A	N/A
25th	0,010	0,063	0,026	0,203	N/A	N/A
26th	0,003	0,017	0,005	0,035	N/A	N/A
27th	0,014	0,090	0,017	0,130	N/A	N/A
28th	0,003	0,021	0,006	0,047	N/A	N/A
29th	0,012	0,073	0,019	0,147	N/A	N/A
30th	0,003	0,019	0,005	0,040	N/A	N/A
31th	0,013	0,084	0,019	0,149	N/A	N/A
32th	0,003	0,017	0,004	0,030	N/A	N/A
33th	0,009	0,055	0,010	0,076	N/A	N/A
34th	0,003	0,018	0,004	0,027	N/A	N/A
35th	0,006	0,038	0,016	0,120	N/A	N/A
36th	0,003	0,017	0,007	0,053	N/A	N/A
37th	0,007	0,042	0,010	0,073	N/A	N/A
38th	0,003	0,017	0,003	0,025	N/A	N/A
39th	0,009	0,057	0,012	0,092	N/A	N/A
40th	0,002	0,013	0,004	0,028	N/A	N/A
THD40 [%]	--	2,275	--	3,646	23%	13%
PWHD [%]	--	2,090	--	3,965	23%	22%



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## Annex to the G99/1 certificate of compliance No. U23-0828

### Appendix A2-3 Compliance Verification Report for Inverter Connected Power Generating Modules

Extract from test report according to the Engineering Recommendation G99

Nr. ASAP-ESH-P23030281

#### Power Quality. Harmonics.

##### SSE-HH3K-P1-EU

Generating Unit rating per phase (rpp)			3000 W		Limit in BS EN61000-3-12 in %	
At 45-55% of rated output 1520 W			100% of rated output 3028 W			
Harmonic	Measured Value (MV) in [A]	Measured Value (MV) in [%]	Measured Value (MV) in [A]	Measured Value (MV) in [%]		
2nd	0,021	0,157	0,059	0,451	8%	8%
3rd	0,246	1,889	0,335	2,567	21,6%	N/A
4th	0,008	0,060	0,023	0,174	4%	4%
5th	0,143	1,096	0,254	1,946	10,7%	10,7%
6th	0,008	0,059	0,011	0,081	2,67%	2,67%
7th	0,064	0,492	0,143	1,099	7,2%	7,2%
8th	0,005	0,040	0,007	0,057	2%	2%
9th	0,040	0,303	0,094	0,720	3,8%	N/A
10th	0,003	0,023	0,006	0,047	1,6%	1,6%
11th	0,025	0,195	0,078	0,599	3,1%	3,1%
12th	0,003	0,024	0,005	0,042	1,33%	1,33%
13th	0,031	0,240	0,061	0,468	2%	2%
14th	0,003	0,023	0,005	0,037	N/A	N/A
15th	0,034	0,257	0,047	0,360	N/A	N/A
16th	0,002	0,018	0,005	0,035	N/A	N/A
17th	0,031	0,240	0,032	0,246	N/A	N/A
18th	0,005	0,035	0,004	0,032	N/A	N/A
19th	0,025	0,194	0,033	0,249	N/A	N/A
20th	0,003	0,021	0,004	0,034	N/A	N/A
21th	0,019	0,149	0,024	0,183	N/A	N/A
22th	0,003	0,021	0,004	0,033	N/A	N/A
23th	0,013	0,101	0,022	0,169	N/A	N/A
24th	0,003	0,020	0,004	0,032	N/A	N/A
25th	0,008	0,064	0,022	0,169	N/A	N/A
26th	0,002	0,019	0,005	0,039	N/A	N/A
27th	0,012	0,094	0,015	0,116	N/A	N/A
28th	0,003	0,021	0,005	0,038	N/A	N/A
29th	0,010	0,076	0,022	0,166	N/A	N/A
30th	0,002	0,019	0,005	0,038	N/A	N/A
31th	0,011	0,085	0,015	0,112	N/A	N/A
32th	0,002	0,018	0,005	0,040	N/A	N/A
33th	0,008	0,058	0,020	0,151	N/A	N/A
34th	0,003	0,020	0,006	0,045	N/A	N/A
35th	0,005	0,038	0,013	0,097	N/A	N/A
36th	0,002	0,018	0,010	0,076	N/A	N/A
37th	0,006	0,045	0,012	0,089	N/A	N/A
38th	0,002	0,017	0,005	0,041	N/A	N/A
39th	0,008	0,059	0,010	0,073	N/A	N/A
40th	0,002	0,014	0,004	0,027	N/A	N/A
THD40 [%]	--	2,339	--	3,659	23%	13%
PWHD [%]	--	2,154	--	3,168	23%	22%

**Appendix A2-3 Compliance Verification Report for Inverter Connected Power Generating Modules**

Extract from test report according to the Engineering Recommendation G99

Nr. ASAP-ESH-P23030281

Power Quality. Power factor.				
Output power	216,2V	230V	253V	Measured at three voltage levels and at full output. Voltage to be maintained within $\pm 1,5\%$ of the stated level during the test.
20%	0,9958	0,9989	0,9990	
50%	0,9993	0,9998	0,9998	
75%	0,9996	0,9999	0,9999	
100%	0,9998	0,9999	0,9999	
Limit	>0,95	>0,95	>0,95	

Power Quality. Voltage fluctuation and Flicker.								
	Starting			Stopping			Running	
	dmax	dc	d(t)	dmax	dc	d(t)	Pst	Plt 2 hours
Measured values at test impedance	0,38	0,12	0,00	0,16	0,04	0,00	0,07	0,05
Measured values at standard impedance	0,38	0,12	0,00	0,16	0,04	0,00	0,07	0,05
Values for maximum impedance	0,38	0,12	0,00	0,16	0,04	0,00	0,07	0,05
Limits set under BS EN 61000-3-11	4%	3,3%	3,3% 500ms	4%	3,3%	3,3% 500ms	1,0	0,65
Test impedance	R	0,400	$\Omega$	XI	0,250	$\Omega$		
	Z	0,472	$\Omega$					
Standard impedance	R	0,400	$\Omega$	XI	0,250	$\Omega$		
	Z	0,472	$\Omega$					
Maximum impedance	R	0,400	$\Omega$	XI	0,250	$\Omega$		
	Zmax	0,472	$\Omega$					



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## Annex to the G99/1 certificate of compliance No. U23-0828

### Appendix A2-3 Compliance Verification Report for Inverter Connected Power Generating Modules

Extract from test report according to the Engineering  
Recommendation G99

Nr. ASAP-ESH-P23030281

#### Power Quality. DC injection.

##### SSE-HH4K6-P1-EU

Test level power [%]	10	55	100
Recorded value [mA]	33	17	19
Recorded value [%]	0,19	0,10	0,11
Limit [%]	0,25	0,25	0,25

#### Note

Tests are carried out at three defined power levels  $\pm 5\%$ . At 230 V a 4 kW three phase Inverter has a current output of 17,39 A so DC limit is 43 mA. These tests is undertaken in accordance with Annex A.7.1.4.4.

The % DC injection ("as % of rated AC current" below) is calculated as follows:

% DC injection = Recorded DC value in Amps / Base current where the base current is the Registered Capacity (W) / V phase.

The % DC injection should not be greater than 0,25%.

##### SSE-HH6K-P1-EU

Test level power [%]	10	55	100
Recorded value [mA]	15	15	30
Recorded value [%]	0,06	0,06	0,11
Limit [%]	0,25	0,25	0,25

#### Note

Tests are carried out at three defined power levels  $\pm 5\%$ . At 230 V a 6 kW three phase Inverter has a current output of 26,09 A so DC limit is 65 mA. These tests is undertaken in accordance with Annex A.7.1.4.4.

The % DC injection ("as % of rated AC current" below) is calculated as follows:

% DC injection = Recorded DC value in Amps / Base current where the base current is the Registered Capacity (W) / V phase.

The % DC injection should not be greater than 0,25%.

Note: Informative measurement of DC-injection of each phase of the inverter and a limit of 0,25% per phase of the rated current per phase as pass criteria.



## Annex to the G99/1 certificate of compliance No. U23-0828

### Appendix A2-3 Compliance Verification Report for Inverter Connected Power Generating Modules

Extract from test report according to the Engineering Recommendation G99

Nr. ASAP-ESH-P23030281

#### Fault level Contribution.

For a directly coupled SSEG			For a Inverter SSEG		
Parameter	Symbol	Value	Time after fault	Volts [V]	Amps [A]
Peak Short Circuit current	$I_p$	N/A	20ms	21,41	28,87
Initial Value of aperiodic current	A	N/A	100ms	13,62	19,88
Initial symmetrical short-circuit current*	$I_k$	N/A	250ms	N/A	N/A
Decaying (aperiodic) component of short circuit current*	$i_{DC}$	N/A	500ms	N/A	N/A
Reactance/Resistance Ratio of source*	X/R	N/A	Time to Trip [s]	0,225	

For rotating machines and linear piston machines the test should produce a 0s – 2s plot of the short circuit current as seen at the Generating Unit terminals.

\* Values for these parameters should be provided where the short circuit duration is sufficiently long to enable interpolation of the plot.

#### Self Monitoring – Solid state switching.

**N/A**

It has been verified that in the event of the solid state switching device failing to disconnect the Power Park Module, the voltage on the output side of the switching device is reduced to a value below 50 volts within 0,5 seconds.

N/A

Note. Unit do not provide solid state switching relays. In case the semiconductor bridge is switched off, then the voltage on the output drops to 0. In this case the relays on the output will also open (Functional safety of the internal automatic disconnection device according to VDE 0124-100).

#### Cyber security

**P**

Confirm that the Manufacturer or Installer of the Micro-generator has provided a statement describing how the Micro-generator has been designed to comply with cyber security requirements, as detailed in 9.7.

Yes

Note. Different levels of access, all are password protected, only certain parameters can be changed on maintenance level. Manufacturer information provided, see test report.

#### Wiring functional tests if required by para. 15.2.1

**N/A**

Confirm that the relevant test schedule is attached (tests to be undertaken at time of commissioning).

N/A

Note.

The inverter was tested in a test laboratory. The correct wiring functional test in the field has to be done by the responsible person for the installation of the plant.

#### Logic Interface (input port) Required by paragraph 11.1.3.1

**P**

Confirm that an input port is provided and can be used to reduce the Active Power output to zero

Yes

Note. Manufacturer information provided..

Provide high level description of logic interface, e.g. details in 11.1.3.1 such as AC or DC signal

Yes

The HI3K-HI6K series inverter are available with multiple communication options such as WiFi,Bluetooth, RS485 and Meter with an external device.

Operating information like output voltage, current, frequency, fault information, etc., can be monitored locally or remotely and cellphone App via these interfaces.

**Appendix A2-3 Compliance Verification Report for Inverter Connected Power Generating Modules**

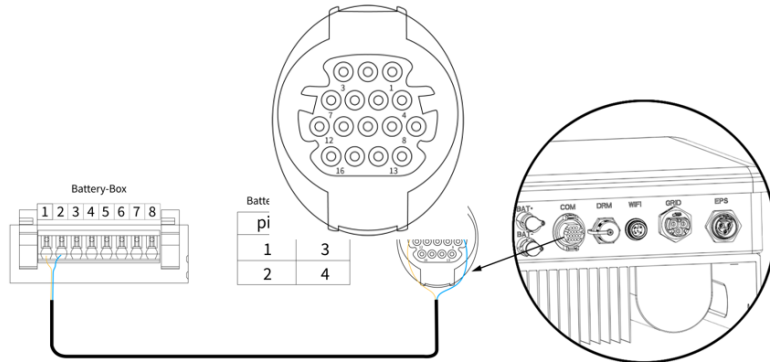
**Extract from test report according to the Engineering Recommendation G99**

**Nr. ASAP-ESH-P23030281**

The inverter has an interface for WiFi/Bluetooth devices that allow this device to collect information from inverter; including inverter working status, performance etc., and update that information to monitoring platform (the WiFi/Bluetooth device is available to purchase from your local supplier).

Connection steps:

1. Plug the WiFi/Bluetooth device into "WiFi/Bluetooth" port at the bottom of the inverter.
2. For WiFi device: Connect the WiFi/Bluetooth with the local router, and complete the WiFi/Bluetooth configuration (please refer to the WiFi/Bluetooth product manual for more details).
3. Set-up the site account on the Sosen monitoring platform (please refer to the monitoring user manual for more details).



Batterie	
pi	
1	3
2	4

PIN	1	2	3	4	5	6	7	8
Definition	NC	NC	<b>BMS CANH</b>	<b>BMS CANL</b>	BMS 485A	BMS 485B	METER 485A	METER 485B
PIN	9	10	11	12	13	14	15	16
Definition	EMS 485A	EMS 485B	GND_COM	NC	NC	NC	NC	NC