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Certification body of BV CPS GmbH
Accredited according to EN 45011 -
ISO / IEC Guide 65

Certificate of Conformity self-generation unit

Manufacturer / applicant: Samil Power Co., Ltd.,
No.6, Xuefengshan Road,
Suqian High-tech Industrial Development Zone,
Jiangsu Province,
P.R.China

| | | | | |
|---|---------------------------------|------------------------|------------------------|-------------------------|
| Type of power generation unit: | Grid-tied photovoltaic inverter | | | |
| Name of PGU: | SolarLake 5500TL-PM | SolarLake 7000TL-PM | SolarLake 8500TL-PM | SolarLake 10000TL-PM |
| Active power (nominal power at reference conditions) [kW]: | 5,5kW | 7,0kW | 8,5kW | 10,0kW |
| Rated voltage: | 230 / 400 V; N; PE | | | |

Firmware version: Master DSP SW: V1.00; Slave DSP SW: V1.00; HMI DSP SW: V1.00

Connection rule: VDE-AR-N 4105:2011-08 – Power generation systems connected to the low-voltage distribution network
Technical minimum requirements for the connection to and parallel operation with low-voltage distribution networks.

Applicable standards / directives: DIN VDE V 0124-100 (VDE V 0124-100): 2012-07 – Grid integration of power generation systems – low voltage
Test requirements for power generation units to be connected and operated parallel with the low-voltage distribution networks

The above mentioned generation units have been tested and certified according to the test guideline VDE 0124-100. The electrical properties required in the connection rule are satisfied.

- Verification of permissible system perturbations
- Verification of the symmetry characteristics of three-phase inverter modules
- Verification of the characteristics of the power generation unit on the network
- Verification of the possibility to take part in the generation management / network security management

The certificate contains the following information:

- Technical specifications of the power generation units, the deployed auxiliary equipment and the software version used.
- Schematic structure of power generation unit
- Summarised information about the characteristics of the power generation unit (mode of operation)

BV project number: 13TH0482

Certificate number: U13-0847

Date of issue: 2013-12-12

Valid until: 2016-12-11

Certification body

Dieter Zitzmann



(A partial representation of the certificate requires the written permission of BV CPS GmbH)



Deutsche
Akkreditierungsstelle
D-ZE-12024-01-01

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F.3 Requirements for the test report for power generation units

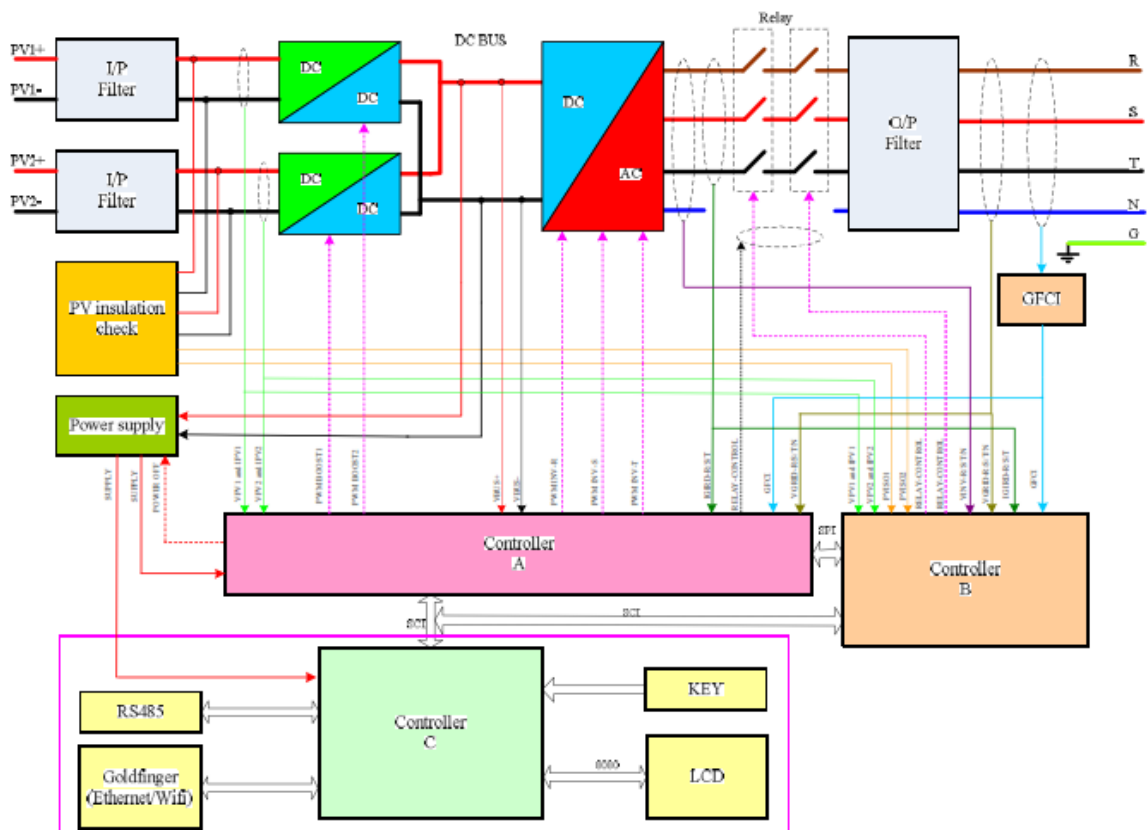
Extract from the test report for unit certification Nr. 13TH0482
 „Determination of electrical properties“

Description of the power generation unit

| | | | | |
|--|--|---------------------|---------------------|----------------------|
| Manufacturer / applicant: | Samil Power Co., Ltd., No.6, Xuefengshan Road, Suqian High-tech Industrial Development Zone, Jiangsu Province, P.R.China | | | |
| Type of power generation unit: | Grid-tied photovoltaic inverter | | | |
| Name of PGU: | SolarLake 5500TL-PM | SolarLake 7000TL-PM | SolarLake 8500TL-PM | SolarLake 10000TL-PM |
| Maximum active power P_{Emax} [kW]: | 5,50 | 6,99 | 8,49 | 9,90 |
| Maximum apparent power S_{Emax} [kVA]: | 5,54 | 7,02 | 8,56 | 10,05 |
| Rated voltage: | 230 / 400 V; N; PE | | | |
| Firmware version: | Master DSP SW: V1.00; Slave DSP SW: V1.00; HMI DSP SW: V1.00 | | | |
| Measurement period: | 2013-11-18 bis 2013-11-29 | | | |

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 thanks to the inverter bridge and two series-connected relays. This enables a safe disconnection of the power generation unit from the network in case of error.



F.3 Requirements for the test report for power generation units

Extract from the test report for unit certification Nr. 13TH0482
 „Determination of electrical properties“

Active power
 (tested according to VDE 0124-100 point 5.3.2.1)

| Name of PGU: | SolarLake 5500TL-PM | SolarLake 7000TL-PM | SolarLake 8500TL-PM | SolarLake 10000TL-PM |
|------------------|---------------------|---------------------|---------------------|----------------------|
| P_{Emax} [kW] | 5,50 | 6,99 | 8,49 | 9,90 |
| S_{Emax} [kVA] | 5,54 | 7,02 | 8,56 | 6,99 |

Note:
 At $\cos\varphi = 1$ the active power is equal to the rated apparent power.
 For the implementation of a reactive power set point assignment, the active power is reduced if necessary.

Reactive power supply
 (tested according to VDE 0124-100 point 5.3.6.1)

| | | |
|------------------------------|------------|----------------------|
| Active power | S_{Emax} | 40 – 60 % P_{Emax} |
| Name of PGU: | Type | |
| $\cos\varphi$ under-excited: | 0,895 | 0,897 |
| $\cos\varphi$ over-excited | 0,897 | 0,899 |
| $\cos\varphi$ | 0,999 | 0,998 |

The self-generation unit is approved for self-generation systems larger than 13.8kVA. The self-generation unit has no possibility for regulation of the displacement factor in the range from $\cos\varphi$ 0,90 over-excited to $\cos\varphi$ 0,90 under-excited.

Reactive power transfer function – standard $\cos\varphi$ (P)-characteristic curve
 (tested according to VDE 0124-100 point 5.3.6.4)

| Active power $P_{Emax\ setpoint}$ [%] | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|---------------------------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Name of PGU: | Type | | | | | | | | | |
| Active power P_{Emax} [%] | N/A | 1.78 | 2.69 | 3.60 | 4.50 | 5.40 | 6.30 | 7.19 | 8.08 | 8.96 |
| $\cos\varphi$ setpoint of P_{Emax} | N/A | 0.993 | 0.998 | 0.999 | 0.999 | 0.982 | 0.961 | 0.940 | 0.920 | 0.901 |
| $\cos\varphi$ | N/A | 1.000 | 1.000 | 1.000 | 1.000 | 0.980 | 0.960 | 0.940 | 0.921 | 0.901 |

According to VDE 0124-100, an accuracy of $\cos\varphi$ 0,01 is required for testing the Reactive power transfer function. The standard $\cos\varphi$ -(P)-characteristic curve is respected. To provide the set point of the reactive power, active power will be reduced at 100 % P/P_n .

F.3 Requirements for the test report for power generation units

| | | |
|--|-------|---------------------|
| Extract from the test report for unit certification | | Nr. 13TH0482 |
| „Determination of electrical properties“ | | |
| Switching operations | | |
| (tested according to VDE 0124-100 point 5.1.2) | | |
| Switch-on without specification (to the primary energy source) | k_i | 0,079 |
| Unfavorable case when switching the generator step | k_i | N/A |
| Switch-on at auxiliary conditions (of the primary energy source) | k_i | 0,082 |
| Worst value of all switching operations | k_i | 0,082 |
| Flicker | | |
| (tested according to VDE 0124-100 point 5.1.3) | | |
| Line impedance angle ψ_k : | | 32° |
| System flicker coefficient c_{ψ} : | | 2,595 |