solis
GINLONG TECHNOLOGIES CO.,LTD.

S5-GC(25-50)K

Solis Three Phase Grid-Tied Inverters

Efficient

- Max. efficiency 98.8%
- String current up to 16A
- 3/4 MPPT design, supports multiple orientation system design
- Night time PID recovery function, increases overall system yield (optional)
- Wide voltage range and low startup voltage

Safe

- IP66
- AFCI protection, proactively reduces fire risk
- Globally recognised branded componentry for longer life
- Intelligent redundant fan-cooling

Smart

- Supports export power control
- Intelligent string monitoring, smart I-V curve scan
- Supports RS485, WiFi, GPRS
- Scan to register on SolisCloud, supports remote upgrade and control

Economic

- Supports GPRS/WiFi communication with less wiring and reduced installation costs
- > 150% DC/AC ratio
- Supports high power modules for lower installation costs

Models:

S5-GC25K / S5-GC30K

S5-GC33K / S5-GC36K

S5-GC40K / S5-GC40K-HV

S5-GC50K-HV

360° View

DATASHEET

S5-GC(25-50)K

Models	25K	30K	33K	36K	40K	40K-HV	50K-HV
Input DC							
Recommended max. PV power	37.5 kW	45 kW	49.5 kW	54 kW	60 kW	60 kW	75 kW
Max. input voltage	1100 V						
Rated voltage	600 V						
Start-up voltage	180 V						
MPPT voltage range	200-1000 V						
Max. input current	32 A / 32 A / 32 A			4*32 A			
Max. short circuit current	40 A / 40 A / 40 A			4*40 A			
MPPT number/Max. input strings number	3/6			4/8			
Output AC							
Rated output power	25 kW	30 kW	33 kW	36 kW	40 kW	40 kW	50 kW
Max. apparent output power	27.5 kVA	33 kVA	36.3 kVA	39.6 kVA	44 kVA	44 kVA	55 kVA
Max. output power	27.5 kW	33 kW	36.3 kW	39.6 kW	44 kW	44 kW	55 kW
Rated grid voltage	3/N/PE, 220 V / 380 V, 230 V / 400 V					3/PE, 480 V	
Rated grid frequency	50 Hz / 60 Hz						
Rated grid output current	38.0 A / 36.1 A	45.6 A / 43.3 A	50.1 A / 47.6 A	54.7 A / 52.0 A	60.8 A / 57.7 A	48.1 A	60.1 A
Max. output current	41.8 A	50.2 A	55.1 A	60.2 A	66.9 A	53.0 A	66.2 A
Power factor	>0.99 (0.8 leading - 0.8 lagging)						
THDi	<3%						
Efficiency							
Max. efficiency	98.5%		98.6%	98.7%		98.8%	
EU efficiency	98.1%		98.2%	98.3%		98.4%	
Protection							
DC reverse-polarity protection	Yes						
Short circuit protection	Yes						
Output over current protection	Yes						
Surge protection	DC Type II / AC Type II						
Grid monitoring	Yes						
Anti-islanding protection	Yes						
Temperature protection	Yes						
Strings monitoring	Yes						
I/V Curve scanning	Yes						
Integrated AFCI (DC arc-fault circuit protection)	Yes (1)						
Integrated PID recovery	Optional						
Integrated DC switch	Optional						
General Data							
Dimensions (W*H*D)	647*629*252 mm						
Weight	38.2 kg			42.1 kg			
Topology	Transformerless						
Self-consumption (night)	<1 W						
Operating ambient temperature range	-25 ~ +60°C						
Relative humidity	0-100%						
Ingress protection	IP66						
Cooling concept	Intelligent redundant fan-cooling						
Max. operation altitude	4000 m						
Grid connection standard	G99, VDE-AR-N 4105 / VDE V 0124, EN 50549-1, VDE 0126 / UTE C 15 / VFR:2019, RD 1699 / RD 244 / UNE 206006 / UNE 206007-1, CEI 0-21, C10/11, NRS 097-2-1, EIFS 2018.2, IEC 62116, IEC 61727, IEC60068, IEC 61683, EN 50530						
Safety/EMC standard	IEC/EN 62109-1/-2, IEC/EN 61000-6-1/-2/-3/-4						
Features							
DC connection	MC4 connector						
AC connection	OT terminal						
Display	LCD						
Communication	RS485, Optional: Wi-Fi, GPRS						

(1) Activation required.

CERTIFICATE

TÜVRheinland®

of Conformity
Low Voltage Directive 2014/35/EU

Registration No.: AN 50519833 0001

Report No.: 50263108 010

Holder:

Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Product:

PV-Inverter
(Grid-connected PV Inverter)

Identification:

Type Designation: S5-GC25K S5-GC30K S5-GC33K S5-GC36K
S5-GC40K S5-GC40K-HV S5-GC50K-HV
S5-GC15K-LV S5-GC20K-LV S5-GC23K-LV
S5-GC25K-AU S5-GC30K-AU S5-GC33K-AU
S5-GC36K-AU S5-GC40K-AU S5-GC40K-HV-AU
S5-GC50K-HV-AU
Continued on page 0002

This certificate of conformity is based on an evaluation of a sample of the above mentioned product. Technical Report and documentation are at the Licence Holder's disposal. This is to certify that the tested sample is in conformity with Annex I of Council Directive 2014/35/EU, referred to as the Low Voltage Directive. This certificate does not imply assessment of the series-production of the product and does not permit the use of a TÜV Rheinland mark of conformity. The holder of the certificate is authorized to use this certificate in connection with the EC declaration of conformity according to Annex IV of the Directive.

TÜVRheinland®
Certification Body

Date 26.09.2021

A. Chen

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

CE **The CE marking may be used if all relevant and effective EC Directives are complied with.** CE

CERTIFICATE

TÜVRheinland®

of Conformity
Low Voltage Directive 2014/35/EU

Registration No.: AN 50519833 0002

Report No.: 50263108 010

Holder:
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Product:
PV-Inverter
(Grid-connected PV Inverter)

Identification:

Serial Number : Engineering Sample
Remark(s) : Issued in conjunction with TÜV Rheinland license R 50518312 0001-0006.

This certificate of conformity is based on an evaluation of a sample of the above mentioned product. Technical Report and documentation are at the Licence Holder's disposal. This is to certify that the tested sample is in conformity with Annex I of Council Directive 2014/35/EU, referred to as the Low Voltage Directive. This certificate does not imply assessment of the series-production of the product and does not permit the use of a TÜV Rheinland mark of conformity. The holder of the certificate is authorized to use this certificate in connection with the EC declaration of conformity according to Annex IV of the Directive.

TÜVRheinland®

Certification Body

Date 26.09.2021

A. Chen

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

CE The CE marking may be used if all relevant and effective EC Directives are complied with. CE

TÜV Rheinland (China) Ltd.
Member of TÜV Rheinland Group

TÜVRheinland®
Precisely Right.

Ginlong technologies Co., Ltd.
Zhang Kun

No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Date : 27.09.2021
Our ref. : Kese 01
Your ref.: Zhang kun

Ref : AN Certificate of Conf. Low Voltage D.

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : AN 50519833 0001
Report No. : 50263108 010

Dear Zhang Kun,

We herewith confirm that a sample of the above mentioned technical equipment has been tested and was found to be in accordance with the relevant requirements.

Enclosed please find your Certificate of Conformity.

We appreciate your kind support and would like to offer our assistance and continuous services in the future.

With kind regards,

Certification Body

A. Chen

Enclosure

C E R T I F I C A T E
of Conformity

TÜVRheinland®

Registration No.: AK 50522088 0001

Report No.: 50281041 007

Holder:
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Product:
PV-Inverter
(Grid-connected PV Inverter)

Identification:

```
Type Designation : Solis-aaK-5G (aa=25,30,33,36,40)
                   Solis-bbK-HV-5G (bb=40,50)
                   Solis-ccK-LV-5G (cc=15,20,23)
                   S5-GCxxK (xx=25,30,33,36,40)
                   S5-GCyyK-HV (yy=40,50)
                   S5-GCzzK-LV (zz=15,20,23)
Serial Number    : Engineering Samples
Firmware version : V31
Remark(s)        : Refer to report 50281041 007 for details.
```

Tested acc. to:
IEC 61727:2004
IEC 62116:2014

The certificate of conformity refers to the above mentioned product. This is to certify that the specimen is in conformity with the assessment requirement mentioned above. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity.

Certification Body

TÜV Rheinland LGA Products GmbH Zertifizierstelle TÜV Rheinland

Date 22.10.2021

Weichun Li

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

solis

GINLONG TECHNOLOGIES CO.,LTD.

S5-GC(50-60)K

Solis Three Phase Inverters

Efficient

- Max. efficiency 98.7%
- String current up to 16A
- 5/6 MPPT design, supports multiple orientation system design
- Night time PID recovery function, increases overall system yield (optional)

Safe

- IP66, C5 Anti-Corrosion Level
- Intelligent redundant fan-cooling
- Globally recognised branded componentry for longer life
- AFCI protection, proactively reduces fire risk

Smart

- Night SVG function
- Supports export power control
- Intelligent string monitoring, smart I-V curve scan
- Scan to register on SolisCloud, supports remote upgrade and control

Economic

- Supports GPRS/WiFi communication with less wiring and reduced installation costs
- DC side supports "Y" connector
- 10/12 string inputs allow for 150%+ DC oversizing

Models:

S5-GC50K / S5-GC60K

360° View

DATASHEET

S5-GC(50-60)K

Models	50K	60K
Input DC		
Max. input voltage	1100 V	
Rated voltage	600 V	
Start-up voltage	195 V	
MPPT voltage range	180-1000 V	
Max. input current	5*32 A	6*32 A
Max. short circuit current	5*40 A	6*40 A
MPPT number/Max. input strings number	5/10	6/12
Output AC		
Rated output power	50 kW	60 kW
Max. apparent output power	55 kVA	66 kVA
Max. output power	55 kW	66 kW
Rated grid voltage	3/N/PE, 220 V / 380 V, 230 V / 400 V	
Rated grid frequency	50 Hz / 60 Hz	
Rated grid output current	76.0 A / 72.2 A	91.2 A / 86.6 A
Max. output current	83.6 A	100.3 A
Power factor	>0.99 (0.8 leading - 0.8 lagging)	
THDi	<3%	
Efficiency		
Max. efficiency	98.7%	
EU efficiency	98.3%	
Protection		
DC reverse-polarity protection	Yes	
Short circuit protection	Yes	
Output over current protection	Yes	
Surge protection	DC Type II / AC Type II	
Grid monitoring	Yes	
Anti-islanding protection	Yes	
Temperature protection	Yes	
Strings monitoring	Yes	
I/V Curve scanning	Yes	
Integrated AFCI (DC arc-fault circuit protection)	Yes (1)	
Integrated PID recovery	Optional (2)	
Integrated DC switch	Optional	
General Data		
Dimensions (W*H*D)	691*578*338 mm	
Weight	54.5 kg	
Topology	Transformerless	
Self-consumption (night)	<1 W	
Operating ambient temperature range	-25 ~ +60°C	
Relative humidity	0-100%	
Ingress protection	IP66	
Cooling concept	Intelligent redundant fan-cooling	
Max. operation altitude	4000 m	
Grid connection standard	G99, VDE-AR-N 4105 / VDE V 0124, EN 50549-1, VDE 0126 / UTE C 15 / VFR:2019, RD 1699 / RD 244 / UNE 206006 / UNE 206007-1, CEI 0-21, C10/11, NRS 097-2-1, EIFS 2018.2, IEC 62116, IEC 61727, IEC60068, IEC 61683, EN 50530	
Safety/EMC standard	IEC 62109-1/-2, IEC62116 & IEC 61000-6-1/-2/-3/-4	
Features		
DC connection	MC4 connector	
AC connection	OT terminal (max. 70 mm^2)	
Display	LCD, Capacitive touch buttons	
Communication	RS485, USB, Optional: Wi-Fi, GPRS	

(1) Activation required. (2) Due to the similar functional logic, when the night time PID-Recovery function is integrated, the night time var compensation function can not be used. Also, the negative grounding option is not available for inverters with night time PID-Recovery function.

CERTIFICATE

TÜVRheinland®

of Conformity
Low Voltage Directive 2014/35/EU

Registration No.: AN 50519833 0001

Report No.: 50263108 010

Holder:

Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Product:

PV-Inverter
(Grid-connected PV Inverter)

Identification:

Type Designation: S5-GC25K S5-GC30K S5-GC33K S5-GC36K
S5-GC40K S5-GC40K-HV S5-GC50K-HV
S5-GC15K-LV S5-GC20K-LV S5-GC23K-LV
S5-GC25K-AU S5-GC30K-AU S5-GC33K-AU
S5-GC36K-AU S5-GC40K-AU S5-GC40K-HV-AU
S5-GC50K-HV-AU
Continued on page 0002

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TÜVRheinland®
Certification Body

Date 26.09.2021

A. Chen

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

CE **The CE marking may be used if all relevant and effective EC Directives are complied with.** CE

CERTIFICATE

TÜVRheinland®

of Conformity
Low Voltage Directive 2014/35/EU

Registration No.: AN 50519833 0002

Report No.: 50263108 010

Holder:
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Product:
PV-Inverter
(Grid-connected PV Inverter)

Identification:

Serial Number : Engineering Sample
Remark(s) : Issued in conjunction with TÜV Rheinland license R 50518312 0001-0006.

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TÜVRheinland®

Certification Body

Date 26.09.2021

A. Chen

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

CE The CE marking may be used if all relevant and effective EC Directives are complied with. CE

TÜV Rheinland (China) Ltd.
Member of TÜV Rheinland Group

TÜVRheinland®
Precisely Right.

Ginlong technologies Co., Ltd.
Zhang Kun

No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Date : 27.09.2021
Our ref. : Kese 01
Your ref.: Zhang kun

Ref : AN Certificate of Conf. Low Voltage D.

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : AN 50519833 0001
Report No. : 50263108 010

Dear Zhang Kun,

We herewith confirm that a sample of the above mentioned technical equipment has been tested and was found to be in accordance with the relevant requirements.

Enclosed please find your Certificate of Conformity.

We appreciate your kind support and would like to offer our assistance and continuous services in the future.

With kind regards,

Certification Body

A. Chen

Enclosure

C E R T I F I C A T E
of Conformity

TÜVRheinland®

Registration No.: AK 50522088 0001

Report No.: 50281041 007

Holder:
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Product:
PV-Inverter
(Grid-connected PV Inverter)

Identification:

```
Type Designation : Solis-aaK-5G (aa=25,30,33,36,40)
                   Solis-bbK-HV-5G (bb=40,50)
                   Solis-ccK-LV-5G (cc=15,20,23)
                   S5-GCxxK (xx=25,30,33,36,40)
                   S5-GCyyK-HV (yy=40,50)
                   S5-GCzzK-LV (zz=15,20,23)
Serial Number    : Engineering Samples
Firmware version : V31
Remark(s)        : Refer to report 50281041 007 for details.
```

Tested acc. to:
IEC 61727:2004
IEC 62116:2014

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Certification Body

TÜV Rheinland LGA Products GmbH Zertifizierstelle TÜV Rheinland

Date 22.10.2021

Weichun Li

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

GINLONG

No. 57 Jintong Road,
Binhai (Sea front) Industrial Park,
Xiangshan, Ningbo, Zhejiang, 315712, P.R.China
Tel: (+86) 574 6578 1806 Fax: (+86) 574 6578 1606
E-Mail: info@Ginlong.com

13th June 2021

To whom it may concern

letter of intent

Our company, Ginlong Technologies Co., Ltd, with headquarters in Zhejiang, China, are pioneers in PV inverters. Although Ginlong Technologies has become one of the world's most competitive manufacturers of PV inverters and maintains a strong investment in R&D and continual improvements in production methods, customer service remains a primary focus and a key to the company's success

Ginlong hereby confirm that Gunda Power Pvt Ltd, with its registered office in 123/10, Pannipitiya Road, Battaramulla, Sri Lanka, is one of our customers and we hereby authorize them to sale our products in Sri Lanka

Yours sincerely
Ginlong Technologies Co., Ltd

SOLIS INVERTER WARRANTY

Ginlong(Ningbo) Technologies Co., Ltd.

No. 57 Jintong Road, Binhai Industrial Park, Xiangshan, Ningbo, Zhejiang 315712, China
Tel: (+86) 574 6578 1806 Email: sales@ginlong.com

Solis Inverter are manufactured by Ginlong (Ningbo) Technologies Co., Ltd. (The Company) (refered to as Ginlong) provides the following Warranty to the purchaser (The Customer) of the Inverter (The Goods). (The Customer is deemed to be the owner of the installed Goods at first sale.

****

1. Warranty Terms

The Company warrants all Goods to be free from defects in material or workmanship under normal use and service for a period of 5 years from the date of sale to the Customer.

The Warranty covers the cost of repairs or replacement parts. The Goods must be returned to the Company for inspection.

The company may repair or replace faulty components at its discretion.

This warranty extends the Customer's statutory rights and cannot be construed so as to diminish such statutory rights.

2. Warranty Extension

The purchaser may apply for a warranty extension within 12 months of purchase by providing the serial number of the unit along with proof of purchase. An extended warranty can be purchased for a further 5 years (Total 10 years).

3. Warranty Limitations

The Warranty is valid only for Goods purchased either directly from the Company or from an authorized reseller of the company.

The Warranty is not transferable and applies to brand new Goods only.

Defective parts replaced under Warranty become the property of the Company.

The Warranty does not cover:

(a) Access or transport costs;

(b) Consequential damages including but not limited to loss of revenue;

(c) Claims by third parties other than the Customer;

(d) Defects of installation. (Except where the installation is performed by the Company);

(e) Goods damaged as a consequence of incorrect installation. (Except where the installation is performed by the Company);

(f) Items ancillary to installation not supplied by the Company;

(g) Duties, import/export fees or costs and other general administrative costs;

(h) Damage to Goods caused by misuse, improper handling or unauthorized modification;

(i) Loss or damage occurring whilst in transit;

(j) Accidental or willful damage;

(k) Any Goods described in a quotation or delivery note as 'ex-display' or 'reconditioned'. (A separate Warranty extension may have been issued to cover such Goods.)

Labour, travel and delivery (to and from customer) will be charged if goods returned found to be not faulty following a warranty claim.

Any part or component that shall have been subject to abuse, misuse, negligence, accident or natural disaster, including but not limited to lightning, hail storm, tornado, acts neither foreseen nor controlled and commonly defined as force majeure.

4. Warranty Claims Procedure

To make a warranty claim the following information needs to be provided:

- Completed RTM Inspection Form
- Product Model (ie. Solis 1.5kW) and Product Serial Number (ie. A1110011)
- Copy of the invoice for the inverter
- Copy of the installation report and installation certificate

The authorised reseller will liaise with the Company regarding repair or replacement. The cost of repair or replacement will be borne by the Company provided the Warranty has been validated and the Warranty period has not expired.

Where repairs must be effected at the Company's headquarters, the Company will endeavor to minimize the down time for the Goods.

Mini 4G

700W
-
3600W

Solis Mini 4G Series Inverter

- MINI series - Extended to 3600W
- High frequency switching technology - Smaller, smarter
- DRM integrated, fully comply with AS4777.2:2015
- Compact and lightweight
- 50V-500V input voltage range – ultra low startup
- Over 97.5% Max. effciency
- Precise MPPT algorithm
- Intergrated Export Power Manager(EPM)
- Rs485, WiFi/LAN/GPRS (optional) interface
- WiFi monitoring available-iphone and android app available
- 5 years standard warranty, 20 years optional upgrade

Model:

120V Solis-mini-1000-4G -LV

220V Solis-mini-700-4G Solis-mini-1000-4G Solis-mini-1500-4G
Solis-mini-2000-4G Solis-mini-2500-4G Solis-mini-3000-4G
Solis-mini-3600-4G

Features:

- EPM — Export power manager
- HF SWITCH — High switch frequency
- WiFi/GPRS — Real time monitoring
- 60V — Start-up Voltage
- Available on the iPhone App Store / Available on the Android App Store
- IP65

Datasheet

Model	Solis-mini-1000-4G-LV	Solis-mini-700-4G	Solis-mini-1000-4G	Solis-mini-1500-4G	Solis-mini-2000-4G	Solis-mini-2500-4G	Solis-mini-3000-4G	Solis-mini-3600-4G
Energy Source	PV							
Input Side(DC)								
Max. DC input power(kW)	1.2	0.9	1.2	1.8	2.3	3	3.5	4
Max. DC input voltage(V)	600							
Start-up voltage(V)	90	60			90			
MPPT voltage range(V)	50-500				80-500			
Max. input current per MPPT(A)	11A							19A
MPPT number/Max input strings number	1/1							1/2
Output Side (AC)								
Rated output power(kW)	1	0.7	1	1.5	2	2.5	3	3.6
Max. apparent output power(kVA)	1.1	0.8	1.1	1.7	2.2	2.8	3.3	3.6
Max. output power(kW)	1.1	0.8	1.1	1.7	2.2	2.8	3.3	3.6
Rated grid voltage(V_{LL})	101/120/127	220/230						
Rated grid frequency(Hz)	50/60							
Operation phase	Single							
Rated grid output current(A)	8.3	3.2/3.0	4.5/4.3	6.8/6.5	9.1/8.7	11.4/10.9	13.6/13	16
Max. output current(A)	9.2	4.4	5.2	8.1	10.5	13.3	15.7	16
Power Factor (at rated output power)	0.8 leading ... 0.8 lagging							
THDi	<3%							
DC injection current(mA)	<0.5%In							
Grid frequency range(Hz)	47-52 or 57-62							
Efficiency								
Max.efficiency	97.2%					97.5%		
EU efficiency	96.5%					96.8%		
MPPT efficiency	>99.5%							
Protection								
DC reverse-polarity protection	Yes							
Short circuit protection	Yes							
Output over current protection	Yes							
Output over voltage protection	Yes							
Insulation resistance monitoring	Yes							
Residual current detection	Yes							
Surge protection	Yes							
Islanding protection	Yes							
Temperature protection	Yes							
Integrated DC switch	Optional							
General Data								
Dimensions(mm)	310W*373H*160D							
Weight(kg)	8.5					8.8		
Topology	Transformerless							
Self consumption (night)	<1W(Night)							
Operating ambient temperature range	-25~60℃							
Ingress protection	IP65							
Noise emission{typical}	<20 dBA							
Cooling concept	Natural convection							
Max.operation altitude	4000m							
Designed lifetime	>20 years							
Grid connection standard	EN50438, G83/2, AS4777.2:2015, VDE0126-1-1, IEC61727, VDE N4105							
Relative humidity	0~100%							
Safety/EMC standard	IEC62109-1/-2, NB/T 32004,EN61000-6-1, EN61000-6-3							
Features								
DC connection	MC-4 mateable							
AC connection	IP67 rated plug							
Display	LCD,2×20 Z.							
Communication connections	4 pins RS485 connector							
Warranty	5 years standard (extend to 20 years)							

TÜV Rheinland (China) Ltd.
Member of TÜV Rheinland Group

TÜVRheinland®
Precisely Right.

Ningbo Ginlong technologies Co.,
Ltd.
Zhang Kun
-
No.57 Jintong Road, Binhai,
(seafront)
industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Date : 18.05.2017
Our ref. : DJW 01
Your ref.: 52109827

Ref : R TÜV-Mark Approval

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : R 50379026 0001
Report No. : 50081618 001

Dear Zhang Kun,

The above specified equipment has been tested and found to be in accordance with the relevant requirements.

Please find enclosed your certificate as specified above.

If cancellation of the certificate is submitted by 15 November in a given year, no fee will be charged for the following year.

The certificate is issued with the reservation that the license holder applies all information required in § 6 of the ProdSG related to name and address of the manufacturer or his authorized representative / importer, including their respective contact addresses on the product prior to marketing of the product in the European Economic Area.

With kind regards,

Certification Body

Weichun Li

Enclosure

TÜV Rheinland (China) Ltd.
莱茵检测认证服务（中国）有限公司
Unit 707, AVIC Bldg., No. 168, Central Road, East 3rd Ring Road, Chaoyang District, Beijing, 100022, P.R.China
北京市朝阳区东三环中路乙10号
艾维克大厦707室
邮编：100022
Tel: (8610)6566 9988
Fax: (8610)6566 9887
e-mail: info@bj.chn.tuv.com
Internet: http://www.chn.tuv.com

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*	Blatt *Sheet*
R 50379026	0001

Ihr Zeichen *Client Reference*	Unser Zeichen *Our Reference*	Ausstellungsdatum	*Date of Issue*
52109827	01-DJW-50081618 001	18.05.2017	*(dayimo/yr)*

Genehmigungsinhaber *License Holder*
Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront)
industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront)
industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Prüfzeichen *Test Mark*

TÜVRheinland ZERTIFIZIERT
Bauart geprüft Sicherheit Regelmäßige Produktions-Überwachung
www.tuv.com ID 141904745

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product ***(Product Identification)***

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

Type Designation	: Solis-mini-700-4G Solis-mini-1000-4G
Vmax PV [Vd.c.]	: 600
Isc PV [Ad.c.]	: 17.2
MPP Voltage Range[Vd.c.]	: 66-500/94-400
Max. Input Current[Ad.c.]	: 11
Overvoltage Category (OVC)	: II for PV
Rated Output Voltage[Va.c.]	: 230V
Rated Output Frequency[Hz]	: 50/60
Rated Output Power[kW]	: 700/1000
Max. Output Current[Aa.c.]	: 4.4/5.2
Power Factor	: [-0.80, 0.80]
Overvoltage Category (OVC)	: III for AC mains

continued on page 0002

ANLAGE (Appendix): 1

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich beachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel.: +49 221 806-1371 e-mail: cert-validity@de.tuv.com
Fax: +49 221 806-3935 http://www.tuv.com/safety

TÜV Rheinland LGA Products GmbH Zertifizierstelle TÜV Rheinland

Zertifizierungsstelle

Weichun Li

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*	Blatt *Sheet*
R 50379026	0002

Ihr Zeichen *Client Reference*	Unser Zeichen *Our Reference*	Ausstellungsdatum	*Date of Issue* (day/mo/yr)
52109827	01-DJW-50081618 001	18.05.2017	

Genehmigungsinhaber *License Holder*
Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront)
industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront)
industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Prüfzeichen *Test Mark*

TÜVRheinland ZERTIFIZIERT

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation) *Certified Product (Product Identification)*

Lizenzentgelte - Einheit *License Fee - Unit*

PV-Wechselrichter (Grid-connected PV Inverter)

Continuation
Type Designation : Solis-mini-1500-4G
Solis-mini-2000-4G

Vmax PV [Vd.c.]	: 600
Isc PV [Ad.c.]	: 17.2
MPP Voltage Range[Vd.c.]	: 161-400/187-400
Max. Input Current[Ad.c.]	: 11
Overvoltage Category (OVC)	: II for PV
Rated Output Voltage[Va.c.]	: 230V
Rated Output Frequency[Hz]	: 50/60
Rated Output Power[kW]	: 1500/2000
Max. Output Current[Aa.c.]	: 8.1/9.1
Power Factor	: [-0.80, 0.80]
Overvoltage Category (OVC)	: III for AC mains

continued on page 0003

ANLAGE (Appendix): 1

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

Zertifizierungsstelle

Weichun Li

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel.: +49 221 806-1371 e-mail: cert-validity@de.tuv.com
Fax: +49 221 806-3935 http://www.tuv.com/safety

Zertifikat *Certificate*

TÜVRheinland

Zertifikat Nr. *Certificate No.*	Blatt *Sheet*
R 50379026	0003

Ihr Zeichen *Client Reference*	Unser Zeichen *Our Reference*	Ausstellungsdatum	*Date of Issue*
52109827	01-DJW-50081618 001	18.05.2017	*(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront)
industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront)
industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Prüfzeichen *Test Mark*

TÜVRheinland ZERTIFIZIERT
Sicherheit geprüft
Regelmäßige Produktions-überwachung
www.tuv.com ID 1419047340

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

Continuation
Type Designation : Solis-mini-2500-4G
Solis-mini-3000-4G

Vmax PV [Vd.c.]	: 600
Isc PV [Ad.c.]	: 17.2
MPP Voltage Range[Vd.c.]	: 234-400/281-500
Max. Input Current[Ad.c.]	: 11
Overvoltage Category (OVC)	: II for PV
Rated Output Voltage[Va.c.]	: 230V
Rated Output Frequency[Hz]	: 50/60
Rated Output Power[kW]	: 2500/3000
Max. Output Current[Aa.c.]	: 11.4/13.6
Power Factor	: [-0.80, 0.80]
Overvoltage Category (OVC)	: III for AC mains

continued on page 0004

ANLAGE (Appendix): 1

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel.: +49 221 806-1371 e-mail: cert-validity@de.tuv.com
Fax: +49 221 806-3935 http://www.tuv.com/safety

TÜV Rheinland LGA Products GmbH Zertifizierungsstelle

Weichun Li

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*	Blatt *Sheet*
R 50379026	0004

Ihr Zeichen *Client Reference*	Unser Zeichen *Our Reference*	Ausstellungsdatum	*Date of Issue*
52109827	01-DJW-50081618 001	18.05.2017	*(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ningbo Ginlong technologies
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No.57 Jintong Road, Binhai,
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industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront)
industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Prüfzeichen *Test Mark*

TÜVRheinland® ZERTIFIZIERT

Bauart geprüft Sicherheit
Regelmäßige Produktions-Überwachung

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

Continuation
Type Designation : Solis-mini-3600-4G

Vmax PV [Vd.c.] : 600
Isc PV [Ad.c.] : 17.2
MPP Voltage Range[Vd.c.] : 337-500
Max. Input Current[Ad.c.] : 11
Overvoltage Category (OVC) : II for PV

Rated Output Voltage[Va.c.]: 230V
Rated Output Frequency[Hz] : 50/60
Rated Output Power[kW] : 3600
Max. Output Current[Aa.c.] : 16
Power Factor : [-0.80, 0.80]
Overvoltage Category (OVC) : III for AC mains

continued on page 0005

ANLAGE (Appendix): 1

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich beachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel.: +49 221 806-1371 e-mail: certi-validity@de.tuv.com
Fax: +49 221 806-3935 http://www.tuv.com/safety

TÜV Rheinland LGA Products GmbH Zertifizierstelle

Zertifizierungsstelle

Weichun Li

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*	Blatt *Sheet*
R 50379026	0005

Ihr Zeichen *Client Reference*	Unser Zeichen *Our Reference*	Ausstellungsdatum	*Date of Issue* *(day/mo/yr)*
52109827	01-DJW-50081618 001	18.05.2017	

Genehmigungsinhaber *License Holder*
Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront)
industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront)
industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Prüfzeichen *Test Mark*

TÜVRheinland ZERTIFIZIERT
Bauart geprüft
Sicherheit
Regelmäßige Produktions-Überwachung
www.tuv.com
ID 1419847545

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation) *Certified Product (Product Identification)*

Lizenzentgelte - Einheit *License Fee - Unit*

PV-Wechselrichter (Grid-connected PV Inverter)

as page 0004 15
Continuation

Protective Class	: I
Enclosure Protection (IP)	: IP65
Pollution degree (PD)	: PD 2(inside), PD3(outside)
Altitude [m]	: 4000
Operating Temperature [°C]	: -25 to 60 (> 45 derating)
Type of Inverter	: Non-isolated

Remark:
The installation has to be carried out according to the
Any additional requirements in countries where the product
is going to be marketed have to be considered additionally.

15

ANLAGE (Appendix): 1

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel.: +49 221 806-1371 e-mail: cert-validity@de.tuv.com
Fax: +49 221 806-3935 http://www.tuv.com/safety

Zertifizierungsstelle

Weichun Li

TÜV Rheinland (China) Ltd.
Member of TÜV Rheinland Group

TÜVRheinland®
Precisely Right.

Ningbo Ginlong technologies Co., Ltd.
Zhang Kun
-
No.57 Jintong Road, Binhai,
(seafront)
industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Date : 18.05.2017
Our ref. : DJW 01
Your ref.: 52109827

Ref : AN Certificate of Conf. Low Voltage D.

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : AN 50379081 0001
Report No. : 50081618 001

Dear Zhang Kun,

We herewith confirm that a sample of the above mentioned technical equipment has been tested and was found to be in accordance with the relevant requirements.

Enclosed please find your Certificate of Conformity.

We appreciate your kind support and would like to offer our assistance and continuous services in the future.

With kind regards,

Certification Body

Weichun Li

Enclosure

TÜV Rheinland (China) Ltd.
莱茵检测认证服务（中国）有限公司
Unit 707, AVIC Bldg., No. 10B, Central Road, East 3rd Ring Road, Chaoyang District, Beijing, 100022, P.R.China
北京市朝阳区东三环中路乙10号
中航元大厦707室
邮编：100022
Tel: (0010)6566 9566
Fax: (0010)6566 9567
e-mail: info@bj.chn.tuv.com
Internet: http://www.chn.tuv.com

CERTIFICATE

TÜVRheinland

of Conformity
Low Voltage Directive 2014/35/EU

Registration No.: AN 50379081 0001

Report No.: 50081618 001

Holder:
Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront) industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Product:
PV-Inverter
(Grid-connected PV Inverter)

Identification:

Type Designation	:	Solis-mini-700-4G Solis-mini-1000-4G Solis-mini-1500-4G Solis-mini-2000-4G Solis-mini-2500-4G Solis-mini-3000-4G Solis-mini-3600-4G
Serial Number	:	A000534491-001
Remark	:	Issued in conjunction with TÜV Rheinland license R 50379026 0001-0005.

This certificate of conformity is based on an evaluation of a sample of the above mentioned product. Technical Report and documentation are at the Licence Holder's disposal. This is to certify that the tested sample is in conformity with Annex I of Council Directive 2014/35/EU, referred to as the Low Voltage Directive. This certificate does not imply assessment of the series-production of the product and does not permit the use of a TÜV Rheinland mark of conformity. The holder of the certificate is authorized to use this certificate in connection with the EC declaration of conformity according to Annex IV of the Directive.

Certification Body

Date 18.05.2017

Weichun Li

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

CE The CE marking may be used if all relevant and effective EC Directives are complied with. CE

C E R T I F I C A T E

of Conformity

TÜVRheinland®

Registration No.: AK 50403825 0001

Report No.: 50132560 001

Holder:
Ningbo Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai, (seafront), Industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P. R. China

Product:
PV-Inverter
(Grid-Connected PV Inverter)

Identification:

Type Designation	:	Solis-mini-3000-4G Solis-mini-2500-4G Solis-mini-2500-4G Solis-mini-2000-4G Solis-mini-1000-4G
Serial Number	:	Engineering Samples
Firmware version	:	V13
Remark(s)	:	Refer to report 50132560 001 for details.

Tested acc. to:
IEC 61727:2004
IEC 62116:2014

The certificate of conformity refers to the above mentioned product. This is to certify that the specimen is in conformity with the assessment requirement mentioned above. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity.

Certification Body

TÜV Rheinland LGA Products GmbH Zertifizierstelle

Date 29.03.2018

Weichun Li

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

1P 4G

2.5kW
-
6kW

Solis 1P 4G Single Phase Inverter

- Solis 1P 4G Single Phase Range
- High frequency switching technology - Smaller, smarter
- Dual MPPT design with precise MPPT algorithm
- Intergrated Export Power Manager(EPM)
- Over 98.1% Max.efficiency
- RS485, WiFi/LAN/GPRS (optional) interface
- WiFi monitoring available-iphone and android app available
- 5 years standard warranty, 20 years optional upgrade

Model:

Solis-1P2.5K-4G
Solis-1P3K-4G
Solis-1P3.6K-4G
Solis-1P4K-4G
Solis-1P4.6K-4G
Solis-1P5K-4G
Solis-1P6K-4G

Features:

- EPM — Export power manager
- HF SWITCH — High switch frequency
- AFCI — Optional
- IP65
- WiFi/GPRS — Real time monitoring
- Available on the iPhone App Store
- Available on the Android App Store

Datasheet

Model	Solis-1P2.5K-4G	Solis-1P3K-4G	Solis-1P3.6K-4G	Solis-1P4K-4G	Solis-1P4.6K-4G	Solis-1P5K-4G	Solis-1P6K-4G
Energy Source	PV						
Input Side(DC)							
Max. DC input power(kW)	3	3.5	4.2	4.6	5.3	5.8	6.6
Max. DC input voltage(V)	550	600					
Start-up voltage(V)	60	120					
MPPT voltage range(V)	50-450	90-520					
Max. input current per MPPT(A/B)	11A+11A						
MPPT number/Max input strings number	2/2						
Output Side (AC)							
Rated output power(kW)	2.5	3	3.6	4	4.6	5	6
Max. apparent output power(kVA)	2.8	3.3	4	4.4	5	5	6
Max. output power(kW)	2.8	3.3	4	4.4	5	5	6
Rated grid voltage(V_{LL})	220/230						
Rated grid frequency(Hz)	50/60						
Operation phase	Single						
Rated grid output current(A)	11.4/10.9	13.6/13	16/15.7	18.2/17.4	20.9/20	22.7/21.7	27.3
Max. output current(A)	13.3	15.7	16	21	23.8	25	27.3
Power Factor (at rated output power)	0.8 leading ... 0.8 lagging						
THDi	<3%						
DC injection current(mA)	<0.5%In						
Grid frequency range(Hz)	47-52 or 57-62						
Efficiency							
Max.efficiency	97.8%			98.1%			
EU efficiency	97.1%			97.3%			
MPPT efficiency	>99.5%						
Protection							
DC reverse-polarity protection	Yes						
Short circuit protection	Yes						
Output over current protection	Yes						
Output over voltage protection	Yes						
Insulation resistance monitoring	Yes						
Residual current detection	Yes						
Surge protection	Yes						
Islanding protection	Yes						
Temperature protection	Yes						
Integrated DC switch	Optional						
General Data							
Dimensions(mm)	310W*543H*160D						
Weight(kg)	11.5						
Topology	Transformerless						
Self consumption (night)	<1W(Night)						
Operating ambient temperature range	-25~60℃						
Ingress protection	IP65						
Noise emission{typical}	<30 dBA						
Cooling concept	Natural convection						
Max.operation altitude	4000m						
Designed lifetime	>20 years						
Grid connection standard	EN50438, G83/2, G59/3, AS4777.2:2015, VDE0126-1-1, IEC61727, VDE N4105						
Relative humidity	0~100%						
Safety/EMC standard	IEC62109-1/-2, NB/T 32004,EN61000-6-1, EN61000-6-3						
Features							
DC connection	MC-4 mateable						
AC connection	IP67 rated plug						
Display	LCD,2×20 Z.						
Communication connections	4 pins RS485 connector						
Warranty	5 years standard (extend to 20 years)						

C E R T I F I C A T E

of Conformity

TÜVRheinland®

Registration No.: AK 50403828 0001

Report No.: 50132563 001

Holder:
Ningbo Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai, (seafront), Industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P. R. China

Product:
PV-Inverter
(Grid-Connected PV Inverter)

Identification:

Type Designation : Solis-1P5K-4G Solis-1P4K-4G
Serial Number : Engineering Samples
Firmware version : V13
Remark(s) : Refer to report 50132563 001 for details.

Tested acc. to:

IEC 61727:2004
IEC 62116:2014

The certificate of conformity refers to the above mentioned product. This is to certify that the specimen is in conformity with the assessment requirement mentioned above. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity.

TÜV Rheinland LGA Products GmbH Certification Body Zertifizierungsstelle

Date 29.03.2018

Weichun Li

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Product Service

CERTIFICATE

No. B 17 04 86470 019

Holder of Certificate: **Ningbo Ginlong Technologies Co., Ltd.**
No.57 Jintong Road
Binhai Industrial Park, Xiangshan
315712 Ningbo, Zhejiang
PEOPLE'S REPUBLIC OF CHINA

Certification Mark:

Product: **Converter**
Grid-Tied Inverter

The product was tested on a voluntary basis and complies with the essential requirements. The certification mark shown above can be affixed on the product. It is not permitted to alter the certification mark in any way. In addition the certification holder must not transfer the certificate to third parties. See also notes overleaf.

Test report no.: 704091623704-00

Valid until: 2022-03-31

Date, 2017-04-06
(Zhengdong Ma)

TÜV®

A1 / 04.11

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Product Service

CERTIFICATE
No. B 17 04 86470 019

Model(s):

Solis-1P5K-4G, Solis-1P4.6K-4G, Solis-1P4K-4G, Solis-1P3.6K-4G, Solis-1P3K-4G, Solis-1P2.5K-4G, Solis-1P2K-4G, Solis-1P1.5K-4G, Solis-1P1K-4G, URE-1P5K-4G, URE-1P4.6K-4G, URE-1P4K-4G, URE-1P3.6K-4G, URE-1P3K-4G, URE-1P2.5K-4G, URE-1P2K-4G, URE-1P1.5K-4G, URE-1P1K-4G, GCI-1P5K-4G, GCI-1P4.6K-4G, GCI-1P4K-4G, GCI-1P3.6K-4G, GCI-1P3K-4G, GCI-1P2.5K-4G, GCI-1P2K-4G, GCI-1P1.5K-4G, GCI-1P1K-4G, Mate-5K-4G, Mate-4.6K-4G, Mate-4K-4G, Mate-3.6K-4G, Mate-3K-4G, Mate-2.5K-4G, Mate-2K-4G, Mate-1.5K-4G, Mate-1K-4G, Solis-1P3K-4G-ST, URE-1P3K-4G-ST, GCI-1P3K-4G-ST, Mate-3K-4G-ST.

Parameters:

Max. input voltage:	see attachment
MPP voltage range:	See attachment
Max. input current:	See attachment
Isc PV (absolute maximum):	See attachment
Rated grid voltage:	a.c. 230/240V
Rated grid frequency:	50/60Hz
Max. AC output active power:	See attachment
Max. AC output apparent power:	See attachement
Max. continuous output current:	See attachment
Adjustable cos(ø):	0.8...1...0.8
Protection class:	I
Degree of protection:	IP65
Overvoltage category:	III(MAINS), II(PV)
Ambient temperature:	-25 ... +60°C

Other ratings refer to attachment.

Tested according to:

IEC 62109-1(ed.1)
IEC 62109-2(ed.1)
EN 62109-1:2010
EN 62109-2:2011

Production Facility(ies):

86470

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CERTIFICATE
No. B 17 04 86470 019

Product Service

Electrical ratings for various models:

Models	Solis-1P1K-4G GCI-1P1K-4G Mate-1K-4G URE-1P1K-4G	Solis-1P1.5K-4G GCI-1P1.5K-4G Mate-1.5K-4G URE-1P1.5K-4G	Solis-1P2K-4G GCI-1P2K-4G Mate-2K-4G URE-1P2K-4G	Solis-1P2.5K-4G GCI-1P2.5K-4G Mate-2.5K-4G URE-1P2.5K-4G
PV input ratigns:				
Max. input voltage:	d.c. 550 V			
MPP voltage range:	d.c. 50 – 450V			
Max. input current:	d.c. 11A			
Isc PV (absolute maximum):	d.c. 17.2A			
AC output:				
Rated grid voltage:	a.c. 230/240V			
Rated grid frequency:	50/60Hz			
Max. AC output active power:	1100W	1700W	2200W	2800W
Max. AC output apparent power:	1100VA	1700VA	2200VA	2800VA
Max. Continuous output current:	a.c. 5.2A	a.c. 8.1A	a.c. 10.5A	a.c. 13.3A

Models	Solis-1P3K-4G GCI-1P3K-4G Mate-3K-4G URE-1P3K-4G	Solis-1P3.6K-4G GCI-1P3.6K-4G Mate-3.6K-4G URE-1P3.6K-4G	Solis-1P4K-4G GCI-1P4K-4G Mate-4K-4G URE-1P4K-4G	Solis-1P4.6K-4G GCI-1P4.6K-4G Mate-4.6K-4G URE-1P4.6K-4G	Solis-1P5K-4G GCI-1P5K-4G Mate-5K-4G URE-1P5K-4G
PV input ratigns:					
Max. input voltage:	d.c. 600 V				
MPP voltage range:	d.c. 100 – 500V				
Max. input current:	d.c. 2x11A				
Isc PV (absolute maximum):	d.c. 2x17.2A				
AC output:					
Rated grid voltage:	a.c. 230/240V				
Rated grid frequency:	50/60Hz				
Max. AC output active power:	3300W	4000W	4400W	4600W	5000W
Max. AC output apparent power:	3300VA	4000VA	4400VA	4600VA	5000VA
Max. Continuous output current:	a.c. 15.7A	a.c. 16A	a.c. 21A	a.c. 25A	a.c. 25A

Models	Solis-1P3K-4G-ST, GCI-1P3K-4G-ST, Mate-3K-4G-ST, URE-1P3K-4G-ST
PV input ratigns:	
Max. input voltage:	d.c. 600 V
MPP voltage range:	d.c. 100 – 500V
Max. input current:	d.c. 11A
Isc PV (absolute maximum):	d.c. 17.2A
AC output:	
Rated grid voltage:	a.c. 230/240V
Rated grid frequency:	50/60Hz
Max. AC output active power:	3300W
Max. AC output apparent power:	3300VA
Max. Continuous output current:	a.c. 15.7A

C E R T I F I C A T E
of Conformity

TÜVRheinland®

Registration No.: AK 50419820 0001

Report No.: 50181860 001

Holder:
Ningbo Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai, (seafront), Industrial Park,
Xiangshan Ningbo, Zhejiang 315712
P. R. China

Product:
PV-Inverter
(Grid-connected PV Inverter)

Identification:

Type Designation:	Solis-1P6K-4G Solis-1P5K-4G
	Solis-1P4.6K-4G Solis-1P4K-4G
	Solis-1P3.6K-4G Solis-1P3K-4G
	Solis-1P2.5K-4G
Firmware Version:	1F0010
Remark(s)	: Refer to report 50181860 001 for details.

Tested acc. to:
UTE C15-712-1/07.13
DIN VDE 0126-1-1/A1 VFR2014
Enedis-NOI-RES_13E

The certificate of conformity refers to the above mentioned product. This is to certify that the specimen is in conformity with the assessment requirement mentioned above. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity.

Certification Body

Date 10.10.2018

Weichun Li

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

TÜVRheinland®

Certificat de conformité

Fabricant :	**Ningbo Ginlong technologies Co., Ltd.** **No.57 Jintong Road, Binhai, (seafront) Industrial Park, Xiangshan, Ningbo, zhejiang, 315712, P.R. China**
Type unité de production :	**onduleur photovoltaïque lié au réseau**
Modèle:	**Solis-1P2.5K-4G, Solis-1P3K-4G, Solis-1P3.6K-4G, Solis-1P4K-4G, Solis-1P4.6K-4G, Solis-1P5K-4G, Solis-1P6K-4G**
Version micrologiciel :	**1F0010**
Règles de raccordement au réseau :	**UTE C 15-712-1/07.13** UNION TECHNIQUE DE L'ELECTRICITE, GUIDE PRATIQUE, Installations photovoltaïques raccordées au réseau public de distribution **ENEDIS-NOI-RES_13E : 2016** Protections of production facilities connected to the public distribution network **DIN VDE 0126-1-1/A1 VFR 2014** Organe de commutation automatique entre une installation de production autonome parallèle au réseau et le réseau à basse tension public
Numéro rapport d'essai :	**50181860 001**
Numéro de certificat :	**AK 50419820 0001**
Date d'émission :	**Otcober 10, 2018**

Li Weichun
General Manager

TÜV Rheinland LGA Products GmbH – Tillystraße 2 – 90431 Nürnberg

Product Service

Compliance Document

No. D 086470 0039 Rev. 00

Holder of Certificate: **Ningbo Ginlong Technologies Co., Ltd.**
No.57 Jintong Road
Binhai Industrial Park, Xiangshan
315712 Ningbo, Zhejiang
PEOPLE'S REPUBLIC OF CHINA

Product: **Converter**
Grid-Tied Inverter

This Compliance document confirms the compliance with the listed standards on a voluntary basis. It refers only to the sample submitted for testing and certification and does not certify the quality or safety of the serial products. See also notes overleaf.

Test report no.: 704091805709-00

Date, 2018-10-25 (Zhengdong Ma)

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Product Service

Compliance Document

No. D 086470 0039 Rev. 00

Model(s): Solis-1P2.5K-4G, Solis-1P3K-4G, Solis-1P3.6K-4G, Solis-1P4K-4G, Solis-1P4.6K-4G, Solis-1P5K-4G, Solis-1P6K-4G

Parameters:

Models	Solis-1P2.5K-4G	Solis-1P3K-4G	Solis-1P3.6K-4G	Solis-1P4K-4G
PV input ratigns:				
Max. input voltage:	d.c. 550 V	d.c. 600 V	d.c. 600 V	d.c. 600 V
MPP voltage range:	d.c. 50 – 450V	d.c. 90 – 520V	d.c. 90 – 520V	d.c. 90 – 520V
Max. input current:	d.c. 2x11A	d.c. 2x11A	d.c. 2x11A	d.c. 2x11A
Isc PV (absolute maximum):	d.c. 2x17.2A	d.c. 2x17.2A	d.c. 2x17.2A	d.c. 2x17.2A
AC output:				
Rated grid voltage:	a.c. 230/240V			
Rated grid frequency:	50/60Hz			
Rated output power:	2500W	3000W	3600W	4000W
Max. AC output active power:	2800W	3300W	4000W	4400W
Max. AC output apparent power:	2800VA	3300VA	4000VA	4400VA
Max. Continuous output current:	a.c. 13.3A	a.c. 15.7A	a.c. 16A	a.c. 21A
Adjustable cos(φ)	-0.8...1...+0.8			

Models	Solis-1P4.6K-4G	Solis-1P5K-4G	Solis-1P6K-4G
PV input ratigns:			
Max. input voltage:	d.c. 600 V		
MPP voltage range:	d.c. 90 – 520V		
Max. input current:	d.c. 2x11A		
Isc PV (absolute maximum):	d.c. 2x17.2A		
AC output:			
Rated grid voltage:	a.c. 230/240V		
Rated grid frequency:	50/60Hz		
Rated output power:	4600W	5000W	6000W
Max. AC output active power:	5000W	5000W	6000W
Max. AC output apparent power:	5000VA	5000VA	6000VA
Max. Continuous output current:	a.c. 23.8A	a.c. 25A	a.c. 27.3A
Adjustable cos(φ)	-0.8...1...+0.8		

General specifications:	
Protection class:	I
Degree of protection	IP65
Overvoltage category	II(PV), III(MAINS)
Ambient temperature	-25 ... +60°C

Tested according to: DIN VDE 0126-1-1 (VDE V 0126-1-1):2013

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TÜV®

S6-GR1P(2.5-6)K

Solis Single Phase Inverters

360 degree

Features:

- Max. efficiency 97.7%
- String current up to **14A**
- Super high frequency switching technology
- Wide voltage range and low startup voltage
- 2 MPPT design with precise MPPT algorithm
- Intergrated Export Power Manager (EPM)
- Integrated AFCI (DC arc-fault circuit protection)
- Compact and lightweight
- Friendly and adaptable connection to the grid

Model:

S6-GR1P2.5K S6-GR1P3K S6-GR1P3.6K
S6-GR1P4K S6-GR1P4.6K S6-GR1P5K
S6-GR1P6K

Datasheet

Model Name	S6-GR1P2.5K	S6-GR1P3K	S6-GR1P3.6K	S6-GR1P4K	S6-GR1P4.6K	S6-GR1P5K	S6-GR1P6K
Input DC							
Recommended max. PV power	3.75 kW	4.5 kW	5.4 kW	6 kW	6.9 kW	7.5 kW	9 kW
Max. input voltage	550 V	600 V					
Rated voltage	250 V	330 V					
Start-up voltage	60 V	120 V					
MPPT voltage range	50-450 V	90-520 V					
Max. input current	14 A / 14 A						
Max. short circuit current	22 A / 22 A						
MPPT number/Max. input strings number	2/2						
Output AC							
Rated output power	2.5 kW	3 kW	3.6 kW	4 kW	4.6 kW	5 kW	6 kW
Max. apparent output power	2.8 kVA	3.3 kVA	4 kVA	4.4 kVA	5 kVA	5 kVA	6 kVA
Max. output power	2.8 kW	3.3 kW	4 kW	4.4 kW	5 kW	5 kW	6 kW
Rated grid voltage	1/N/PE, 220 V / 230 V						
Rated grid frequency	50 Hz / 60 Hz						
Rated grid output current	11.4 A / 10.9 A	13.6 A / 13.0 A	16.0 A / 15.7 A	18.2 A / 17.4 A	20.9 A / 20.0 A	22.7 A / 21.7 A	27.3 A
Max. output current	13.3 A	15.7 A	16.0 A	21.0 A	23.8 A	25.0 A	27.3 A
Power Factor	>0.99 (0.8 leading - 0.8 lagging)						
THDi	<3%						
Efficiency							
Max. efficiency	97.3%	97.3%		97.6%		97.7%	
EU efficiency	96.5%	96.6%		97.1%		97.1%	
Protection							
DC reverse-polarity protection	Yes						
Short circuit protection	Yes						
Output over current protection	Yes						
Surge protection	Yes						
Grid monitoring	Yes						
Anti-islanding protection	Yes						
Temperature protection	Yes						
Integrated AFCI (DC arc-fault circuit protection)	Yes (1)						
Integrated DC switch	Optional						
General Data							
Dimensions (W*H*D)	310*543*160 mm						
Weight	11 kg	11.2 kg		12 kg			
Topology	Transformerless						
Self consumption (night)	<1 W						
Operating ambient temperature range	-25 ~ +60°C						
Relative humidity	0-100%						
Ingress protection	IP66						
Cooling concept	Natural convection						
Max. operation altitude	4000 m						
Grid connection standard	G98 or G99, VDE-AR-N 4105 / VDE V 0124, EN 50549-1, VDE 0126 / UTE C 15 / VFR:2019, RD 1699 / RD 244 / UNE 206006 / UNE 206007-1, CEI 0-21, C10/11, NRS 097-2-1, TOR, EIFS 2018.2, IEC 62116, IEC 61727, IEC 60068, IEC 61683, EN 50530, MEA, PEA						
Safety/EMC standard	IEC/EN 62109-1/-2, IEC/EN 61000-6-2/-3						
Features							
DC connection	MC4 connector						
AC connection	Quick connection plug						
Display	LCD						
Communication	RS485, Optional: Wi-Fi, GPRS						

(1) Activation required.

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Product Service

Attestation of Conformity

No. N8A 086470 0020 Rev. 05

Holder of Certificate: **Ginlong Technologies Co., Ltd.**
No.57 Jintong Road
Binhai Industrial Park, Xiangshan
315712 Ningbo, Zhejiang
PEOPLE'S REPUBLIC OF CHINA

Product: **Converter**
PV Grid-Tied Inverter

This Attestation of Conformity is issued on a voluntary basis according to the Low Voltage Directive 2014/35/EU relating to electrical equipment designed for use within certain voltage limits. It confirms that the listed equipment complies with the principal protection requirements of the directive and is based on the technical specifications applicable at the time of issuance. It refers only to the particular sample submitted for testing and certification. For details see: www.tuvsud.com/ps-cert

Test report no.: 704091623704-05

Date, 2021-08-17

(Zhengdong Ma)

After preparation of the necessary technical documentation as well as the EU declaration of conformity the required CE marking can be affixed on the product. The declaration of conformity is issued under the sole responsibility of the manufacturer. Other relevant EU-directives have to be observed.

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Product Service

Attestation of Conformity

No. N8A 086470 0020 Rev. 05

Model(s):

Solis-1P2.5K-4G, Solis-1P3K-4G, Solis-1P3.6K-4G, Solis-1P4K-4G, Solis-1P4.6K-4G, Solis-1P5K-4G-MX, Solis-1P5K-4G, Solis-1P6K-4G, Solis-1P2.5K-4G-C, Solis-1P3K-4G-C, Solis-1P3.6K-4G-C, Solis-1P4K-4G-C, Solis-1P4.6K-4G-C, Solis-1P5K-4G-MX-C, Solis-1P5K-4G-C,
Solis-1P6K-4G-C, S5-GR1P2.5K, S5-GR1P3K, S5-GR1P3.6K, S5-GR1P4K, S5-GR1P4.6K, S5-GR1P5K, S5-GR1P6K.
S6-GR1P2.5K, S6-GR1P3K, S6-GR1P3.6K, S6-GR1P4K, S6-GR1P4.6K, S6-GR1P5K, S6-GR1P6K.S6-GR1P2.5K-R, S6-GR1P3K-R, S6-GR1P3.6K-R, S6-GR1P4K-R, S6-GR1P4.6K-R, S6-GR1P5K-R, S6-GR1P6K-R.

Parameters:

Models	Solis-1P2.5K-4G Solis-1P2.5K-4G-C	Solis-1P3K-4G Solis-1P3K-4G-C	Solis-1P3.6K-4G Solis-1P3.6K-4G-C	Solis-1P4K-4G Solis-1P4K-4G-C
PV input ratings:				
Max. input voltage:	550Vd.c.	600Vd.c.	600Vd.c.	600Vd.c.
MPP voltage range:	50-450Vd.c.	90-520Vd.c.	90-520Vd.c.	90-520Vd.c.
Max. input current:	2 x 11Ad.c.	2 x 11Ad.c.	2 x 11Ad.c.	2 x 11Ad.c.
Isc PV (absolute maximum):	2 x 17.2Ad.c.	2 x 17.2Ad.c.	2 x 17.2Ad.c.	2 x 17.2Ad.c.
AC output ratings:				
Rated grid voltage:	1/N/PE 220/230Va.c.	1/N/PE 220/230Va.c.	1/N/PE 220/230Va.c.	1/N/PE 220/230Va.c.
Rated grid frequency:	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Rated output power:	2500W	3000W	3600W	4000W
Max. AC output active power:	2800W	3300W	4000W	4400W
Max. AC output apparent power:	2800VA	3300VA	4000VA	4400VA
Max. continuous output current:	13.3Aa.c.	15.7Aa.c.	16Aa.c.	21Aa.c.

After preparation of the necessary technical documentation as well as the EU declaration of conformity the required CE marking can be affixed on the product. The declaration of conformity is issued under the sole responsibility of the manufacturer. Other relevant EU-directives have to be observed.

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Product Service

Attestation of Conformity

No. N8A 086470 0020 Rev. 05

After preparation of the necessary technical documentation as well as the EU declaration of conformity the required CE marking can be affixed on the product. The declaration of conformity is issued under the sole responsibility of the manufacturer. Other relevant EU-directives have to be observed.

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Product Service

Attestation of Conformity

No. N8A 086470 0020 Rev. 05

Models	Solis-1P4.6K-4G Solis-1P4.6K-4G-C	Solis-1P5K-4G Solis-1P5K-4G-C	Solis-1P5K-4G-MX Solis-1P5K-4G-MX-C	Solis-1P6K-4G Solis-1P6K-4G-C
PV input ratings:				
Max. input voltage:	600Vd.c.	600Vd.c.	600Vd.c.	600Vd.c.
MPP voltage range:	90-520Vd.c.	90-520Vd.c.	90-520Vd.c.	90-520Vd.c.
Max. input current:	2 x 11Ad.c.	2 x 11Ad.c.	2 x 11Ad.c.	2 x 11Ad.c.
Isc PV (absolute maximum):	2 x 17.2Ad.c.	2 x 17.2Ad.c.	2 x 17.2Ad.c.	2 x 17.2Ad.c.
AC output ratings:				
Rated grid voltage:	1/N/PE 220/230Va.c.	1/N/PE 220/230Va.c.	1/N/PE 220/230Va.c.	1/N/PE 220/230Va.c.
Rated grid frequency:	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Rated output power:	4600W	5000W	4999W	6000W
Max. AC output active power:	5000W	5000W	4999W	6000W
Max. AC output apparent power:	5000VA	5000VA	4999VA	6000VA
Max. continuous output current:	23.8Aa.c	25Aa.c	21.7Aa.c.	27.3Aa.c.

After preparation of the necessary technical documentation as well as the EU declaration of conformity the required CE marking can be affixed on the product. The declaration of conformity is issued under the sole responsibility of the manufacturer. Other relevant EU-directives have to be observed.

Product Service

Attestation of Conformity

No. N8A 086470 0020 Rev. 05

Models	S5-GR1P2.5K S6-GR1P2.5K S6-GR1P2.5K-R	S5-GR1P3K S6-GR1P3K S6-GR1P3K-R	S5-GR1P3.6K S6-GR1P3.6K S6-GR1P3.6K-R	S6-GR1P4K S6-GR1P4K S6-GR1P4K-R
PV input ratings:				
Max. input voltage:	550Vd.c.	600Vd.c.	600Vd.c.	600Vd.c.
MPP voltage range:	50-450Vd.c.	90-520Vd.c.	90-520Vd.c.	90-520Vd.c.
Max. input current:	2 x 14Ad.c.	2 x 14Ad.c.	2 x 14Ad.c.	2 x 14Ad.c.
Isc PV (absolute maximum):	2 x 22Ad.c.	2 x 22Ad.c.	2 x 22Ad.c.	2 x 22Ad.c.
AC output ratings:				
Rated grid voltage:	1/N/PE 220/230Va.c.	1/N/PE 220/230Va.c.	1/N/PE 220/230Va.c.	1/N/PE 220/230Va.c.
Rated grid frequency:	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Rated output power:	2500W	3000W	3600W	4000W
Max. AC output active power:	2800W	3300W	4000W	4400W
Max. AC output apparent power:	2800VA	3300VA	4000VA	4400VA
Max. continuous output current:	13.3Aa.c.	15.7Aa.c.	16Aa.c.	21Aa.c.

After preparation of the necessary technical documentation as well as the EU declaration of conformity the required CE marking can be affixed on the product. The declaration of conformity is issued under the sole responsibility of the manufacturer. Other relevant EU-directives have to be observed.

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Product Service

Attestation of Conformity

No. N8A 086470 0020 Rev. 05

Models	S5-GR1P4.6K S6-GR1P4.6K S6-GR1P4.6K-R	S5-GR1P5K S6-GR1P5K S6-GR1P5K-R	S5-GR1P6K S6-GR1P6K S6-GR1P6K-R
Max. input voltage:	600Vd.c.	600Vd.c.	600Vd.c.
MPP voltage range:	90-520Vd.c.	90-520Vd.c.	90-520Vd.c.
Max. input current:	2 x 14Ad.c.	2 x 14Ad.c.	2 x 14Ad.c.
Isc PV (absolute maximum):	2 x 22Ad.c.	2 x 22Ad.c.	2 x 22Ad.c.
Rated grid voltage:	1/N/PE 220/230Va.c.	1/N/PE 220/230Va.c.	1/N/PE 220/230Va.c.
Rated grid frequency:	50/60Hz	50/60Hz	50/60Hz
Rated output power:	4600W	5000W	6000W
Max. AC output active power:	5000W	5000W	6000W
Max. AC output apparent power:	5000VA	5000VA	6000VA
Max. continuous output current:	23.8Aa.c.	25Aa.c.	27.3Aa.c.

General specifications:		
Models	S6 series moldes	all other models
Adjustable cos(φ)	-0.8…1…+0.8	
Protection class	I	
Degree of protection	IP66	IP65
Overvoltage category	II(PV), III(MAINS)	
Ambient temperature	-25°C … +60°C	
Inverter topology	Non-isolated	

Tested according to:

EN 62109-1:2010
EN 62109-2:2011

After preparation of the necessary technical documentation as well as the EU declaration of conformity the required CE marking can be affixed on the product. The declaration of conformity is issued under the sole responsibility of the manufacturer. Other relevant EU-directives have to be observed.

TÜV SÜD Product Service GmbH • Certification Body • Ridlerstraße 65 • 80339 Munich • Germany

C E R T I F I C A T E

of Conformity

TÜVRheinland®

Registration No.: AK 50514285 0001

Report No.: CN20G2DH 002

Holder:

Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Product:

PV-Inverter
(Grid-Connected PV Inverter)

Identification:

Type Designation: S6-GR1PxxK (xx=2.5,3,3.6,4,4.6,5,6)
Solis-1Pxxk-4G (xx=2.5,3,3.6,4,4.6,5,6)
Firmware Version: V2F
Serial Number : Engineering Samples
Remark : Refer to test report CN20G2DH 002 for detail.

Tested acc. to:

IEC 61727:2004
IEC 62116:2014

The certificate of conformity refers to the above mentioned product. This is to certify that the specimen is in conformity with the assessment requirement mentioned above. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity.

Certification Body

TÜV Rheinland LGA Products GmbH Zertifizierstelle TÜV Rheinland

Date 27.08.2021

Weichun Li

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

TÜV Rheinland (China) Ltd.
Member of TÜV Rheinland Group

TÜVRheinland®
Precisely Right.

Ginlong technologies Co., Ltd.
Zhang Kun

No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Date : 27.08.2021
Our ref. : LIUPHI 01
Your ref.: Z.K

Ref : AK Certificate of Conformity

Type of Equipment : Grid-Connected PV Inverter
Model Designation : See Certificate
Certificate No. : AK 50514285 0001
Report No. : CN20G2DH 002

Dear Zhang Kun,

We herewith confirm that a sample of the above mentioned technical equipment has been tested and was found to be in accordance with the relevant requirements.

Enclosed please find your Certificate of Conformity.

We appreciate your kind support and would like to offer our assistance and continuous services in the future.

With kind regards,

Certification Body

Weichun Li

Enclosure

solis

S5-GR3P(3-20)K

Solis Three Phase Inverters

360 degree

Model:

S5-GR3P3K S5-GR3P4K S5-GR3P5K S5-GR3P6K S5-GR3P8K S5-GR3P9K S5-GR3P10K
S5-GR3P12K S5-GR3P13K S5-GR3P15K S5-GR3P17K S5-GR3P20K

Efficient

- Max. efficiency 98.7%
- String current up to **16A**
- Wide voltage range and low startup voltage

Safe

- IP66
- AFCI protection, proactively reduces fire risk
- Automatic voltage stabilization technology in weak grid conditions

Smart

- Supports export power control
- Supports RS485, WiFi, GPRS
- Scan to register on SolisCloud, supports remote upgrade and control

Economic

- Compact design, simple installation and maintenance
- > 150% DC/AC ratio
- Supports high power modules for lower installation costs

Datasheet

Model Name	S5-GR3P3K	S5-GR3P4K	S5-GR3P5K	S5-GR3P6K	S5-GR3P8K	S5-GR3P9K	S5-GR3P10K	S5-GR3P12K	S5-GR3P13K	S5-GR3P15K	S5-GR3P17K	S5-GR3P20K
Input DC												
Recommended max. PV power	4.5 kW	6 kW	7.5 kW	9 kW	12 kW	13.5 kW	15 kW	18 kW	19.5 kW	22.5 kW	25.5 kW	30 kW
Max. input voltage	1100 V											
Rated voltage	600 V											
Start-up voltage	180 V											
MPPT voltage range	160-1000 V											
Max. input current	16 A / 16 A							32 A / 32 A				
Max. short circuit current	25 A / 25 A							50 A / 50 A				
MPPT number/Max. input strings number	2/2							2/4				
Output AC												
Rated output power	3 kW	4 kW	5 kW	6 kW	8 kW	9 kW	10 kW	12 kW	13 kW	15 kW	17 kW	20 kW
Max. apparent output power	3.3 kVA	4.4 kVA	5.5 kVA	6.6 kVA	8.8 kVA	9.9 kVA	11 kVA	13.2 kVA	14.3 kVA	16.5 kVA	18.7 kVA	22 kVA
Max. output power	3.3 kW	4.4 kW	5.5 kW	6.6 kW	8.8 kW	9.9 kW	11 kW	13.2 kW	14.3 kW	16.5 kW	18.7 kW	22 kW
Rated grid voltage	3/N/PE, 220 V / 380 V, 230 V / 400 V											
Rated grid frequency	50 Hz / 60 Hz											
Rated grid output current	4.6 A / 4.3 A	6.1 A / 5.8 A	7.6 A / 7.2 A	9.1 A / 8.7 A	12.2 A / 11.5 A	13.7 A / 13.0 A	15.2 A / 14.4 A	18.2 A / 17.3 A	19.8 A / 18.8 A	22.8 A / 21.7 A	25.8 A / 24.6 A	30.4 A / 28.9 A
Max. output current	4.7 A	6.4 A	7.9 A	9.5 A	12.7 A	14.3 A	15.9 A	19.1 A	20.7 A	23.8 A	27 A	31.8 A
Power Factor	>0.99 (0.8 leading - 0.8 lagging)											
THDi	<2%											
Efficiency												
Max. efficiency	98.3%				98.5%			98.6%			98.7%	
EU efficiency	97.7%				97.9%			98.0%			98.1%	
Protection												
DC reverse-polarity protection	Yes											
Short circuit protection	Yes											
Output over current protection	Yes											
Surge protection	Yes											
Grid monitoring	Yes											
Anti-islanding protection	Yes											
Temperature protection	Yes											
Integrated AFCI (DC arc-fault circuit protection)	Yes (1)											
Integrated DC switch	Optional											
General Data												
Dimensions (W*H*D)	310*563*219 mm											
Weight	17.8 kg								18.8 kg		20 kg	
Topology	Transformerless											
Self consumption (night)	<1 W											
Operating ambient temperature range	-25 ~ +60°C											
Relative humidity	0-100%											
Ingress protection	IP66											
Cooling concept	Natural convection							Intelligent redundant fan-cooling				
Max. operation altitude	4000 m											
Grid connection standard	G98 or G99, VDE-AR-N 4105 / VDE V 0124, EN 50549-1, VDE 0126 / UTE C 15 / VFR:2019, RD 1699 / RD 244 / UNE 206006 / UNE 206007-1, CEI 0-21, C10/11, NRS 097-2-1, TOR, EIFS 2018.2, IEC 62116, IEC 61727, IEC 60068, IEC 61683, EN 50530											
Safety/EMC standard	IEC/EN 62109-1/-2, IEC/EN 61000-6-1/-2/-3/-4											
Features												
DC connection	MC4 connector											
AC connection	Quick connection plug											
Display	LCD											
Communication	RS485, Optional: Wi-Fi, GPRS											

(1) Activation required.

C E R T I F I C A T E
of Conformity

TÜVRheinland®

Registration No.: AK 50514507 0001

Report No.: 50171233 006

Holder:
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Product:
PV-Inverter
(Grid-connected PV Inverter)

Identification:

```
Type Designation : Solis-3PxK-4G   S5-GR3PyK
                   (x=5,6,8,9,10,12,15,17,20)
                   (y=3,4,5,6,8,9,10,12,13,15,17,20)
Serial Number    : Engineering Samples
Firmware version : V18
Remark(s)        : Refer to report 50171233 006 for details.
```

Tested acc. to:
IEC 61727:2004
IEC 62116:2014

The certificate of conformity refers to the above mentioned product. This is to certify that the specimen is in conformity with the assessment requirement mentioned above. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity.

Certification Body
TÜV Rheinland LGA Products GmbH Zertifizierstelle TÜV Rheinland®

Date 13.08.2021

Weichun Li

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

TÜV Rheinland (China) Ltd.
Member of TÜV Rheinland Group

TÜVRheinland®
Precisely Right.

Ginlong technologies Co., Ltd.
Zhang Kun

No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Date : 13.08.2021
Our ref. : PJG 01
Your ref.: Kun Zhang

Ref : AK Certificate of Conformity

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : AK 50514556 0001
Report No. : 50330358 004

Dear Zhang Kun,

We herewith confirm that a sample of the above mentioned technical equipment has been tested and was found to be in accordance with the relevant requirements.

Enclosed please find your Certificate of Conformity.

We appreciate your kind support and would like to offer our assistance and continuous services in the future.

With kind regards,

Certification Body

Weichun Li

CC: Ginlong technologies Co., Ltd.

Enclosure

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50384315

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0016

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum**	*Date of Issue*
Qingying Cui	01-Kese-50166775 014	18.08.2021	*(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Prüfzeichen *Test Mark*

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Sicherheit
Regelmäßige Produktions-überwachung
www.tuv.com
ID 1419049315

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

Type Designation	: S5-GR3P3K	S5-GR3P4K	S5-GR3P5K 3
Vmax PV [Vd.c.]	: 1100		
Isc PV [Ad.c.]	: 25/25		
MPP Voltage Range[Vd.c.]	: 160-1000		
Max. Input Current[Ad.c.]	: 16/16		
Overvoltage Category (OVC)	: II for PV		
Rated Output Volt.[Va.c.]	: 3/N/PE, 220/380 V, 230/400 V		
Rated Output Freq.[Hz]	: 50/60		
Rated Output Power[W]	: 3000	4000	5000
Max. Output Curr.[Aa.c.]	: 4.7	6.4	7.9
Power Factor	: [-0.80, 0.80]		

continued on page 0017

ANLAGE (Appendix): 1.2

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel.: +49 221 806-1371 e-mail: cert-validity@de.tuv.com
Fax: +49 221 806-3935 http://www.tuv.com/safety

TÜV Rheinland LGA Products GmbH TÜV Rheinland® Zertifizierungsstelle

Zertifizierungsstelle
Weichun Li

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50384315

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0017

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum**	*Date of Issue*
Qingying Cui	01-Kese-50166775 014	18.08.2021	*(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Prüfzeichen *Test Mark*

TÜVRheinland® ZERTIFIZIERT
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Sicherheit
Regelmäßige Produktions-überwachung
www.tuv.com ID 1419049315

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

as page 0016 continuation 3

Type Designation	: S5-GR3P6K	S5-GR3P8K	S5-GR3P9K
Vmax PV [Vd.c.]	: 1100		
Isc PV [Ad.c.]	: 25/25		
MPP Voltage Range[Vd.c.]	: 160-1000		
Max. Input Current[Ad.c.]	: 16/16		
Overvoltage Category (OVC)	: II for PV		
Rated Output Volt.[Va.c.]	: 3/N/PE, 220/380 V, 230/400 V		
Rated Output Freq.[Hz]	: 50/60		
Rated Output Power[W]	: 6000	8000	9000
Max. Output Curr.[Aa.c.]	: 9.5	12.7	14.3
Power Factor	: [-0.80, 0.80]		

continued on page 0018

ANLAGE (Appendix): 1.2

3

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

Zertifizierungsstelle

TÜV Rheinland LGA Products GmbH
TÜV Rheinland®

Weichun Li

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel.: +49 221 806-1371 e-mail: cert-validity@de.tuv.com
Fax: +49 221 806-3935 http://www.tuv.com/safety

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50384315

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0018

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum**	*Date of Issue*
Qingying Cui	01-Kese-50166775 014	18.08.2021	*(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Prüfzeichen *Test Mark*

TÜVRheinland® ZERTIFIZIERT
Bauart geprüft
Sicherheit
Regelmäßige Produktions-überwachung
www.tuv.com ID 1419049315

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

as page 0017 continuation 2

Type Designation	: S5-GR3P10K	S5-GR3P12K
Vmax PV [Vd.c.]	: 1100	
Isc PV [Ad.c.]	: 25/25	50/50
MPP Voltage Range[Vd.c.]	: 160-1000	
Max. Input Current[Ad.c.]	: 16/16	32/32
Overvoltage Category (OVC)	: II for PV	
Rated Output Volt.[Va.c.]	: 3/N/PE, 220/380 V, 230/400 V	
Rated Output Freq.[Hz]	: 50/60	
Rated Output Power[W]	: 10000	12000
Max. Output Curr.[Aa.c.]	: 15.9	19.1
Power Factor	: [-0.80, 0.80]	

continued on page 0019

ANLAGE (Appendix): 1.2

2

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

Zertifizierungsstelle

TÜV Rheinland LGA Products GmbH

Weichun Li

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel.: +49 221 806-1371 e-mail: cert-validity@de.tuv.com
Fax: +49 221 806-3935 http://www.tuv.com/safety

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50384315

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0019

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum**	*Date of Issue*
Qingying Cui	01-Kese-50166775 014	18.08.2021	*(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Prüfzeichen *Test Mark*

TÜVRheinland® ZERTIFIZIERT
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ID 1419049315

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation) **Lizenzentgelte - Einheit**
Certified Product ***(Product Identification)*** ***License Fee - Unit***

PV-Wechselrichter (Grid-connected PV Inverter)

as page 0018 continuation 2

Type Designation	:	S5-GR3P13K S5-GR3P15K
Vmax PV [Vd.c.]	:	1100
Isc PV [Ad.c.]	:	50/50
MPP Voltage Range[Vd.c.]	:	160-1000
Max. Input Current[Ad.c.]	:	32/32
Overvoltage Category (OVC)	:	II for PV
Rated Output Volt.[Va.c.]	:	3/N/PE, 220/380 V, 230/400 V
Rated Output Freq.[Hz]	:	50/60
Rated Output Power[W]	:	13000 15000
Max. Output Curr.[Aa.c.]	:	20.7 23.8
Power Factor	:	[-0.80, 0.80]

continued on page 0020

ANLAGE (Appendix): 1.2

2

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel.: +49 221 806-1371 e-mail: cert-validity@de.tuv.com
Fax: +49 221 806-3935 http://www.tuv.com/safety

Zertifizierungsstelle

TÜV Rheinland LGA Products GmbH TÜV Rheinland® Zertifizierungsstelle

Weichun Li

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50384315

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0020

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum**	*Date of Issue*
Qingying Cui	01-Kese-50166775 014	18.08.2021	*(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Prüfzeichen *Test Mark*

TÜVRheinland® ZERTIFIZIERT
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www.tuv.com
ID 1419049315

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation) **Lizenzentgelte - Einheit**
Certified Product ***(Product Identification)*** ***License Fee - Unit***

PV-Wechselrichter (Grid-connected PV Inverter)

as page 0019 continuation 2

Type Designation	:	S5-GR3P17K S5-GR3P20K
Vmax PV [Vd.c.]	:	1100
Isc PV [Ad.c.]	:	50/50
MPP Voltage Range[Vd.c.]	:	160-1000
Max. Input Current[Ad.c.]	:	32/32
Overvoltage Category (OVC)	:	II for PV
Rated Output Volt.[Va.c.]	:	3/N/PE, 220/380 V, 230/400 V
Rated Output Freq.[Hz]	:	50/60
Rated Output Power[W]	:	17000 20000
Max. Output Curr.[Aa.c.]	:	27 31.8
Power Factor	:	[-0.80, 0.80]

continued on page 0021

ANLAGE (Appendix): 1.2

2

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
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TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel.: +49 221 806-1371 e-mail: cert-validity@de.tuv.com
Fax: +49 221 806-3935 http://www.tuv.com/safety

Zertifizierungsstelle
TÜV Rheinland LGA Products GmbH TÜV Rheinland® Zertifizierstelle
Weichun Li

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*	Blatt *Sheet*
R 50384315	0021

Ihr Zeichen *Client Reference*	Unser Zeichen *Our Reference*	Ausstellungsdatum	*Date of Issue*
Qingying Cui	01-Kese-50166775 014	18.08.2021	*(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ginlong technologies Co., Ltd.
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(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
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Prüfzeichen *Test Mark*

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www.tuv.com ID 1419049315

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation) *Certified Product (Product Identification)*

Lizenzentgelte - Einheit *License Fee - Unit*

PV-Wechselrichter (Grid-connected PV Inverter)

as page 0020 continuation 3

Type Designation : S5-GR3P5K-AU S5-GR3P6K-AU S5-GR3P8K-AU

Vmax PV [Vd.c.]	: 1100		
Isc PV [Ad.c.]	: 50/25	50/25	50/50
MPP Voltage Range[Vd.c.]	: 160-1000		
Max. Input Current[Ad.c.]	: 32/16	32/16	32/32
Overvoltage Category (OVC)	: II for PV		
Rated Output Volt.[Va.c.]	: 3/N/PE, 230/400 V		
Rated Output Freq.[Hz]	: 50		
Rated Output Power[W]	: 5000	6000	8000
Max. Output Curr.[Aa.c.]	: 7.9	9.5	12.7
Power Factor	: [-0.80, 0.80]		

continued on page 0022

ANLAGE (Appendix): 1.2

3

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Fax: +49 221 806-3935 http://www.tuv.com/safety

Zertifizierungsstelle
TÜV Rheinland LGA Products GmbH TÜV Rheinland® zertifizierte Stelle
Weichun Li

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50384315

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0022

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum** *Date of Issue*
Qingying Cui	01-Kese-50166775 014	18.08.2021 *(day/mo/yr)*

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Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
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Fertigungsstätte *Manufacturing Plant*
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Prüfzeichen *Test Mark*

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Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation) *Certified Product (Product Identification)*

Lizenzentgelte - Einheit *License Fee - Unit*

PV-Wechselrichter (Grid-connected PV Inverter)

as page 0021 continuation 2

Type Designation	: S5-GR3P9K-AU	S5-GR3P10K-AU
Vmax PV [Vd.c.]	: 1100	
Isc PV [Ad.c.]	: 50/50	
MPP Voltage Range[Vd.c.]	: 160-1000	
Max. Input Current[Ad.c.]	: 32/32	
Overvoltage Category (OVC)	: II for PV	
Rated Output Volt.[Va.c.]	: 3/N/PE, 230/400 V	
Rated Output Freq.[Hz]	: 50	
Rated Output Power[W]	: 9000	10000
Max. Output Curr.[Aa.c.]	: 14.3	15.9
Power Factor	: [-0.80, 0.80]	

continued on page 0023

ANLAGE (Appendix): 1.2

2

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Zertifizierungsstelle

TÜV Rheinland LGA Products GmbH
TÜV Rheinland®
Zertifizierstelle

Weichun Li

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Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50384315

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0023

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum**	*Date of Issue*
Qingying Cui	01-Kese-50166775 014	18.08.2021	*(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ginlong technologies Co., Ltd.
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Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation) *Certified Product (Product Identification)*

Lizenzentgelte - Einheit *License Fee - Unit*

PV-Wechselrichter (Grid-connected PV Inverter)

as page 0022 continuation 3

Type Designation: S5-GR3P5K-LV S5-GR3P6K-LV S5-GR3P10K-LV

Vmax PV [Vd.c.]	: 1100		
Isc PV [Ad.c.]	: 25/25	25/25	50/50
MPP Voltage Range[Vd.c.]	: 160-500		
Max. Input Current[Ad.c.]	: 16/16	16/16	32/32
Overvoltage Category (OVC)	: II for PV		
Rated Output Volt.[Va.c.]	: 3/N/PE, 208/220/240 V		
Rated Output Freq.[Hz]	: 50/60		
Rated Output Power[W]	: 5000	6000	10000
Max. Output Curr.[Aa.c.]	: 14.4	16.7	28.8
Power Factor	: [-0.80, 0.80]		

continued on page 0024

ANLAGE (Appendix): 1.2

3

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Zertifizierungsstelle

TÜV Rheinland LGA Products GmbH ® TÜV Rheinland Zertifizierungsstelle

Weichun Li

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Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50384315

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0024

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum**	*Date of Issue*
Qingying Cui	01-Kese-50166775 014	18.08.2021	*(day/mo/yr)*

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No.57 Jintong Road, Binhai,
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315712 Zhejiang
P.R. China

Fertigungsstätte *Manufacturing Plant*
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Prüfzeichen *Test Mark*

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IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation) **Lizenzentgelte - Einheit**
Certified Product (Product Identification) ***License Fee - Unit***

PV-Wechselrichter (Grid-connected PV Inverter)

as page 0023 continuation 2

Type Designation	: S5-GR3P8K-BE	S5-GR3P10K-BE
Vmax PV [Vd.c.]	: 1100	
Isc PV [Ad.c.]	: 50/50	
MPP Voltage Range[Vd.c.]	: 160-1000	
Max. Input Current[Ad.c.]	: 32/32	
Overvoltage Category (OVC)	: II for PV	
Rated Output Volt.[Va.c.]	: 3/N/PE, 230/400 V	
Rated Output Freq.[Hz]	: 50	
Rated Output Power[W]	: 8000	10000
Max. Output Curr.[Aa.c.]	: 12.7	15.9
Power Factor	: [-0.80, 0.80]	

continued on page 0025

2

ANLAGE (Appendix): 1.2

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Zertifizierungsstelle

TÜV Rheinland LGA Products GmbH TÜV Rheinland® Zertifizierungsstelle

Weichun Li

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Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50384315

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0025

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum**	*Date of Issue*
Qingying Cui	01-Kese-50166775 014	18.08.2021	*(day/mo/yr)*

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Prüfzeichen *Test Mark*

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Geprüft nach *Tested acc. to*
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IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

as page 0024 continuation

Protective Class	: Class I
Ingress Protection (IP)	: IP66
Pollution Degree (PD)	: PD3
Operating Temperature [°C]	: -25 to 60 (> 45 derating)
Type of Inverter	: Non-isolated

Remark(s):
The installation has to be carried out according to the attached installation instruction.
Any additional requirements in countries where the product is going to be marketed have to be considered additionally.

ANLAGE (Appendix): 1.2

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
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Zertifizierungsstelle

TÜVRheinland LGA Products GmbH TÜV Rheinland® Zertifizierungsstelle

Weichun Li

3P 4G

5kW
-
10kW

4G NEW

Solis 3P 4G Three Phase Inverter

- Solis 4G Three Phase Range
- 160V-850V MPPT voltage range-ultra low startup
- Dual MPPT design with precise MPPT algorithm
- THDi<1.5%, low harmonic distortion against grid
- Over 98.7% Max.efficiency
- RS485, WiFi/LAN/GPRS (optional) interface
- Multiple protections levels
- WiFi monitoring available-iphone and android app available
- 5 years standard warranty, 20 years optional upgrade

Model:

220V Solis-3P5K-4G-LV Solis-3P6K-4G-LV

400V Solis–3P5K-4G Solis–3P6K-4G Solis–3P8K-4G

Solis–3P9K-4G Solis–3P10K-4G

Features:

THDi	IP65	160-850	AFCI	WiFi/GPRS	
<1.5%		MPPT voltage range	Optional	Real time monitoring	Available on the iPhone App Store Available on the Android App Store

Datasheet

Model	Solis-3P5K-4G-LV	Solis-3P6K-4G-LV	Solis-3P5K-4G	Solis-3P6K-4G	Solis-3P8K-4G	Solis-3P9K-4G	Solis-3P10K-4G
Energy Source	PV						
Input Side(DC)							
Max. DC input power(kW)	6	7.2	6	7.2	9.6	10.8	12
Max. DC input voltage(V)	1000						
Start-up voltage(V)	180						
MPPT voltage range(V)	160-500		160-850				
Max. input current per MPPT(A/B)	11A+11A						
MPPT number/Max input strings number	2/2						
Output Side (AC)							
Rated output power(kW)	5	6	5	6	8	9	10
Max. apparent output power(kVA)	5.5	6.6	5.5	6.6	8.8	9.9	11
Max. output power(kW)	5.5	6.6	5.5	6.6	8.8	9.9	11
Rated grid voltage(V_{LL})	208/220/240		400				
Rated grid frequency(Hz)	50/60						
Operation phase	Three						
Rated grid output current@400V	13.1	15.7	7.2	8.7	11.5	13.0	14.4
Max. output current(A)	14.4	16.7	7.9	9.5	12.7	14.3	15.9
Power Factor (at rated output power)	0.8 leading ... 0.8 lagging						
THDi	<1.5%						
DC injection current	<0.5%In						
Grid frequency range(Hz)	47-52 or 57-62						
Efficiency							
Max.efficiency	98.0%		98.3%		98.7%		
EU efficiency	97.5%		97.8%		98.1%		
MPPT efficiency	>99.5%						
Protection							
DC reverse-polarity protection	Yes						
Short circuit protection	Yes						
Output over current protection	Yes						
Output over voltage protection	Yes						
Insulation resistance monitoring	Yes						
Residual current detection	Yes						
Surge protection	Yes						
Islanding protection	Yes						
Temperature protection	Yes						
Integrated DC switch	Optional						
General Data							
Dimensions(mm)	310W*538H*158D						
Weight(kg)	14.1		13.6		14.1		
Topology	Transformerless						
Self consumption (night)	<1W(Night)						
Operating ambient temperature range	-25~60℃						
Ingress protection	IP65						
Noise emission{typical}	<30 dBA						
Cooling concept	Natural convection						
Max.operation altitude	4000m						
Designed lifetime	>20 years						
Grid connection standard	En50438, G59/3, AS4777, VDE0126-1-1, IEC61727						
Relative humidity	0~100%						
Safety/EMC standard	IEC62109-1/-2, AS3100						
Features							
DC connection	MC-4 mateable						
AC connection	Terminal connectors						
Display	LCD,2×20 Z.						
Communication connections	4 pins RS485 connector						
Warranty	5 years standard (extend to 20 years)						

3P 4G

10kW
-
20kW

4G NEW

Solis 3P 4G Three Phase Inverter

- Solis 4G Three Phase Range
- 160V-850V MPPT voltage range-ultra low startup
- Dual MPPT design with precise MPPT algorithm
- THDi<1.5%, low harmonic distortion against grid
- Over 98.7% Max.efficiency
- RS485, WiFi/LAN/GPRS (optional) interface
- Multiple protections levels
- WiFi monitoring available-iphone and android app available
- 5 years standard warranty, 20 years optional upgrade

Model:

220V Solis-3P10K-4G-LV

400V Solis–3P12K-4G Solis–3P15K-4G Solis–3P17K-4G
Solis–3P20K-4G

Features:

THDi	IP65	Weight	AFCI	WiFi/GPRS	App Store
<1.5%		18.9kg	Optional	Real time monitoring	Available on the iPhone App Store / Available on the Android App Store

Datasheet

Model	Solis-3P10K-4G-LV	Solis-3P12K-4G	Solis-3P15K-4G	Solis-3P17K-4G	Solis-3P20K-4G
Energy Source	PV				
Input Side(DC)					
Max. DC input power(kW)	12	14.5	18	20.4	24
Max. DC input voltage(V)	1000				
Start-up voltage(V)	180				
MPPT voltage range(V)	160-500	160-850			
Max. input current per MPPT(A/B)	22A+22A				
MPPT number/Max input strings number	2/4				
Output Side (AC)					
Rated output power(kW)	10	12	15	17	20
Max. apparent output power(kVA)	11	13.2	16.5	18.7	22
Max. output power(kW)	11	13.2	16.5	18.7	22
Rated grid voltage(V_{LL})	208/220/240	400			
Rated grid frequency(Hz)	50/60				
Operation phase	Three				
Rated grid output current@400V	26.2	17.3	21.7	24.6	28.9
Max. output current(A)	28.8	19.1	23.8	27	31.8
Power Factor (at rated output power)	0.8 leading ... 0.8 lagging				
THDi	<1. 5%				
DC injection current(mA)	<0.5%In				
Grid frequency range(Hz)	47-52 or 57-62				
Efficiency					
Max.efficiency	98.0%	98.7%			
EU efficiency	97.5%	98.1%			
MPPT efficiency	>99.5%				
Protection					
DC reverse-polarity protection	Yes				
Short circuit protection	Yes				
Output over current protection	Yes				
Output over voltage protection	Yes				
Insulation resistance monitoring	Yes				
Residual current detection	Yes				
Surge protection	Yes				
Islanding protection	Yes				
Temperature protection	Yes				
Integrated DC switch	Optional				
General Data					
Dimensions(mm)	310W*563H*219D				
Weight(kg)	19.8	18.9		19.8	
Topology	Transformerless				
Self consumption (night)	<1W(Night)				
Operating ambient temperature range	-25°C~60°C				
Ingress protection	IP65				
Noise emission{typical}	<30 dBA				
Cooling concept	Intelligent redundant fan-cooling				
Max.operation altitude	4000m				
Designed lifetime	>20 years				
Grid connection standard	En50438, G59/3, AS4777, VDE0126-1-1, IEC61727				
Relative humidity	0~100%				
Safety/EMC standard	IEC62109-1/-2, AS3100				
Features					
DC connection	MC-4 mateable				
AC connection	Terminal connectors				
Display	LCD,2×20 Z.				
Communication connections	4 pins RS485 connector				
Warranty	5 years standard (extend to 20 years)				

3P

15kW
-
40kW

Solis Three PV Inverter

- Three phase output
- Over 98.8% Max. effciency
- 200V- 1000V input voltage range
- 7.0" LCD color screen display
- Four MPPT design with precise MPPT algorithm
- Compact and light design, easy installation
- IP65 rated for outdoor installation
- RS485, WiFi/GPRS (optional) interface
- Anti-resonance, single transformer can connect 6M+ in parallel
- WiFi and monitoring app available
- 5 years standard warranty, 20 years optional upgrade

Model:

220V	Solis-15K-LV	Solis-20K-LV		
400V	Solis-20K	Solis-25K	Solis-30K	Solis-33K
480V	Solis-36K-HV	Solis–40K–HV		

Features:

- Fanless — Cooling Concept
- Four — MPPT
- 7" — LCD
- WiFi/GPRS — Real time monitoring
- Available on the iPhone App Store / Available on the Android App Store
- IP65

Datasheet

Model	Solis-15K-LV	Solis-20K-LV	Solis-20K	Solis-25K	Solis-30K	Solis-33K	Solis-36K-HV	Solis-40K-HV
Energy Source	PV							
Input Side(DC)								
Max. DC input power(kW)	18	24	24	30	36	40	43	48
Max. DC input voltage(V)	1000							
Start-up voltage(V)	350							
MPPT voltage range(V)	200-800							
Max. input current per MPPT(A/B/C/D)	20A+20A		18A+18A+18A+18A					
MPPT number/Max input strings number	2/4		4/8					
Output Side (AC)								
Rated output power(kW)	15	20	20	25	30	33	36	40
Max. apparent output power(kVA)	15	20	22	27.5	33	33	40	44
Max. output power(kW)	15	20	22	27.5	33	33	40	44
Rated grid voltage(V_{LL})	220		400				480	
Rated grid frequency(Hz)	50/60							
Operation phase	Three							
Rated grid output current@400V	39.4	52.5	28.7	36.1	43.3	47.8	43.3	48.1
Max. output current(A)	39.4	52.5	33.3	41.7	50	50	47.8	53
Power Factor (at rated output power)	0.8 leading ... 0.8 lagging							
THDi	<3%							
DC injection current(mA)	<0.5%In							
Grid frequency range(Hz)	47-52 or 57-62							
Efficiency								
Max.efficiency	97.0%		98.6%			98.7%	98.8%	
EU efficiency	96.5%		98.3%			98.3%	98.4%	
MPPT efficiency	>99.9%							
Protection								
DC reverse-polarity protection	Yes							
Short circuit protection	Yes							
Output over current protection	Yes							
Output over voltage protection	Yes							
Insulation resistance monitoring	Yes							
Residual current detection	Yes							
Surge protection	Yes							
Islanding protection	Yes							
Temperature protection	Yes							
Integrated DC switch	Optional							
General Data								
Dimensions(mm)	530W*700H*356.5D							
Weight(kg)	58.2		57.2	58.2				
Topology	Transformerless							
Self consumption (night)	<1W(Night)							
Operating ambient temperature range	-25~60℃							
Ingress protection	IP65							
Noise emission{typical}	<30 dBA							
Cooling concept	Natural convection							
Max.operation altitude	4000m							
Designed lifetime	>20 years							
Grid connection standard	EN50438, G59/3, AS4777, VDE0126-1-1, IEC61727							
Relative humidity	0~100%							
Safety/EMC standard	IEC62109-1/-2, AS3100, EN61000-6-1, EN61000-6-3							
Features								
DC connection	MC-4 mateable							
AC connection	Terminal connectors							
Display	7.0"LCD color screen display							
Communication connections	4 pins RS485 connector , 2 RJ45 connector							
Warranty	5 years standard (extend to 20 years)							

Solis-(40-60)K, Solis-(50-70)K-HV

Solis Three Phase Inverters

Features:

- Over 99% Max. effciency
- Wide voltage range and low startup voltage
- 4 MPPT input, each rated current is 22A/28.5A, compatible with high power module
- THDi<3%, low harmonic distortion against grid
- Anti-resonance, Supporting over 6MW parallelled in one transformer
- Perfect commercial site monitoring solution
- Intelligent redundancy fan

Model:

400V: Solis-40K Solis-50K Solis-60K-4G

480V: Solis-50K-HV Solis-60K-HV Solis-70K-HV-4G

Datasheet

Model Name	Solis-40K	Solis-50K	Solis-50K-HV	Solis-60K-HV	Solis-60K-4G	Solis-70K-HV-4G
Input DC						
Max. input power	48kW	60kW	60kW	72kW	72kW	84kW
Max. input voltage	1100V					
Rated voltage	600V	600V	720V	720V	600V	720V
Start-up voltage	200V					
MPPT voltage range	200-1000V					
Max. input current	4*22A	4*28.5A	4*22A	4*28.5A		
Max. Short Circuit current	4*34.3A	4*44.5A	4*34.3A	4*44.5A		
MPPT number/Max. input strings number	4/8	4/12	4/8	4/12		
Output AC						
Rated output power	40kW	50kW	50kW	60kW	60kW	70kW
Max. apparent output power	44kVA	55kVA	55kVA	66kVA	66kVA	77kVA
Max. output power	44kW	55kW	55kW	66kW	66kW	77kW
Rated grid voltage	3/N/PE, 220/380V, 230/400V		3/PE, 480V		3/N/PE, 220/380V, 230/400V	3/PE, 480V
Rated grid frequency	50Hz/60Hz					
Rated grid output current	60.8A/58A	76.0A/72.2A	60.2A	72.2A	91.2A/86.6A	84.2A
Max. output current	66.9A	83.3A	66.2A	80A	100A	92.6A
Power Factor	>0.99 (Adjustable from 0.8 leading to 0.8 lagging)					
THDi	<3%					
Efficiency						
Max. efficiency	98.8%		99.0%		99.0%	
EU efficiency	98.4%		98.7%		98.5%	
Protection						
DC reverse-polarity protection	Yes					
Short circuit protection	Yes					
Output over current protection	Yes					
Surge protection (DC/AC)	Yes					
Grid monitoring	Yes					
Anti-Islanding protection	Yes					
Temperature protection	Yes					
Integrated DC switch	Optional					
General Data						
Dimensions (W*H*D)	630mm*700mm*357mm					
Weight	61kg	63kg	61kg	63kg		
Topology	Transformerless					
Self consumption	<1W (Night)					
Operating ambient temperature range	-25~60°C					
Relative humidity	0~100%					
Ingress protection	IP65					
Cooling concept	Natural convection	Intelligent redundant fan-cooling	Natural convection	Intelligent redundant fan-cooling		
Max. operation altitude	4000m					
Grid connection standard	VDE-AR-N 4105, VDE V 0124, VDE V 0126-1-1, UTE C15-712-1, NRS 097-1-2, G98, G99, EN 50549-1/-2, RD 1699, UNE 206006, UNE 206007-1, IEC61727, DEWA					
Safety/EMC standard	IEC 62109-1/-2, IEC62116, EN 61000-6-2/-4					
Features						
DC connection	MC4					
AC connection	OT Terminal connectors					
Display	LCD, 2×20 Z.					
Communication	RS485; WiFi/GPRS (optional)					

Certificate Number: AZ 69023047 Page: 0001

TÜVRheinland

CERTIFICATE OF SUITABILITY

Authorised marking: TUV023047E

This is to certify that TÜV Rheinland Australia Pty Ltd as accredited by JAS-ANZ in accordance with ISO/IEC Guide 65 has examined for compliance with certification standards, the electrical equipment described hereunder and authorises the certificate holder to affix the above mentioned mark to products of the same type; or the Regulatory Compliance Mark (RCM) provided that the requirements of all relevant parts of AS/NZS 4417 applicable to the article are fulfilled

CERTIFICATE HOLDER:

Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo, Zhejiang 315712
P. R. China

DESCRIPTION OF EQUIPMENT

Declared class: Non-declared

Product: Grid-Connected PV Inverter

Trade Name / Manufacturer: Ginlong

Model Number: Solis-3P5K-4G-AU; Solis-3P6K-4G-AU; Solis-3P8K-4G-AU; Solis-3P9K-4G-AU; Solis-3P10K-4G-AU; Solis-3P12K-4G; Solis-3P15K-4G; Solis-3P17K-4G; Solis-3P20K-4G.

Ratings: (Ratings info refer to CONTINIATION SHEET 1 - 2).

Standard: AS/NZS 4777.2:2015
IEC 62109-1:2010
IEC 62109-2:2011

Issue Date: 02/10/2018
Expiry Date: 02/10/2023

Signed for and on behalf of TÜV Rheinland Australia Pty Ltd

Billy Chu

JAS-ANZ
Acc. No. Z2870404AA
www.jas-anz.org/register

TUV Rheinland Australia Pty Ltd
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CERTIFICATE OF SUITABILITY

Authorised marking: TUV023047E

CONTINUATION SHEET 1

DESCRIPTION OF EQUIPMENT

Ratings information:

For all models:
Output voltage: 230/400Va.c., 3/N/PE, 50/60Hz, three-phase;
Class I, IP65, PD3, Transformerless;
Operating Temp.: -25°C to 60°C (>45°C derating);
Overvoltage Category (OVC) for AC output: III;
Maximum input voltage: 1000Vd.c., Independent MPPT: 2;
MPPT Voltage: 160-850Vd.c.;
Overvoltage Category (OVC) for PV output: II.

For model Solis-3P5K-4G-AU:
Input: Imax: 22+11A, I(s.c.) input: 34.3+17.2Ad.c.;
Output: Pn: 5000W, Apparent Power: 5500VA, Imax: 7.9A.

For model Solis-3P6K-4G-AU:
Input: Imax: 22+11A, I(s.c.) input: 34.3+17.2Ad.c.;
Output: Pn: 6000W, Apparent Power: 6600VA, Imax: 9.5A.

For model Solis-3P8K-4G-AU:
Input: Imax: 22+22A, I(s.c.) input: 34.3+34.3Ad.c.;
Output: Pn: 8000W, Apparent Power: 8800VA, Imax: 12.7A.

For model Solis-3P9K-4G-AU:
Input: Imax: 22+22A, I(s.c.) input: 34.3+34.3Ad.c.;
Output: Pn: 9000W, Apparent Power: 9900VA, Imax: 14.2A.

Issue Date: 02/10/2018
Expiry Date: 02/10/2023

Signed for and on behalf of TÜV Rheinland Australia Pty Ltd

JAS-ANZ
Acc. No. Z2670404AA
www.jas-anz.org/register

Billy Chu

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Website: www.au.tuv.com

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CERTIFICATE OF SUITABILITY

Authorised marking: TUV023047E

CONTINUATION SHEET 2

DESCRIPTION OF EQUIPMENT

Ratings information:

For model Solis-3P10K-4G-AU:
Input: Imax: 22+22A, I(s.c.) input: 34.3+34.3Ad.c.;
Output: Pn: 10000W, Apparent Power: 11000VA, Imax: 15.9A.

For model Solis -3P12K-4G:
Input: Imax: 22+22A, I(s.c.) input: 34.3+34.3Ad.c.;
Output: Pn: 12000W, Apparent Power: 13200VA, Imax: 19.1A.

For model Solis -3P15K-4G:
Input: Imax: 22+22A, I(s.c.) input: 34.3+34.3Ad.c.;
Output: Pn: 15000W, Apparent Power: 16500VA, Imax: 23.8A.

For model Solis -3P17K-4G:
Input: Imax: 22+22A, I(s.c.) input: 34.3+34.3Ad.c.;
Output: Pn: 17000W, Apparent Power: 18700VA, Imax: 27.0A.

For model Solis -3P20K-4G:
Input: Imax: 22+22A, I(s.c.) input: 34.3+34.3Ad.c.;
Output: Pn: 20000W, Apparent Power: 22000VA, Imax: 31.8A.

Issue Date: 02/10/2018
Expiry Date: 02/10/2023

Signed for and on behalf of TÜV Rheinland Australia Pty Ltd

Billy Chu

JAS-ANZ

Acc. No. Z357/0404AA
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Website: www.au.tuv.com

C E R T I F I C A T E
of Conformity

TÜVRheinland®

Registration No.: AK 50421012 0001

Report No.: 50171233 001

Holder:
Ningbo Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai, (seafront), Industrial Park,
Xiangshan Ningbo, Zhejiang 315712
P. R. China

Product:
PV-Inverter
(Grid-connected PV Inverter)

Identification:

Type Designation	: Solis-3P5K-4G	Solis-3P6K-4G
	Solis-3P8K-4G	Solis-3P9K-4G
	Solis-3P10K-4G	Solis-3P12K-4G
	Solis-3P15K-4G	Solis-3P17K-4G
	Solis-3P20K-4G	
Serial Number	: Engineering Samples	
Firmware version	: V18	
Remark(s)	: Refer to report 50171233 001 for details.	

Tested acc. to:
IEC 61727:2004
IEC 62116:2014

The certificate of conformity refers to the above mentioned product. This is to certify that the specimen is in conformity with the assessment requirement mentioned above. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity.

Certification Body

Date 24.10.2018

Weichun Li

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

TÜV Rheinland (China) Ltd.
Member of TÜV Rheinland Group

TÜVRheinland®
Precisely Right.

Ningbo Ginlong technologies Co., Ltd.
Zhang Kun
-
No.57 Jintong Road, Binhai, (seafront), Industrial Park,
Xiangshan Ningbo, Zhejiang 315712
P. R. China

Date : 25.10.2018
Our ref. : QJL 01
Your ref.: Kun Zhang

Ref : AK Certificate of Conformity

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : AK 50421012 0001
Report No. : 50171233 001

Dear Zhang Kun,

We herewith confirm that a sample of the above mentioned technical equipment has been tested and was found to be in accordance with the relevant requirements.

Enclosed please find your Certificate of Conformity.

We appreciate your kind support and would like to offer our assistance and continuous services in the future.

With kind regards,

Certification Body

Weichun Li

CC: Ningbo Ginlong technologies

Enclosure

TÜV Rheinland (China) Ltd.
莱茵检测认证服务（中国）有限公司
Unit 707, AVIC Bldg., No. 109, Central Road, East 3rd Ring Road, Chaoyang District, Beijing, 100022, P.R.China
北京市朝阳区东三环中路乙10号
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Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50331629

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0001

Ihr Zeichen *Client Reference*	Unser Zeichen *Our Reference*	Ausstellungsdatum	*Date of Issue*
52109827	01-DJW-15083814 001	26.02.2016	*(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront) industrial Park, Xiangsha
Ningbo, Zhejiang 315712
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront) industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Prüfzeichen *Test Mark*

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ID 1419032012

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

Type Designation	: Solis-20K URE-20K GCI-20K-W Solapowa-20K Soltaro-20K	12
Vmax PV [Vd.c.]	: 1000	
Isc PV [Ad.c.]	: 23.4/23.4/23.4/23.4	
MPP Voltage Range[Vd.c.]	: 200-800	
Max. Input Current[Ad.c.]	: 18/18/18/18	
Overvoltage Category (OVC)	: II for PV	
Rated Output Voltage[Va.c.]	: 3~400	
Rated Output Frequency[Hz]	: 50	
Rated Output Power[kW]	: 20	
Max. Output Current[Aa.c.]	: 33.3	
Power Factor	: [-0.80, 0.80]	
Overvoltage Category (OVC)	: III for AC mains	

continued on page 0002

12

ANLAGE (Appendix): 1

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel +49 221 806-1371 e-mail cert-validity@de.tuv.com
Fax +49 221 806-3935 http://www.tuv.com/safety

TÜV Rheinland LGA Products GmbH
TÜVRheinland
Zertifizierungsstelle

Zertifizierungsstelle
Werehun Li

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50331629

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0002

Ihr Zeichen *Client Reference*	Unser Zeichen *Our Reference*	Ausstellungsdatum	*Date of Issue*
52109827	01-DJW-15083814 001	26.02.2016	*(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
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Ningbo, Zhejiang 315712
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ningbo Ginlong technologies
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No.57 Jintong Road, Binhai,
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P.R. China

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IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

5

as page 0001
Continuation
Type Designation : Solis-25K URE-25K GCI-25K-W
Solapowa-25K Soltaro-25K

Vmax PV [Vd.c.] : 1000
Isc PV [Ad.c.] : 23.4/23.4/23.4/23.4
MPP Voltage Range[Vd.c.] : 200-800
Max. Input Current[Ad.c.] : 18/18/18/18
Overvoltage Category (OVC) : II for PV

Rated Output Voltage[Va.c.] : 3~400
Rated Output Frequency[Hz] : 50
Rated Output Power[kW] : 25
Max. Output Current[Aa.c.] : 41.7
Power Factor : [-0.80, 0.80]
Overvoltage Category (OVC) : III for AC mains

continued on page 0003

5

ANLAGE (Appendix): 1

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich beachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

TÜV Rheinland LGA Products GmbH
TÜVRheinland
Zertifizierungsstelle

Zertifizierungsstelle

Weichun Li

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel +49 221 806-1371 e-mail cert-validity@de.tuv.com
Fax +49 221 806-3935 http://www.tuv.com/safety

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50331629

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0003

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum**	*Date of Issue*
52109827	01-DJW-15083814 001	26.02.2016	*(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
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Ningbo, Zhejiang 315712
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ningbo Ginlong technologies
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Ningbo, Zhejiang 315712
P.R. China

Prüfzeichen *Test Mark*

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Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

5

as page 0001
Continuation
Type Designation : Solis-30K URE-30K GCI-30K-W
Solapowa-30K Soltaro-30K

Vmax PV [Vd.c.] : 1000
Isc PV [Ad.c.] : 23.4/23.4/23.4/23.4
MPP Voltage Range[Vd.c.] : 200-800
Max. Input Current[Ad.c.] : 18/18/18/18
Overvoltage Category (OVC) : II for PV

Rated Output Voltage[Va.c.]: 3~400
Rated Output Frequency[Hz] : 50
Rated Output Power[kW] : 30
Max. Output Current[Aa.c.] : 47.8
Power Factor : [-0.80, 0.80]
Overvoltage Category (OVC) : III for AC mains

continued on page 0004

5

ANLAGE (Appendix): 1

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

TÜV Rheinland LGA Products GmbH Zertifizierungsstelle TÜVRheinland

Weichun Li

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Zertifikat *Certificate*

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R 50331629

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0004

Ihr Zeichen *Client Reference*	Unser Zeichen *Our Reference*	Ausstellungsdatum *Date of Issue (day/mo/yr)*
52109827	01-DJW-15083814 001	26.02.2016

Genehmigungsinhaber *License Holder*
Ningbo Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai, (seafront) industrial Park, Xiangsha
Ningbo, Zhejiang 315712
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ningbo Ginlong technologies Co., Ltd.
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Prüfzeichen *Test Mark*

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Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation) *Certified Product (Product Identification)*

Lizenzentgelte - Einheit *License Fee - Unit*

PV-Wechselrichter (Grid-connected PV Inverter)

4

as page 0001
Continuation
Type Designation : Solis-36K-HV Solapowa-36K-HV URE-36K-HV Soltaro-36K-HV

Vmax PV [Vd.c.] : 1000
Isc PV [Ad.c.] : 23.4/23.4/23.4/23.4
MPP Voltage Range[Vd.c.] : 200-800
Max. Input Current[Ad.c.] : 18/18/18/18
Overvoltage Category (OVC) : II for PV

Rated Output Voltage[Va.c.] : 3~480
Rated Output Frequency[Hz] : 50
Rated Output Power[kW] : 36
Max. Output Current[Aa.c.] : 47.8
Power Factor : [-0.80, 0.80]
Overvoltage Category (OVC) : III for AC mains

continued on page 0005

4

ANLAGE (Appendix): 1

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel. +49 221 806-1371 e-mail cert-validity@de.tuv.com
Fax +49 221 806-3935 http://www.tuv.com/safety

TÜV Rheinland LGA Products GmbH TÜVRheinland® Zertifizierungsstelle

Zertifizierungsstelle
Weichun Li

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50331629

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0005

Ihr Zeichen *Client Reference*	Unser Zeichen *Our Reference*	Ausstellungsdatum	*Date of Issue*
52109827	01-DJW-15083814 001	26.02.2016	*(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront) industrial Park, Xiangsha
Ningbo, Zhejiang 315712
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront) industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Prüfzeichen *Test Mark*
TÜVRheinland ZERTIFIZIERT
Bauart geprüft
Sicherheit
Regelmäßige Produktions-überwachung
www.tuv.com
ID 1419032012

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

4

as page 0001
Continuation

Type Designation	:	Solis-40K-HV Solapowa-40K-HV URE-40K-HV Soltaro-40K-HV
Vmax PV [Vd.c.]	:	1000
Isc PV [Ad.c.]	:	23.4/23.4/23.4/23.4
MPP Voltage Range[Vd.c.]	:	200-800
Max. Input Current[Ad.c.]	:	18/18/18/18
Overvoltage Category (OVC)	:	II for PV
Rated Output Voltage[Va.c.]	:	3~480
Rated Output Frequency[Hz]	:	50
Rated Output Power[kW]	:	40
Max. Output Current[Aa.c.]	:	48.1
Power Factor	:	[-0.80, 0.80]
Overvoltage Category (OVC)	:	III for AC mains

continued on page 0006

4

ANLAGE (Appendix): 1

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

TÜV Rheinland LGA Products GmbH

Zertifizierungsstelle

Weichun Li

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel +49 221 806-1371 e-mail cert-validity@de.tuv.com
Fax +49 221 806-3935 http://www.tuv.com/safety

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50331629

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0006

Ihr Zeichen *Client Reference*	Unser Zeichen *Our Reference*	Ausstellungsdatum	*Date of Issue*
52109827	01-DJW-15083814 001	26.02.2016	*(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront) industrial Park, Xiangsha
Ningbo, Zhejiang 315712
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront) industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Prüfzeichen *Test Mark*

TÜVRheinland® ZERTIFIZIERT
Bauart geprüft
Sicherheit
Regelmäßige Produktions-überwachung
www.tuv.com
ID 1419032012

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

as page 0001
Continuation

Protective Class	: I
Enclosure Protection (IP)	: IP65
Pollution degree (PD)	: PD 2(inside), PD3(outside)
Altitude [m]	: 2000
Operating Temperature [°C]	: -25 to 60 (> 45 derating)
Type of Inverter	: Non-isolated

Remark:
The installation has to be carried out according to the attached installation instruction.
Any additional requirements in countries where the product is going to be marketed have to be considered additionally.

ANLAGE (Appendix): 1

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel. +49 221 806-1371 e-mail cert-validity@de.tuv.com
Fax +49 221 806-3935 http://www.tuv.com/safety

TÜV Rheinland LGA Products GmbH Zertifizierungsstelle

Zertifizierungsstelle
Weichun Li

TÜV Rheinland (China) Ltd.
Member of TÜV Rheinland Group

TÜVRheinland®
Precisely Right.

Ningbo Ginlong technologies Co., Ltd.
Zhang Kun
-
No.57 Jintong Road, Binhai, (seafront) industrial Park,
Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Date : 26.02.2016
Our ref. : DJW 01
Your ref.: 52109827

Ref : R TÜV-Mark Approval

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : R 50331629 0001
Report No. : 15083814 001

Dear Zhang Kun,

The above specified equipment has been tested and found to be in accordance with the relevant requirements.

Please find enclosed your certificate as specified above.

If cancellation of the certificate is submitted by 15 November in a given year, no fee will be charged for the following year.

The certificate is issued with the reservation that the license holder applies all information required in § 6 of the ProdSG related to name and address of the manufacturer or his authorized representative / importer, including their respective contact addresses on the product prior to marketing of the product in the European Economic Area.

With kind regards,

Certification Body

Weichun Li

Enclosure

TÜV Rheinland (China) Ltd.
莱茵检测认证服务（中国）有限公司
Unit 707, AVIC Bldg., No. 10B, Central Road, East 3rd Ring Road, Chaoyang District, Beijing, 100022, P.R.China
北京市朝阳区东三环中路乙10号 艾维克大厦707室 邮编：100022
Tel: (8610)6566 6660
Fax: (8610)6566 6667
e-mail: info@bj.chn.tuv.com
Internet: http://www.chn.tuv.com

C E R T I F I C A T E

TÜVRheinland®

of Conformity
Low Voltage Directive 2014/35/EU

Registration No.: AN 50332210 0001

Report No.: 15083814 001

Holder:

Ningbo Ginlong technologies
Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront) industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Product:

PV-Inverter
(Grid-connected PV Inverter)

Identification:

Type Designation : Solis-20K URE-20K GCI-20K-W
Solapowa-20K Soltaro-20K
See more tpye designation in attachment 1.1

Serial Number : Engineering Sample
Remark : Issued in conjunction with TÜV Rheinland license R 50331629 0001-0006.

This certificate of conformity is based on an evaluation of a sample of the above mentioned product. Technical Report and documentation are at the Licence Holder's disposal. This is to certify that the tested sample is in conformity with Annex I of Council Directive 2014/35/EU, referred to as the Low Voltage Directive. This certificate does not imply assessment of the series-production of the product and does not permit the use of a TÜV Rheinland mark of conformity. The holder of the certificate is authorized to use this certificate in connection with the EC declaration of conformity according to Annex IV of the Directive.

TÜV Rheinland LGA Products GmbH Zertifizierungsstelle TÜVRheinland®

Certification Body

Date 26.02.2016

Weichun Li

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

CE The CE marking may be used if all relevant and effective EC Directives are complied with. CE

TÜVRheinland®

1.1

TÜV Rheinland
LGA Products GmbH

Tillystraße 2, 90431 Nürnberg

Attachment to
Registration No.: AN 50332210 0001
Report No.: 15083814 001

Manufacturer: Ningbo Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai, (seafront) industrial Park, Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Scope:

Solis-25K URE-25K GCI-25K-W
Solapowa-25K Soltaro-25K

Solis-30K URE-30K GCI-30K-W
Solapowa-30K Soltaro-30K

Solis-36K-HV Solapowa-36K-HV
URE-36K-HV Soltaro-36K-HV

Solis-40K-HV Solapowa-40K-HV
URE-40K-HV Soltaro-40K-HV

TÜV Rheinland LGA Products GmbH Zertifizierungsstelle

Cologne, 26.02.2016

Weichun Li

TÜV Rheinland (China) Ltd.
Member of TÜV Rheinland Group

TÜVRheinland®
Precisely Right.

Ningbo Ginlong technologies Co., Ltd.
Zhang Kun
-
No.57 Jintong Road, Binhai, (seafront) industrial Park,
Xiangshan
Ningbo, Zhejiang 315712
P.R. China

Date : 26.02.2016
Our ref. : DJW 01
Your ref.: 52109827

Ref : AN Certificate of Conf. Low Voltage D.

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : AN 50332210 0001
Report No. : 15083814 001

Dear Zhang Kun,

We herewith confirm that a sample of the above mentioned technical equipment has been tested and was found to be in accordance with the relevant requirements.

Enclosed please find your Certificate of Conformity.

We appreciate your kind support and would like to offer our assistance and continuous services in the future.

With kind regards,

Certification Body

Weichun Li

Enclosure

TÜV Rheinland (China) Ltd.
莱茵检测认证服务（中国）有限公司
Unit 707, AVIC Bldg., No. 10B, Central Road, East 3rd Ring Road, Chaoyang District, Beijing, 100022, P.R.China
北京市朝阳区东三环中路乙10号
艾维克大厦707室
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Fax: (8610)6566 6667
e-mail: info@bj.chn.tuv.com
Internet: http://www.chn.tuv.com

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Product Service

Attestation of Conformity

No. N8A 17 10 86470 025

Holder of Certificate: **Ningbo Ginlong Technologies Co., Ltd.**
No.57 Jintong Road
Binhai Industrial Park, Xiangshan
315712 Ningbo, Zhejiang
PEOPLE'S REPUBLIC OF CHINA

Product: **Converter**
Grid-Tied Inverter

This Attestation of Conformity is issued on a voluntary basis according to the Low Voltage Directive 2014/35/EU relating to electrical equipment designed for use within certain voltage limits. It confirms that the listed equipment complies with the principal protection requirements of the directive and is based on the technical specifications applicable at the time of issuance. It refers only to the particular sample submitted for testing and certification. See also notes overleaf.

Test report no.: 7040917716002-00

Date, 2017-11-03 (Zhengdong Ma)

CE After preparation of the necessary technical documentation as well as the EU conformity declaration the required CE marking can be affixed on the product. That declaration of conformity is issued under the sole responsibility of the manufacturer. Other relevant EU-directives have to be observed.

TÜV SÜD Product Service GmbH · Zertifizierstelle · Ridlerstraße 65 · 80339 München · Germany

TÜV®

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Product Service

Attestation of Conformity
No. N8A 17 10 86470 025

Model(s):

Solis-40K, Solis-50K, Solis-50K-HV, Solis-60K-HV, Solapowa-40K, Solapowa-50K, Solapowa-50K-HV, Solapowa-60K-HV, Soltaro-40K, Soltaro-50K, Soltaro-50K-HV, Soltaro-60K-HV, URE-40K, URE-50K.

Parameters:

Max. input voltage:	See attachments
MPP voltage range:	See attachments
Max. input current:	See attachments
Isc PV (absolute maximum):	See attachments
Rated grid voltage:	See attachments
Rated grid frequency:	50/60Hz
Max. AC output active power:	See attachments
Max. AC output apparent power:	See attachement
Max. continuous output current:	See attachments
Adjustable cos(Ø):	-0.8...1...+0.8
Protection class:	I
Degree of protection:	IP65
Overvoltage category:	II(PV), III(MAINS)
Ambient temperature:	-25... + 60°C

Other ratings refer to attachments.

Tested according to:

EN 62109-1:2010
EN 62109-2:2011

TÜV®

A1 / 04.11

Attestation of Conformity
No. N8A 17 10 86470 025

Product Service

Electrical ratings for various models:

Models	Solis-40K URE-40K Solapowa-40K Soltaro-40K	Solis-50K URE-50K Solapowa-50K Soltaro-50K	Solis-50K-HV Solapowa-50K-HV Soltaro-50K-HV	Solis-60K-HV Solapowa-60K-HV Soltaro-60K-HV
PV input ratigns:				
Max. input voltage:	d.c. 1100 V			
MPP voltage range:	d.c. 200-1000V			
Max. input current:	d.c. 22*4A	d.c. 28.5*4A	d.c. 22*4A	d.c. 28.5*4A
Isc PV (absolute maximum):	d.c. 34.3 A	d.c. 44.5 A	d.c. 34.3 A	d.c. 44.5 A
AC output:				
Rated grid voltage:	a.c.380V	a.c.380V	a.c. 480/500V	a.c. 480/500V
Rated grid frequency:	50/60Hz			
Max. AC output active power:	44000W	55000W	55000W	66000W
Max. AC output apparent power:	44000VA	55000VA	55000VA	66000VA
Max. Continuous output current:	a.c. 66.9 A	a.c. 83.3 A	a.c. 66.2 A	a.c. 80 A

solis

GINLONG TECHNOLOGIES CO.,LTD.

S6-GR1P(2.5-6)K-S

Solis Single Phase Inverters

Features:

- String current up to 16A
- Integrated with zero export power control function
- Light weight with compact design for easy installation
- 2 MPPT design with precise MPPT algorithm

Models:

S6-GR1P2.5K-S / S6-GR1P3K-S

S6-GR1P3.6K-S / S6-GR1P4K-S

S6-GR1P4.6K-S / S6-GR1P5K-S

S6-GR1P6K-S

DATASHEET

S6-GR1P(2.5-6)K-S

Models	2.5K	3K	3.6K	4K	4.6K	5K	6K
Input DC							
Recommended max. PV power	3.75 kW	4.5 kW	5.4 kW	6 kW	6.9 kW	7.5 kW	9 kW
Max. input voltage	550 V						
Rated voltage	250 V	330 V					
Start-up voltage	60 V	100 V					
MPPT voltage range	50-550 V	90-550 V					
Max. input current	16 A / 16 A						
Max. short circuit current	22 A / 22 A						
MPPT number/Max. input strings number	2/2						
Output AC							
Rated output power	2.5 kW	3 kW	3.6 kW	4 kW	4.6 kW	5 kW	6 kW
Max. apparent output power	2.5 kVA	3 kVA	3.6 kVA	4 kVA	4.6 kVA	5 kVA	6 kVA
Max. output power	2.5 kW	3 kW	3.6 kW	4 kW	4.6 kW	5 kW	6 kW
Rated grid voltage	1/N/PE, 220 V / 230 V						
Rated grid frequency	50 Hz / 60 Hz						
Rated grid output current	11.4 A / 10.9 A	13.6 A / 13 A	16 A / 15.7 A	18.2 A / 17.4 A	20.9 A / 20 A	22.7 A / 21.7 A	27.3 A / 26.1 A
Max. output current	11.4 A	13.6 A	16 A	18.2 A	20.9 A	22.7 A	27.3 A
Power factor	>0.99 (0.8 leading - 0.8 lagging)						
THDi	<3%						
Efficiency							
Max. efficiency	97.3%	97.3%		97.6%		97.7%	
EU efficiency	96.5%	96.6%		97.1%		97.1%	
Protection							
DC reverse-polarity protection	Yes						
Short circuit protection	Yes						
Output over current protection	Yes						
Surge protection	Yes						
Grid monitoring	Yes						
Anti-islanding protection	Yes						
Temperature protection	Yes						
Integrated AFCI (DC arc-fault circuit protection)	Yes [1]						
Integrated DC switch	Yes						
General Data							
Dimensions (W*H*D)	330*371*161 mm						
Weight	8.2 kg	8.3 kg		8.9 kg			9 kg
Topology	Transformerless						
Self-consumption (night)	<1 W						
Operating ambient temperature range	-25 ~ +60°C						
Relative humidity	0-100%						
Ingress protection	IP66						
Cooling concept	Natural convection						
Max. operation altitude	4000 m						
Grid connection standard	G98[2] or G99, VDE-AR-N 4105 / VDE V 0124, EN 50549-1, VDE 0126 / UTE C 15 / VFR:2019, RD 1699 / RD 244 / UNE 206006 / UNE 206007-1, CEI 0-21, C10/11, NRS 097-2-1, EIFS 2018.2, IEC 62116, IEC 61727, IEC60068, IEC 61683, EN 50530, MEA, PEA						
Safety/EMC standard	IEC/EN 62109-1/-2, IEC/EN 61000-6-2/-3						
Features							
DC connection	MC4 connector						
AC connection	Quick connection plug						
Display	LED + APP						
Communication	RS485, USB, Optional: Wi-Fi, GPRS						

(1) Activation required. (2) G98 for 2.5K-3.6K.

C E R T I F I C A T E

of Conformity

Registration No.: AK 50577679 0001

Report No.: CN23NXBZ 001

Holder:
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Product:
PV-Inverter
(Grid-Connected PV Inverter)

Identification:

```
Type Designation: S6-GR1PxxK-S (xx=2.5,3,3.6,4,4.6,5,6)
Serial Number   : Engineering Samples
Firmware Version: A1
Remark          : Refer to report CN23NXBZ 001 for details.
```

Tested acc. to:

```
IEC 61727:2004
IEC 62116:2014
```

The certificate of conformity refers to the above mentioned product. This is to certify that the specimen is in conformity with the assessment requirement mentioned above. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity.

Certification Body

Date 24.03.2023

TÜV Rheinland LGA Products GmbH

Weichun Li

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

TÜV Rheinland (China) Ltd.
Member of TÜV Rheinland Group

TÜVRheinland®
Precisely Right.

Ginlong technologies Co., Ltd.
Qingying Cui

No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Date : 06.04.2023
Our ref. : Jiangyi 01
Your ref.: Qingying Cui

Ref : R TÜV-Bauart-Zeichen o. Akkred. Nr.

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : R 50580695 0001
Report No. : CN23ML6O 001

Dear Qingying Cui,

The above specified equipment has been tested and found to be in accordance with the relevant requirements.

Please find enclosed your certificate as specified above.

If cancellation of the certificate is submitted by 15 November in a given year, no fee will be charged for the following year.

The certificate is issued with the reservation that the license holder applies all information required in § 6 of the ProdSG related to name and address of the manufacturer or his authorized representative / importer, including their respective contact addresses on the product prior to marketing of the product in the European Economic Area.
In case you have a change regarding your involved local representative for the certificate, please inform us in due time.

With kind regards,

Certification Body

Bruce Li

Enclosure

TÜV Rheinland (China) Ltd.
莱茵检测认证服务（中国）有限公司
Room 301, 3F and Room 1203,12F, Building 4, No.15, Ronghua South Road, Beijing Economic-Technological Development Area Beijing (Yizhuang group in high-end industrial area of Beijing Pilot Free Trade Zone), P.R.China,100176
北京市北京经济技术开发区荣华南路15号院4号楼3层301室、12层1203室(北京自贸试验区高端产业片区亦庄组团)
邮编：100176
Tel: 86 10 8524 2222
Fax: 86 10 8524 2200
e-mail: info@bj.chn.tuv.com
Internet: http://www.chn.tuv.com

Zertifikat *Certificate*

Zertifikat Nr. *Certificate No.*
R 50580695

Blatt *Sheet*
0001

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum** *Date of Issue*
Qingying Cui	01-Jiangyi-CN23ML6O 001	06.04.2023 *(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ginlong technologies Co., Ltd.
No. 188 Jinkai Road, Binhai Industrial
Park, Xiangshan, Ningbo,
315712 Zhejiang
P.R. China

Prüfzeichen *Test Mark*
TÜVRheinland ZERTIFIZIERT
Bauart geprüft
Sicherheit
Regelmäßige Produktions-überwachung
www.tuv.com
ID 1111267338

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

Type Designation	: 1) S6-GR1P2.5K-S	2) S6-GR1P3K-S	13
	3) S6-GR1P3.6K-S	4) S6-GR1P4K-S	
Isc PV [Ad.c.]	: 22+22		
Vmax PV [Vd.c.]	: 550		
Max. Input Current Ad.c.]	: 16+16		
MPP Voltage Range[Vd.c.]	: 1)50-550	2)90-550	
	3)90-550	4)90-550	
Overvoltage Category (OVC)	: II for PV		
Rated Output Volt.[Va.c.]	: L+N+PE,220/230		
Rated Output Freq.[Hz]	: 50/60		
Max. Output Curr.[Aa.c.]	: 1)11.4	2)13.6	
	3)16	4)18.2	
Rated Output Power[kW]	: 1)2.5	2)3	
	3)3.6	4)4	
Power Factor	: -0.8 to 0.8		
Overvoltage Category (OVC)	: III for AC mains		

continued on page 0002

13

ANLAGE (Appendix): 1.0

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

TÜV Rheinland LGA Products GmbH Zertifizierungsstelle

Zertifizierungsstelle

Bruce Li

Bruce Li

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
http://www.tuv.com/safety E-mail: markcheck@tuv.com
Fax: +49 221 806-3935

Zertifikat *Certificate*

Zertifikat Nr. *Certificate No.*
R 50580695

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0002

Ihr Zeichen *Client Reference*	Unser Zeichen *Our Reference*	Ausstellungsdatum *Date of Issue*
Qingying Cui	01-Jiangyi-CN23ML6O 001	06.04.2023 *(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ginlong technologies Co., Ltd.
No. 188 Jinkai Road, Binhai Industrial
Park, Xiangshan, Ningbo,
315712 Zhejiang
P.R. China

Prüfzeichen *Test Mark*

TÜVRheinland ZERTIFIZIERT
Bauart geprüft
Sicherheit
Regelmäßige Produktions-überwachung
www.tuv.com
ID 1111267338

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

as page 0001 continuation

Type Designation	: 5) S6-GR1P4.6K-S 6) S6-GR1P5K-S 7) S6-GR1P6K-S	3
Isc PV [Ad.c.]	: 22+22	
Vmax PV [Vd.c.]	: 550	
Max. Input Current Ad.c.]	: 16+16	
MPP Voltage Range[Vd.c.]	: 90-550	
Overvoltage Category (OVC)	: II for PV	
Rated Output Volt.[Va.c.]	: L+N+PE,220/230	
Rated Output Freq.[Hz]	: 50/60	
Max. Output Curr.[Aa.c.]	: 5)20.9 6)22.7 7)27.3	
Rated Output Power[kW]	: 5)4.6 6)5 7)6	
Power Factor	: -0.8 to 0.8	
Overvoltage Category (OVC)	: III for AC mains	

continued on page 0003

3

ANLAGE (Appendix): 1.0

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
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TÜV Rheinland LGA Products GmbH Zertifizierungsstelle

Zertifizierungsstelle

Bruce Li

Bruce Li

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
http://www.tuv.com/safety E-mail: markcheck@tuv.com
Fax: +49 221 806-3935

Zertifikat *Certificate*

Zertifikat Nr. *Certificate No.*
R 50580695

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0003

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum** *Date of Issue*
Qingying Cui	01-Jiangyi-CN23ML6O 001	06.04.2023 *(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ginlong technologies Co., Ltd.
No. 188 Jinkai Road, Binhai Industrial
Park, Xiangshan, Ningbo,
315712 Zhejiang
P.R. China

Prüfzeichen *Test Mark*

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www.tuv.com
ID 1111267338

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

as page 0002 continuation

Protective Class	: I
Enclosure Protection (IP)	: IP66
Pollution degree (PD)	: PD2(inside), PD3(outside)
Altitude [m]	: 4000
Operating Temperature [°C]	: -25 to 60 (>45 derating)
Type of Inverter	: Non-isolated

Remark:
The installation has to be carried out according to the
Any additional requirements in countries where the product
is going to be marketed have to be considered additionally.

ANLAGE (Appendix): 1.0

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
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TÜV Rheinland LGA Products GmbH Zertifizierungsstelle

Zertifizierungsstelle

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http://www.tuv.com/safety E-mail: markcheck@tuv.com
Fax: +49 221 806-3935

solis
GINLONG TECHNOLOGIES CO.,LTD.

S6-GR1P(0.6-3.6)K-M

Solis Mini Series Inverters

Features:

- Max. efficiency 97.3%
- String current up to 14A
- Super high frequency switching technology
- Wide voltage range and low startup voltage
- Precise MPPT algorithm
- Integrated Export Power Manager (EPM)
- AFCI protection, proactively reduces fire risk
- Compact and lightweight
- Friendly and adaptable connection to the grid

Models:

S6-GR1P0.6K-M / S6-GR1P0.7K-M

S6-GR1P1K-M / S6-GR1P1.5K-M

S6-GR1P2K-M / S6-GR1P2.5K-M

S6-GR1P3K-M / S6-GR1P3.6K-M

360° View

DATASHEET

S6-GR1P(0.6-3.6)K-M

Models	0.6K	0.7K	1K	1.5K	2K	2.5K	3K	3.6K
Input DC								
Recommended max. PV power	0.9 kW	1.1 kW	1.5 kW	2.3 kW	3 kW	3.8 kW	4.5 kW	5.4 kW
Max. input voltage	600 V							
Rated voltage	200 V				330 V			
Start-up voltage	60 V				90 V			
MPPT voltage range	50-500 V				80-500 V			
Max. input current	14 A							19 A
Max. short circuit current	22 A							24 A
MPPT number/Max. input strings number	1/1							1/2
Output AC								
Rated output power	0.6 kW	0.7 kW	1 kW	1.5 kW	2 kW	2.5 kW	3 kW	3.6 kW
Max. apparent output power	0.6 kVA	0.77 kVA	1.1 kVA	1.65 kVA	2.2 kVA	2.75 kVA	3.3 kVA	3.6 kVA
Max. output power	0.6 kW	0.77 kW	1.1 kW	1.65 kW	2.2 kW	2.75 kW	3.3 kW	3.6 kW
Rated grid voltage	1/N/PE, 220 V / 230 V							
Rated grid frequency	50 Hz / 60 Hz							
Rated grid output current	2.6 A	3.2 A / 3.0 A	4.5 A / 4.3 A	6.8 A / 6.5 A	9.1 A / 8.7 A	11.4 A / 10.9 A	13.6 A / 13 A	16 A
Max. output current	2.6 A	4.4 A	5.2 A	8.1 A	10.5 A	13.3 A	15.7 A	16 A
Power factor	>0.99 (0.8 leading - 0.8 lagging)							
THDi	<3%							
Efficiency								
Max. efficiency	96.6%			96.6%	97.1%	97.1%		97.3%
EU efficiency	95.3%			95.4%	96.4%	96.7%		96.8%
Protection								
DC reverse-polarity protection	Yes							
Short circuit protection	Yes							
Output over current protection	Yes							
Surge protection	Yes							
Grid monitoring	Yes							
Anti-islanding protection	Yes							
Temperature protection	Yes							
Integrated AFCI (DC arc-fault circuit protection)	Yes (1)							
Integrated DC switch	Optional							
General Data								
Dimensions (W*H*D)	310*373*160 mm							
Weight	7.4 kg					7.7 kg		
Topology	Transformerless							
Self-consumption (night)	<1 W							
Operating ambient temperature range	-25 ~ +60°C							
Relative humidity	0-100%							
Ingress protection	IP66							
Cooling concept	Natural convection							
Max. operation altitude	4000 m							
Grid connection standard	G98 or G99, VDE-AR-N 4105 / VDE V 0124, EN 50549-1, VDE 0126 / UTE C 15 / VFR:2019, RD 1699 / RD 244 / UNE 206006 / UNE 206007-1, CEI 0-21, C10/11, NRS 097-2-1, EIFS 2018.2, IEC 62116, IEC 61727, IEC 60068, IEC 61683, EN 50530, MEA, PEA							
Safety/EMC standard	IEC/EN 62109-1/-2, IEC/EN 61000-6-1/-2/-3/-4							
Features								
DC connection	MC4 connector							
AC connection	Quick connection plug							
Display	LCD							
Communication	RS485, Optional: Wi-Fi, GPRS							

(1) Activation required.

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50516877

Blatt *Sheet*
0001

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum** *Date of Issue*
Qingying Cui	01-Pengmar-CN21SFB3 001	30.08.2021 *(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Prüfzeichen *Test Mark*

TÜVRheinland® ZERTIFIZIERT
Bauart geprüft
Sicherheit
Regelmäßige Produktions-überwachung
www.tuv.com ID 1111244287

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation) *Certified Product (Product Identification)*

Lizenzentgelte - Einheit *License Fee - Unit*

PV-Wechselrichter (Grid-connected PV Inverter)

Type Designation	: S6-GR1P0.7K-M-R S6-GR1P0.7K-M	13
Vmax PV [Vd.c.]	: 600	
Isc PV [Ad.c.]	: 22	
MPP Voltage Range[Vd.c.]	: 50-500	
Max. Input Current[Ad.c.]	: 14	
Rated Output Power[W]	: 700	
Max. Output Curr.[Aa.c.]	: 4.4	

Type Designation	: S6-GR1P1K-M-R S6-GR1P1K-M	
Vmax PV [Vd.c.]	: 600	
Isc PV [Ad.c.]	: 22	
MPP Voltage Range[Vd.c.]	: 50-500	
Max. Input Current[Ad.c.]	: 14	
Rated Output Power[W]	: 1000	
Max. Output Curr.[Aa.c.]	: 5.2	

Continued on page 0002

13

ANLAGE (Appendix): 1.0

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TÜV Rheinland LGA Products GmbH Zertifizierungsstelle

Zertifizierungsstelle

Bruce Li

Bruce Li

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
http://www.tuv.com/safety E-mail: markcheck@tuv.com
Fax: +49 221 806-3935

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Member of TÜV Rheinland Group

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Precisely Right.

Ginlong technologies Co., Ltd.
Qingying Cui

No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Date : 17.09.2021
Our ref. : Pengmar 01
Your ref.: Qingying Cui

Ref : R TÜV-Bauart-Zeichen o. Akkred. Nr.

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : R 50516877 0001
Report No. : CN21SFB3 001

Dear Qingying Cui,

The above specified equipment has been tested and found to be in accordance with the relevant requirements.

Please find enclosed your certificate as specified above.

If cancellation of the certificate is submitted by 15 November in a given year, no fee will be charged for the following year.

The certificate is issued with the reservation that the license holder applies all information required in § 6 of the ProdSG related to name and address of the manufacturer or his authorized representative / importer, including their respective contact addresses on the product prior to marketing of the product in the European Economic Area.

With kind regards,

Certification Body

Bruce Li

Bruce Li

Enclosure

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50516877

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0002

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum** *Date of Issue*
Qingying Cui	01-Pengmar-CN21SFB3 001	17.09.2021 *(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Prüfzeichen *Test Mark*

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www.tuv.com
ID 1111244287

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product ***(Product Identification)***

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

as page 0001 continuation 4

Type Designation	: S6-GR1P1.5K-M-R S6-GR1P1.5K-M
Vmax PV [Vd.c.]	: 600
Isc PV [Ad.c.]	: 22
MPP Voltage Range[Vd.c.]	: 50-500
Max. Input Current[Ad.c.]	: 14
Rated Output Power[W]	: 1500
Max. Output Curr.[Aa.c.]	: 8.1

Type Designation	: S6-GR1P2K-M-R S6-GR1P2K-M
Vmax PV [Vd.c.]	: 600
Isc PV [Ad.c.]	: 22
MPP Voltage Range[Vd.c.]	: 80-500
Max. Input Current[Ad.c.]	: 14
Rated Output Power[W]	: 2000
Max. Output Curr.[Aa.c.]	: 10.5

Continued on page 0003

4

ANLAGE (Appendix): 1.0

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TÜV Rheinland LGA Products GmbH Zertifizierungsstelle

Zertifizierungsstelle

Bruce Li

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Ginlong technologies Co., Ltd.
Qingying Cui

No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Date : 17.09.2021
Our ref. : Pengmar 01
Your ref.: Qingying Cui

Ref : R TÜV-Bauart-Zeichen o. Akkred. Nr.

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : R 50516877 0002
Report No. : CN21SFB3 001

Dear Qingying Cui,

The above specified equipment has been tested and found to be in accordance with the relevant requirements.

Please find enclosed your certificate as specified above.

If cancellation of the certificate is submitted by 15 November in a given year, no fee will be charged for the following year.

The certificate is issued with the reservation that the license holder applies all information required in § 6 of the ProdSG related to name and address of the manufacturer or his authorized representative / importer, including their respective contact addresses on the product prior to marketing of the product in the European Economic Area.

With kind regards,

Certification Body

Bruce Li

Bruce Li

cc: Ginlong technologies Co., Ltd.

Enclosure

TÜV Rheinland (China) Ltd.
Room 301, 3F and Room 1203, 12F,
Building 4, No. 15, Ronghua South Road,
Beijing Economic-Technological
Development Area, Beijing
www.chn.tuv.com

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12层1203室
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Tel: 86 10 8524 2222
Fax: 86 10 8524 2200
Hotline: 400 883 1300
800 999 3668
GC Service mailbox: service-gc@tuv.com

电话：86 10 8524 2222
传真：86 10 8524 2200
热线：400 883 1300
800 999 3668
大中华区服务邮箱: service-gc@tuv.com

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50516877

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0003

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum**	*Date of Issue*
Qingying Cui	01-Pengmar-CN21SFB3 001	17.09.2021	*(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
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P.R. China

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EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation) *Certified Product (Product Identification)*

Lizenzentgelte - Einheit *License Fee - Unit*

PV-Wechselrichter (Grid-connected PV Inverter)

as page 0002 continuation 4

Type Designation	: S6-GR1P2.5K-M-R S6-GR1P2.5K-M
Vmax PV [Vd.c.]	: 600
Isc PV [Ad.c.]	: 22
MPP Voltage Range[Vd.c.]	: 80-500
Max. Input Current[Ad.c.]	: 14
Rated Output Power[W]	: 2500
Max. Output Curr.[Aa.c.]	: 13.3

Type Designation	: S6-GR1P3K-M-R S6-GR1P3K-M
Vmax PV [Vd.c.]	: 600
Isc PV [Ad.c.]	: 22
MPP Voltage Range[Vd.c.]	: 80-500
Max. Input Current[Ad.c.]	: 14
Rated Output Power[W]	: 3000
Max. Output Curr.[Aa.c.]	: 15.7

Continued on page 0004

ANLAGE (Appendix): 1.0

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TÜV Rheinland LGA Products GmbH Zertifizierungsstelle

Zertifizierungsstelle
Bruce Li

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http://www.tuv.com/safety E-mail: markcheck@tuv.com
Fax: +49 221 806-3935

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Member of TÜV Rheinland Group

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Qingying Cui

No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Date : 17.09.2021
Our ref. : Pengmar 01
Your ref.: Qingying Cui

Ref : R TÜV-Bauart-Zeichen o. Akkred. Nr.

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : R 50516877 0003
Report No. : CN21SFB3 001

Dear Qingying Cui,

The above specified equipment has been tested and found to be in accordance with the relevant requirements.

Please find enclosed your certificate as specified above.

If cancellation of the certificate is submitted by 15 November in a given year, no fee will be charged for the following year.

The certificate is issued with the reservation that the license holder applies all information required in § 6 of the ProdSG related to name and address of the manufacturer or his authorized representative / importer, including their respective contact addresses on the product prior to marketing of the product in the European Economic Area.

With kind regards,

Certification Body

Bruce Li

cc: Ginlong technologies Co., Ltd.

Enclosure

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50516877

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0004

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum** *Date of Issue*
Qingying Cui	01-Pengmar-CN21SFB3 001	17.09.2021 *(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Prüfzeichen *Test Mark*

TÜVRheinland® ZERTIFIZIERT
Bauart geprüft
Sicherheit
Regelmäßige Produktions-überwachung
www.tuv.com ID 1111244287

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

as page 0003 continuation 2

Type Designation	: S6-GR1P3.6K-M-R S6-GR1P3.6K-M
Vmax PV [Vd.c.]	: 600
Isc PV [Ad.c.]	: 30
MPP Voltage Range[Vd.c.]	: 80-500
Max. Input Current[Ad.c.]	: 19
Rated Output Power[W]	: 3600
Max. Output Curr.[Aa.c.]	: 16

Continued on page 0005

2

ANLAGE (Appendix): 1.0

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
http://www.tuv.com/safety E-mail: markcheck@tuv.com
Fax: +49 221 806-3935

TÜV Rheinland LGA Products GmbH Zertifizierungsstelle

Zertifizierungsstelle
Bruce Li

TÜV Rheinland (China) Ltd.
Member of TÜV Rheinland Group

TÜVRheinland®
Precisely Right.

Ginlong technologies Co., Ltd.
Qingying Cui

No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Date : 17.09.2021
Our ref. : Pengmar 01
Your ref.: Qingying Cui

Ref : R TÜV-Bauart-Zeichen o. Akkred. Nr.

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : R 50516877 0004
Report No. : CN21SFB3 001

Dear Qingying Cui,

The above specified equipment has been tested and found to be in accordance with the relevant requirements.

Please find enclosed your certificate as specified above.

If cancellation of the certificate is submitted by 15 November in a given year, no fee will be charged for the following year.

The certificate is issued with the reservation that the license holder applies all information required in § 6 of the ProdSG related to name and address of the manufacturer or his authorized representative / importer, including their respective contact addresses on the product prior to marketing of the product in the European Economic Area.

With kind regards,

Certification Body

Bruce Li

Bruce Li

cc: Ginlong technologies Co., Ltd.

Enclosure

TÜV Rheinland (China) Ltd.
Room 301, 3F and Room 1203, 12F,
Building 4, No. 15, Ronghua South Road,
Beijing Economic-Technological
Development Area, Beijing
www.chn.tuv.com

莱茵检测认证服务(中国)有限公司
北京市北京经济技术开发区
荣华南路15号院4号楼3层301室
12层1203室
邮编：100176
www.chn.tuv.com

Tel: 86 10 8524 2222
Fax: 86 10 8524 2200
Hotline: 400 883 1300
800 999 3668
GC Service mailbox: service-gc@tuv.com

电话：86 10 8524 2222
传真：86 10 8524 2200
热线：400 883 1300
800 999 3668
大中华区服务邮箱: service-gc@tuv.com

Zertifikat *Certificate*

TÜVRheinland®

Zertifikat Nr. *Certificate No.*
R 50516877

Blatt *Sheet*
0005

Ihr Zeichen *Client Reference*	**Unser Zeichen** *Our Reference*	**Ausstellungsdatum** *Date of Issue*
Qingying Cui	01-Pengmar-CN21SFB3 001	17.09.2021 *(day/mo/yr)*

Genehmigungsinhaber *License Holder*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Fertigungsstätte *Manufacturing Plant*
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Prüfzeichen *Test Mark*

TÜVRheinland ZERTIFIZIERT
Bauart geprüft
Sicherheit
Regelmäßige Produktions-überwachung
www.tuv.com ID 1111244287

Geprüft nach *Tested acc. to*
IEC 62109-1:2010
IEC 62109-2:2011
EN 62109-1:2010
EN 62109-2:2011

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Wechselrichter (Grid-connected PV Inverter)

as page 0004 continuation

Overvoltage Category (OVC)	: II for PV
Rated Output Volt. [Va.c.]	: 1/N/PE, 220 V / 230 V
Rated Output Freq. [Hz]	: 50 / 60
Power Factor	: [-0.80, 0.80]
Overvoltage Category (OVC)	: III for AC mains
Protective Class	: Class I
Ingress Protection (IP)	: IP66
Pollution Degree (PD)	: PD 2 (inside) PD 3 (outside)
Altitude [m]	: 2000
Operating Temperature [°C]	: -25 to +60
Type of Inverter	: Non-isolated

Remark(s):
The installation has to be carried out according to the attached installation instruction.
Any additional requirements in countries where the product is going to be marketed have to be considered additionally.

ANLAGE (Appendix): 1.0

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

TÜV Rheinland LGA Products GmbH Zertifizierungsstelle

Zertifizierungsstelle

Bruce Li

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
http://www.tuv.com/safety E-mail: markcheck@tuv.com
Fax: +49 221 806-3935

TÜV Rheinland (China) Ltd.
Member of TÜV Rheinland Group

TÜVRheinland®
Precisely Right.

Ginlong technologies Co., Ltd.
Qingying Cui

No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Date : 17.09.2021
Our ref. : Pengmar 01
Your ref.: Qingying Cui

Ref : R TÜV-Bauart-Zeichen o. Akkred. Nr.

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : R 50516877 0005
Report No. : CN21SFB3 001

Dear Qingying Cui,

The above specified equipment has been tested and found to be in accordance with the relevant requirements.

Please find enclosed your certificate as specified above.

If cancellation of the certificate is submitted by 15 November in a given year, no fee will be charged for the following year.

The certificate is issued with the reservation that the license holder applies all information required in § 6 of the ProdSG related to name and address of the manufacturer or his authorized representative / importer, including their respective contact addresses on the product prior to marketing of the product in the European Economic Area.

With kind regards,

Certification Body

Bruce Li

Bruce Li

cc: Ginlong technologies Co., Ltd.

Enclosure

TÜV Rheinland (China) Ltd.
Room 301, 3F and Room 1203, 12F,
Building 4, No. 15, Ronghua South Road,
Beijing Economic-Technological
Development Area, Beijing
www.chn.tuv.com

莱茵检测认证服务(中国)有限公司
北京市北京经济技术开发区
荣华南路15号院4号楼3层301室
12层1203室
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Hotline : 400 883 1300
800 999 3668
GC Service mailbox : service-gc@tuv.com

电话：86 10 8524 2222
传真：86 10 8524 2200
热线：400 883 1300
800 999 3668
大中华区服务邮箱：service-gc@tuv.com

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Product Service

Compliance Document

No. D 086470 0114 Rev. 00

Holder of Certificate: **Ginlong Technologies Co., Ltd.**
No.57 Jintong Road
Binhai Industrial Park, Xiangshan
315712 Ningbo, Zhejiang
PEOPLE'S REPUBLIC OF CHINA

Product: **Converter (PV-Inverter)**

This Compliance document confirms the compliance with the listed standards on a voluntary basis. It refers only to the sample submitted for testing and certification and does not certify the quality or safety of the serial products. For details see: www.tuvsud.com/ps-cert

Test report no.: 64772228006301

Date, 2022-06-08

(Tony Liu)

TÜV SÜD Product Service GmbH • Certification Body • Ridlerstraße 65 • 80339 Munich • Germany

TÜV®

Product Service

Compliance Document

No. D 086470 0114 Rev. 00

Model(s): S6-GR1P3.6K-M, S6-GR1P3K-M, S6-GR1P2.5K-M, S6-GR1P2K-M, S6-GR1P1.5K-M, S6-GR1P1K-M, S6-GR1P0.7K-M, S6-GR1P3.6K-M-R, S6-GR1P3K-M-R, S6-GR1P2.5K-M-R, S6-GR1P2K-M-R, S6-GR1P1.5K-M-R, S6-GR1P1K-M-R, S6-GR1P0.7K-M-R

Trade name: solis

TÜV SÜD Product Service GmbH • Certification Body • Ridlerstraße 65 • 80339 Munich • Germany

Product Service

Compliance Document

No. D 086470 0114 Rev. 00

Parameters:

Model:	S6-GR1P0.7K-M S6-GR1P0.7K-M-R	S6-GR1P1K-M S6-GR1P1K-M-R	S6-GR1P1.5K-M S6-GR1P1.5K-M-R
INPUT			
V_{MAX} PV [Vdc]	600		
I_{SC} PV[A]	22		
MPP Voltage Range V_{MPP}[Vdc]	50-500		
Max. Input Current Imax [A]	14		
MPP Full Power Voltage Range [Vdc]	66-500	94-500	141-500
Start PV Voltage [Vdc]	60		
Backfeed Current [A]	0		
Overvoltage Category (OVC)	II		
OUTPUT			
Rated Output Voltage Ur [Vac]	1/N/PE, 220/230V		
Normal Operating Voltage Range Un [Vac]	176-253V/184-264V		
Rated Output Frequency F_{NETZ} [Hz]	50/60		
Normal Operating Frequency Range F_n [Hz]	45-55Hz/55-65Hz		
Rated Output Power P_E [W]	700	1000	1500
Max. Output Power P_{Emax} [W]	800	1100	1700
Max. Output Current Imax [A]	4.4	5.2	8.1
Power Factor cosφ [Λ]	-0.8, 0.8		
Standby Power Consumption [W]	＜1		
Night Power Consumption [W]	＜1		
THD [V / I] (100% full power)	＜3%		
Acoustic Noise [dB]	＜20		
Overvoltage Category (OVC)	III		
SYSTEM			
Protective Class	I		
Enclosure Protection (IP)	IP66		
Operating Temperature Range [°C]	-25 to +60		
Pollution degree (PD)	PD2		
Altitude [m]	2000		
Array Insulation Resistance Detection [Ω]	200K		
The accuracy of resistance measurement [%]	＜10		

Model:	S6-GR1P2K-M S6-GR1P2K-M-R	S6-GR1P2.5K-M S6-GR1P2.5K-M-R
INPUT		
V_{MAX} PV [Vdc]	600	
I_{SC} PV[A]	22	
MPP Voltage Range V_{MPP}[Vdc]	80-500	
Max. Input Current Imax [A]	14	
MPP Full Power Voltage Range [Vdc]	187-500	234-500
Start PV Voltage [Vdc]	90	
Backfeed Current [A]	0	
Overvoltage Category (OVC)	II	
OUTPUT		
Rated Output Voltage Ur [Vac]	1/N/PE, 220/230V	
Normal Operating Voltage Range Un [Vac]	176-253V/184-264V	
Rated Output Frequency F_{NETZ} [Hz]	50/60	
Normal Operating Frequency Range F_n [Hz]	45-55Hz/55-65Hz	
Rated Output Power P_E [W]	2000	2500
Max. Output Power P_{Emax} [W]	2200	2800
Max. Output Current Imax [A]	10.5	13.3

TÜV SÜD Product Service GmbH • Certification Body • Ridlerstraße 65 • 80339 Munich • Germany

Product Service

Compliance Document

No. D 086470 0114 Rev. 00

Power Factor cosφ [ʎ]	-0.8, 0.8
Standby Power Consumption [W]	＜1
Night Power Consumption [W]	＜1
THD [V / I] (100% full power)	＜3%
Acoustic Noise [dB]	＜20
Overvoltage Category (OVC)	III
SYSTEM	
Protective Class	I
Enclosure Protection (IP)	IP66
Operating Temperature Range [°C]	-25 to +60
Pollution degree (PD)	PD2
Altitude [m]	2000
Array Insulation Resistance Detection [Ω]	200K
The accuracy of resistance measurement [%]	＜10

Model:	S6-GR1P3K-M S6-GR1P3K-M-R	S6-GR1P3.6K-M S6-GR1P3.6K-M-R
INPUT		
V_{MAX} PV [Vdc]	600	
I_{SC} PV[A]	22	30
MPP Voltage Range V_{MPP}[Vdc]	80-500	
Max. Input Current Imax [A]	14	19
MPP Full Power Voltage Range [Vdc]	281-500	195-500
Start PV Voltage [Vdc]	90	
Backfeed Current [A]	0	
Overvoltage Category (OVC)	II	
OUTPUT		
Rated Output Voltage Ur [Vac]	1/N/PE, 220/230V	
Normal Operating Voltage Range Un [Vac]	176-253V/184-264V	
Rated Output Frequency F_{NETZ} [Hz]	50/60	
Normal Operating Frequency Range F_n [Hz]	45-55Hz/55-65Hz	
Rated Output Power P_E [W]	3000	3600
Max. Output Power P_{Emax} [W]	3300	3600
Max. Output Current Imax [A]	15.7	16
Power Factor cosφ [ʎ]	-0.8, 0.8	
Standby Power Consumption [W]	＜1	
Night Power Consumption [W]	＜1	
THD [V / I] (100% full power)	＜3%	
Acoustic Noise [dB]	＜20	
Overvoltage Category (OVC)	III	
SYSTEM		
Protective Class	I	
Enclosure Protection (IP)	IP66	
Operating Temperature Range [°C]	-25 to +60	
Pollution degree (PD)	PD2	
Altitude [m]	2000	
Array Insulation Resistance Detection [Ω]	200K	
The accuracy of resistance measurement [%]	＜10	

Tested according to:

EN IEC 61000-3-11:2019
EN 61000-3-12:2011

TÜV SÜD Product Service GmbH • Certification Body • Ridlerstraße 65 • 80339 Munich • Germany

TÜV®

CERTIFICATE

TÜVRheinland®

of Conformity
Low Voltage Directive 2014/35/EU

Registration No.: AN 50519078 0001

Report No.: CN21SFB3 001

Holder:

Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Product:

PV-Inverter
(Grid-connected PV Inverter)

Identification:

Type Designation: S6-GR1P3.6K-M S6-GR1P3K-M S6-GR1P2.5K-M
S6-GR1P2K-M S6-GR1P1.5K-M S6-GR1P1K-M
S6-GR1P0.7K-M S6-GR1P3.6K-M-R S6-GR1P3K-M-R
S6-GR1P2.5K-M-R S6-GR1P2K-M-R S6-GR1P1.5K-M-R
S6-GR1P1K-M-R S6-GR1P0.7K-M-R
Serial Number : Engineering Sample
Remark(s) : Issued in conjunction with TÜV Rheinland license R 50516877 0001-0005.

This certificate of conformity is based on an evaluation of a sample of the above mentioned product. Technical Report and documentation are at the Licence Holder's disposal. This is to certify that the tested sample is in conformity with Annex I of Council Directive 2014/35/EU, referred to as the Low Voltage Directive. This certificate does not imply assessment of the series-production of the product and does not permit the use of a TÜV Rheinland mark of conformity. The holder of the certificate is authorized to use this certificate in connection with the EC declaration of conformity according to Annex IV of the Directive.

TÜV Rheinland LGA Products GmbH Zertifizierungsstelle TÜV Rheinland®

Certification Body

Bruce Li

Date 17.09.2021

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

CE **The CE marking may be used if all relevant and effective EC Directives are complied with.** CE

TÜV Rheinland (China) Ltd.
Member of TÜV Rheinland Group

TÜVRheinland®
Precisely Right.

Ginlong technologies Co., Ltd.
Qingying Cui

No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Date : 17.09.2021
Our ref. : DJW 01
Your ref.: Qingying Cui

Ref : AN Certificate of Conf. Low Voltage D.

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : AN 50519078 0001
Report No. : CN21SFB3 001

Dear Qingying Cui,

We herewith confirm that a sample of the above mentioned technical equipment has been tested and was found to be in accordance with the relevant requirements.

Enclosed please find your Certificate of Conformity.

We appreciate your kind support and would like to offer our assistance and continuous services in the future.

With kind regards,

Certification Body

Bruce Li

Bruce Li

Enclosure

C E R T I F I C A T E

of Conformity
EC Council Directive 2014/30/EU
Electromagnetic Compatibility

Registration No.: AE 50555891 0001

Report No.: 50084876 012

Holder:
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Product:
PV-Inverter
(Grid-connected PV Inverter)

Identification:
See type designations in attachment 1.1
Serial No.: n.a.
Remark: Refer to test reports 50084876 001-012 for details.
Continued on page 0002.

Tested acc. to:
EN IEC 61000-6-4:2019
EN IEC 61000-6-3:2021
EN IEC 61000-6-2:2019
EN IEC 61000-6-1:2019
EN 55011:2016+A1+A11+A2

This certificate of conformity is based on an evaluation of a sample of the above mentioned product. Technical Report and documentation are at the Licence Holder's disposal. This is to certify that the tested sample is in conformity with all provisions of Annex I of Council Directive 2014/30/EU.
This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity. The holder of the certificate is authorized to use this certificate in connection with the EC declaration of conformity according to the a.m. Directive.

Certification Body

Date 19.08.2022

Xinhua Lu

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

CE The CE marking may only be used if all relevant and effective EC Directives are complied with. CE

C E R T I F I C A T E

of Conformity
EC Council Directive 2014/30/EU
Electromagnetic Compatibility

Registration No.: AE 50555891 0002

Report No.: 50084876 012

Holder:
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Product:
PV-Inverter
(Grid-connected PV Inverter)

Identification:
See type designations in attachment 1.1
Serial No.: n.a.
Remark: Refer to test reports 50084876 001-012 for details.
Refer to page 0001.

Tested acc. to:
IEC 61000-6-4:2018
IEC 61000-6-3:2020
IEC 61000-6-2:2016
IEC 61000-6-1:2016
CISPR 11:2015+A1+A2

This certificate of conformity is based on an evaluation of a sample of the above mentioned product. Technical Report and documentation are at the Licence Holder's disposal. This is to certify that the tested sample is in conformity with all provisions of Annex I of Council Directive 2014/30/EU.
This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity. The holder of the certificate is authorized to use this certificate in connection with the EC declaration of conformity according to the a.m. Directive.

Certification Body

Date 19.08.2022

Xinhua Lu

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

CE The CE marking may only be used if all relevant and effective EC Directives are complied with. CE

TÜVRheinland®

1.1

TÜV Rheinland
LGA Products GmbH
Tillystraße 2, 90431 Nürnberg

Attachment to
Registration No.: AE 50555891 0001
Report No.: 50084876 012

Manufacturer:
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Scope:

type designation:

Solis-mini-700-4G	S5-GR1P0.7K-M	S6-GR1P0.7K-M
S6-GR1P0.7K-M-R	Solis-mini-1000-4G	S5-GR1P1K-M
S6-GR1P1K-M	S6-GR1P1K-M-R	Solis-mini-1500-4G
S5-GR1P1.5K-M	S6-GR1P1.5K-M	S6-GR1P1.5K-M-R
Solis-mini-2000-4G	S5-GR1P2K-M	S6-GR1P2K-M
S6-GR1P2K-M-R	Solis-mini-2500-4G	S5-GR1P2.5K-M
S6-GR1P2.5K-M	S6-GR1P2.5K-M-R	Solis-mini-3000-4G
S5-GR1P3K-M	S6-GR1P3K-M	S6-GR1P3K-M-R
Solis-mini-3600-4G	S5-GR1P3.6K-M	S6-GR1P3.6K-M
S6-GR1P3.6K-M-R	S6-GR1P1K-M-LV	
S6-GR1P0.6K-M		

TÜV Rheinland LGA Products GmbH TÜVRheinland Zertifizierungsstelle

Certification Body

Date: 2022-08-19

Xinhua Lu

GINLONG

CE

EU Declaration of Conformity – CE

This is to declare that the products listed below have been manufactured according to the following EU directives:

- **Low Voltage Directive 2014/35/EU**
- **Electromagnetic Compatibility 2014/30/EU**
- **2011/65/EU RoHS Directive**

Manufacturer	Ginlong (Solis) Technologies Co., Ltd.
Address	NO.57 Jintong Road, Binhai Industrial Park, Xiangshan Ningbo, Zhejiang, 315712, China
Product Type	Grid-connected PV Inverter
Model	Solis-mini-700-4G, Solis-mini-1000-4G, Solis-mini-1500-4G, Solis-mini-2000-4G, Solis-mini-2500-4G, Solis-mini-3000-4G, Solis-mini-3600-4G, S5-GR1P0.7K-M, S5-GR1P1K-M, S5-GR1P1.5K-M, S5-GR1P2K-M, S5-GR1P2.5K-M, S5-GR1P3K-M, S5-GR1P3.6K-M, S6-GR1P0.7K-M, S6-GR1P1K-M, S6-GR1P1.5K-M, S6-GR1P2K-M, S6-GR1P2.5K-M, S6-GR1P3K-M, S6-GR1P3.6K-M,

The following standards have been applied according to the aforementioned directives:

Low Voltage Directive 2014/35/EU
EN 62109-1:2010, EN 62109-2:2011

Electromagnetic Compatibility 2014/30/EU
EN 55011:2016
EN 61000-6-1:2007, EN 61000-6-2:2005, EN 61000-6-3:2007+A1, EN 61000-6-4:2007+A1
IEC 61000-3-2:2018+A1, IEC 61000-3-3:2013+A1+A2

Rohs Directive 2011/65/EU
EN 63000:2018

All modifications to this declaration will be confirmed by Ginlong, otherwise this declaration will no longer be valid. The product defined here-in was manufactured under the condition of the EU directive and standards. Product responsibility is within the manufacturer's guarantee and this declaration of conformity is issued under the responsibility of the manufacturer.

Ningbo, 2.Nov.2021

锦浪科技股份有限公司
GINLONG TECHNOLOGIES CO.,LTD.

PanRuyi
Certification Supervisor

C E R T I F I C A T E
of Conformity

TÜVRheinland®

Registration No.: AK 50522088 0001

Report No.: 50281041 007

Holder:
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Product:
PV-Inverter
(Grid-connected PV Inverter)

Identification:

```
Type Designation : Solis-aaK-5G (aa=25,30,33,36,40)
                   Solis-bbK-HV-5G (bb=40,50)
                   Solis-ccK-LV-5G (cc=15,20,23)
                   S5-GCxxK (xx=25,30,33,36,40)
                   S5-GCyyK-HV (yy=40,50)
                   S5-GCzzK-LV (zz=15,20,23)
Serial Number    : Engineering Samples
Firmware version : V31
Remark(s)        : Refer to report 50281041 007 for details.
```

Tested acc. to:
IEC 61727:2004
IEC 62116:2014

The certificate of conformity refers to the above mentioned product. This is to certify that the specimen is in conformity with the assessment requirement mentioned above. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity.

Certification Body

TÜV Rheinland LGA Products GmbH Zertifizierstelle TÜV Rheinland

Date 22.10.2021

Weichun Li

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

C E R T I F I C A T E

of Conformity

Registration No.: AK 50570569 0001

Report No.: CN22VJC9 001

Holder:

Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Product:

PV-Inverter
(Grid-Connected PV Inverter)

Identification:

```
Type Designation : Solis-xxK-5G-PRO(xx=75,80,100,110,125)
Serial Number    : Engineering Samples
Firmware version : A1
Remark(s)        : Refer to report CN22VJC9 001 for details.
```

Tested acc. to:

IEC 61727:2004
IEC 62116:2014

The certificate of conformity refers to the above mentioned product. This is to certify that the specimen is in conformity with the assessment requirement mentioned above. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity.

Certification Body

Date 05.01.2023

TÜV Rheinland LGA Products GmbH TÜVRheinland

Weichun Li

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

C E R T I F I C A T E

of Conformity

TÜVRheinland®

Registration No.: AK 50514285 0001

Report No.: CN20G2DH 002

Holder:

Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Product:

PV-Inverter
(Grid-Connected PV Inverter)

Identification:

Type Designation: S6-GR1PxxK (xx=2.5,3,3.6,4,4.6,5,6)
Solis-1Pxxk-4G (xx=2.5,3,3.6,4,4.6,5,6)
Firmware Version: V2F
Serial Number : Engineering Samples
Remark : Refer to test report CN20G2DH 002 for detail.

Tested acc. to:

IEC 61727:2004
IEC 62116:2014

The certificate of conformity refers to the above mentioned product. This is to certify that the specimen is in conformity with the assessment requirement mentioned above. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity.

Certification Body

TÜV Rheinland LGA Products GmbH Zertifizierstelle TÜV Rheinland

Date 27.08.2021

Weichun Li

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

TÜV Rheinland (China) Ltd.
Member of TÜV Rheinland Group

TÜVRheinland®
Precisely Right.

Ginlong technologies Co., Ltd.
Zhang Kun

No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Date : 27.08.2021
Our ref. : LIUPHI 01
Your ref.: Z.K

Ref : AK Certificate of Conformity

Type of Equipment : Grid-Connected PV Inverter
Model Designation : See Certificate
Certificate No. : AK 50514285 0001
Report No. : CN20G2DH 002

Dear Zhang Kun,

We herewith confirm that a sample of the above mentioned technical equipment has been tested and was found to be in accordance with the relevant requirements.

Enclosed please find your Certificate of Conformity.

We appreciate your kind support and would like to offer our assistance and continuous services in the future.

With kind regards,

Certification Body

Weichun Li

Enclosure

C E R T I F I C A T E
of Conformity

TÜVRheinland®

Registration No.: AK 50514507 0001

Report No.: 50171233 006

Holder:
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Product:
PV-Inverter
(Grid-connected PV Inverter)

Identification:

```
Type Designation : Solis-3PxK-4G   S5-GR3PyK
                   (x=5,6,8,9,10,12,15,17,20)
                   (y=3,4,5,6,8,9,10,12,13,15,17,20)
Serial Number    : Engineering Samples
Firmware version : V18
Remark(s)        : Refer to report 50171233 006 for details.
```

Tested acc. to:
IEC 61727:2004
IEC 62116:2014

The certificate of conformity refers to the above mentioned product. This is to certify that the specimen is in conformity with the assessment requirement mentioned above. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity.

Certification Body
TÜV Rheinland LGA Products GmbH Zertifizierstelle TÜV Rheinland®

Date 13.08.2021

Weichun Li

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

TÜV Rheinland (China) Ltd.
Member of TÜV Rheinland Group

TÜVRheinland®
Precisely Right.

Ginlong technologies Co., Ltd.
Zhang Kun

No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Date : 13.08.2021
Our ref. : PJG 01
Your ref.: Kun Zhang

Ref : AK Certificate of Conformity

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : AK 50514556 0001
Report No. : 50330358 004

Dear Zhang Kun,

We herewith confirm that a sample of the above mentioned technical equipment has been tested and was found to be in accordance with the relevant requirements.

Enclosed please find your Certificate of Conformity.

We appreciate your kind support and would like to offer our assistance and continuous services in the future.

With kind regards,

Certification Body

Weichun Li

CC: Ginlong technologies Co., Ltd.

Enclosure

C E R T I F I C A T E
of Conformity

TÜVRheinland®

Registration No.: AK 50510974 0001

Report No.: CN21KSGT 001

Holder:
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Product:
PV-Inverter
(Grid-Connected PV Inverter)

Identification:

Type Designation	:	S5-GC50K S5-GC60K S5-GC60K-HV S5-GC70K-HV
Serial Number	:	Engineering Samples
Firmware version	:	VD6
Remark(s)	:	Refer to report CN21KSGT 001 for details.

Tested acc. to:
IEC 61727:2004
IEC 62116:2014

The certificate of conformity refers to the above mentioned product. This is to certify that the specimen is in conformity with the assessment requirement mentioned above. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity.

Certification Body

Date 14.07.2021

Weichun Li

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

TÜV Rheinland (China) Ltd.
Member of TÜV Rheinland Group

TÜVRheinland®
Precisely Right.

Ginlong technologies Co., Ltd.
Zhang Kun

No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Date : 14.07.2021
Our ref. : PJG 01
Your ref.: Kun Zhang

Ref : AK Certificate of Conformity

Type of Equipment : Grid-Connected PV Inverter
Model Designation : See Certificate
Certificate No. : AK 50510974 0001
Report No. : CN21KSGT 001

Dear Zhang Kun,

We herewith confirm that a sample of the above mentioned technical equipment has been tested and was found to be in accordance with the relevant requirements.

Enclosed please find your Certificate of Conformity.

We appreciate your kind support and would like to offer our assistance and continuous services in the future.

With kind regards,

Certification Body

Weichun Li

CC: Ginlong technologies Co., Ltd.

Enclosure

TÜV Rheinland (China) Ltd.
莱茵检测认证服务（中国）有限公司
Unit 707, AVIC Bldg., No. 10B, Central Road, East 3rd Ring Road, Chaoyang District, Beijing, 100022, P.R.China
北京市朝阳区东三环中路乙10号 艾维克大厦707室 邮编：100022
Tel: (8610)6566 6660
Fax: (8610)6566 6667
e-mail: info@bj.chn.tuv.com
Internet: http://www.chn.tuv.com

CERTIFICATE
of Conformity

TÜVRheinland®

Registration No.: AK 50522814 0001

Report No.: CN214JCP 001

Holder:
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Product:
PV-Inverter
(Grid-connected PV Inverter)

Identification:

```
Type Designation : S6-GR1P0.7K-M  S6-GR1P1K-M
                   S6-GR1P1.5K-M  S6-GR1P2K-M
                   S6-GR1P2.5K-M  S6-GR1P3K-M
                   S6-GR1P3.6K-M
Serial Number    : Engineering Samples
Firmware version : V2F
Remark(s)        : Refer to report CN214JCP 001 for details.
```

Tested acc. to:
IEC 61727:2004
IEC 62116:2014

The certificate of conformity refers to the above mentioned product. This is to certify that the specimen is in conformity with the assessment requirement mentioned above. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity.

TÜVRheinland
Certification Body

Date 27.10.2021

A. Chen

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

TÜV Rheinland (China) Ltd.
Member of TÜV Rheinland Group

TÜVRheinland®
Precisely Right.

Ginlong technologies Co., Ltd.
Zhang Kun

No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Date : 27/10/2021
Our ref. : Pengmar 01
Your ref.: Zhang kun

Ref : AK Certificate of Conformity

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : AK 50522814 0001
Report No. : CN214JCP 001

Dear Zhang Kun,

We herewith confirm that a sample of the above mentioned technical equipment has been tested and was found to be in accordance with the relevant requirements.

Enclosed please find your Certificate of Conformity.

We appreciate your kind support and would like to offer our assistance and continuous services in the future.

With kind regards,

Certification Body

A. Chen

CC: Ginlong technologies Co., Ltd.

Enclosure

TÜV Rheinland (China) Ltd.
莱茵检测认证服务（中国）有限公司
No. 01/03B-08, Floor 7 and No. 01/04B-08, Floor 11, AVIC Building, No.10B, Central Road, East 3rd Ring Road, Chaoyang District, Beijing, P.R. China
北京市朝阳区东三环中路乙10号艾维克大厦第7层第01、03B-08号，第11层第01、04B-08号
邮编：100022
Tel: (8610)8524 2222
Fax: (8610)8524 2200
e-mail: info@bj.chn.tuv.com
Internet: http://www.chn.tuv.com

C E R T I F I C A T E

of Conformity

Registration No.: AK 50577679 0001

Report No.: CN23NXBZ 001

Holder:
Ginlong technologies Co., Ltd.
No.57 Jintong Road, Binhai,
(seafront), Industrial Park,
Xiangshan Ningbo
315712 Zhejiang
P.R. China

Product:
PV-Inverter
(Grid-Connected PV Inverter)

Identification:

```
Type Designation: S6-GR1PxxK-S (xx=2.5,3,3.6,4,4.6,5,6)
Serial Number   : Engineering Samples
Firmware Version: A1
Remark          : Refer to report CN23NXBZ 001 for details.
```

Tested acc. to:

```
IEC 61727:2004
IEC 62116:2014
```

The certificate of conformity refers to the above mentioned product. This is to certify that the specimen is in conformity with the assessment requirement mentioned above. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity.

Certification Body

Date 24.03.2023

TÜV Rheinland LGA Products GmbH

Weichun Li

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Product Service

Compliance Document

No. D 086470 0138 Rev. 00

Holder of Certificate: **Ginlong Technologies Co., Ltd.**
No.57 Jintong Road
Binhai Industrial Park, Xiangshan
315712 Ningbo, Zhejiang
PEOPLE'S REPUBLIC OF CHINA

Product: **Converter**
Hybrid Inverter

This Compliance document confirms the compliance with the listed standards on a voluntary basis. It refers only to the sample submitted for testing and certification and does not certify the quality or safety of the serial products. For details see: www.tuvsud.com/ps-cert

Test report no.: 704092304835-00

Date, 2023-05-24

(Zhengdong Ma)

TÜV SÜD Product Service GmbH • Certification Body • Ridlerstraße 65 • 80339 Munich • Germany

TÜV®

Product Service

Compliance Document

No. D 086470 0138 Rev. 00

Model(s): **S6-EH1P3K-L-PRO, S6-EH1P3.6K-L-PRO, S6-EH1P5K-L-PRO, S6-EH1P6K-L-PRO, S6-EH1P8K-L-PRO**

Parameters:

Models	S6-EH1P3K-L-PRO	S6-EH1P3.6K-L-PRO
1) PV input		
Max. input voltage	600 Vd.c.	600 Vd.c.
MPPT voltage range	90 - 520 Vd.c.	90 - 520 Vd.c.
Max. input current	2x16A	2x16A
Max. short-circuit input current	2x24A	2x24A
2) Battery input		
Battery type	Li-ion / Lead-acid	Li-ion / Lead-acid
Battery voltage range	40 - 60 Vd.c.	40 - 60 Vd.c.
Max. charge current:	70 Ad.c.	80 Ad.c.
Max. discharge current:	70 Ad.c.	80 Ad.c.
3) AC-output (Back-up)		
Rated output voltage:	230 Va.c.	230 Va.c.
Rated output frequency:	50 Hz	50 Hz
Rated output current:	13A	15.7A
Rated output power	3000W	3600W

4) AC-output (Grid side)		
Rated output voltage:	230 Va.c.	230 Va.c.
Rated output frequency:	50 Hz	50 Hz
Max. output current:	15A	20A
Max. apparent output power	3300VA	4000VA
Power factor range	0.8(leading)-0.8(lagging)	0.8(leading)-0.8(lagging)
5) AC input		
Rated output voltage:	230 Va.c.	230 Va.c.
Rated output frequency:	50 Hz	50 Hz
Max. continuous current:	20A	25A

TÜV SÜD Product Service GmbH • Certification Body • Ridlerstraße 65 • 80339 Munich • Germany

TÜV®

Product Service

Compliance Document

No. D 086470 0138 Rev. 00

Models	S6-EH1P5K-L-PRO	S6-EH1P6K-L-PRO	S6-EH1P8K-L-PRO
1) PV input			
Max. input voltage	600 Vd.c.	600 Vd.c.	600 Vd.c.
MPPT voltage range	90 - 520 Vd.c.	90 - 520 Vd.c.	90 - 520 Vd.c.
Max. input current	2x16A	2x16A	32A/20A
Max. short-circuit input current	2x24A	2x24A	36A/30A
2) Battery input			
Battery type	Li-ion / Lead-acid	Li-ion / Lead-acid	Li-ion / Lead-acid
Battery voltage range	40 - 60 Vd.c.	40 - 60 Vd.c.	40 - 60 Vd.c.
Max. charge current:	112 Ad.c.	135 Ad.c.	190 Ad.c.
Max. discharge current:	112 Ad.c.	135 Ad.c.	190 Ad.c.
3) AC-output (Back-up)			
Rated output voltage:	230 Va.c.	230 Va.c.	230 Va.c.
Rated output frequency:	50 Hz	50 Hz	50 Hz
Rated output current:	21.7A	26.1A	34.8A
Rated output power	5000W	6000W	8000W

4) AC-output (Grid side)			
Rated output voltage:	230 Va.c.	230 Va.c.	230 Va.c.
Rated output frequency:	50 Hz	50 Hz	50 Hz
Max. output current:	25A	30A	40A
Max. apparent output power	5500VA	6600VA	8800VA
Power factor range	0.8(leading)-0.8(lagging)	0.8(leading)-0.8(lagging)	0.8(leading)-0.8(lagging)
5) AC input			
Rated output voltage:	230 Va.c.	230 Va.c.	230 Va.c.
Rated output frequency:	50 Hz	50 Hz	50 Hz
Max. continuous current:	32A	40A	50A

Tested according to:

IEC 61727:2004
IEC 62116:2014
IEC 61683:1999
IEC 60068-2-1:2007
IEC 60068-2-2:2007
IEC 60068-2-14:2009
IEC 60068-2-27:2008
IEC 60068-2-30:2005
IEC 60068-2-64:2008
IEC 60068-2-64:2008/AMD1:2019

TÜV SÜD Product Service GmbH • Certification Body • Ridlerstraße 65 • 80339 Munich • Germany

TÜV®

TEST REPORT

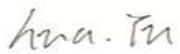
NRS 097-2-1:2017

Grid interconnection of embedded generation
Part 2: Small-scale embedded generation

Report	
Report Number. ..... :	6108594.50
Date of issue..... :	2021-09-08
Total number of pages.....	99 pages
Testing Laboratory ..... :	DEKRA Testing and Certification (Shanghai) Ltd.
Address ..... :	3F, #250 Jiangchangsan Road, Building 16, Headquarter Economy Park Shibei Hi-Tech Park, Zhabei District, Shanghai 200436, China
Applicant's name ..... :	Ginlong Technologies Co., Ltd.
Address ..... :	No. 57 Jintong Road, Binhai Industrial Park, Xiangshan, Ningbo, Zhejiang, 315712, P.R. China.
Test specification:	
Standard..... :	NRS 097-2-1:2017 (Edition 2.1 July 2020)
Test procedure..... :	Type test
Non-standard test method..... :	N/A
Test Report Form No. ..... :	NRS 097-2-1_V2.1
Test Report Form(s) Originator ..... :	DEKRA Testing and Certification (Shanghai) Ltd.
Master TRF..... :	Dated 2017-07
Test item description..... :	Grid-Connected PV Inverter
Trade Mark ..... :	solis inverters
Manufacturer ..... :	Ginlong Technologies Co., Ltd. No. 57 Jintong Road, Binhai Industrial Park, Xiangshan, Ningbo, Zhejiang, 315712, P.R. China.
Model/Type reference ..... :	Solis-1P1K-4G, Solis-1P1.5K-4G, Solis-1P2K-4G, Solis-1P2.5K-4G, Solis-1P3K-4G, Solis-1P3.6K-4G, Solis-1P4K-4G, Solis-1P4.6K-4G S5-GR1P2.5K, S5-GR1P3K, S5-GR1P3.6K, S5-GR1P4K, S5-GR1P4.6K S6-GR1P2.5K, S6-GR1P3K, S6-GR1P3.6K, S6-GR1P4K, S6-GR1P4.6K

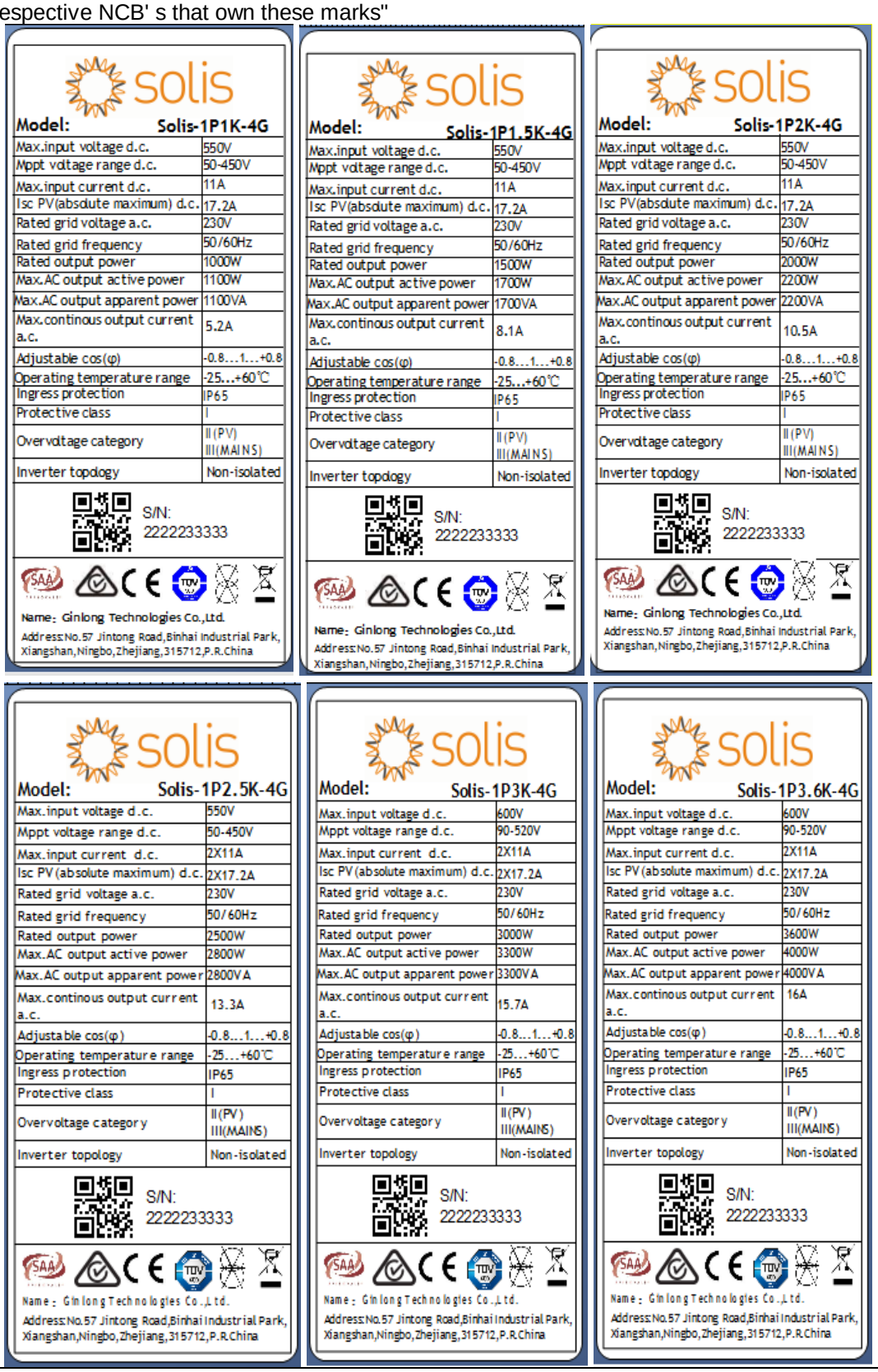
Ratings……..:	Ratings of the test product: Operating temperature range: - 25°C to + 60°C Protective class: I Ingress protection rating: IP66 for S6 series, IP65 for other models Power factor range (adjustable): 0.8 leading…0.8 lagging Solis-1P1K-4G: PV input: max 550Vdc, MPP voltage range: 50–450Vdc, max 11A, Isc PV: 17,2A AC output: 230V, 50Hz, max 5,2A, 1100W Solis-1P1.5K-4G: PV input: max 550Vdc, MPP voltage range: 50–450Vdc, max 11A, Isc PV: 17,2A AC output: 230V, 50Hz, max 8,1A, 1700W Solis-1P2K-4G: PV input: max 550Vdc, MPP voltage range: 50–450Vdc, max 11A, Isc PV: 17,2A AC output: 230V, 50Hz, max 10,5A, 2200W Solis-1P2.5K-4G: PV input: max 550Vdc, MPP voltage range: 50–450Vdc, max 2x11A, Isc PV: 2x17,2A AC output: 230V, 50Hz, max 13,3A, 2800W Solis-1P3K-4G PV input: max 600Vdc, MPP voltage range: 90–520Vdc, max 2x11A, Isc PV: 2x17,2A AC output: 230V, 50Hz, max 15,7A, 3300W Solis-1P3.6K-4G: PV input: max 600Vdc, MPP voltage range: 90–520Vdc, max 2x11A, Isc PV: 2x17,2A AC output: 230V, 50Hz, max 16A, 4000W Solis-1P4K-4G: PV input: max 600Vdc, MPP voltage range: 90–520Vdc, max 2x11A, Isc PV: 2x17,2A AC output: 230V, 50Hz, max 21A, 4400W Solis-1P4.6K-4G: PV input: max 600Vdc, MPP voltage range: 90–520Vdc, max 2x11A, Isc PV: 2x17,2A AC output: 230V, 50Hz, max 23,8A, 4600W S5-GR1P2.5K PV input: max 550Vdc, MPP voltage range: 50–450Vdc, max 2x12,5A, Isc PV: 2x17,2A AC output: 230V, 50Hz, max 13,3A, 2800W S5-GR1P3K PV input: max 600Vdc, MPP voltage range: 90–520Vdc, max 2x12,5A, Isc PV: 2x17,2A AC output: 230V, 50Hz, max 15,7A, 3300W S5-GR1P3.6K PV input: max 600Vdc, MPP voltage range: 90–520Vdc, max 2x12,5A, Isc PV: 2x17,2A AC output: 230V, 50Hz, max 16A, 4000W S5-GR1P4K PV input: max 600Vdc, MPP voltage range: 90–520Vdc, max 2x12,5A, Isc PV: 2x17,2A

	AC output: 230V, 50Hz, max 21A, 4400W S5-GR1P4.6K PV input: max 600Vdc, MPP voltage range: 90–520Vdc, max 2x12,5A, Isc PV: 2x17,2A AC output: 230V, 50Hz, max 23,8A, 4600W S6-GR1P2.5K PV input: max 550Vdc, MPP voltage range: 50–450Vdc, max 2x14A, Isc PV: 2x22A AC output: 230V, 50Hz, max 13,3A, 2800W S6-GR1P3K PV input: max 600Vdc, MPP voltage range: 90–520Vdc, max 2x14A, Isc PV: 2x22A AC output: 230V, 50Hz, max 15,7A, 3300W S6-GR1P3.6K PV input: max 600Vdc, MPP voltage range: 90–520Vdc, max 2x14A, Isc PV: 2x22A AC output: 230V, 50Hz, max 16A, 4000W S6-GR1P4K PV input: max 600Vdc, MPP voltage range: 90–520Vdc, max 2x14A, Isc PV: 2x22A AC output: 230V, 50Hz, max 21A, 4400W S6-GR1P4.6K PV input: max 600Vdc, MPP voltage range: 90–520Vdc, max 2x14A, Isc PV: 2x22A AC output: 230V, 50Hz, max 23,8A, 4600W

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	Testing Laboratory:	DEKRA Testing and Certification (Shanghai) Ltd.	
Testing location/ address ..... :		3F, #250 Jiangchangsan Road, Building 16, Headquarter Economy Park Shibei Hi-Tech Park, Zhabei District, Shanghai 200436, China	
☒	Associated Testing Laboratory:	DEKRA Testing and Certification (Suzhou) Co., Ltd.	
Testing location/ address ..... :		No.99, Hongye Road, Suzhou Industrial Park, Suzhou, Jiangsu, P.R. China	
Tested by (name, function, signature) ..... :		Hua Yu	
Approved by (name, function, signature)..... :		Jason Guo	
☐	~~Testing procedure: TMP/CTF Stage 1:~~		
~~Testing location/ address ..... :~~			
~~Tested by (name, function, signature) ..... :~~			
~~Approved by (name, function, signature)..... :~~			
☐	~~Testing procedure: WMT/CTF Stage 2:~~		
~~Testing location/ address ..... :~~			
~~Tested by (name + signature) ..... :~~			
~~Witnessed by (name, function, signature) ..... :~~			
~~Approved by (name, function, signature)..... :~~			
☐	~~Testing procedure: SMT/CTF Stage 3 or 4:~~		
~~Testing location/ address ..... :~~			
~~Tested by (name, function, signature) ..... :~~			
~~Witnessed by (name, function, signature) ..... :~~			
~~Approved by (name, function, signature)..... :~~			
~~Supervised by (name, function, signature) .... :~~			

Copy of marking plate:

"The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCB' s that own these marks"



Model:	Solis-1P1K-4G
Max.input voltage d.c.	550V
Mppt voltage range d.c.	50-450V
Max.input current d.c.	11A
Isc PV(absolute maximum) d.c.	17.2A
Rated grid voltage a.c.	230V
Rated grid frequency	50/60Hz
Rated output power	1000W
Max.AC output active power	1100W
Max.AC output apparent power	1100VA
Max.continous output current a.c.	5.2A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP65
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

S/N: 2222233333

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park, Xiangshan,Ningbo,Zhejiang,315712,P.R.China

Model:	Solis-1P1.5K-4G
Max.input voltage d.c.	550V
Mppt voltage range d.c.	50-450V
Max.input current d.c.	11A
Isc PV(absolute maximum) d.c.	17.2A
Rated grid voltage a.c.	230V
Rated grid frequency	50/60Hz
Rated output power	1500W
Max.AC output active power	1700W
Max.AC output apparent power	1700VA
Max.continous output current a.c.	8.1A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP65
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

S/N: 2222233333

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park, Xiangshan,Ningbo,Zhejiang,315712,P.R.China

Model:	Solis-1P2K-4G
Max.input voltage d.c.	550V
Mppt voltage range d.c.	50-450V
Max.input current d.c.	11A
Isc PV(absolute maximum) d.c.	17.2A
Rated grid voltage a.c.	230V
Rated grid frequency	50/60Hz
Rated output power	2000W
Max.AC output active power	2200W
Max.AC output apparent power	2200VA
Max.continous output current a.c.	10.5A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP65
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

S/N: 2222233333

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park, Xiangshan,Ningbo,Zhejiang,315712,P.R.China

Model:	Solis-1P2.5K-4G
Max.input voltage d.c.	550V
Mppt voltage range d.c.	50-450V
Max.input current d.c.	2X11A
Isc PV(absolute maximum) d.c.	2X17.2A
Rated grid voltage a.c.	230V
Rated grid frequency	50/60Hz
Rated output power	2500W
Max.AC output active power	2800W
Max.AC output apparent power	2800VA
Max.continous output current a.c.	13.3A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP65
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

S/N: 2222233333

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park, Xiangshan,Ningbo,Zhejiang,315712,P.R.China

Model:	Solis-1P3K-4G
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X11A
Isc PV(absolute maximum) d.c.	2X17.2A
Rated grid voltage a.c.	230V
Rated grid frequency	50/60Hz
Rated output power	3000W
Max.AC output active power	3300W
Max.AC output apparent power	3300VA
Max.continous output current a.c.	15.7A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP65
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

S/N: 2222233333

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park, Xiangshan,Ningbo,Zhejiang,315712,P.R.China

Model:	Solis-1P3.6K-4G
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X11A
Isc PV(absolute maximum) d.c.	2X17.2A
Rated grid voltage a.c.	230V
Rated grid frequency	50/60Hz
Rated output power	3600W
Max.AC output active power	4000W
Max.AC output apparent power	4000VA
Max.continous output current a.c.	16A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP65
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

S/N: 2222233333

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park, Xiangshan,Ningbo,Zhejiang,315712,P.R.China

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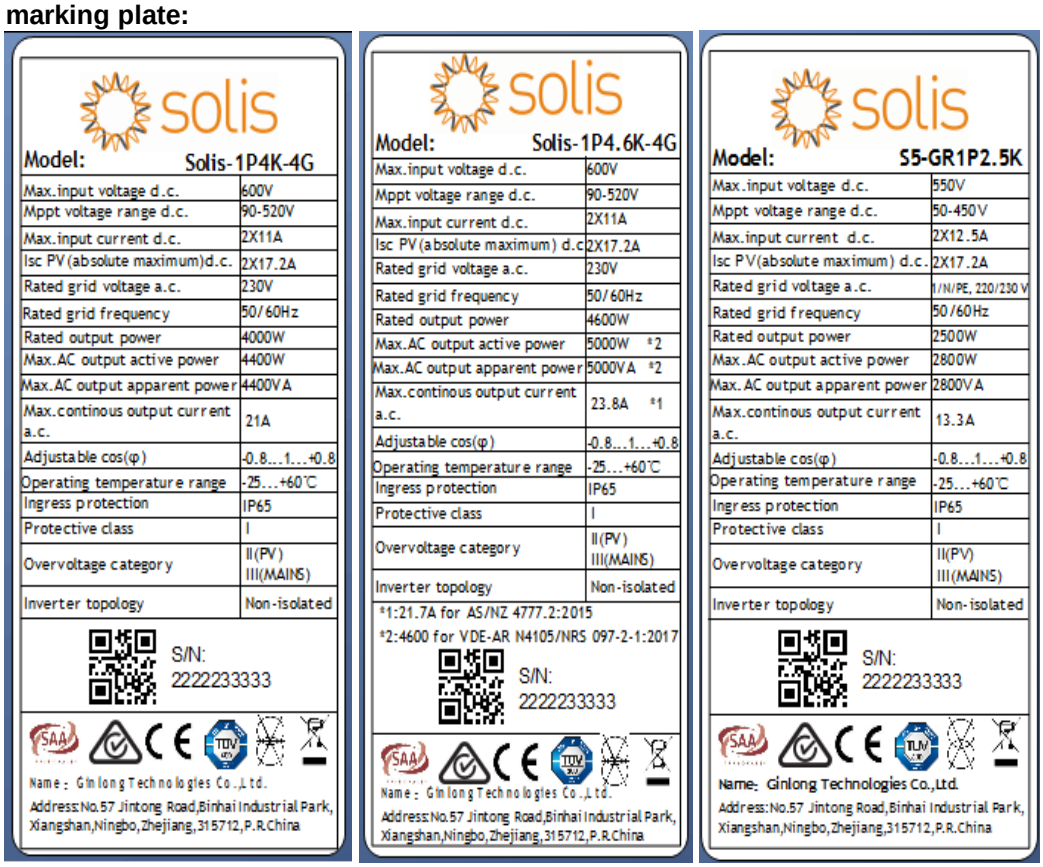


Model:	Solis-1P4K-4G
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X11A
Isc PV(absolute maximum)d.c.	2X17.2A
Rated grid voltage a.c.	230V
Rated grid frequency	50/60Hz
Rated output power	4000W
Max.AC output active power	4400W
Max.AC output apparent power	4400VA
Max.continous output current a.c.	21A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP65
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

S/N: 2222233333

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park, Xiangshan,Ningbo,Zhejiang,315712,P.R.China

Model:	Solis-1P4.6K-4G
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X11A
Isc PV(absolute maximum) d.c.	2X17.2A
Rated grid voltage a.c.	230V
Rated grid frequency	50/60Hz
Rated output power	4600W
Max.AC output active power	5000W *2
Max.AC output apparent power	5000VA *2
Max.continous output current a.c.	23.8A *1
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP65
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

*1:21.7A for AS/NZ 4777.2:2015
*2:4600 for VDE-AR N4105/NRS 097-2-1:2017

S/N: 2222233333

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park, Xiangshan,Ningbo,Zhejiang,315712,P.R.China

Model:	S5-GR1P2.5K
Max.input voltage d.c.	550V
Mppt voltage range d.c.	50-450V
Max.input current d.c.	2X12.5A
Isc PV(absolute maximum) d.c.	2X17.2A
Rated grid voltage a.c.	1/N/PE, 220/230 V
Rated grid frequency	50/60Hz
Rated output power	2500W
Max.AC output active power	2800W
Max.AC output apparent power	2800VA
Max.continous output current a.c.	13.3A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP65
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

S/N: 2222233333

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park, Xiangshan,Ningbo,Zhejiang,315712,P.R.China

Model:	S5-GR1P3K
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X12.5A
Isc PV(absolute maximum) d.c.	2X17.2A
Rated grid voltage a.c.	1/N/PE, 220/230 V
Rated grid frequency	50/60Hz
Rated output power	3000W
Max.AC output active power	3300W
Max.AC output apparent power	3300VA
Max.continous output current a.c.	15.7A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP65
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

S/N: 2222233333

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park, Xiangshan,Ningbo,Zhejiang,315712,P.R.China

Model:	S5-GR1P3.6K
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X12.5A
Isc PV(absolute maximum) d.c.	2X17.2A
Rated grid voltage a.c.	1/N/PE, 220/230 V
Rated grid frequency	50/60Hz
Rated output power	3600W
Max.AC output active power	4000W
Max.AC output apparent power	4000VA
Max.continous output current a.c.	16A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP65
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

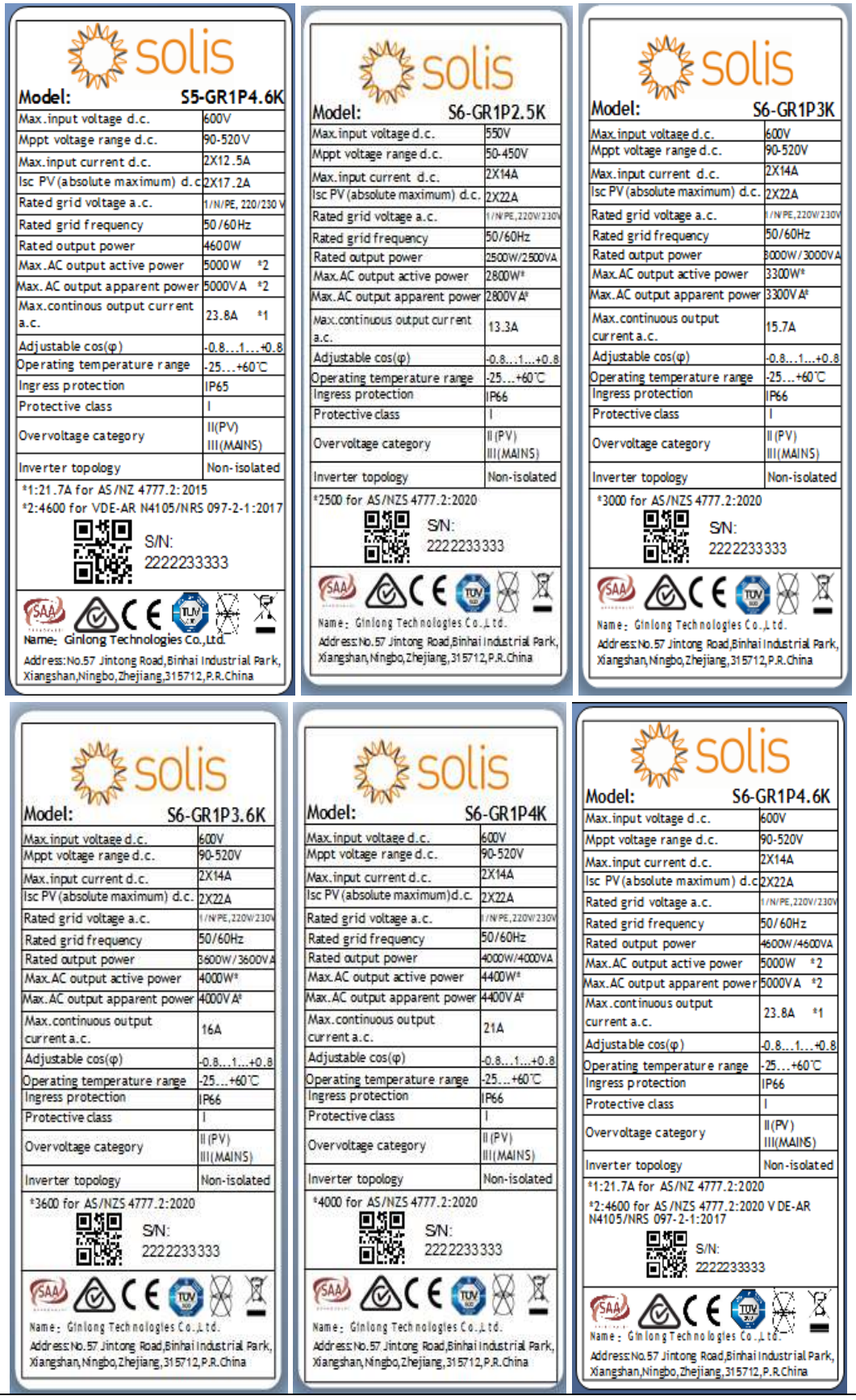
S/N: 2222233333

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park, Xiangshan,Ningbo,Zhejiang,315712,P.R.China

Model:	S5-GR1P4K
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X12.5A
Isc PV(absolute maximum)d.c.	2X17.2A
Rated grid voltage a.c.	1/N/PE, 220/230 V
Rated grid frequency	50/60Hz
Rated output power	4000W
Max.AC output active power	4400W
Max.AC output apparent power	4400VA
Max.continous output current a.c.	21A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP65
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

S/N: 2222233333

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park, Xiangshan,Ningbo,Zhejiang,315712,P.R.China



Model:	S5-GR1P4.6K
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X12.5A
Isc PV (absolute maximum) d.c.	2X17.2A
Rated grid voltage a.c.	1/N/PE, 220/230V
Rated grid frequency	50/60Hz
Rated output power	4600W
Max.AC output active power	5000W *2
Max.AC output apparent power	5000VA *2
Max.continous output current a.c.	23.8A *1
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP65
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

*1:21.7A for AS/NZ 4777.2:2015
*2:4600 for VDE-AR N4105/NRS 097-2-1:2017

S/N: 2222233333

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park, Xiangshan,Ningbo,Zhejiang,315712,P.R.China

Model:	S6-GR1P2.5K
Max.input voltage d.c.	550V
Mppt voltage range d.c.	50-450V
Max.input current d.c.	2X14A
Isc PV (absolute maximum) d.c.	2X22A
Rated grid voltage a.c.	1/N/PE,220V/230V
Rated grid frequency	50/60Hz
Rated output power	2500W/2500VA
Max.AC output active power	2800W*
Max.AC output apparent power	2800VA*
Max.continuous output current a.c.	13.3A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP66
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

*2500 for AS/NZS 4777.2:2020

S/N: 2222233333

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park, Xiangshan,Ningbo,Zhejiang,315712,P.R.China

Model:	S6-GR1P3K
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X14A
Isc PV (absolute maximum) d.c.	2X22A
Rated grid voltage a.c.	1/N/PE,220V/230V
Rated grid frequency	50/60Hz
Rated output power	3000W/3000VA
Max.AC output active power	3300W*
Max.AC output apparent power	3300VA*
Max.continuous output current a.c.	15.7A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP66
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

*3000 for AS/NZS 4777.2:2020

S/N: 2222233333

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park, Xiangshan,Ningbo,Zhejiang,315712,P.R.China

Model:	S6-GR1P3.6K
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X14A
Isc PV (absolute maximum) d.c.	2X22A
Rated grid voltage a.c.	1/N/PE,220V/230V
Rated grid frequency	50/60Hz
Rated output power	3600W/3600VA
Max.AC output active power	4000W*
Max.AC output apparent power	4000VA*
Max.continuous output current a.c.	16A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP66
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

*3600 for AS/NZS 4777.2:2020

S/N: 2222233333

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park, Xiangshan,Ningbo,Zhejiang,315712,P.R.China

Model:	S6-GR1P4K
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X14A
Isc PV (absolute maximum) d.c.	2X22A
Rated grid voltage a.c.	1/N/PE,220V/230V
Rated grid frequency	50/60Hz
Rated output power	4000W/4000VA
Max.AC output active power	4400W*
Max.AC output apparent power	4400VA*
Max.continuous output current a.c.	21A
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP66
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

*4000 for AS/NZS 4777.2:2020

S/N: 2222233333

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park, Xiangshan,Ningbo,Zhejiang,315712,P.R.China

Model:	S6-GR1P4.6K
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X14A
Isc PV (absolute maximum) d.c.	2X22A
Rated grid voltage a.c.	1/N/PE,220V/230V
Rated grid frequency	50/60Hz
Rated output power	4600W/4600VA
Max.AC output active power	5000W *2
Max.AC output apparent power	5000VA *2
Max.continuous output current a.c.	23.8A *1
Adjustable cos(φ)	-0.8...1...+0.8
Operating temperature range	-25...+60℃
Ingress protection	IP66
Protective class	I
Overvoltage category	II(PV) III(MAINS)
Inverter topology	Non-isolated

*1:21.7A for AS/NZ 4777.2:2020
*2:4600 for AS/NZS 4777.2:2020 V DE-AR N4105/NRS 097-2-1:2017

S/N: 2222233333

Name: Ginlong Technologies Co.,Ltd.
Address:No.57 Jintong Road,Binhai Industrial Park, Xiangshan,Ningbo,Zhejiang,315712,P.R.China

Test item particulars:				
Equipment mobility ..... :	movable fixed	hand-held transportable	stationary for building-in	
Connection to the mains ..... :	pluggable equipment permanent connection		direct plug-in for building-in	
Enviromental category ..... :	outdoor	indoor unconditional	indoor conditional	
Over voltage category Mains ..... :	OVC I	OVC II	OVC III	OVC IV
Over voltage category PV ..... :	OVC I	OVC II	OVC III	OVC IV
Mains supply tolerance (%) ..... :	According to South African deviation in NRS 097-2-1:2017 (Edition 2.1 July 2020)			
Tested for power systems ..... :	TN			
IT testing, phase-phase voltage (V) ..... :	N/A			
Class of equipment ..... :	Class I Not classified	Class II	Class III	
Mass of equipment (kg) ..... :	About 11,5 kg			
Pollution degree ..... :	PD2			
IP protection class ..... :	IP66 for S6 series, IP65 for other models			
Possible test case verdicts:				
- test case does not apply to the test object ..... :	N/A			
- test object does meet the requirement ..... :	P (Pass)			
- test object does not meet the requirement ..... :	F (Fail)			
- this clause is information reference for installation . :	Info.			
Testing:				
Date of receipt of test item ..... :	2017-05-16 (samples provided by applicant)			
Date (s) of performance of tests ..... :	2017-10-16 to 2017-11-06, 2020-12-01			

General remarks:

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 Issuing testing laboratory.

The measurement result is considered in conformance with the requirement if it is within the prescribed limit. It is not necessary to account the uncertainty associated with the measurement result.

The information provided by the customer in this report may affect the validity of the results, the test lab is not responsible for it.

This report is not used for social proof function in China market.

"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.
Throughout this report a ☒ comma / ☐ point is used as the decimal separator.

Name and address of factory (ies):

Ginlong Technologies Co., Ltd.

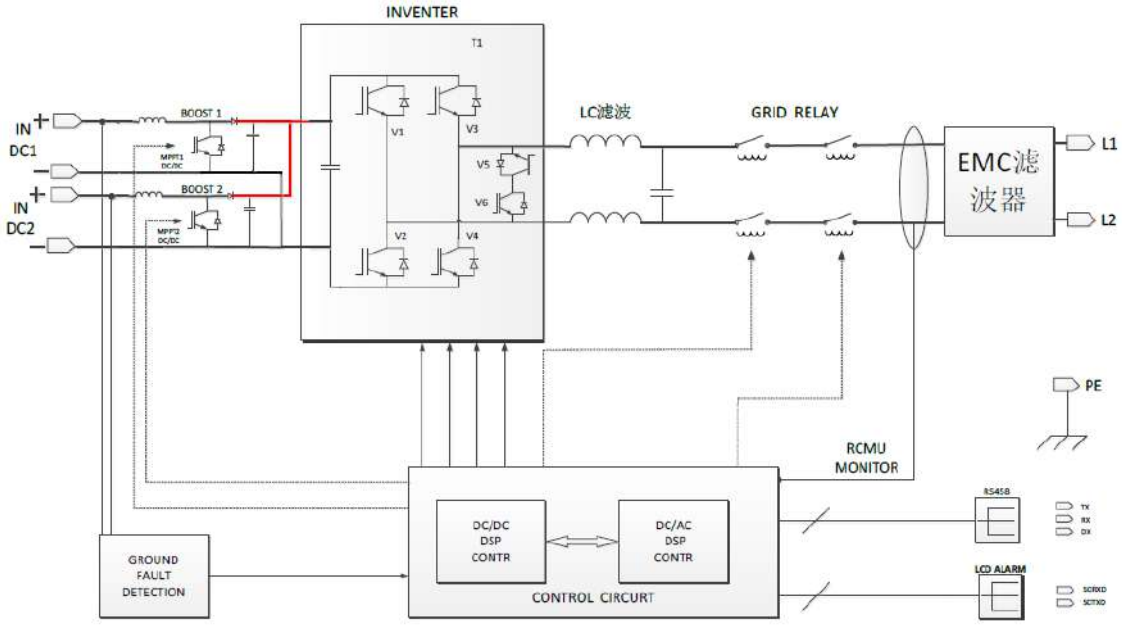
No. 57 Jintong Road, Binhai Industrial Park, Xiangshan, Ningbo, Zhejiang, 315712, P.R. China.

General product information:

The products are single phase grid-connected photovoltaic inverter converts DC voltage into AC voltage.

The unit is providing EMC filtering at the input and output towards mains. The output was switched off redundant by the high power switching bridge and two relays in series. This assures that the opening of the output circuit will also operate in case of one error.

Block Diagram



Description of the electrical circuit and functional safety (redundancy control):

The internal control is redundant built. It consists of two Microcontrollers; the master DSP can control the relays, sample the PV voltage, current and BUS voltage, measures grid voltage, frequency, AC current with injected DC, insulation resistance to ground and residual current. The slave DSP is redundant controller, it is using for control the relay, sample grid voltage, frequency and current. Both microcontrollers communicate with each other.

The voltage and frequency measurement were performed with resistors in serial that were connected directly to line and neutral. Both controllers get these signals and analyse the data.

The unit provides two relays in series in each phase. The relays are test before each start-up. When single-fault applied to one relay, an error code will appear on display panel, another redundant relay provides basic insulation maintained between the PV array and the mains.

Model difference:

1. The models Solis-1P1K-4G, Solis-1P1.5K-4G, Solis-1P2K-4G have single MPPT function and identical in hardware and just power derating according software.
2. The models Solis-1P2.5K-4G, Solis-1P3K-4G, Solis-1P3.6K-4G, Solis-1P4K-4G, Solis-1P4.6K-4G have dual MPPT function and identical in hardware and just power derating according software.
3. The models Solis-1P1K-4G, Solis-1P1.5K-4G, Solis-1P2K-4G are similar with Solis-1P2.5K-4G, Solis-1P3K-4G, Solis-1P3.6K-4G, Solis-1P4K-4G, Solis-1P4.6K-4G in software and hardware except the differences of electrical ratings, the number of BUS capacitors and the number of MPPT input.
4. The models S5-GR1P2.5K, S5-GR1P3K, S5-GR1P3.6K, S5-GR1P4K, S5-GR1P4.6K which are identical to Solis-1P2.5K-4G, Solis-1P3K-4G, Solis-1P3.6K-4G, Solis-1P4K-4G, Solis-1P4.6K-4G except max input current is different.
5. The models S6-GR1P2.5K, S6-GR1P3K, S6-GR1P3.6K, S6-GR1P4K, S6-GR1P4.6K which are identical to Solis-1P2.5K-4G, Solis-1P3K-4G, Solis-1P3.6K-4G, Solis-1P4K-4G, Solis-1P4.6K-4G

except max input current is different.

The detail rating difference please see rating label for reference.

The product was tested on:

Hardware version:
Main board: MT2070-V3
Control board: DK1635-V2
LCD board: LG1635-V2

Software version:
DSP: V0C
LCD: V0C

Amendment 1 report:
The original report No. 6018912.50 issued by DEKRA dated on 2017-11-28 were updated and including below modifications which were considered as technical modifications:
--- The standard NRS 097-2-1:2017 was change to NRS 097-2-1:2017 (Edition 2.1 July 2020)
--- The Manufacturer name of “Ningbo Ginlong Technologies Co., Ltd.” was changed to “Ginlong Technologies Co., Ltd.”
--- Add model S5-GR1P2.5K, S5-GR1P3K, S5-GR1P3.6K, S5-GR1P4K, S5-GR1P4.6K. Deleted the model Solis-1P2.5K2-4G and Solis-1P3K-4G-ST of original report.
After reviewing, clause 4.1.13.2 unintentional conducted emissions were considered necessary, the test result see Appendix 3: EMC Report of Conducted Emission in the frequency band 30 kHz to 150 kHz.

Amendment 2 report:
The Amendment 1 No. 6092293.50 issued by DEKRA dated on 2020-12-30 were updated and including below modifications which were considered as technical modifications:
--- Add model S6-GR1P2.5K, S6-GR1P3K, S6-GR1P3.6K, S6-GR1P4K, S6-GR1P4.6K.
After reviewing and evaluated, no test was considered necessary.

NRS 097-2-1:2017			
Clause	Requirement – Test	Result – Remark	Verdict
4	Requirements		–
	In South Africa, safety is regulated via regulations such as the Occupational Health and Safety (OHS) Act, calling on amongst others the electrical installation regulations, which invokes other standards such as SANS 10142-1.		–
	Performance aspects are regulated via international standards, industry specifications and licensing conditions, which include relevant parts of the grid code(s).		–
	In this part of NRS 097, 4.1 deals with performance aspects, 4.2 deals with safety aspects and 4.3 deals with metering.		–
4.1	Utility compatibility (Performance aspects)		P
4.1.1	General		P
4.1.1.1	This clause describes the technical issues and the responsibilities related to interconnecting an embedded generator to a utility network.	Noticed.	P
4.1.1.2	The quality of power provided by the embedded generator in the case of the on-site a.c. loads and the power delivered to the utility is governed by practices and standards on voltage, flicker, frequency, harmonics and power factor. Deviation from these standards represents out-of-bounds conditions. The embedded generator is required to sense the deviation and might need to disconnect from the utility network.	Noticed.	P
4.1.1.3	All power quality parameters (voltage, flicker, frequency and harmonics) shall be measured at the POC, unless otherwise specified (see annex A). NOTE The frequency cannot be changed by an EG.	See appended table.	P
	The power quality to be supplied to customers and influenced by SSEG shall comply with NRS 048-2. This implies that the combined voltage disturbances caused by the specific EG and other customers, added to normal background voltage disturbances, may not exceed levels stipulated by NRS 048-2. The maximum emission levels that may be contributed by SSEG are provided in this document (see 4.1.5 to 4.1.10).		P
	The customer can expect power quality at the POC in line with NRS 048-2. As such, the generator may not contribute significant disturbances to the voltage supplied at the POC. Typical contributions for small customer installations (total installation) are provided in Annex D of NRS 048-4.		P
4.1.1.4	The embedded generator's a.c. voltage, current and frequency shall be compatible with the utility at the POC.	Noticed.	P
4.1.1.5	The embedded generator shall be type approved, unless otherwise agreed upon with the utility (see annex A).	Noticed.	P
4.1.1.6	The maximum size of the embedded generator is limited to the rating of the supply point on the premises.	Rely in the responsibility of the installer.	N/A
4.1.1.7	The utility will approve the size of the embedded generator and will decide on the connection point and conditions. In some cases it may be required to create a separate supply point.		P

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Clause	Requirement – Test	Result – Remark	Verdict
4.1.1.8	Embedded generators larger than 13.8 kVA shall be of the balanced three-phase type unless only a single-phase network supply is available, in which case NRS 097-2-3 recommendations can be applied based on the NMD. NOTE 1 This value refers to the maximum export potential of the generation device/system. NOTE 2 In the case of long feeder spurs the maximum desired capacity of the EG might require approval by the utility and might result in the requirement for a three-phase connection for smaller units.	Less than 13.8 kVA	N/A
4.1.1.9	A customer with a multiphase connection shall split the embedded generator in a balanced manner over all phases if the EG is larger than 4.6 kVA. NOTE Balancing phases in a multiphase embedded generator is deemed desirable.	Single phase inverter used in single phase network.	N/A
4.1.1.10	Embedded generators or generator systems larger than 100 kVA may have additional requirements, for example, they must be able to receive communication signals for ceasing generation/disconnection from the utility supply, if the utility requires such. Communication facilities shall be provided to utility at no charge for integration with SCADA or other system when required. See Annex G (G.1). NOTE The RPP Grid Code requires category A3 units to be able to interface with the utility in order to receive stop and start signals.	Less than 13.8 kVA	N/A
4.1.1.11	In line with the current Renewable Power Plant Grid Code, embedded generators smaller than 1000 kVA connected to low-voltage form part of Category A generators, with the following subcategories:		P
	a) Category A1: 0 – 13.8 kVA; This sub-category includes RPPs of Category A with rated power in the range from 0 to 13.8 kVA, inclusive of 13.8 kVA.	Category A1 generator	P
	b) Category A2: 13.8 kVA – 100 kVA; and This sub-category includes RPPs of Category A with rated power in the range greater than 13.8 kVA but less than 100 kVA.		N/A
	c) Category A3: 100 kVA – 1 MVA. This sub-category includes RPPs of Category A with rated power in the range from 100 kVA but less than 1 MVA.		N/A
	NOTE 1 These sub-categories must be cross-checked with the Renewable Power Plant Grid Code (or other part of the Grid Code where applicable); where applicable, requirements will apply per sub-category and not per sizes defined here.		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	NOTE 2 Until a separate Grid Code for non-renewable technologies have been compiled and published, relevant categories from this document will apply to non-renewable SSEG.		N/A
4.1.1.12	In accordance with SANS 10142-1, all generators shall be wired permanently.		P
	NOTE 1 Some international companies are distributing so-called “plug-in” generators, where a small PV panel and inverter is connected to the supply circuit via a standard (load) plug. At present such installations are not regarded as safe and in contravention of SANS 10142-1.		P
	NOTE 2 This option will be reviewed when internationally accepted norms are finalised to ensure plugs and plug points are safe when feeding power into the grid as well as additional requirements for such generators or plugs.		P
4.1.1.13	Any UPS/generating device that operates in parallel with the grid may only connect to the grid when it complies fully with the requirements of this part of NRS 097. This includes UPS configurations with or without EG. NOTE The requirement is applicable irrespective of the duration of parallel operation.		P
4.1.1.14	Standby-generators are covered by SANS 10142-1.		N/A
4.1.1.15	All generators larger than 100 kVA will be controllable, i.e. be able to control the active output power dependent on network conditions/abnormal conditions. This includes several smaller units that totals more than 100 kVA at a single POC.		N/A
4.1.1.16	Maximum DC Voltage may not exceed 1000V. This is the voltage on the DC side of the inverter, for example when no load is taken and maximum source energy is provided, e.g. peak solar radiation occurs on the solar panels.	Maximum DC voltage 600 V.	P
4.1.2	Normal voltage operating range		P
4.1.2.1	In accordance with IEC 61727, utility-interconnected embedded generators do not normally regulate voltage, they inject current into the utility. Therefore the voltage operating range for embedded generators is designed as protection which responds to abnormal utility network conditions and not as a voltage regulation function.		P
4.1.2.2	The embedded generator shall synchronise (see 4.1.12) with the utility network before a connection is established. The embedded generator shall not control the voltage, unless agreed to by the utility (see annex A).	See clause 4.1.12	P
4.1.2.3	An embedded generator that operates in parallel with the utility system shall operate within the voltage trip limits defined in 4.2.2.3.2.		P
4.1.3	Reference source impedance and short-circuit levels (fault levels)		P

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Clause	Requirement – Test	Result – Remark	Verdict
4.1.3.1	The impact of the generator on the network voltage and quality of supply levels is directly linked to the (complex) source impedance and short-circuit level. The minimum short-circuit level to which a generator can be connected should be based on the size of the generator as well as the design criteria.		P
4.1.3.2	For general purposes of testing and design for potential worst case conditions, a minimum network strength of the following may be assumed: Z_source = 1.05 + j 0.32 ohm, i.e. I_SC = 210 A and S_SC = 146 kVA (three-phase). NOTE This does not imply a guarantee that the fault level will be more than this at all times. Fault levels less than this may be sufficient for small loads in certain applications.		P
4.1.3.3	The maximum network strength will be assumed to be no more than 33 times the rated active power of the generator. The R/X ratio will be assumed between 0.33 to 3.		P
	NOTE 1 In practice, the generators will connect to the network at a wide range of short-circuit ratios. The assumption of a maximum ratio of 33 will allow safe connection of the SSEG in most practical situations. NOTE 2 The minimum fault level at which the generator may be connected is at the discretion of the manufacturer, provided that the requirements of this specification is met at the specified fault level.		P
4.1.3.4	The relevant utility will advise whether equipment may be connected at other network characteristics, i.e. for weaker parts of the network.		P
4.1.3.5	The generator documentation and nameplate shall state the reference impedance (complex impedance) and fault level that was used for design and certification and that it is not intended to connect the generator to a network with a higher network impedance than specified for the certification. NOTE See Annex C (Network Impedance), for more information.		P
4.1.4	General QOS requirements		P
4.1.4.1	Embedded generators can expect QOS levels on networks to be in line with NRS 048-2. It is expected that the embedded generator will be able to operate continuously under worst-case conditions.		P
4.1.4.2	Notwithstanding this, the embedded generator must protect itself from potential excursions beyond NRS 048-2 and ensure fail-safe conditions. Should the embedded generator be unable to operate according to requirements of this document for such excursions, it shall disconnect and cease generation onto the network.		P
4.1.5	Flicker and voltage changes	See appended table.	P

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Clause	Requirement – Test	Result – Remark	Verdict
4.1.5.1	When connected to a network impedance equal to the reference impedance used during certification, no SSEG may generate flicker levels higher than the following: a) short-term flicker severity (Pst) = 0.35; and b) long-term flicker severity (Plt) = 0.30.		P
4.1.5.2	It is anticipated that the utility will plan the connections in line with acceptable flicker limits, i.e. the ratio of the size of the generator to the network strength at the point of connection.		P
4.1.5.3	According to VDE-AR-N 4105, no generator shall be connected to a system where generation rejection (i.e. tripping of SSEG while generating at full capacity, regardless of reason) will lead to a voltage change of 3 % or more at the PCC, thereby minimising the potential to exceed rapid voltage change limits.		P
	NOTE 1 A voltage change of 3 % aligns to a ratio of the network fault level to generator size of 33 (ignoring network impedance angle and load power factor). NOTE 2 Standard connection conditions for customers typically include a maximum flicker contribution in line with annex D of NRS 048-4. Should these flicker levels be exceeded, the customer will be required to put mitigating measures in place as and when required by the utility.		P
4.1.6	Voltage unbalance		P
4.1.6.1	Under normal circumstances, for single and dual-phase EG, the unbalanced generation may not exceed 4.6 kVA connected between any two or different phases at an installation. Units larger than 4.6 kVA will be split evenly over the available phase connections so that this can be maintained. NOTE Depending on the network capacity, the utility may impose more stringent conditions.		P
4.1.6.2	Three-phase generators may not contribute more than 0.2 % voltage unbalance when connected to a network with impedance equal to the reference impedance. NOTE Standard connection conditions for customers typically include a maximum voltage unbalance contribution in line with NRS 048-4, Annex D. Should a three-phase customer exceed these voltage unbalance levels, the customer will be required to put mitigating measures in place as and when required by the utility.	Single phase PV inverter.	N/A
4.1.7	Commutation notches		P
	The relative depth of commutation notches due to line-commutated inverters shall not exceed 5 % of nominal voltage at the POC for any operational state.		P
4.1.8	DC injection		P

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Clause	Requirement – Test	Result – Remark	Verdict
4.1.8.1	The average d.c. current injected by the embedded generator shall not exceed 0.5 % of the rated a.c. output current over any 1-minute period, into the utility a.c. interface under any operating condition.	See appended table.	P
4.1.8.2	According to section 4.2.2.5, the generator(s) must disconnect within 500 ms when the d.c. current exceeds this value.	See appended table.	P
4.1.9	Normal frequency operating range		P
	An embedded generator that operates in parallel with the utility system shall operate within the frequency trip limits defined in 4.2.2.3.3.		P
4.1.10	Harmonics and waveform distortion		P
4.1.10.1	Only devices that inject low levels of current and voltage harmonics will be accepted; the higher harmonic levels increase the potential for adverse effects on connected equipment.		P
4.1.10.2	Acceptable levels of harmonic voltage and current depend upon distribution system characteristics, type of service, connected loads or apparatus, and established utility practice.		P
4.1.10.3	The embedded generator output shall have low current-distortion levels to ensure that no adverse effects are caused to other equipment connected to the utility system.		P
4.1.10.4	The harmonic and inter-harmonic current distortion shall comply with the relevant emission limits in accordance with IEC 61727, reproduced in table 1. **Table 1 — Maximum harmonic current distortion as percentage of rated current** 1 / 2 / 3 / 4 / 5 / 6 **Harmonic order (h)** / **h<11** / **11≤h<17** / **17≤h<23** / **23≤h<35** / **35≤h** Percentage of rated current (Odd harmonics) / 4,0 / 2,0 / 1,5 / 0,6 / 0,3 Percentage of rated current (Even harmonics) / 1,0 / 0,5 / 0,38 / 0,15 / 0,08 Percentage of rated current (Inter-harmonics) / 0,1 / 0,25 / 0,19 / 0,08 / 0,03 Total Demand Distortion = 5% NOTE 1 Even harmonics are limited to 25 % of the odd harmonic limits NOTE 2 Inter-harmonic are limited to 25 % of the odd harmonic limits and adjusted for the 200 Hz band measurement required by IEC 61000-4-7, except for the lower frequencies where the flicker contribution is more likely. NOTE 3 Total Demand Distortion = Total Harmonic Distortion		P
4.1.10.5	The harmonic and inter-harmonic distortion applies up to 3 kHz (60th harmonic). NOTE The harmonic limits above 2.5 kHz and all inter-harmonic limits refer to limits measured in accordance with IEC 61000-4-7.	See appended table.	P
4.1.11	Power factor		P
4.1.11.1	Irrespective of the number of phases to which an embedded generator is connected, it shall comply with the power factor requirements in accordance with 4.1.11.2 to 4.1.11.12 on each phase for system normal conditions when the output power exceeds 20 % of rated active power.	See appended table.	P

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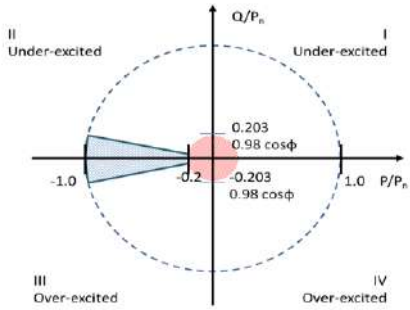
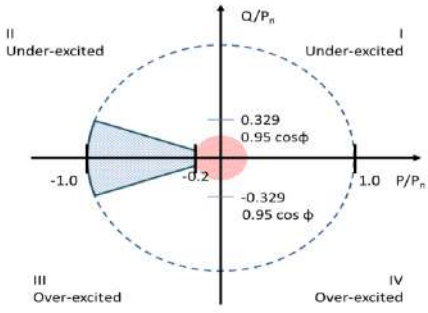
Clause	Requirement – Test	Result – Remark	Verdict
4.1.11.2	For static power converter embedded generators and synchronous embedded generators of sub-categories A1 and A2, the power factor shall remain above 0.98 as shown in Figure 1. The embedded generator shall operate anywhere in the shaded area of figure 1.  **Figure 1 — Power factor operating requirements for SSEG categoried A1 and A2 (using the load-reference arrows system)** NOTE At the time of publication, this is in contradiction with the RPP Grid Code.	Category A1 static power converter generator.	P
4.1.11.3	For asynchronous embedded generators of sub-categories A1 and A2, which cannot control the power factor over any range, the power factor shall reach the shaded area of figure 1 within 60 s. The power factor shall remain above 0.98 as shown in figure 1. The embedded generator shall operate anywhere in the shaded area. NOTE At the time of publication, this is in contradiction with the RPP Grid Code.	Category A1 static power converter generator.	N/A
4.1.11.4	For static power converter embedded generators and synchronous embedded generators of sub-category A3, the power factor shall remain above 0.95 as shown in Figure 2. The embedded generator shall operate anywhere in the shaded area of Figure 2.	Category A1 static power converter generator.	N/A
4.1.11.5	For asynchronous embedded generators of sub-category A3, which cannot control the power factor over any range, the power factor shall reach the shaded area of Figure 2 within 60 s. The power factor shall remain above 0.95 as shown in Figure 2. The embedded generator shall operate anywhere in the shaded area.  **Figure 2 — Power factor operating requirements for SSEG categoried A3 (using the load-reference arrows system)**	Category A1 static power converter generator.	N/A

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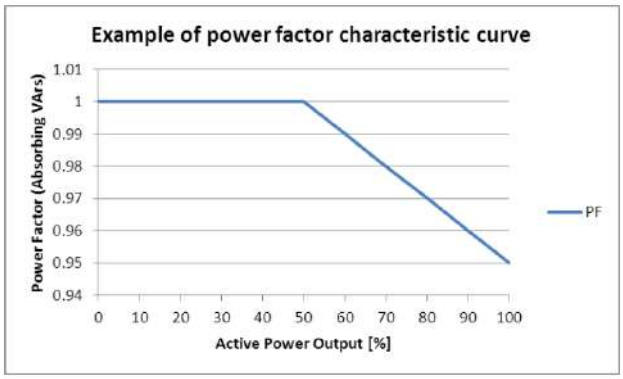
Clause	Requirement – Test	Result – Remark	Verdict
4.1.11.6	Where the EG is capable of controlling the power factor at the POC, the EG should improve the power factor at the POC towards unity.		P
4.1.11.7	Unless otherwise agreed with the utility, the standard power factor setting shall be unity for the full power output range.		P
4.1.11.8	The maximum tolerance on the reactive power setting is 5 % of the rated active power.		P
4.1.11.9	For embedded generators of sub-category A3, the power factor shall be settable to operate according to a characteristic curve provided by the utility, if required by the utility, within the range 0.95 leading and 0.95 lagging; An example of a standard characteristic curve is shown in figure 3.  Figure 3 — Example of power factor characteristics curve (under-excited)	Category A1 static power converter generator.	N/A
4.1.11.10	These limits apply, unless otherwise agreed upon with the utility (see annex A).		P
4.1.11.11	Equipment for reactive power compensation shall either:		P
	a) be connected or disconnected with the embedded generator, or b) operated via automatic control equipment for disconnection when not required.		P
4.1.11.12	The requirement for and type of detuning for reactive power compensation devices will be agreed upon by the owner of the generator and utility.		P
	NOTE Detuning is highly recommended for all reactive power compensation devices to prevent (a) potential current overloading of capacitors due to existing voltage harmonics, (b) potential voltage transient amplification at the POC due to upstream switching conditions, and (c) potential resonance with the network impedance that may lead to excessive harmonic amplification.		P
4.1.12	Synchronization		P
4.1.12.1	All embedded generators shall synchronize with the utility network before the parallel connection is made. This applies to all embedded generators where a voltage exists at the generator terminals before connection with the utility network.		P

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Clause	Requirement – Test	Result – Remark	Verdict
4.1.12.2	Automatic synchronization equipment shall be the only method of synchronization.		P
4.1.12.3	For a synchronous generator, the limits for the synchronizing parameters for each phase are: a) frequency difference: 0.3 Hz, b) voltage difference: 5 % of nominal voltage per phase, and c) phase angle difference: 20 ° (degrees).		P
4.1.12.4	Mains excited generators do not need to synchronise when the generator is started as a motor before generation starts.		P
4.1.12.5	Mains excited generators may require soft-starting when the start-up voltage change is anticipated to be more than 3 %.		P
4.1.12.6	The start-up current for static power converters shall not exceed the full-power rated current of the generator.		P
4.1.12.7	Also refer to 4.2.4 for re-synchronising conditions.		P
4.1.12.8	The embedded generator shall synchronize with the utility network only when the voltage and frequency has been stable within the ranges provided in 4.2.2.3 for at least 60 seconds. NOTE Some utilities may require this to be longer than 60 seconds.		P
4.1.13	Electromagnetic compatibility (EMC)		P
4.1.13.1	Electromagnetic compatibility (EMC) refers to the ability of equipment or a system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment. EMC comprises two components, namely a radiated and conducted component. Significant attention is given to radiated EMC due to the potential impact over larger distances. However, with advances in smart grids and business management systems, the potential impacts from conducted EMI must be considered. The conditions in 4.1.13.2 and 4.1.13.6 below apply to conducted unintentional signals, while clause 4.1.13.7 applies to radiated unintentional emissions from generating equipment.	See TUV SUD EMC test report no.: 64.772.21.80058.02 for reference.	P

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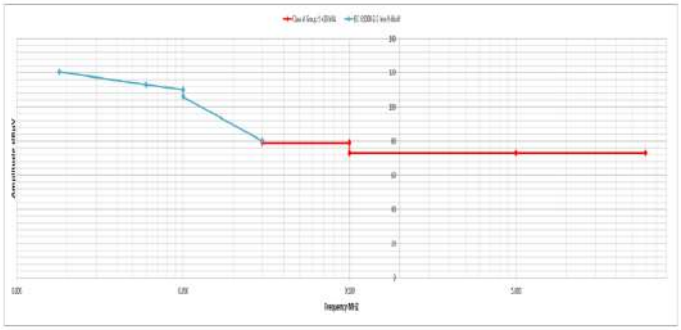
Clause	Requirement – Test	Result – Remark	Verdict
4.1.13.2	All unintentional conducted emissions from generating equipment, in the frequency band 30 kHz to 150 kHz, shall be 9 dBµV lower than the compatibility levels specified in clause 4.12.3 of IEC 61000-2-2:2000+A2: 2018 when measured in unsymmetrical voltage mode (i.e. between any phase or neutral and the earth) using a quasi-peak detector. An illustration of the limits is provided in Figure 4, below.  Figure 4 — NRS 097-2-1 emission limits	See Appendix 3: EMC Report of Conducted Emission in the frequency band 30 kHz to 150 kHz with report No. 20C0120R-V2 by issued DEKRA.	P
4.1.13.3	The test method and set up for verifying compliance with 4.1.13.1, herein, shall be according to clause 7 of *CISPR 16-2-1*. The test receiver used for verification shall comply with clauses 4 and 5 of *CISPR 16-1-1:2019*, and the AMN or LISN used for verification shall comply with clause 4 of *CISPR 16-1-2*. NOTE When measuring conducted emissions at high currents, for example at ≥ 25 A, during testing, the AMN or LISN can be connected as a voltage probe. See clause A.5 in Annexure A of *CISPR 16-1-1*.		P
4.1.13.4	All unintentional conducted emissions from generating equipment, in the frequency band above 150 kHz to 30 MHz, shall comply with SANS 211 (CISPR11), in particular limits for Class A group 1 (< 20 kVA).	See TUV SUD EMC test report no.: 64.772.21.80058.02 for reference.	P
4.1.13.5	The conducted emission requirement applies to all ports or connections to the utility supply, whether the connection is intended for monitoring, communication, power transfer or any other reason for connecting to the utility supply.		P
4.1.13.6	In the event of susceptibility to electromagnetic interference, the unit shall be fail-safe, i.e. any deviation from intended performance must comply with all relevant specifications, both in terms of safety (i.e. disconnection) and impact on the network.		P
4.1.13.7	Notwithstanding this, should any interference be experienced to existing or new ripple-control, building management system equipment and/or other PLC-based communication, the owner of the embedded generator should take the necessary remedial action to prevent further interference as will be agreed with the utility or the other affected party.		P
4.1.13.8	All radiated emissions from generating equipment shall comply with ICASA requirements.		P

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Clause	Requirement – Test	Result – Remark	Verdict
4.1.14	Mains signalling (e.g. PLC and ripple control)		N/A
4.1.14.1	Mains signalling refers to intentional signals induced into the utility supply network, where the intention is to facilitate data transfer from one component to another.		N/A
4.1.14.2	All intentional emissions (communication signals) from generating equipment shall comply with limits for intentional emissions in SANS 50065-1, limited to an acceptable band as prescribed by SANS 50065-1.		N/A
4.1.14.3	Notwithstanding this, should any interference be experienced to existing or new ripple control, building management system equipment and/or other PLC-based communication, the owner of the embedded generator shall take the necessary remedial action to prevent further interference as will be agreed with the utility or the other affected party.		N/A
4.2	Safety protection and control		P
4.2.1	General	Noticed.	P
	The safe operation of the embedded generator in conjunction with the utility network shall be ensured at all times. Safe operation includes people and equipment safety, i.e.:		P
	a) People safety: and i) owner (including personnel and / or inhabitants of the property) of the embedded generator; ii) general public safety; iii) utility personnel; and iv) general emergency response personnel, e.g. fire brigade should a fire arise at the embedded generator.		P
	b) Equipment safety: i) utility equipment; ii) other customers' equipment connected to the same network(s); and iii) generator own equipment.		P
	Some of the safety aspects mentioned above may be covered in other specifications and standards and the embedded generator should ensure that safe operation is maintained at all times taking cognisance of all of the above aspects.		P
	Furthermore, the embedded generator owner is responsible for precautions against damage to its own equipment due to utility originating events, e.g. switching events, voltage and frequency variations, automatic reclosing onto the network etc. However, this protection may not conflict with the requirements of this specification.		P
4.2.2	Safety disconnect from utility network		P
4.2.2.1	General		P

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Clause	Requirement – Test	Result – Remark	Verdict
4.2.2.1.1	All SSEG shall comply with the safety requirements in accordance with SANS/IEC 62109-1 and IEC 62109-2. NOTE In principle, IEC 62109 documents only apply to PV inverters. However, other SSEG shall prove compliance to these safety requirements to the satisfaction of the utility.	See TUV SUD IEC 62109-1/-2 test report no.: 70.409.16.237.04-05 for reference.	P
4.2.2.1.2	The embedded generator shall automatically and safely disconnect from the grid in the event of an abnormal condition. Abnormal conditions include: a) network voltage or frequency out-of-bounds conditions, b) loss-of-grid conditions, c) d.c. current injection threshold exceeded (per phase), d) and residual d.c. current (phase and neutral currents summated).		P
4.2.2.2	Disconnection device (previously disconnection switching unit)	See appended table.	P
4.2.2.2.1	The embedded generator shall be equipped with a disconnection device, which separates the embedded generator from the grid due to abnormal conditions. The disconnection unit may be integrated into one of the components of the embedded generator (for example the PV utility-interconnected inverter) or may be an independent device installed between the embedded generator and the utility interface.	The grid-connected PV inverter provides two relays integrated in series for both line and neutral.	P
4.2.2.2.2	The disconnection switching unit shall be able to operate under all operating conditions of the utility network. NOTE It is the responsibility of the embedded generator owner to enquire about the operating conditions of the utility network, e.g. fault levels for the foreseeable future.		P
4.2.2.2.3	A failure within the disconnection device shall lead to disconnection of the generator from the utility supply and indication of the failure condition.	See appended table.	P
4.2.2.2.4	A single failure within the disconnection switching unit shall not lead to failure to disconnect. Failures with one common cause shall be taken into account and addressed through adequate redundancy.	See appended table.	P
4.2.2.2.5	The disconnection device shall disconnect the generator from the network by means of two series connected robust automated load disconnect switches.	The grid-connected PV inverter provides two relays integrated in series for both line and neutral.	P
4.2.2.2.6	Both switches shall be electromechanical switches.		P
4.2.2.2.7	Each electromechanical switch shall disconnect the embedded generator on the neutral and the live wire(s). NOTE The switching unit need not disconnect its sensing circuits.		P
4.2.2.2.8	All rotating generating units, e.g. synchronous or asynchronous generating units shall have adequate redundancy in accordance with 4.2.2.2.5.	Not rotating generating units.	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
4.2.2.2.9	A static power converter without simple separation shall make use of two series connected electromechanical disconnection switches.	The grid-connected PV inverter provides two relays integrated in series for both line and neutral.	P
4.2.4.2.10	The current breaking capacity of each disconnecting switch shall be appropriately sized for the application. In cases where the disconnecting device is an electromechanical switching device such as a contactor, this requires suitable coordination with the upstream short circuit protection device (circuit breaker).		P
4.2.2.2.11	Any programmable parameters of the disconnection switching unit shall be protected from interference by third-parties, i.e. password protected or access physically sealed.		P
4.2.2.2.12	In order to allow customers to supply their own load in isolated operation (islanded) where this is feasible and required, the disconnection device may be incorporated upstream of part of or all of a customers' loads, provided that none of the network disconnection requirements in this document are violated.		P
4.2.2.2.13	All EG installations larger than 30 kVA shall have a central disconnection device. NOTE 1 This requirement may be amended by the utility, i.e. the utility may require a central disconnection switch unit for any size and type of generator. NOTE 2 This requirement may be amended by the utility. The central disconnection switch unit will typically be waived only when a lockable disconnection switch, accessible to the utility, is installed. NOTE 3 This is an interim requirement based on requirements of VDE-AR-N 4105 and will be revisited as more information becomes available.	Category A1 static power converter generator less than 30kVA.	N/A
4.2.2.2.14	The network and system grid protection voltage and frequency relay for the central disconnection device will be type-tested and certified on its own (stand-alone tested). All clauses of 4.2.2, except 4.2.2.4 (anti-islanding) apply.	Not used central disconnection device.	N/A
4.2.2.3	Overvoltage, undervoltage and frequency		
4.2.2.3.1	General	See appended table.	P
	The values in 4.2.2.3 relate to SSEG in sub-categories A1 and A2. These are kept from a historical perspective. The Grid Code requirements will override values and requirements in this category.	Category A1 static power converter generator.	P
	Sub-category A3 generators shall disconnect from the network according to the RPP Grid Code for all abnormal conditions as well as stay connected in accordance with the voltage ride-through requirements of the RPP Grid Code.		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	Abnormal conditions can arise on the utility system and requires a response from the connected embedded generator. This response is to ensure the safety of utility maintenance personnel and the general public, and also to avoid damage to connected equipment. The abnormal utility conditions of concern are voltage and frequency excursions above or below the values stated in this clause and the RPP Grid Code (section 5.2 of version 3.0). The embedded generator shall disconnect in accordance with the requirements of 4.2.2.3 if these conditions occur.		P
	The accuracy for voltage trip values shall be within 0 % to +1 % of the nominal voltage from the upper boundary trip setting, and within -1% to 0% of the nominal voltage from the lower boundary trip setting.		P
	The accuracy for frequency trip values shall be within 0 to +0.1 % of the fundamental frequency from the upper boundary trip setting, and within -0.1 % to 0 % of the fundamental frequency from the lower boundary the trip setting.		P
4.2.2.3.2	Overvoltage and undervoltage	See appended table.	P
	The embedded generator in sub-category A1 and A2 shall cease to energize the utility distribution system should the network voltage deviate outside the conditions specified in table 2. The following conditions shall be met, with voltages in r.m.s. and measured at the POC. NOTE 1 All discussions regarding system voltage refer to the nominal voltage. NOTE 2 At the time of publication, these settings are in contradiction to the RPP Grid Code. These may only be applied with exemption to the relevant clause or after the RPP Grid Code has been suitably amended. NOTE 3 Measurements at the generator terminals will generally be sufficient for the overvoltage settings. If the expected voltage drop across the cable connecting the EG to the POC is too high, undervoltage settings might have to be adjusted. **Table 2 — Response to abnormal voltages for SSEG in sub-categories A1 and A2**		P

1	2
Voltage range (at point of connection)	**Maximum trip time** S
V < 50 %	0,2 s
50 % ≤ V < 85 %	10 s
85 % ≤ V ≤ 110 %	Continuous operation
110 % < V < 115 %	40 s
115% ≤ V < 120%	2 s
120 % ≤ V	0,16 s
NOTE If multi-voltage control settings are not possible, the more stringent trip time should be implemented, e.g. 2 s between 110% and 120% of voltage.	

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Clause	Requirement – Test	Result – Remark	Verdict
	The purpose of the allowed time delay is to ride through short-term disturbances to avoid excessive nuisance tripping. The generator does not have to cease to energize if the voltage returns to the normal utility continuous operating condition within the specified trip time. NOTE Induction/synchronous generators need to be mindful of synchronisation issues and may have to apply faster trip times.		P
	A customer with a multiphase connection shall monitor all phases for out-of-bounds voltage conditions. The EG shall be disconnected if an out-of-bounds voltage condition is detected on any of the phases.		P
	In line with NRS 048-2, it is recommended that A1 and A2 SSEG be able to ride through at least Y and X1 type dips, i.e. not disconnect for these events. The purpose is to avoid excessive nuisance tripping.		P
	Category A3 SSEG shall be able to ride through low and/or high voltage events in accordance with the RPP Grid Code.		N/A
	The generator shall maintain the pre-dip current during any dip event for which it remains connected.		P
	The ride-through and trip times are shown graphically in figure 4.  Figure 5 — Graphical representation of voltage-ride-through and voltage disconnect requirements for A1 and A2 EG		P
4.2.2.3.3	Over-frequency and under-frequency	See appended table.	P
	This requirement is in line with the RPP Grid Code (version 3.0) and applies to all EG in category A. NOTE The RPP Grid Code should be consulted for developments in the requirements for response to over-frequency and under-frequency events.		P
	The embedded generation system shall cease to energize the utility network when the utility frequency deviates outside the specified conditions. Both over- and under-frequency conditions indicate system abnormal conditions and all generators are expected to assist in stabilising the system during such periods.		P
	When the utility frequency is less than 47 Hz, the embedded generator shall disconnect from the utility network within 0.2 s.		P

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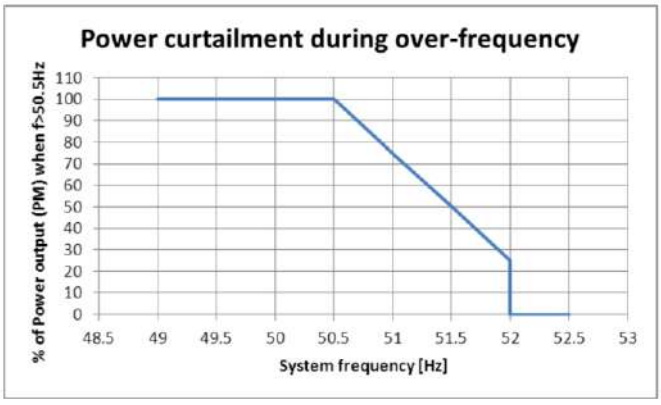
Clause	Requirement – Test	Result – Remark	Verdict
	While the utility frequency is in the range of 47 Hz and 50.5 Hz, the system shall operate normally. In order to prevent hysteresis switching (on-off toggling) during over-frequency conditions, the output power shall be reduced as follows:		P
	When the utility frequency exceeds 50.5 Hz, the active power available at the time shall be stored as the maximum power value P_M; this value P_M shall not be exceeded until the frequency has stabilised below 50.5 Hz for at least 4 seconds.		P
	The EG system shall control the output power as a function of PM at a gradient of 50 % per Hertz as illustrated in figure 5. The power generation shall follow the curve shown in figure 5 up and down while the system frequency is in the range 50.5 Hz to 52 Hz.		P
	When the utility frequency is more than 52 Hz for longer than 4 seconds, the embedded generator shall cease to energise the utility line within 0.5 s.		P
4.2.2.3.3.1	Relaxation for non-controllable generators		P
	Non-controllable generators may disconnect randomly within the frequency range 50.5 Hz to 52 Hz. The disconnect frequency for non-controllable generators will each be set at a random value by the manufacturer, with the option of changing this to a utility provided setting. The random disconnect frequency shall be selected so that all generators from any specific manufacturer will disconnect uniformly over the range with 0.1 Hz increments.		P
	When the utility frequency is more than the non-controllable generator over-frequency setpoint for longer than 4 seconds, the non-controllable generator shall cease to energise the utility line within 0.5 s. NOTE At the time of publication, this is in contradiction with the RPP Grid Code.  **Figure 6 — Power curtailment during over-frequency**		P
4.2.2.4	Prevention of islanding		P

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Clause	Requirement – Test	Result – Remark	Verdict
4.2.2.4.1	A utility distribution network can become de-energized for several reasons: for example, a substation breaker that opens due to a fault condition or the distribution network might be switched off for maintenance purposes. Should the load and (embedded) generation within an isolated network be closely matched, then the voltage and frequency limits may not be triggered. If the embedded generator control system only made use of passive voltage and frequency out-of-bounds detection, this would result in an unintentional island that could continue beyond the allowed time limits.	See appended table.	P
4.2.2.4.2	In order to detect an islanding condition, the embedded generator shall make use of at least one active islanding detection method. An active islanding detection method intentionally varies an output parameter and monitors the response or it attempts to cause an abnormal condition at the utility interface to trigger an out-of-bounds condition. If the utility supply is available, the attempt to vary an output parameter or cause an abnormal condition will fail and no response will be detected. However, if the utility supply network is de-energized, there will be a response to the change which can be detected. This signals an island condition to the embedded generator upon detection of which the embedded generator shall cease to energize the utility network within a specific time period.	The active islanding detection methods frequency shifting was employed in the grid-connected PV inverter.	P
4.2.2.4.3	Active island detection shall be used in all cases where the EG interfaces with the utility network.		P
4.2.2.4.4	An islanding condition shall cause the embedded generator to cease to energize the utility network within 2 s, irrespective of connected loads or other embedded generators. The embedded generator employing active islanding detection shall comply with the requirements of IEC 62116 (ed.1). NOTE Prevention of islanding measures is only considered on the embedded generator side, i.e. no utility installed anti-islanding measures are considered.	See appended table.	P
4.2.2.4.5	All rotating generators shall use a minimum of two islanding detection methods (e.g. rate-of-change-of-frequency and voltage vector shift detection due to the dead bands (slow detection) of islands in both methods). NOTE It is possible for a condition to exist, where a mains-excited generator becomes self-excited due to capacitance of the network (either cable capacitance or power factor correction). Under such conditions, the mains-excited generator will not disconnect from an island, hence effective islanding detection is required for all rotating generators.	Not rotating generator.	N/A
4.2.2.4.6	Passive methods of islanding detection shall not be the sole method to detect an island condition. When used, passive methods of islanding detection shall be done by three-phase voltage detection and shall be verified by an AC voltage source.		P

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Clause	Requirement – Test	Result – Remark	Verdict
4.2.2.4.7	The embedded generator shall physically disconnect from the utility network in accordance with the requirements in 4.2.2.2.		P
4.2.2.5	DC current injection	See appended table.	P
	The embedded generator shall not inject d.c. current greater than 0.5 % of the rated a.c. output current into the utility interface under any operating condition, measured over a 1-minute interval. The EG shall cease to energize the utility network within 500 ms if this threshold is exceeded.		P
4.2.3	Emergency personnel safety		Info.
	No requirements for emergency personnel safety (e.g. fire brigade) existed at the time of publication. It is expected that such issues will be dealt with in other documents, e.g. OHS Act, SANS 10142-1.		Info.
4.2.4	Response to utility recovery		P
4.2.4.1	The embedded generator shall ensure synchronisation before re-energizing at all times in accordance with 4.1.12.		P
4.2.4.2	After a voltage or frequency out-of-range condition that has caused the embedded generator to cease energizing the utility network, the generator shall not re-energize the utility network until the utility service voltage and frequency have remained within the specified ranges for a continuous and uninterrupted period of 60 s. The reconnection shall commence as follows:		P
4.2.4.2.1	Non-controllable generators may connect randomly within the 1 minute to 10 minute period after voltage and frequency recovery (period includes the 60 s to confirm recovery). The delay for non-controllable generators will each be set at a random value by the manufacturer, with the option of changing this to a utility provided setting. The random value shall be selected so that no more than 2 % of generators from any specific manufacturer will reconnect within 10s of each other.		P
4.2.4.2.2	Controllable generators may reconnect immediately after the 60 s delay confirming recovery of the system voltage and frequency at a maximum rate of 10 % of rated power per minute, i.e. full power output will only be reached after 10 minutes.		N/A
	This ramp rate may be modified at the request of the utility or in consultation with the utility.		P
4.2.5	Isolation		P
4.2.5.1	In line with SANS 10142-1 (as amended), each energy source should have its own, appropriately rated, isolation device.		P
4.2.5.2	It is expected that isolation requirements will be dealt with in more detail in future in e.g. SANS 10142-1/3. Such requirements shall supersede 4.2.5.		P

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Clause	Requirement – Test	Result – Remark	Verdict
4.2.5.3	The embedded generator shall provide a means of isolating from the utility interface in order to allow for safe maintenance of the EG. The disconnection device shall be a double pole for a single-phase EG, a three-pole for a three-phase delta-connected EG, and a four-pole for a three phase star-connected EG. The grid supply side shall be wired as the source.		P
4.2.5.4	The breaking capacity of the isolation circuit-breaker closest to the point of utility connection shall be rated appropriately for the installation point in accordance with SANS 60947-2. This disconnection device does not need to be accessible to the utility.		P
4.2.5.5	For dedicated supplies, a means shall be provided of isolating from the point of supply in order to allow for safe maintenance of the utility network. The disconnection device shall be a double pole for a single-phase EG, a three-pole for a three-phase delta-connected EG, and a four-pole for a three-phase star-connected EG.		P
	This disconnection device shall be lockable and accessible to the utility. NOTE 1 A device inside a lockable box is deemed a lockable device. NOTE 2 This disconnection device may become the new point of control as defined by SANS10142-1.		P
4.2.5.6	The requirement for the utility accessible disconnection device may only be waived by the utility where the risk to the network is deemed acceptable to the utility. Such permission shall be provided in writing. NOTE Full verification form to be signed off and accepted by the utility.		P
4.2.6	Earthing		P
4.2.6.1	The electrical installation shall be earthed in accordance with SANS 10142-1 (as applicable). The earthing requirements for different embedded generation configurations in conjunction with the customer network are described in annex B for the most common earthing systems. NOTE SANS 10142-1 applies to EG feeding a UPS and no connection to the utility supply (see table B5).	Rely in the responsibility of the installer.	N/A

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Clause	Requirement – Test	Result – Remark	Verdict
4.2.6.2	Installations with utility-interconnected inverters without simple separation shall make use of earth leakage protection which are able to respond to d.c. fault currents including smooth d.c. fault currents (i.e. without zero crossings) according to IEC 62109-2 unless the inverter can exclude the occurrence of d.c. earth fault currents on any phase, neutral or earth connection through its circuit design[1)]. This function may be internal or external to the inverter. NOTE IEC 62109-2, Edition 2011, section 4.8.3.5 gives selection criteria for RCD sensitivities. [1)] The appropriate earth leakage unit should be selected to accommodate the higher leakage current of inverters without transformers to avoid nuisance tripping.	Rely in the responsibility of the installer.	N/A
4.2.6.3	Where an electrical installation includes a PV power supply system without at least simple separation between the AC side and the DC side, an integrated RCD function shall be present to provide fault protection by automatic disconnection of supply shall be type B according to IEC/TR 60755, amendment 2. Where the PV inverter by construction is not able to feed DC fault currents into the electrical installation, an RCD of type B according to IEC/TR 60755 amendment 2 is not required. NOTE 1 Consideration must also be given to ensure that any d.c. currents do not impair the effectiveness of any other RCD'S installed throughout the a.c. system. NOTE 2 The earth leakage unit may also fulfil the requirement of the all-pole disconnection device as stated in 4.2.6. NOTE 3 The function of this RCD is not to provide protection against circulating d.c. currents in the inverter and a.c. supply, i.e. does not override 4.1.8.	The inverter was tested and fulfils IEC 62109-1 and IEC 62109-2 for the residual current device (RCD) or residual current monitor (RCM). However if an external residual current device (RCD) is mandatory, the switch must be triggered at a failure current of 300 mA or higher was required in the user manual.	P
4.2.7	Short-circuit protection		P
4.2.7.1	The embedded generator shall have suitably rated short-circuit protection at the connection to the AC mains in accordance with SANS 10142-1 and 3.		P
4.2.7.2	The short-circuit characteristics for the SSEG shall be supplied to the utility.	Not rotating generators.	N/A
4.2.8	Maximum short-circuit contribution		P
	Embedded generators have the potential to increase the fault level of the network to which it is connected. In order to limit the fault level changes in low voltage networks and allow coordination of fault levels with the utility, no generator will exceed the following fault level contribution:		P
	a) for synchronous generators: 8 times the rated current; b) for asynchronous generators: 6 times the rated current; and c) for generators with inverters: 1 times the rated current.		P

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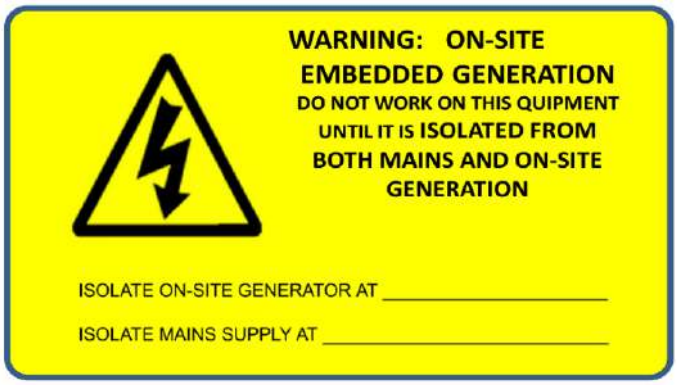
Clause	Requirement – Test	Result – Remark	Verdict
	NOTE At the time of installation, the short-circuit capacity of all existing equipment should be confirmed and upgraded where necessary. Suitable fault current limiting devices may be required to ensure a safe installation. The potential impact on neighbouring installations should also be considered to ensure that those installations remain safe.		P
4.2.9	Labelling		P
4.2.9.1	A label on the distribution board of the premises where the embedded generator is connected shown in figure 7, shall state: "WARNING: ON-SITE EMBEDDED GENERATION. DO NOT WORK ON THIS EQUIPMENT UNTIL IT IS ISOLATED FROM BOTH MAINS AND ON-SITE GENERATION SUPPLIES." or similar warning. Disconnection points for all supplies shall be indicated.  Figure 7 — Example of labelling (more isolation points to be added as required)	Rely in the responsibility of the installer and is stated in the installation instruction of the manufacturer.	N/A
4.2.9.2	The label shall be permanent with lettering of height at least 8 mm.		N/A
4.2.9.3	The label shall comply to requirements of SABS 1186-1.		P
4.2.9.4	The absence of emergency shutdown capabilities will be indicated on signage in accordance with 4.2.2.		P
4.2.10	Robustness requirements		P
	According to 4.2.2.1 all SSEG shall comply with safety requirements in accordance to SANS/IEC 62109-1 and IEC 62109-2. NOTE This section will be expanded in future revisions.	See TUV SUD IEC 62109-1/-2 test report no.: 70.409.16.237.04-05 for reference.	P
4.3	Metering	The meter was not part of the equipment under evaluation in this report.	N/A
4.3.1	General		N/A
4.3.1.1	All meters utilized by the utility shall be the property of the utility even when the meters are located on the premises of the customer. Meters that are embedded in the customer's network shall be accessible to the utility on request.		N/A

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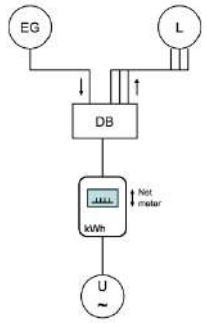
Clause	Requirement – Test	Result – Remark	Verdict
4.3.1.2	Three metering configurations are known in the case of premises where embedded generators are operated, dependent on the tariff structure required or implemented by the supplier. The details are given in 4.3.2 and 4.3.3.		N/A
4.3.1.3	The utility will advise what metering is required based on the application and location of the embedded generator.		N/A
4.3.1.4	Metering will comply to SANS 474/NRS 057 and SANS 473/NRS 071.		N/A
4.3.1.5	Where applicable (manual reading), suitable signage will be attached at the meter, indicating that import and export registers need to be read. Refer to Figure 8 and 4.2.9.  **Figure 8 — Example of labelling for metering points (Colouring and other requirements to be confirmed with the utility).**		N/A
4.3.2	Single-quadrant meter installation		N/A
4.3.2.1	The single-meter arrangement is given in figure 9.  Legend DB distribution board EG embedded generation L customer network U utility network NOTE This type of installation requires an electronic meter where differentiated import and export rates apply. **Figure 9 — Single meter installation**		N/A
4.3.2.2	The EG feeds into the customer network (L), offsetting the customer's own consumption. If the customer is a net electricity importer from the utility (U), the cumulative consumption meter reading will increase. If the customer is a net exporter, the cumulative consumption meter reading decreases.		N/A
4.3.2.3	As a result of using a single meter, the overall consumption and generation of the customer is not recorded. The net import and export of energy is metered and balanced over the metering period.		N/A

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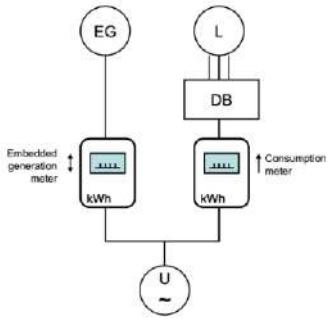
Clause	Requirement – Test	Result – Remark	Verdict
4.3.2.4	A net meter records and balances energy in a single register. An alternative to the net meter is a bi-directional meter which records energy import and export in separate registers. The registers need to be balanced off against each other to provide the necessary information to the billing system. Separate register meters may be preferred by utilities for reasons of revenue protection.		N/A
4.3.3	Multiple meter installation		N/A
	NOTE The feed-in tariff may be worded differently in policy documents, however, the principle is discussed in this section.		N/A
4.3.3.1	Feed-in tariff metering records all the energy generated from the embedded generator and reimburses the EG customer at the set FIT. The consumption of the EG customer is recorded in full and billed in the conventional manner. A customer with embedded generation and consumption therefore requires two meters or a bi-directional active energy meter that records energy flow in both directions.		N/A
4.3.3.2	The metering configuration for FIT metering is given in figure 8 and is referred to as “separate metering”. An existing consumption meter, whether prepayment or conventional, can remain in place. The embedded generation meter shall be a bi-directional active energy meter that records energy flow in both directions.		N/A
4.3.3.3	This metering configuration records overall consumption (L) and overall generation (EG) which is exported to the utility network (U).		N/A
4.3.3.4	The separate metering configuration in figure 10 is the most basic FIT metering configuration. NOTE The relevant regulations applicable in municipalities may not allow this metering configuration in which case the EG can be connected through the separate embedded generation metering configuration shown in figure 10.  Legend DB distribution board EG overall generation L overall consumption U utility network NOTE The EG may have auxiliary supply (electricity usage) **Figure 10 — Separate metering**		N/A

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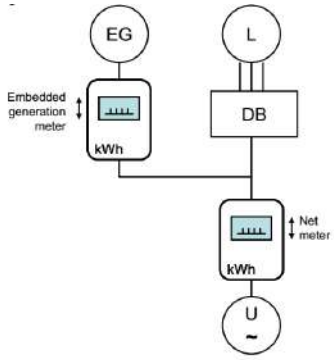
Clause	Requirement – Test	Result – Remark	Verdict
4.3.3.5	In the case where the output of the EG cannot physically be taken to the main distribution board of the customer's premises, an EG meter may be embedded in the customer's network. The appropriate metering configuration is given in figure 11.  Legend DB distribution board EG embedded generation L consumption U utility network **Figure 11 — Separate embedded metering**		N/A
4.3.3.6	The overall generation of the EG is recorded in the bi-directional embedded generation meter while the overall consumption is balanced off between the net meter and the EG meter[2)]. The net meter shall be a bi-directional meter. [2)] The overall electricity consumption over a period is equivalent to the sum of the net meter differential reading and the EG meter differential reading.		N/A
4.3.4	Types of meter		N/A
4.3.4.1	Energy meters used in conjunction with embedded generation shall record active energy. The meters shall be bi-directional type meters. The meters can either be of the single or the separate register type.		N/A
4.3.4.2	The current specification for pre-payment meters does not cater for embedded generation.		N/A
4.3.4.3	In the event that installations with embedded generators are required to record reactive energy in conjunction with active energy, four-quadrant electronic meters shall be utilized.		N/A
4.3.4.4	Meters with the capability of metering quality of supply parameters shall activate the monitoring facility on the meter. NOTE The modalities of the billing and revenue procedures for EG customers will be addressed in the future NRS 097-2-4 specification.		N/A
Annex A	Notes to purchasers		N/A
	NOTE The customer is advised to contact the utility to discuss potential further connection requirements.		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
A.1	The following requirement shall be specified in tender invitations and in each order or contract:		N/A
	Whether all power quality parameters shall be measured at the POC (see 4.1.1.3).		N/A
A.2	The following requirements shall be agreed upon between the customer and the utility:		N/A
	a) whether the EG shall be type approved (see 4.1.1.5);		N/A
	b) whether the EG may control the voltage (see 4.1.2.2);		N/A
	c) the power factor limits (see 4.1.11).		N/A
Annex B	Earthing systems		P
	NOTE SANS 10142-1 does not apply to embedded generators (i.e. connected in parallel to the utility network). Annex B is provided as minimum requirements for earthing systems until the update of SANS 10142-1.		P
B.1	Application of SANS 10142-1	See below.	P
B.1.1	General		P
	SANS 10142-1 applies to low-voltage wiring, earthing, bonding and safety. The requirements in B.1.2 to B.1.5 relating to earthing and to neutral and earth path connections apply.		P
B.1.2	Neutral conductor		P
	The neutral conductor shall not be connected direct to earth or to the earth continuity conductor on the load side of the point of control (see 6.1.6 in SANS 10142-1:2012).		P
B.1.3	Customer's earth terminal		N/A
	Each installation shall have a consumer's earth terminal (see 3.18 of SANS 10142-1:2012) at or near the point where the supply cables enter the building or structure. All conductive parts that are to be earthed (see 6.12.3 in SANS 10142-1:2012) shall be connected to the main earthing terminal (see 3.29.4 in SANS 10142-1:2012), which shall be connected to the consumer's earth terminal. The consumer's earth terminal shall be earthed by connecting it to the supply earth terminal (see 3.78 in SANS 10142-1:2012) or the protective conductor (see 3.15.8 in SANS 10142-1:2012) and, if installed, the earth electrode. The effectiveness of the supply protective conductor shall be determined in accordance with 8.7.5 in SANS 10142-1:2012 (see 6.11.1 as amended by amendment No. 6 in SANS 10142-1:2012).	Rely in the responsibility of the installer.	N/A
B.1.4	Earthing of combined sources		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
	When an installation that has a common neutral is supplied from a combination of transformers and generators located near one another, the neutral terminal of these shall be connected to a single neutral bar. This neutral bar shall be the only point at which the neutral of the installation is earthed except in the case in 7.12.3.1.3 in SANS 10142-1:2012 (see 6.12.4 as amended by amendment No. 6 in SANS 10142-1:2012).	Rely in the responsibility of the installer.	N/A
B.1.5	Neutral bar earthing	Rely in the responsibility of the installer.	N/A
B.1.5.1	Protection in accordance with the requirements in 6.7 in SANS 10142-1:2012 shall be provided for the electrical installation in such a manner as to ensure correct operation of the protection devices, irrespective of the supply or combination of sources of supply. Operation of the protection devices shall not rely upon the connection to the earthing point of the main supply.		N/A
B.1.5.2	Where there is no existing earth electrode in the electrical installation, a suitable earth electrode may be installed in accordance with SANS 10199. When installed, the electrode shall be bonded to the consumer's earth terminal and to the earthing point of the generating set with a conductor of at least half the cross-section of that of the phase conductor, but not less than 6 mm copper, or equivalent. This also applies to a single-phase supply. NOTE 1 In the case of the TN system of electricity supply, an earth electrode is normally not required in an electrical installation (see 7.12.3.1.1 as amended by amendment No. 6 in SANS 10142-1:2012). NOTE 2 IEC 60364-1 distinguishes three families of earthing arrangement, using the two-letter codes TN, TT, and IT. The first letter indicates the connection between earth and the power-supply equipment (generator or transformer). The second letter indicates the connection between earth and the electrical device being supplied. In the case of TN systems, T indicates a direct connection of a point with earth (Latin: terra) and N indicates direct connection to neutral at the origin of the installation, which is connected to the earth.		N/A
B.1.5.3	When an installation is supplied from a combination of transformers and generators located near one another, including alternative supplies, the neutral terminal of these shall be connected to a single earthed neutral bar. This neutral bar shall be the only point at which the neutral of the installation is earthed. Any earth leakage unit shall be positioned to avoid incorrect operation due to the existence of the parallel neutral or earth path (see 7.12.3.1.2 as amended by amendment No. 6 in SANS 10142-1:2012).		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
B.1.5.4	Where alternative supplies are installed remotely from the installation and it is not possible to make use of a single neutral bar, which is earthed, the neutral of each unit shall be earthed at the unit and these points shall be bonded to the consumer's earth terminal (see 6.12.4 of SANS 10142-1:2012). The supply that supplies the installation or part of the installation shall be switched by means of a switch that breaks all live conductors operating substantially together (see annex S of SANS 10142-1:2012), to disconnect the earthed neutral point from the installation neutral when the alternative supply is not connected (see also 6.1.6 of SANS 10142-1:2012 and 7.12.3.1.3 (as amended by amendment No. 6 in SANS 10142-1:2012)).		N/A
B.1.5.5	Where only part of an installation is switched to the alternative supply in the same distribution board, the neutral bar shall be split (see figure S.2 in annex S of SANS 10142-1:2012) and 7.12.3.1.3 (as amended by amendment No. 6 in SANS 10142-1: 2012).		N/A
B.2	Embedded generator and UPS configurations		P
B.2.1	Various configurations of embedded generator and UPS systems were examined, and cross-referenced with the main electrical supply earthing configurations (i.e. TN-S, TN-C-S). Table B.1 shows the permutations explored. NOTE The TT configuration is generally not used in South Africa, but could sometimes be found in certain rural electrification network spurs. **Table B.1 — Generic embedded generation/UPS type versus electricity supply configuration**	TN, except corner-earthed system.	P
B.2.2	Tables B.2 to B.5 illustrate the typical system application types and connections.		N/A

1	2	3	4	5	6
Figure reference	**Application type**	**Alternative supply characteristic**	**Main electricity supply system configuration examined**		
		Internal N-PE bridge connection	**TN-S**	**TN-C-S**	**TT**
Table B.2	Alternative generator, e.g. stand-by diesel or stand-alone generator	Unbridged N-PE	Y	Y	Y
		N-PE bridged	Y	Y	Y
Table B.3	Embedded generator, e.g. utility interconnected PV system		Y	Y	Y
Table B.4	UPS system with a.c. coupled embedded generator	Unbridged N-PE	Y	Y	Y
		N-PE bridged	Y	Y	Y
Table B.5	UPS system	Unbridged N-PE	Y	Y	Y
		N-PE bridged	Y	Y	Y
	UPS system with d.c. coupled embedded generator (e.g. PV or wind)	Unbridged N-PE	Y	Y	Y
		N-PE bridged	Y	Y	Y
NOTE For information only.					

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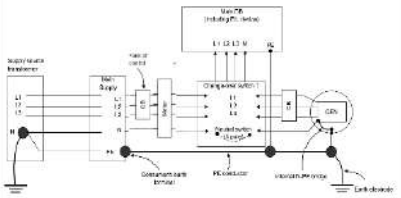
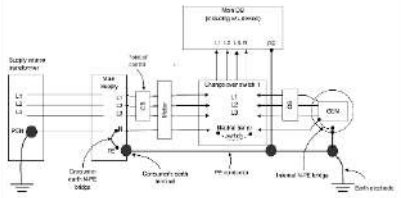
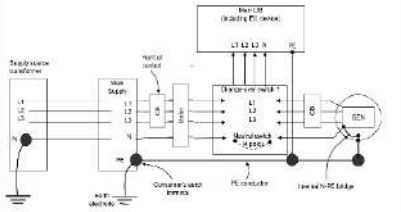
Clause	Requirement – Test	Result – Remark	Verdict
	Table B.2 — Diesel generator in alternative supply configuration	The unit under test was single phase Grid-Connected PV Inverter and not diesel generator.	N/A

Table B.2 — Diesel generator in alternative supply configuration

1 Supply earthing system	2 Wiring diagram	3 Earthing comments
TN-S • Five-wire supply. • Consumer's earth electrode not required. • No N-PE bridge on consumer's earth terminal		**Requirements** • Alternative supply earth electrode required • Bridge N-PE required on alternative supply. • Four-pole change-over switch required.
TN-C-S • Four-wire supply. • Consumer's earth electrode not required. • Bridge N-PE required on consumer's earth terminal		**Requirements** • Alternative supply earth electrode required **Options** • If bridged N-PE on alternative supply, then four-pole change-over switch required. • If open N-PE on alternative supply, then three-pole change-over switch required.
TT • Four-wire supply. • Consumer's earth electrode required. • No N-PE bridge on consumer's earth terminal		**Requirements** • Bridge N-PE required on alternative supply. • Four-pole change-over switch required.
Key: CB circuit-breaker DB distribution board E/L earth leakage GEN alternative generator UPS battery alternative supply		

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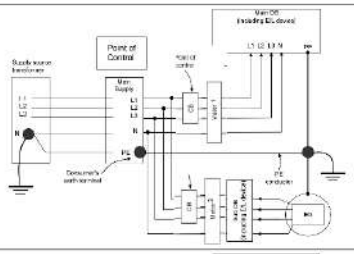
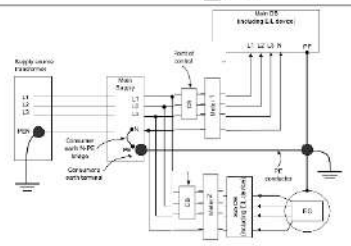
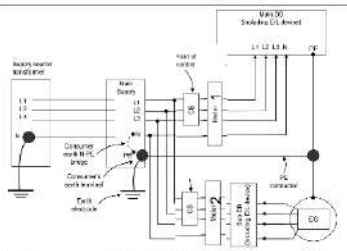
Clause	Requirement – Test	Result – Remark	Verdict
	Table B.3 — Embedded generator without alternative supply		N/A

Table B.3 — Embedded generator without alternative supply

1 Supply earthing system	2 Wiring diagram	3 Earthing comments
TN-S • Five-wire supply. • Consumer's earth electrode not required. • No N-PE bridge on consumer's earth terminal • Main supply = Point of Control • Main DB		**Requirements** • RCD (Type B) required for transformerless inverters. **Options** • EG earth electrode desired
TN-C-S • Four-wire supply. • Consumer's earth electrode not required. • Bridge N-PE required on consumer's earth terminal		**Requirements** • EG on E/L device **Options** • EG earth electrode desired
TT • Four-wire supply. • Consumer's earth electrode required. • No N-PE bridge on consumer's earth terminal		**Requirements** • EG on E/L device

Key: CB circuit-breaker DB distribution board E/L earth leakage
GEN alternative generator EG embedded generator UPS battery alternative supply

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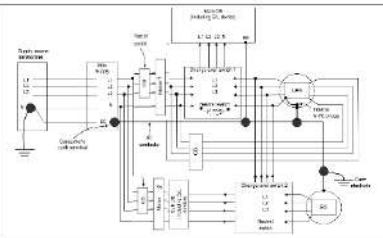
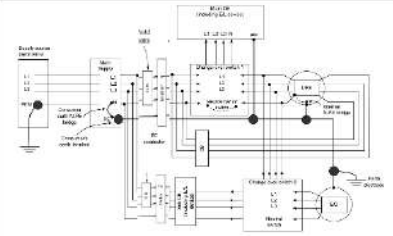
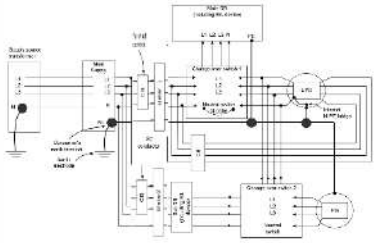
Clause	Requirement – Test	Result – Remark	Verdict
	Table B.4 — Alternative supply with a.c. coupled embedded generator		N/A

Table B.4 — Alternative supply with a.c. coupled embedded generator

1 Supply earthing system	2 Wiring diagram	3 Earthing comments
TN-S • Five-wire supply. • Consumer's earth electrode not required. • No N-PE bridge on consumer's earth terminal		**Requirements** • EG on E/L device • Alternative supply earth electrode required • Bridge N-PE required on alternative supply. • Change-over switch 1 required to be four-pole • Change-over switch 2 required to be four-pole.
TN-C-S • Four-wire supply. • Consumer's earth electrode not required. • Bridge N-PE required on consumer's earth terminal		**Requirements** • EG on E/L device • Alternative supply earth electrode required **Options** • If bridged N-PE on alternative supply, then change-over switch 1 required to be four-pole. • If open N-PE on alternative supply, then change-over switch 1 required to be three-pole. • Change-over switch 2 required to be four-pole
TT • Four-wire supply. • Consumer's earth electrode required. • No N-PE bridge on consumer's earth terminal		**Requirements** • EG on E/L device • Bridge N-PE required on alternative supply. • Change-over switch 1 required to be four-pole • Change-over switch 2 required to be four-pole.
Key: CB circuit-breaker DB distribution board E/L earth leakage GEN alternative generator EG embedded generator UPS battery alternative supply		

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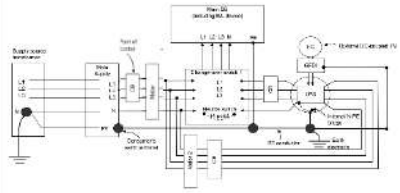
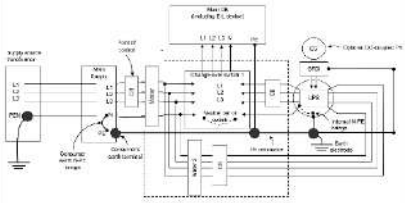
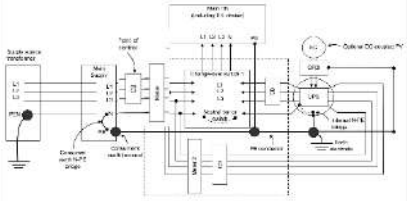
Clause	Requirement – Test	Result – Remark	Verdict
	Table B.5 — Alternative supply with or without d.c. coupled embedded generator **Table B.5 — Alternative supply with or without d.c. coupled embedded generator** 1 Supply earthing system / 2 Wiring diagram / 3 Earthing comments **TN-S** • Five-wire supply. • Consumer's earth electrode not required. • No N-PE bridge on consumer's earth terminal  **Requirements** • If bridged N-PE on alternative supply, then four-pole change-over switch required. • If open N-PE on alternative supply, then three-pole change-over switch required **TN-C-S** • Four-wire supply. • Consumer's earth electrode not required. • Bridge N-PE required on consumer's earth terminal  **Options** • If bridged N-PE on alternative supply, then four-pole change-over switch required. • If open N-PE on alternative supply, then three-pole change-over switch required. **TT** • Four-wire supply. • Consumer's earth electrode required. • No N-PE bridge on consumer's earth terminal  **Requirements** • Bridged N-PE required on alternative supply. • Four-pole change-over switch required. Key: CB circuit-breaker; DB distribution board; GFDI ground fault detector interrupter; GEN alternative generator; EG embedded generator; UPS battery alternative supply		N/A
B.3	Rules of thumb established for embedded generation and backup systems		P
B.3.1	General		P
	Earthing and wiring guidelines were developed as a result of the above rigorous analysis. See tables B.2 to B.5.		P
B.3.2	Earth electrode		N/A
B.3.2.1	All alternative systems shall have an own earth electrode connected to the consumer's earth terminal and shall comply with 7.12.3.1.1 in SANS 10142-1:2012.		N/A
B.3.2.2	Embedded generators need not have their own earth electrode in accordance with SANS 10142-1, but an own earth electrode is preferred.		N/A
B.3.3	N-PE bridge on consumer's earth terminal	Rely in the responsibility of the installer.	N/A
B.3.3.1	The TN-C-S system shall be bridged between N and PE on the consumer's earth terminal in the installation on the supply side of the point of control.		N/A
B.3.3.2	TN-S and TT systems shall be un-bridged (as normal practice). NOTE This is to comply with standard installation requirements for safety.		N/A

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Clause	Requirement – Test	Result – Remark	Verdict
B.3.4	N-PE bridge on alternative supply	Rely in the responsibility of the installer.	N/A
B.3.4.1	TN-S and TT systems shall be bridged.		N/A
B.3.4.2	The TN-C-S may be either bridged or un-bridged. This, however, impacts on change-over switch requirements.		N/A
B.3.5	Change-over switch No. 1 (between main supply and backup supply)	Rely in the responsibility of the installer.	N/A
B.3.5.1	In the case of backup systems WITHOUT an internal N-PE bridge (i.e. where N and PE are isolated), the following is required:		N/A
	a) for a three-phase system: a three-pole change-over switch with common neutral bar; and b) for a single-phase system: a single-pole change-over switch with common neutral bar.		N/A
B.3.5.2	In the case of backup systems WITH an internal N-PE bridge, the following is required:		N/A
	a) for a three-phase system: a four-pole change-over switch including neutral, or a three-pole with overlapping neutral; and b) for a single-phase system: a two-pole change-over switch including neutral, or a single pole with overlapping neutral.		N/A
B.3.5.3	Manual change-over switches shall be three position switches, i.e. break-before-make.		N/A
B.3.6	Change-over switch No. 2 (between a.c. coupled embedded generator and backup supply)	Rely in the responsibility of the installer.	N/A
B.3.6.1	In the case of a three-phase system, there shall be a four-pole change-over switch including neutral, or a three-pole with overlapping neutral.		N/A
B.3.6.2	In the case of a single-phase system, there shall be a two-pole change-over switch including neutral, or a single pole with overlapping neutral.		N/A
Annex C	Network impedance		Info.
Annex D	(Annex A of VDE-AR-N 4105) Explanations		Info.
Annex E	(Annex B of VDE-AR-N 4105) Connection examples		Info.
Annex F	(Annex C of VDE-AR-N 4105) Example of meter panel configurations		Info.
Annex G	Generation management network security management		P
G.1	Generation management network security management		P

NRS 097-2-1:2017			
Clause	Requirement – Test	Result – Remark	Verdict
	NOTE While no South African utility currently has the required communication systems in place for LV systems, embedded generators may be NERSA exempt in providing on-line communication interfaces. However, should the utility require this in future, the embedded generator will provide the required interface at their own cost. Section G.1 provides the recommended requirements for such an interface. At the time of publication, basic communication requirements for category A3 generators are provided in the RPP Grid Code.		P
G.1.1	In addition to requirements elsewhere in this specification, the embedded generator shall be able to control the following parameters as and where signals are sent by the utility:		P
G.1.1.1	Active power control, typically a temporary reduction in active power output;		P
G.1.1.2	Reactive power control, i.e. change of the operating power factor or power factor curve of the generator.		P
G.1.2	For each operational state and/or operational point, the embedded generator must be able to reduce the output power to less than or equal to an active power set-point provided by the utility.		P
G.1.3	Embedded generation systems with a power output capability of 100 kVA or more shall be able to control the output power in steps of 10 % or less of the rated active power.		P
G.1.4	The embedded generator active power output shall reach the new set-point within a period of 1 minute. If this set-point cannot be reached within 5 minutes, the embedded generator shall disconnect from the system. NOTE This implies that embedded generators without the capability to control the output power adequately or in adequate steps, shall disconnect from the system when a reduction in active power output is requested.		P
G.1.5	Embedded generation systems with a power output capability of 100 kVA or more shall be able to control the reactive power (power factor) is steps of 5 % or less of the rated power.		P
G.1.6	Reactive power shall reach the new set-point within a period of 1 minute. If this set-point cannot be reached within 5 minutes, the embedded generator shall disconnect from the system.		P

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Clause	Requirement – Test	Result – Remark	Verdict
G.1.7	According to the RPP Grid Code version 3.0, the accuracy of the control performed for both the active power and reactive power controls, and of the setpoint of both the active power and reactive power, shall not deviate by more than ± 2 % of the setpoint value or by ± 0.5 % of the rated power, depending on which yields the highest tolerance. NOTE Appropriate communication protocols are under discussion with the Grid Code Advisory Committee and will be provided in a future edition of this document. This capability will then become compulsory for all new equipment.		P
G.2	Principles for network support		P
	As a rule, power generation systems of subcategory A3 shall be able to contribute to the static voltage stability in the utility network. Static voltage stability is the voltage stability in the low-voltage network at which the slow voltage changes are maintained within compatible limits in the distribution network. If required due to network related circumstances and by the utility, the embedded generator shall contribute to the static voltage stability in the low-voltage network.		P
	Dynamic grid support, i.e. voltage stability in the event of voltage drops in higher voltage levels, is not required for embedded generators connected to low-voltage networks. NOTE This requirement applies tor units larger than 100 kVA only, smaller units on dedicated circuits (i.e. part of sub-category A3) are exempt.		P
G.3	Emergency personnel safety		P
	The safety of emergency personnel, e.g. fire brigade, shall be dealt with elsewhere.		P
	DC installations will be covered by SANS 10142-X (future document).		P
	A utility accessible disconnector will be available to emergency personnel that will disconnect the a.c. NOTE This clause will be superseded by requirements in the future SANS 10142-X document or other relevant requirements based on the Occupational Health and Safety act (Act No. 85 of 1993) as amended.		P
G.3.1	Appropriate signage shall be installed. The requirements shall be cross-checked with requirements of SANS 10142-1. An example of signage as required by this section of NRS 097 is provided in 4.2.10.		P
G.3.2	It is preferable that all SSEG be installed with emergency shutdown equipment. Examples of requirements are listed in G.3.2.1 to G.3.2.4. The manufacturer shall prove that the emergency shutdown processes and procedures are in line with current international best practices.		P

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Clause	Requirement – Test	Result – Remark	Verdict
G.3.2.1	All a.c. voltages should be shut off, regardless of the operating mode of the equipment at the time of shutdown.		P
G.3.2.2	All fuel inputs to a SSEG (e.g. water feed to a hydro-generator, d.c. input to an inverter, etc.) should be shut off; regardless of the operating mode of the equipment at the time of shutdown. NOTE PV panels cannot be switched off.		P
G.3.2.3	Equipment that have emergency shutdown capabilities, shall have a “fireman’s switch” installed in accordance with SANS 10142-1 at the time of installation in order to activate emergency shutdown. NOTE The d.c. from PV panels and/or battery storage will be assumed to be live.		P
G.3.3	The absence of emergency shutdown capabilities will be indicated on signage referred to in G.3.1.		P

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Clause	Requirement – Test	Result – Remark	Verdict

Test overview:		
NRS 097-2-1:2017		
Clause	Test item	Result
4.1.5	Flicker and voltage changes	P
4.1.6	Voltage unbalance	P
4.1.8.1	DC injection	P
4.1.8.2 & 4.2.2.5	DC current injection	P
4.1.10	Harmonics and waveform distortion	P
4.1.11	Power factor	P
4.2.2.2	Disconnection device (previously disconnection switching unit)	P
4.2.2.3.2	Overvoltage and undervoltage	P
4.2.2.3.3	Overfrequency and underfrequency	P
4.2.2.4	Prevention of islanding (in accordance with IEC 62116)	P
4.2.4	Response to utility recovery (see table 4.2.2.3.2 & 4.2.2.3.3)	P

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Clause	Requirement – Test	Result – Remark	Verdict

4.1.5	TABLE: Flicker and voltage changes		P
Test conditions:	Maximum permissible voltage fluctuation (expressed as a percentage of nominal voltage at 100 % power) and flicker		
Model: Solis-1P4.6K-4G			
Limit	dc = 3,3 (%)	P_{st}=0,35	P_{lt}=0,30
Test value	0,08	0,12	0,08

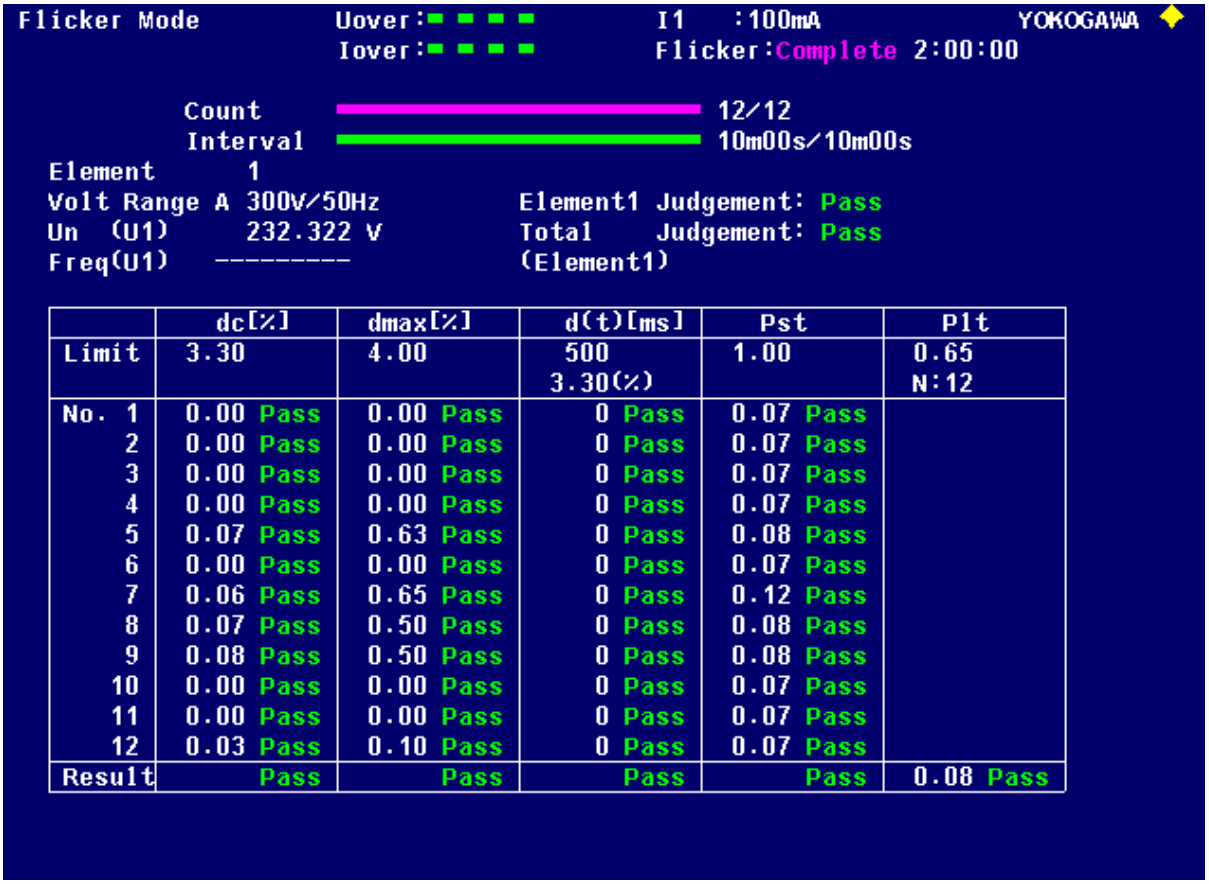
Note:

Calculation of the maximum permissible grid impedance at the point of common coupling based on dc:

Zmax = Zref * 3,3% / dc(Pn)

The tests should be based on the limits of the EN 61000-3-11 for more than 16A.
The tests were performed on model Solis-1P4.6K-4G and are also applicable for all other models stated in this report.

Flicker Test Result



	dc[%]	dmax[%]	d(t)[ms]	Pst	P1t
Limit	3.30	4.00	500 3.30(%)	1.00	0.65 N:12
No. 1	0.00 Pass	0.00 Pass	0 Pass	0.07 Pass	
2	0.00 Pass	0.00 Pass	0 Pass	0.07 Pass	
3	0.00 Pass	0.00 Pass	0 Pass	0.07 Pass	
4	0.00 Pass	0.00 Pass	0 Pass	0.07 Pass	
5	0.07 Pass	0.63 Pass	0 Pass	0.08 Pass	
6	0.00 Pass	0.00 Pass	0 Pass	0.07 Pass	
7	0.06 Pass	0.65 Pass	0 Pass	0.12 Pass	
8	0.07 Pass	0.50 Pass	0 Pass	0.08 Pass	
9	0.08 Pass	0.50 Pass	0 Pass	0.08 Pass	
10	0.00 Pass	0.00 Pass	0 Pass	0.07 Pass	
11	0.00 Pass	0.00 Pass	0 Pass	0.07 Pass	
12	0.03 Pass	0.10 Pass	0 Pass	0.07 Pass	
Result	Pass	Pass	Pass	Pass	0.08 Pass

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Clause	Requirement – Test	Result – Remark	Verdict

4.1.6.2	**TABLE: Voltage unbalance for three-phase generators**				N/A
Measurement No.	1	2	3	4	5
Test at rated power @ cos φ = 1					
U_{E60} [V]: L1					
U_{E60} [V]: L2					
U_{E60} [V]: L3					
U_{E60} [V]: |L1 - L2|					
U_{E60} [V]: |L2 - L3|					
U_{E60} [V]: |L3 - L1|					
cos φ_{E60} max.:					
max voltage unbalance [V]:					
Limit, 0,2%U_{Rated} [V]:					

Note:

Three-phase generators may not contribute more than 0,2 % voltage unbalance when connected to a network with impedance equal to the reference impedance.

The PV inverters were single phase not used in three-phase system.

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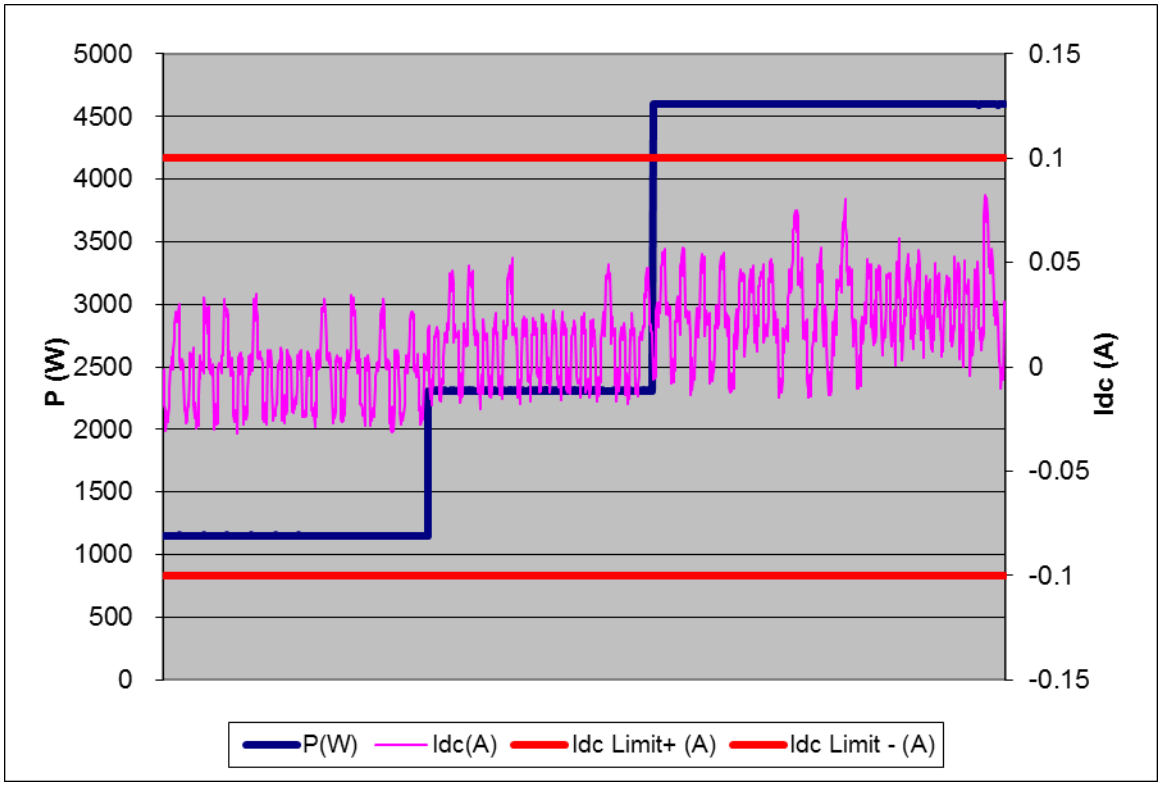
Clause	Requirement – Test	Result – Remark	Verdict

4.1.8.1	TABLE: DC injection		P
Model: Solis-1P4.6K-4G			
Limit:	0,5% of I_{rated} (0,1 A)		
Output power level (%)	25%	50%	100%
Max test value (A)	0,035	0,052	0,082
Percent of rated AC current (%)	0,18%	0,26%	0,41%

Diagram of permanent DC-Injection
(25% / 50% / 100%Pn)



Note:

The average d.c. current injected by the embedded generator shall not exceed 0,5 % of the rated a.c. output current over any 1-minute period, into the utility a.c. interface under any operating condition.

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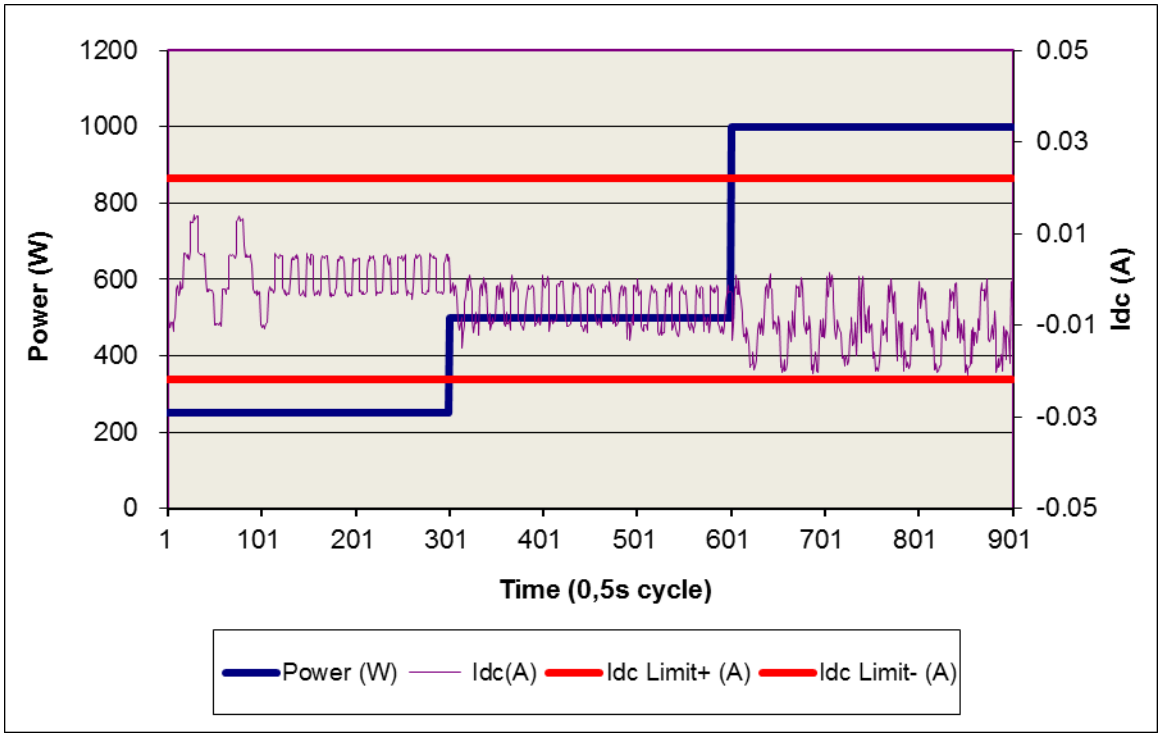
Clause	Requirement – Test	Result – Remark	Verdict

4.1.8.1	TABLE: DC injection		P
Model: Solis-1P1K-4G			
Limit:	0,5% of I_{rated} (0,022 A)		
Output power level (%)	25%	50%	100%
Max test value (A)	0,014	-0,015	-0,021
Percent of rated AC current (%)	0,32%	0,35%	0,49%

Diagram of permanent DC-Injection
(25% / 50% / 100%Pn)



Note:

The average d.c. current injected by the embedded generator shall not exceed 0,5 % of the rated a.c. output current over any 1-minute period, into the utility a.c. interface under any operating condition.

The tests were performed on model Solis-1P4.6K-4G and Solis-1P1K-4G are also applicable for all other models stated in this report.

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Clause	Requirement – Test	Result – Remark	Verdict

4.1.8.2& 4.2.2.5	**TABLE: DC current injection**			**P**
Model: Solis-1P4.6K-4G				
Test conditions:	U_N = 230 Vac Uinput = 360 Vdc Rated Power = 4600 W			
DC Injection (A)	Limits	Trip Time (ms)		
Tested with +0,1 A	I_{DC}:>0,5% I_{rated}, EG disconnection within 500 ms	146	138	129
Tested with -0,1 A	I_{DC}:>0,5% I_{rated}, EG disconnection within 500 ms	135	116	128

Note:

The EG shall cease to energize the utility network within 500 ms if inject d.c. current greater than 0,5 % of the rated a.c. output current into the utility interface.

The tests were performed on model Solis-1P4.6K-4G and are also applicable for all other models stated in this report.

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Clause	Requirement – Test	Result – Remark	Verdict

4.1.10	**TABLE: Harmonics and waveform distortion**			**P**
Harmonics				
Model: Solis-1P4.6K-4G				
Active power (kW)		4,604		
Voltage (V)		230,23		
Current (A)		19,99		
Frequency (Hz)		50,00		
THD (%)		1,62		
Harmonics	Current Magnitude (A)	% of Fundamental	Phase	Harmonic Current Limits (%)
1st	19,999	--	Single Phase	--
2nd	0,081	0,406	Single Phase	1%
3rd	0,121	0,607	Single Phase	4%
4th	0,02	0,098	Single Phase	1%
5th	0,177	0,883	Single Phase	4%
6th	0,012	0,060	Single Phase	1%
7th	0,134	0,669	Single Phase	4%
8th	0,008	0,039	Single Phase	1%
9th	0,099	0,496	Single Phase	4%
10th	0,006	0,032	Single Phase	1%
11th	0,082	0,409	Single Phase	2%
12th	0,006	0,029	Single Phase	0,5%
13th	0,064	0,319	Single Phase	2%
14th	0,004	0,021	Single Phase	0,5%
15th	0,055	0,275	Single Phase	2%
16th	0,004	0,019	Single Phase	0,5%
17th	0,046	0,232	Single Phase	1,5%
18th	0,002	0,012	Single Phase	0,38%
19th	0,044	0,218	Single Phase	1,5%
20th	0,002	0,011	Single Phase	0,38%
21th	0,037	0,185	Single Phase	1,5%
22th	0,003	0,013	Single Phase	0,38%
23th	0,032	0,162	Single Phase	0,6%
24th	0,003	0,016	Single Phase	0,15%
25th	0,026	0,131	Single Phase	0,6%
26th	0,002	0,010	Single Phase	0,15%
27th	0,023	0,114	Single Phase	0,6%

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Clause	Requirement – Test	Result – Remark	Verdict

28th	0,002	0,008	Single Phase	0,15%
29th	0,021	0,105	Single Phase	0,6%
30th	0,001	0,007	Single Phase	0,15%
31th	0,020	0,098	Single Phase	0,6%
32th	0,002	0,009	Single Phase	0,15%
33th	0,017	0,084	Single Phase	0,6%
34th	0,003	0,013	Single Phase	0,15%
35th	0,015	0,077	Single Phase	0,3%
36th	0,003	0,016	Single Phase	0,08%
37th	0,014	0,069	Single Phase	0,3%
38th	0,002	0,011	Single Phase	0,08%
39th	0,012	0,062	Single Phase	0,3%
40th	0,002	0,010	Single Phase	0,08%
41th	0,011	0,053	Single Phase	0,3%
42th	0,002	0,011	Single Phase	0,08%
43th	0,010	0,050	Single Phase	0,3%
44th	0,003	0,017	Single Phase	0,08%
45th	0,009	0,047	Single Phase	0,3%
46th	0,002	0,012	Single Phase	0,08%
47th	0,008	0,042	Single Phase	0,3%
48th	0,003	0,013	Single Phase	0,08%
49th	0,008	0,038	Single Phase	0,3%
50th	0,002	0,012	Single Phase	0,08%

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Clause	Requirement – Test	Result – Remark	Verdict

4.1.10	TABLE: Harmonics and waveform distortion			P
Inter-harmonics				
Model: Solis-1P4.6K-4G				
Frequency [Hz]	Current Magnitude (A)	% of Fundamental	Phase	Harmonic Current Limits (%)
75	0,013	0,064	Single Phase	0,1%
125	0,02	0,098	Single Phase	0,1%
175	0,019	0,095	Single Phase	0,1%
225	0,008	0,041	Single Phase	0,1%
275	0,004	0,021	Single Phase	0,1%
325	0,004	0,020	Single Phase	0,1%
375	0,003	0,015	Single Phase	0,1%
425	0,003	0,015	Single Phase	0,1%
475	0,003	0,014	Single Phase	0,1%
525	0,006	0,028	Single Phase	0,1%
575	0,005	0,023	Single Phase	0,25%
625	0,004	0,021	Single Phase	0,25%
675	0,002	0,012	Single Phase	0,25%
725	0,003	0,016	Single Phase	0,25%
775	0,003	0,014	Single Phase	0,25%
825	0,003	0,013	Single Phase	0,25%
875	0,002	0,010	Single Phase	0,19%
925	0,003	0,013	Single Phase	0,19%
975	0,002	0,011	Single Phase	0,19%
1025	0,002	0,011	Single Phase	0,19%
1075	0,002	0,009	Single Phase	0,19%
1125	0,002	0,008	Single Phase	0,19%
1175	0,002	0,008	Single Phase	0,08%
1225	0,003	0,015	Single Phase	0,08%
1275	0,002	0,011	Single Phase	0,08%
1325	0,002	0,008	Single Phase	0,08%
1375	0,001	0,006	Single Phase	0,08%
1425	0,001	0,007	Single Phase	0,08%
1475	0,001	0,007	Single Phase	0,08%
1525	0,004	0,022	Single Phase	0,08%
1575	0,002	0,008	Single Phase	0,08%
1625	0,004	0,019	Single Phase	0,08%

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Clause	Requirement – Test	Result – Remark	Verdict

1675	0,005	0,025	Single Phase	0,08%
1725	0,003	0,017	Single Phase	0,08%
1775	0,001	0,007	Single Phase	0,03%
1825	0,001	0,005	Single Phase	0,03%
1875	0,001	0,006	Single Phase	0,03%
1925	0,001	0,006	Single Phase	0,03%
1975	0,002	0,008	Single Phase	0,03%

NRS 097-2-1:2017			
Clause	Requirement – Test	Result – Remark	Verdict

4.1.10	**TABLE: Harmonics and waveform distortion**			**P**
Harmonics				
Model: Solis-1P1K-4G				
Active power (kW)		1,076		
Voltage (V)		230,41		
Current (A)		4,687		
Frequency (Hz)		50,00		
THD (%)		2,64		
Harmonics	Current Magnitude (A)	% of Fundamental	Phase	Harmonic Current Limits (%)
1st	4,685	--	Single Phase	--
2nd	0,025	0,542	Single Phase	1%
3rd	0,076	1,613	Single Phase	4%
4th	0,024	0,509	Single Phase	1%
5th	0,062	1,324	Single Phase	4%
6th	0,007	0,155	Single Phase	1%
7th	0,049	1,039	Single Phase	4%
8th	0,006	0,129	Single Phase	1%
9th	0,027	0,579	Single Phase	4%
10th	0,004	0,081	Single Phase	1%
11th	0,019	0,412	Single Phase	2%
12th	0,004	0,078	Single Phase	0,5%
13th	0,010	0,222	Single Phase	2%
14th	0,004	0,075	Single Phase	0,5%
15th	0,007	0,155	Single Phase	2%
16th	0,003	0,073	Single Phase	0,5%
17th	0,003	0,074	Single Phase	1,5%
18th	0,003	0,059	Single Phase	0,38%
19th	0,003	0,056	Single Phase	1,5%
20th	0,002	0,048	Single Phase	0,38%
21th	0,002	0,037	Single Phase	1,5%
22th	0,003	0,058	Single Phase	0,38%
23th	0,002	0,043	Single Phase	0,6%
24th	0,001	0,029	Single Phase	0,15%
25th	0,001	0,027	Single Phase	0,6%
26th	0,001	0,021	Single Phase	0,15%
27th	0,001	0,020	Single Phase	0,6%

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Clause	Requirement – Test	Result – Remark	Verdict

28th	0,003	0,054	Single Phase	0,15%
29th	0,001	0,028	Single Phase	0,6%
30th	0,003	0,054	Single Phase	0,15%
31th	0,003	0,066	Single Phase	0,6%
32th	0,002	0,037	Single Phase	0,15%
33th	0,005	0,110	Single Phase	0,6%
34th	0,002	0,046	Single Phase	0,15%
35th	0,006	0,133	Single Phase	0,3%
36th	0,001	0,025	Single Phase	0,08%
37th	0,005	0,113	Single Phase	0,3%
38th	0,002	0,046	Single Phase	0,08%
39th	0,005	0,107	Single Phase	0,3%
40th	0,002	0,053	Single Phase	0,08%
41th	0,005	0,111	Single Phase	0,3%
42th	0,002	0,040	Single Phase	0,08%
43th	0,005	0,108	Single Phase	0,3%
44th	0,001	0,021	Single Phase	0,08%
45th	0,005	0,117	Single Phase	0,3%
46th	0,001	0,018	Single Phase	0,08%
47th	0,005	0,115	Single Phase	0,3%
48th	0,001	0,026	Single Phase	0,08%
49th	0,006	0,119	Single Phase	0,3%
50th	0,001	0,017	Single Phase	0,08%

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Clause	Requirement – Test	Result – Remark	Verdict

4.1.10	TABLE: Harmonics and waveform distortion			P
Inter-harmonics				
Model: Solis-1P1K-4G				
Frequency [Hz]	Current Magnitude (A)	% of Fundamental	Phase	Harmonic Current Limits (%)
75	0,005	0,097	Single Phase	0,1%
125	0,001	0,026	Single Phase	0,1%
175	0,001	0,027	Single Phase	0,1%
225	0,001	0,028	Single Phase	0,1%
275	0,001	0,027	Single Phase	0,1%
325	0,001	0,026	Single Phase	0,1%
375	0,001	0,025	Single Phase	0,1%
425	0,001	0,030	Single Phase	0,1%
475	0,001	0,025	Single Phase	0,1%
525	0,001	0,025	Single Phase	0,1%
575	0,001	0,028	Single Phase	0,25%
625	0,001	0,028	Single Phase	0,25%
675	0,001	0,030	Single Phase	0,25%
725	0,001	0,029	Single Phase	0,25%
775	0,001	0,028	Single Phase	0,25%
825	0,001	0,029	Single Phase	0,25%
875	0,001	0,031	Single Phase	0,19%
925	0,002	0,033	Single Phase	0,19%
975	0,002	0,035	Single Phase	0,19%
1025	0,002	0,033	Single Phase	0,19%
1075	0,002	0,034	Single Phase	0,19%
1125	0,002	0,035	Single Phase	0,19%
1175	0,002	0,037	Single Phase	0,08%
1225	0,002	0,036	Single Phase	0,08%
1275	0,002	0,042	Single Phase	0,08%
1325	0,002	0,040	Single Phase	0,08%
1375	0,002	0,042	Single Phase	0,08%
1425	0,003	0,054	Single Phase	0,08%
1475	0,002	0,045	Single Phase	0,08%
1525	0,002	0,046	Single Phase	0,08%
1575	0,002	0,052	Single Phase	0,08%
1625	0,002	0,046	Single Phase	0,08%

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Clause	Requirement – Test	Result – Remark	Verdict

1675	0,002	0,049	Single Phase	0,08%
1725	0,003	0,057	Single Phase	0,08%
1775	0,001	0,028	Single Phase	0,03%
1825	0,001	0,029	Single Phase	0,03%
1875	0,001	0,028	Single Phase	0,03%
1925	0,001	0,029	Single Phase	0,03%
1975	0,001	0,028	Single Phase	0,03%

Note:

The tests were performed on model Solis-1P4.6K-4G and Solis-1P1K-4G are also applicable for all other models stated in this report.

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Clause	Requirement – Test	Result – Remark	Verdict

4.1.11	**TABLE: Power factor**								**P**
Model	**Solis-1P4.6K-4G**								—
Output Power Level (%)	20 ± 5	30 ± 5	40 ± 5	50 ± 5	60 ± 5	70 ± 5	80 ± 5	90 ± 5	100 ± 5
Vrms (V)	230,1	230,2	230,2	230,3	230,4	230,4	230,5	230,6	230,7
Arms (A)	3,997	6,021	8,041	10,042	12,048	14,038	16,028	18,010	19,987
Active Power (kW)	0,917	1,383	1,849	2,312	2,773	3,233	3,693	4,151	4,609
Reactive Power (kVar)	0,069	0,076	0,084	0,091	0,099	0,107	0,115	0,124	0,134
Apparent Power (kVA)	0,920	1,386	1,851	2,314	2,775	3,235	3,695	4,153	4,611
PF Limit	>0,98	>0,98	>0,98	>0,98	>0,98	>0,98	>0,98	>0,98	>0,98
Power Factor	0,997	0,998	0,999	0,999	0,999	0,999	0,999	0,999	0,999

Note:

For static power converter embedded generators and synchronous embedded generators of sub-categories A1 and A2, the power factor shall remain above 0,98 as shown in Figure 1. For static power converter embedded generators and synchronous embedded generators of sub-category A3, the power factor shall remain above 0,95 as shown in Figure 2.

In line with the current Renewable Power Plant Grid Code, embedded generators smaller than 1000 kVA connected to low-voltage form part of Category A generators, with the following subcategories:

a) Category A1: 0 – 13,8 kVA;
This sub-category includes RPPs of Category A with rated power in the range from 0 to 13,8 kVA, inclusive of 13,8 kVA.

b) Category A2: 13,8 kVA – 100 kVA; and
This sub-category includes RPPs of Category A with rated power in the range greater than 13,8 kVA but less than 100 kVA.

c) Category A3: 100 kVA – 1 MVA.
This sub-category includes RPPs of Category A with rated power in the range from 100 kVA but less than 1 MVA.

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Clause	Requirement – Test	Result – Remark	Verdict

4.1.11	**TABLE: Power factor**								**P**
Model	**Solis-1P1K-4G**								—
Output Power Level (%)	20 ± 5	30 ± 5	40 ± 5	50 ± 5	60 ± 5	70 ± 5	80 ± 5	90 ± 5	100 ± 5
Vrms (V)	230,0	230,0	230,0	230,0	230,0	230,0	230,0	230,1	230,1
Arms (A)	0,981	1,396	1,763	2,194	2,614	3,077	3,496	3,917	4,389
Active Power (kW)	0,221	0,318	0,403	0,503	0,599	0,706	0,803	0,900	1,008
Apparent Power (kVA)	0,225	0,321	0,406	0,505	0,601	0,708	0,804	0,901	1,010
PF Limit	>0,90	>0,90	>0,90	>0,90	>0,90	>0,90	>0,90	>0,90	>0,90
Power Factor	0,980	0,990	0,994	0,996	0,997	0,998	0,998	0,999	0,999

Note:

For static power converter embedded generators and synchronous embedded generators of sub-categories A1 and A2, the power factor shall remain above 0,98 as shown in Figure 1. For static power converter embedded generators and synchronous embedded generators of sub-category A3, the power factor shall remain above 0,95 as shown in Figure 2.

In line with the current Renewable Power Plant Grid Code, embedded generators smaller than 1000 kVA connected to low-voltage form part of Category A generators, with the following subcategories:

a) Category A1: 0 – 13,8 kVA;
This sub-category includes RPPs of Category A with rated power in the range from 0 to 13,8 kVA, inclusive of 13,8 kVA.

b) Category A2: 13,8 kVA – 100 kVA; and
This sub-category includes RPPs of Category A with rated power in the range greater than 13,8 kVA but less than 100 kVA.

c) Category A3: 100 kVA – 1 MVA.
This sub-category includes RPPs of Category A with rated power in the range from 100 kVA but less than 1 MVA.

The tests were performed on model Solis-1P4.6K-4G and Solis-1P1K-4G are also applicable for all other models stated in this report.

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Clause	Requirement – Test	Result – Remark	Verdict

4.2.2.2	TABLE: Disconnection switching unit - fault condition tests						P
No.	component No.	fault	test voltage [V]	test time	fuse No.	fuse current [A]	Test result
1.	Relay K1	Pin 1 and pin 2 short circuit before start	MAINS: 230V; PV: 500V	10mim	--	--	The EUT can't start up, LCD indicate RelayChk-FAIL, EUT can recover after removing the fault, no damage, no hazard.
2.	Relay K2	Pin 1 and pin 2 short circuit before start	MAINS: 230V; PV: 500V	10mim	--	--	The EUT can't start up, LCD indicate RelayChk-FAIL, EUT can recover after removing the fault, no damage, no hazard.
3.	Relay K3	Pin 1 and pin 2 short circuit before start	MAINS: 230V; PV: 500V	10mim	--	--	The EUT can't start up, LCD indicate RelayChk-FAIL, EUT can recover after removing the fault, no damage, no hazard.
4.	Relay K4	Pin 1 and pin 2 short circuit before start	MAINS: 230V; PV: 500V	10mim	--	--	The EUT can't start up, LCD indicate RelayChk-FAIL, EUT can recover after removing the fault, no damage, no hazard.
5.	AC Voltage measurement disabled, R54	Short circuit	MAINS: 230V; PV: 500V	10mim	--	--	The EUT can't start up, LCD indicate UN-G-V01, EUT can recover after removing the fault, no damage, no hazard.
6.	AC Voltage measurement disabled, R54	Open circuit	MAINS: 230V; PV: 500V	10mim	--	--	The EUT can't start up, LCD indicate UN-G-V01, EUT can recover after removing the fault, no damage, no hazard.
7.	DC Voltage measurement disabled, R52	Short circuit	MAINS: 230V; PV: 500V	10mim	--	--	The EUT run normally. EUT can recover after removing the fault, no damage, no hazard.
8.	DC Voltage measurement disabled, R52	Open circuit	MAINS: 230V; PV: 500V	10mim	--	--	The EUT can't start up, No error. LCD indicate waiting, EUT can recover after removing the fault, no damage, no hazard.
9.	DC BUS Voltage measurement disabled, R65	Short circuit	MAINS: 230V; PV: 500V	10mim	--	--	The EUT run normally. EUT can recover after removing the fault, no damage, no hazard.

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Clause	Requirement – Test	Result – Remark	Verdict

10.	DC BUS Voltage measurement disabled, R65	Open circuit	MAINS: 230V; PV: 500V	10mim	--	--	The EUT can't start up, LCD indicate Grid-INTF, EUT can recover after removing the fault, no damage, no hazard.
11.	Frequency Measurement disabled, R54	Open circuit	MAINS: 230V; PV: 500V	10mim	--	--	The EUT can't start up, LCD indicate UN-G-F01, EUT can recover after removing the fault, no damage, no hazard.
12.	Frequency Measurement disabled, R54	Short circuit	MAINS: 230V; PV: 500V	10mim	--	--	The EUT can't start up, LCD indicate UN-G-F01, EUT can recover after removing the fault, no damage, no hazard.
13.	DC Current sensor defect, C6	Short circuit	MAINS: 230V; PV: 500V	10mim	--	--	The EUT shutdown and disconnected from grid immediately, LCD indicate DC-INTF. EUT can recover after removing the fault, no damage, no hazard.
14.	Leakage Sensor defect, R38	Short circuit	MAINS: 230V; PV: 500V	10mim	--	--	The EUT shutdown and disconnected from grid immediately, LCD indicate ILeak-PR; EUT can recover after removing the fault, no damage, no hazard.
15.	Leakage Sensor defect, R37	Short circuit	MAINS: 230V; PV: 500V	10mim	--	--	The EUT shutdown and disconnected from grid immediately, LCD indicate ILeak-PR; EUT can recover after removing the fault, no damage, no hazard.
16.	Leakage Sensor defect, C47	Short circuit	MAINS: 230V; PV: 500V	10mim	--	--	The EUT shutdown and disconnected from grid immediately, LCD indicate ILeak-PR; EUT can recover after removing the fault, no damage, no hazard.
17.	Main DSP loss of control, R5	Open circuit	MAINS: 230V; PV: 500V	10mim	--	--	The EUT shutdown and disconnected from grid immediately, all data show "0" in LCD, EUT can recover after removing the fault, no damage, no hazard.
18.	Slave DSP loss of control, R222	Open circuit	MAINS: 230V; PV: 500V	10mim	--	--	The EUT shutdown and disconnected from grid immediately, LCD indicate DSP-B-FAULT. EUT can recover after removing the fault, no damage, no hazard.

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Clause	Requirement – Test	Result – Remark	Verdict

19.	Communication Microcontroller defect, R101	Open circuit	MAINS: 230V; PV: 500V	10mim	--	--	The EUT shutdown and disconnected from grid immediately, all data show “0” in LCD, EUT can recover after removing the fault, no damage, no hazard.
Note: The tests were performed on model Solis-1P4.6K-4G are also applicable for all other models stated in this report.							

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Clause	Requirement – Test	Result – Remark	Verdict

4.2.2.3.2	**TABLE: Overvoltage and undervoltage**								**P**
Model: Solis-1P4.6K-4G									
Test conditions:	Output power: 4603 W Frequency: 50 Hz								
First Level									
	Under Voltage				Over Voltage				
Parameter	Voltage	Time			Voltage	Time			
Limit	195,5V	<= 10s			253,0V	<= 40s			
Trip value (V)	195,2V				255,2V				
Disconnection time (s)	200V to 190V	8,02	8,04	8,02	248V to 258V	38,03	38,0	38,0	
Reconnection time (s)	min. 60s	69,0			min. 60s	70,8			
Second Level									
	Under Voltage				Over Voltage				
Parameter	Voltage	Time			Voltage	Time			
Limit	115,0V	<= 0,2 s			264,5V	<= 2s			
Trip value (V)	114,5V				264,7V				
Disconnection time (s)	230V to 110V	0,144	0,143	0,143	230V to 270V	0,152	0,153	0,154	
Reconnection time (s)	min. 60s	78,0			min. 60s	72,6			
Third Level									
	Under Voltage				Over Voltage				
Parameter					Voltage	Time			
Limit					276,0V	<= 160ms			
Trip value (V)					276,7V				
Disconnection time (s)					230V to 280V	0,154	0,153	0,153	
Reconnection time (s)					min. 60s	74,0			

Note:

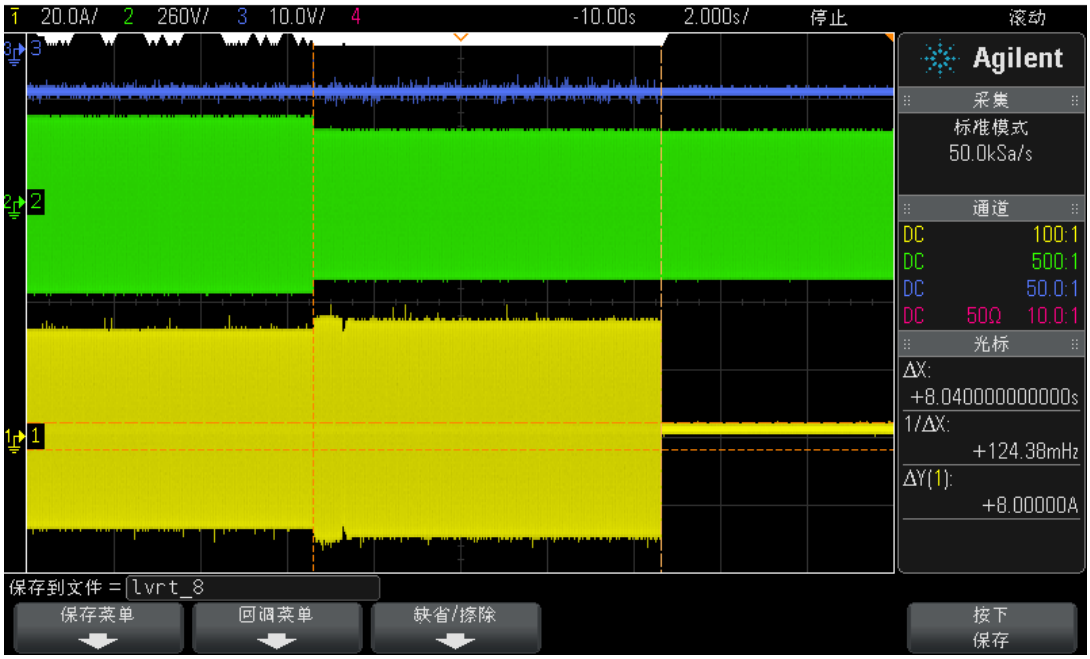
The accuracy for voltage trip values shall be within 0 % to +1 % of the nominal voltage from the upper boundary trip setting, and within -1% to 0% of the nominal voltage from the lower boundary trip setting.

Controllable generators may reconnect immediately after the 60 s delay confirming recovery of the system voltage and frequency at a maximum rate of 10 % of rated power per minute, i.e. full power output will only be reached after 10 minutes.

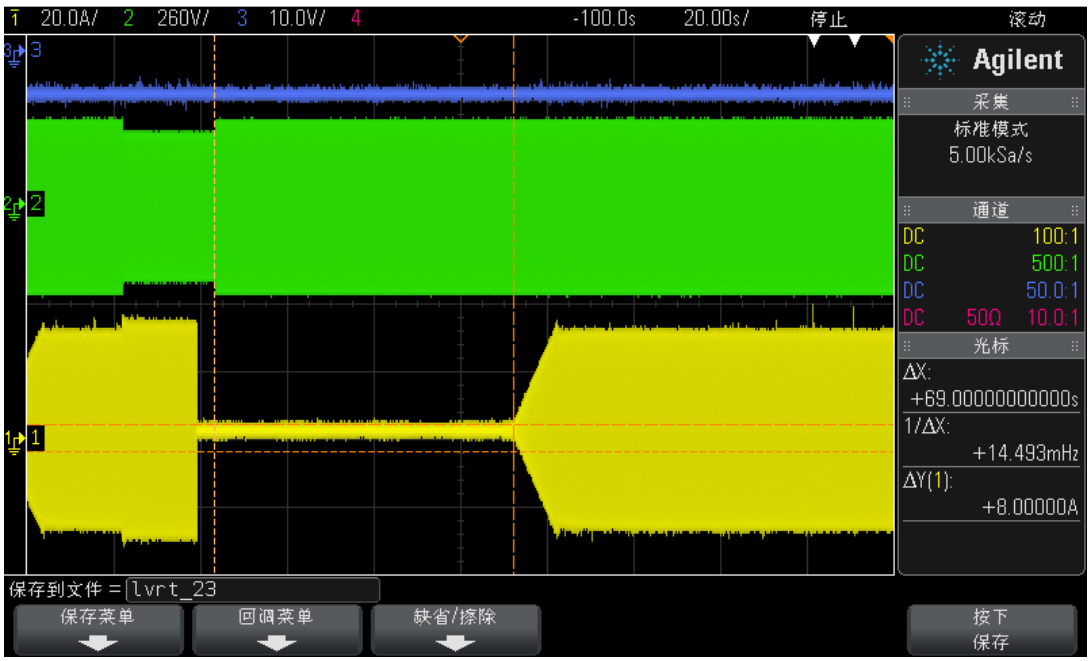
The tests were performed on model Solis-1P4.6K-4G are also applicable for all other models stated in this report.

NRS 097-2-1:2017			
Clause	Requirement – Test	Result – Remark	Verdict

Disconnection Time - Under Voltage First Level

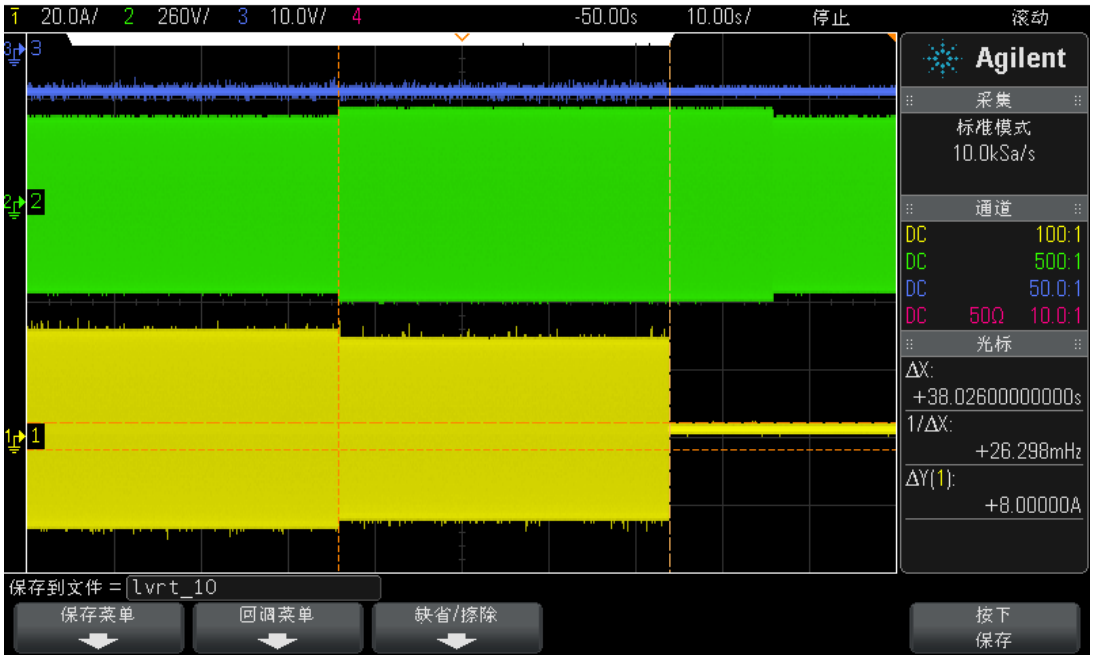


Reconnection Time - Under Voltage First Level

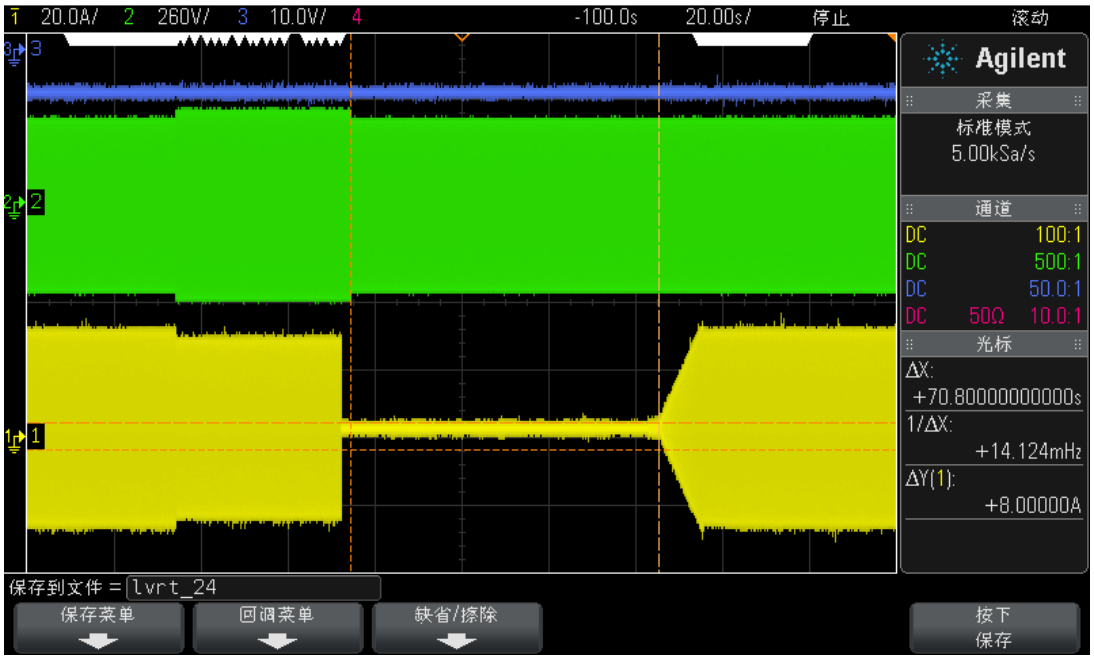


NRS 097-2-1:2017			
Clause	Requirement – Test	Result – Remark	Verdict

Disconnection Time - Over Voltage First Level

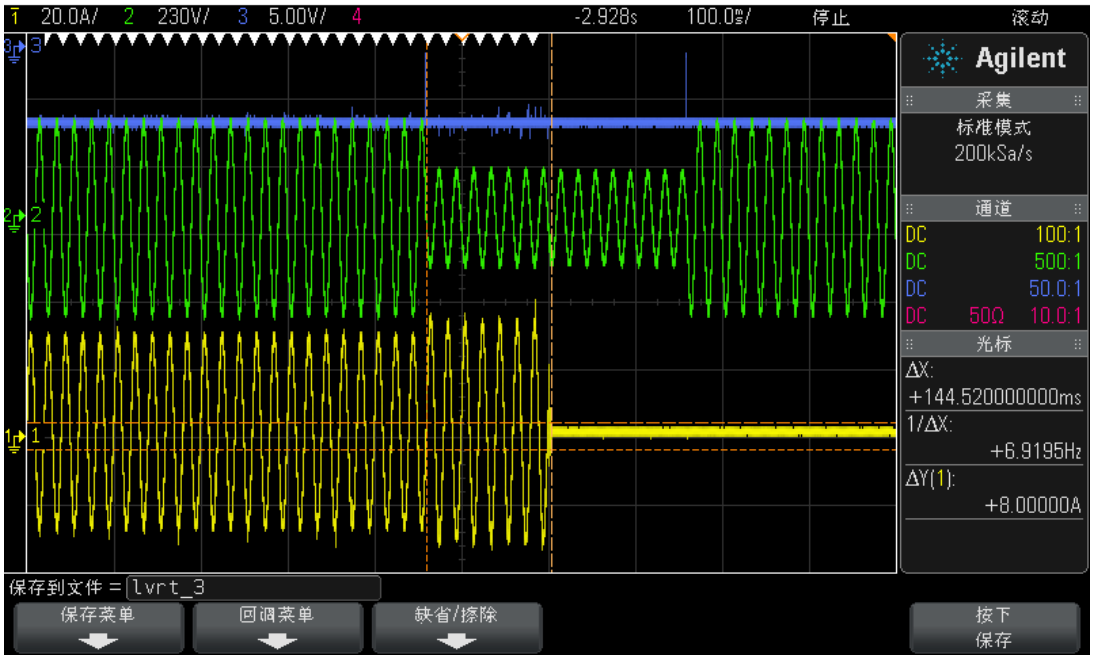


Reconnection Time - Over Voltage First Level

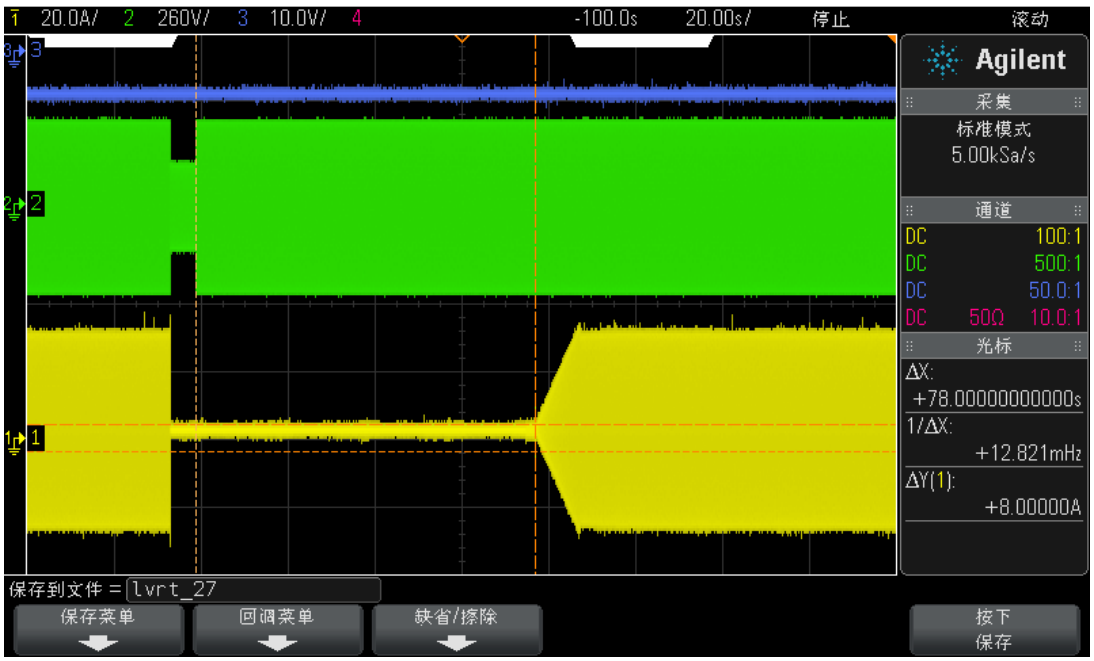


NRS 097-2-1:2017			
Clause	Requirement – Test	Result – Remark	Verdict

Disconnection Time - Under Voltage Second Level

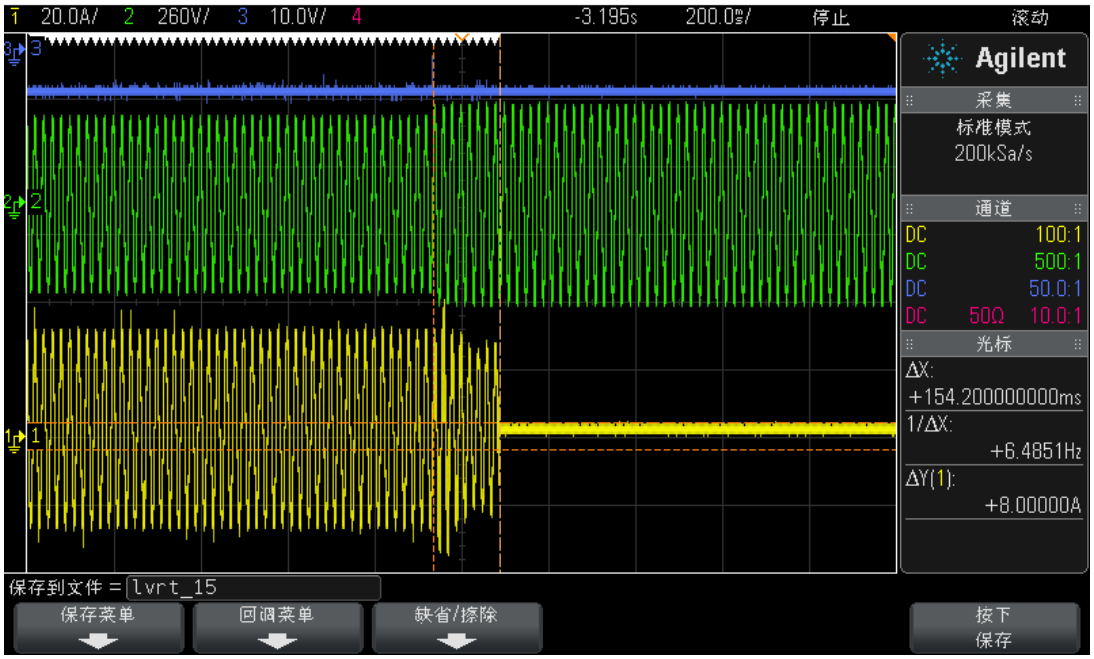


Reconnection Time - Under Voltage Second Level

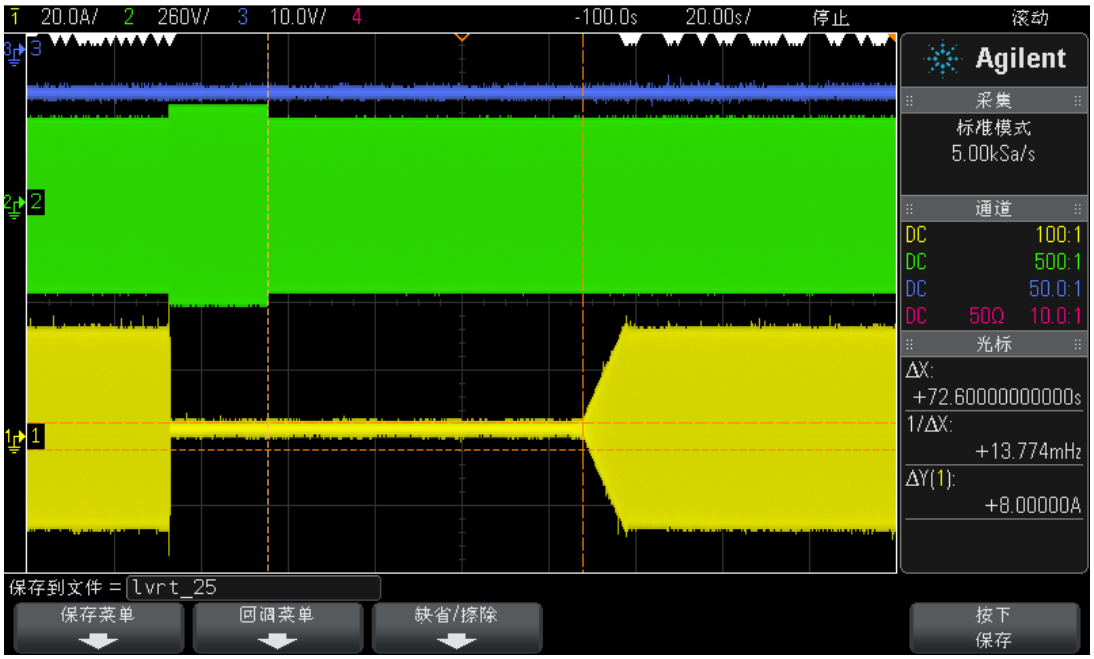


NRS 097-2-1:2017			
Clause	Requirement – Test	Result – Remark	Verdict

Disconnection Time - Over Voltage Second Level

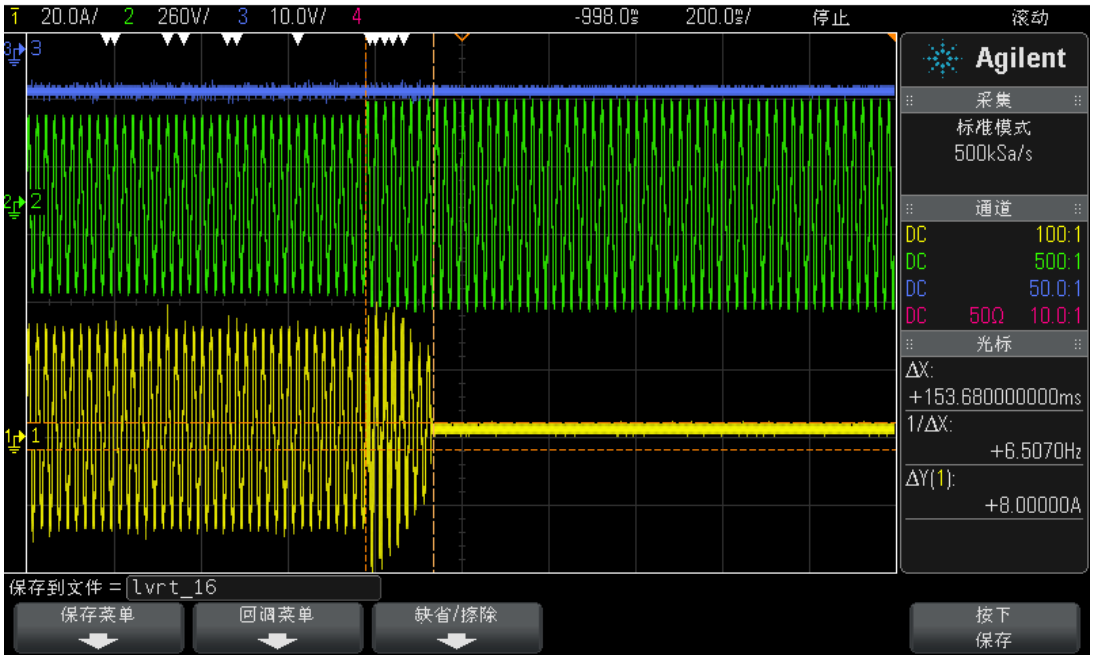


Reconnection Time - Over Voltage Second Level

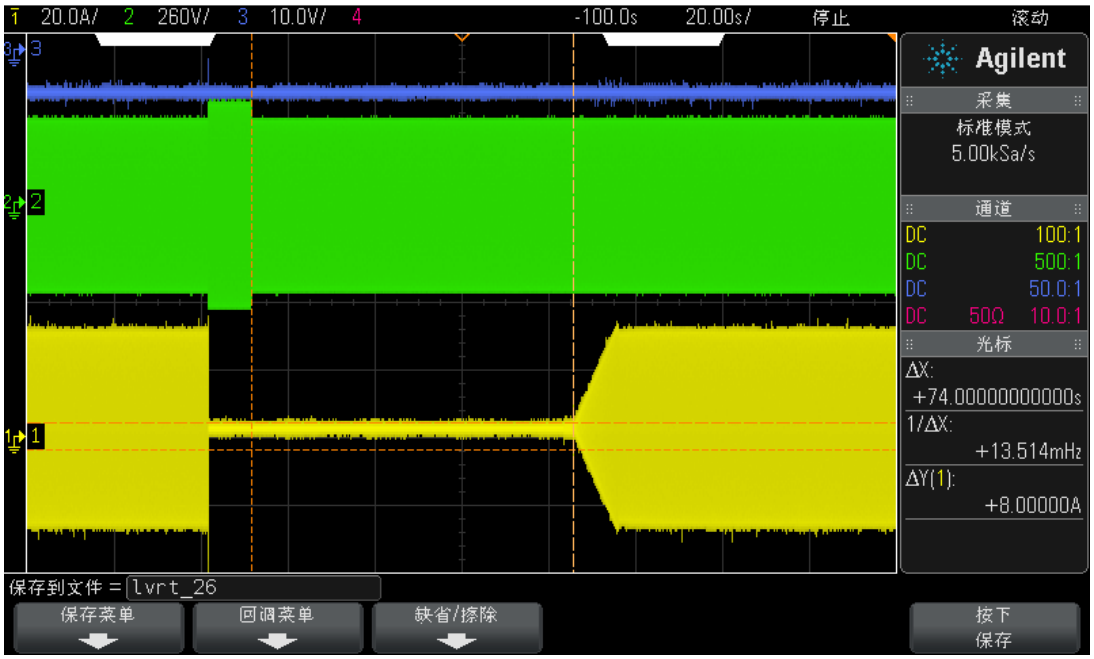


NRS 097-2-1:2017			
Clause	Requirement – Test	Result – Remark	Verdict

Disconnection Time - Over Voltage Third Level



Reconnection Time - Over Voltage Third Level



NRS 097-2-1:2017			
Clause	Requirement – Test	Result – Remark	Verdict

4.2.2.3.3	**TABLE: Overfrequency and underfrequency**								**P**
Model: Solis-1P4.6K-4G									
Test conditions	Output power: 4609 W Frequency: 50 Hz								
	Under frequency				Over frequency				
Parameter	Frequency	Time			Frequency	Time			
Output Voltage		90%U_N	U_N	110%U_N		90%U_N	U_N	110%U_N	
Limit (ms)	47,00Hz	200			52,00Hz	4000+500			
Trip value (Hz)		47,0	47,0	47,0		52,00	52,00	52,00	
Disconnection time (ms)	48,00Hz to 47,00Hz	146,4	158,0	160,0	51,50Hz to 52,50Hz	4250	4300	4230	
Reconnection time (s)	min. 60s	72,9			min. 60s	72,4			

Note:

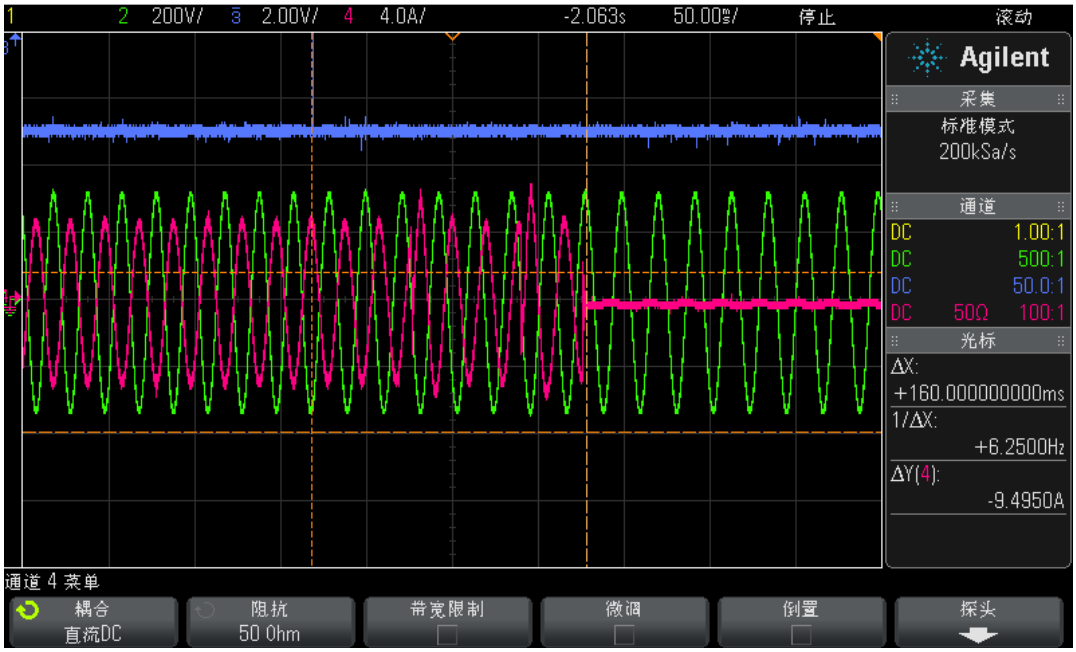
When the utility frequency is less than 47 Hz, the embedded generator shall disconnect from the utility network within 0,2 s. **When the utility frequency is more than 52 Hz for longer than 4 seconds, the embedded generator shall cease to energise the utility line within 0,5 s.**

Controllable generators may reconnect immediately after the 60 s delay confirming recovery of the system voltage and frequency at a maximum rate of 10 % of rated power per minute, i.e. full power output will only be reached after 10 minutes.

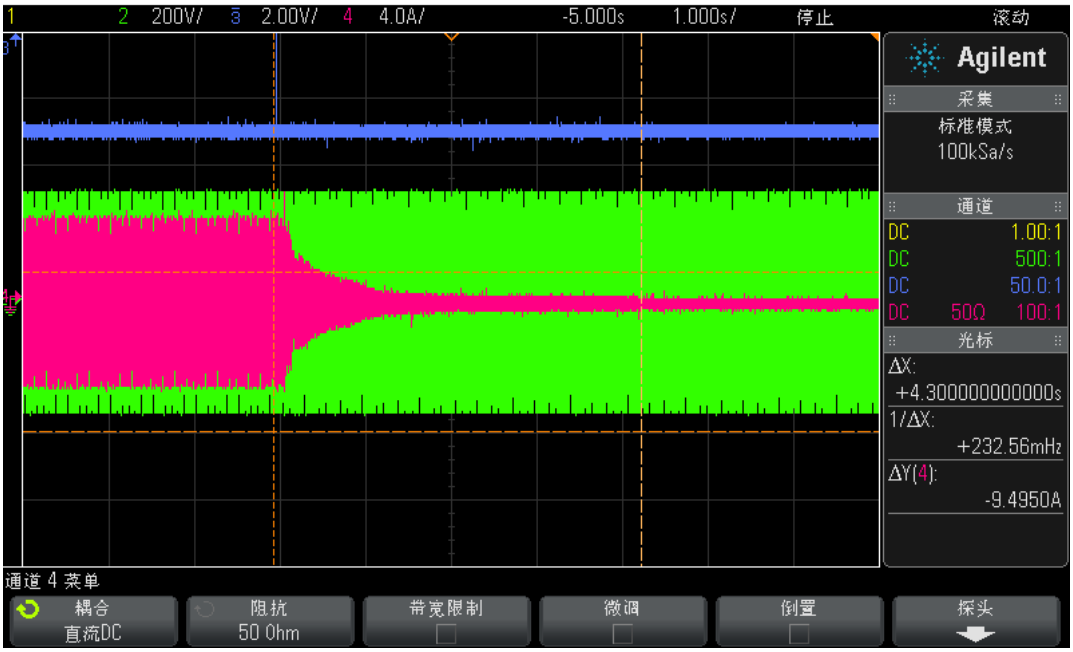
The tests were performed on model Solis-1P4.6K-4G are also applicable for all other models stated in this report.

NRS 097-2-1:2017			
Clause	Requirement – Test	Result – Remark	Verdict

Disconnection Time - Under Frequency

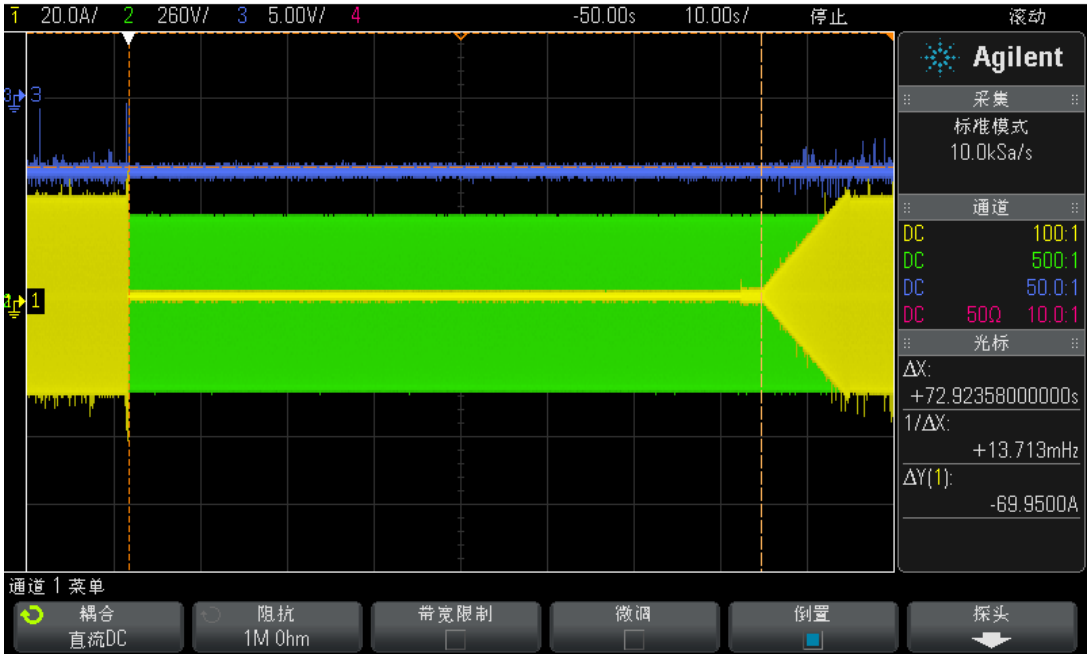


Disconnection time - Over Frequency

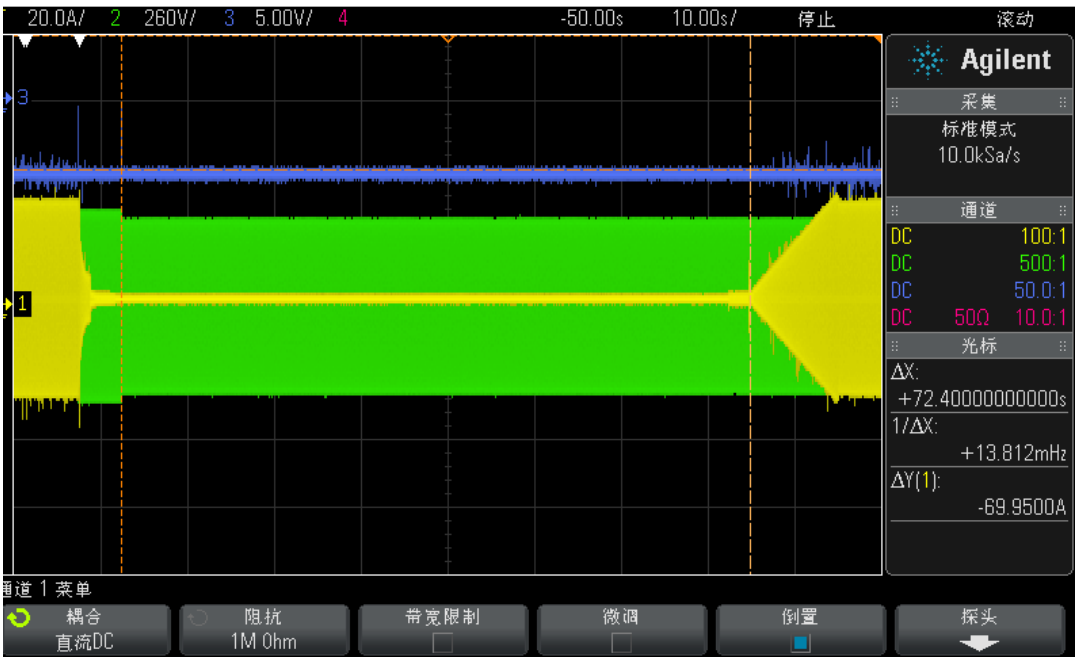


NRS 097-2-1:2017			
Clause	Requirement – Test	Result – Remark	Verdict

Reconnection Time - Under Frequency



Reconnection time - Over Frequency



NRS 097-2-1:2017			
Clause	Requirement – Test	Result – Remark	Verdict

4.2.2.3.3	TABLE: Power curtailment during over-frequency						P
Test:							
1-min mean value	a) 50,00 Hz	b) 50,60 Hz	c) 51,25 Hz	d) 51,75 Hz	e) 51,25 Hz	f) 50,60 Hz	g) 50,00 Hz
1. Measurement a) to g): Active power output > 80% P_{Emax}							
Frequency [Hz]:	50,00	50,60	51,25	51,75	51,25	50,60	50,00
$P_{setpoint}$ [kW]:	N/A	4,405	2,773	1,664	2,773	4,215	N/A
P_{E60} [kW]:	4,637	4,447	2,949	1,793	2,948	4,447	4,645
$\Delta P_{E60}/P_{Setpoint}$ [%]:	N/A	0,95	6,34	7,75	6,31	5,50	N/A
2. Measurement a) to g): Active power output 40% and 60% after freezing > 80% P_{Emax}							
Frequency [Hz]:	50	50,6	51,25	51,75	51,25	50,6	50
$P_{setpoint}$ [kW]:	N/A	2,209	1,453	0,872	1,453	2,209	N/A
P_{E60} [kW]:	2,325	2,229	1,479	0,906	1,481	2,232	2,325
$\Delta P_{E60}/P_{Setpoint}$ [%]:	N/A	0,92	1,78	3,91	1,92	1,05	N/A
Limit $\Delta P_{E60}/P_{Setpoint}$:	+ 10 % of P_{Emax}						

Note:

The EG system shall control the output power as a function of PM at a gradient of 50 % per Hertz as illustrated in figure 5. The power generation shall follow the curve shown in figure 5 up and down while the system frequency is in the range 50,5 Hz to 52 Hz.

The tests were performed on model Solis-1P4.6K-4G are also applicable for all other models stated in this report.

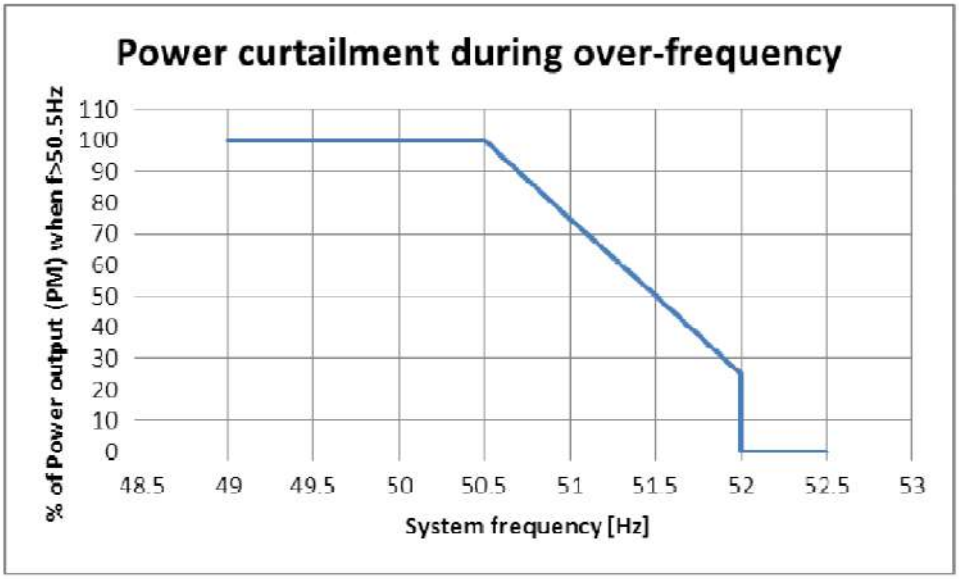


Figure 5 — Power curtailment during over-frequency

NRS 097-2-1:2017			
Clause	Requirement – Test	Result – Remark	Verdict

4.2.2.4	TABLE: Prevention of islanding (In accordance with IEC 62116)	P

Test circuit and parameters

Parameter	Symbol	Units
EUT DC Input		
DC voltage	V_{DC}	V
DC Current	I_{DC}	A
DC Power	P_{DC}	W
EUT AC ouput		
AC voltage	V_{EUT}	V
AC current	I_{EUT}	A
Real power	P_{EUT}	W
Reactive power	Q_{EUT}	VAr
Test Load		
Resistive load current	I_R	A
Inductive load current	I_L	A
Capacitive load current	I_C	A
AC (utility) power source		
Utility real power	P_{AC}	W
Utility reactive power	Q_{AC}	VAr
Utility current	I_{AC}	A

Block diagram test circuit IEC 62116.

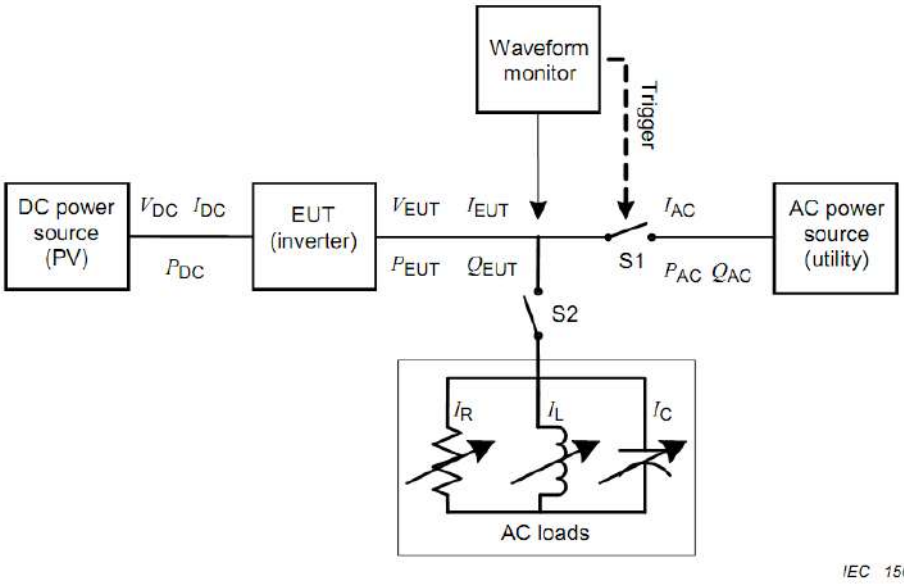


Figure 1 – Test circuit for islanding detection function in a power conditioner (inverter)

NRS 097-2-1:2017			
Clause	Requirement – Test	Result – Remark	Verdict

4.2.2.4	**TABLE: Prevention of islanding** **In accordance with IEC 62116, For test condition A (EUT output = 100%)**	**P**

Model: Solis-1P4.6K-4G

Disconnection limit	2,0 s

No	P_{EUT} [a] (% of EUT rating)	Reactive load (% of Q_L in 6.1.d) 1)	P_{ac} [b] (% of nominal)	Q_{ac} [c] (% of nominal)	Run on Time (ms)	P_{EUT} (kW)	Actual Q_f	V_{DC} [d]	Remarks [e]
1	100	100	0	0	279	4,60	1,00	400	Test A at BL
2	100	100	- 5	- 5	201	4,60	0,97	400	Test A at IB
3	100	100	- 5	0	225	4,60	0,98	400	Test A at IB
4	100	100	- 5	+ 5	266	4,60	1,01	400	Test A at IB
5	100	100	0	- 5	222	4,60	0,97	400	Test A at IB
6	100	100	0	+ 5	182	4,60	1,02	400	Test A at IB
7	100	100	+ 5	- 5	154	4,60	0,99	400	Test A at IB
8	100	100	+ 5	0	180	4,60	1,02	400	Test A at IB
9	100	100	+ 5	+ 5	125	4,60	1,03	400	Test A at IB

Note:
[a] *P*EUT: EUT output power
[b] *P*ac: Active power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0 % test condition value.
[c] Q_{ac}: Reactive power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0 % test condition value.
[d] For test condition A, > 75 % of rated input voltage range used, for test condition B, 50 % of rated input voltage range, ±10 % used, for test condition C, < 20 % of rated input voltage range used. Based on EUT rated input operating range. For example, if range is between X volts and Y volts, 75 % of range = X + 0,75 × (Y – X). Y shall not exceed 0,8 × EUT maximum system voltage (i.e., maximum allowable array open circuit voltage). In any case, the EUT should not be operated outside of its allowable input voltage range.
[e] BL: Balance condition, IB: Imbalance condition.

NRS 097-2-1:2017			
Clause	Requirement – Test	Result – Remark	Verdict

4.2.2.4	**TABLE: Prevention of islanding** **In accordance with IEC 62116, For test condition B (EUT output = 50 % – 66 %)**	**P**

Model: Solis-1P4.6K-4G

Disconnection limit	2,0 s

No	P_{EUT} [a] (% of EUT rating)	Reactive load (% of Q_L in 6.1.d) 1)	P_{ac} [b] (% of nominal)	Q_{ac} [c] (% of nominal)	Run on Time (ms)	P_{EUT} (kW)	Actual Q_f	V_{DC} [d]	Remarks [e]
1	66	66	0	- 5	171	3,03	0,96	300	Test B at IB
2	66	66	0	- 4	271	3,03	0,97	300	Test B at IB
3	66	66	0	- 3	280	3,03	0,98	300	Test B at IB
4	66	66	0	- 2	257	3,03	0,98	300	Test B at IB
5	66	66	0	- 1	282	3,03	0,99	300	Test B at IB
6	66	66	0	0	280	3,03	1,00	300	Test B at BL
7	66	66	0	+ 1	264	3,03	1,01	300	Test B at IB
8	66	66	0	+ 2	181	3,03	1,02	300	Test B at IB
9	66	66	0	+ 3	178	3,03	1,02	300	Test B at IB
10	66	66	0	+ 4	176	3,03	1,03	300	Test B at IB
11	66	66	0	+ 5	157	3,03	1,04	300	Test B at IB

Note:
[a] *P*EUT: EUT output power
[b] *P*ac: Active power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0 % test condition value.
[c] Q_{ac}: Reactive power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0 % test condition value.
[d] For test condition A, > 75 % of rated input voltage range used, for test condition B, 50 % of rated input voltage range, ±10 % used, for test condition C, < 20 % of rated input voltage range used. Based on EUT rated input operating range. For example, if range is between X volts and Y volts, 75 % of range = X + 0,75 × (Y – X). Y shall not exceed 0,8 × EUT maximum system voltage (i.e., maximum allowable array open circuit voltage). In any case, the EUT should not be operated outside of its allowable input voltage range.
[e] BL: Balance condition, IB: Imbalance condition.

NRS 097-2-1:2017			
Clause	Requirement – Test	Result – Remark	Verdict

4.2.2.4	**TABLE: Prevention of islanding** **In accordance with IEC 62116, For test condition C (EUT output = 25 % – 33 %)**	**P**

Model: Solis-1P4.6K-4G

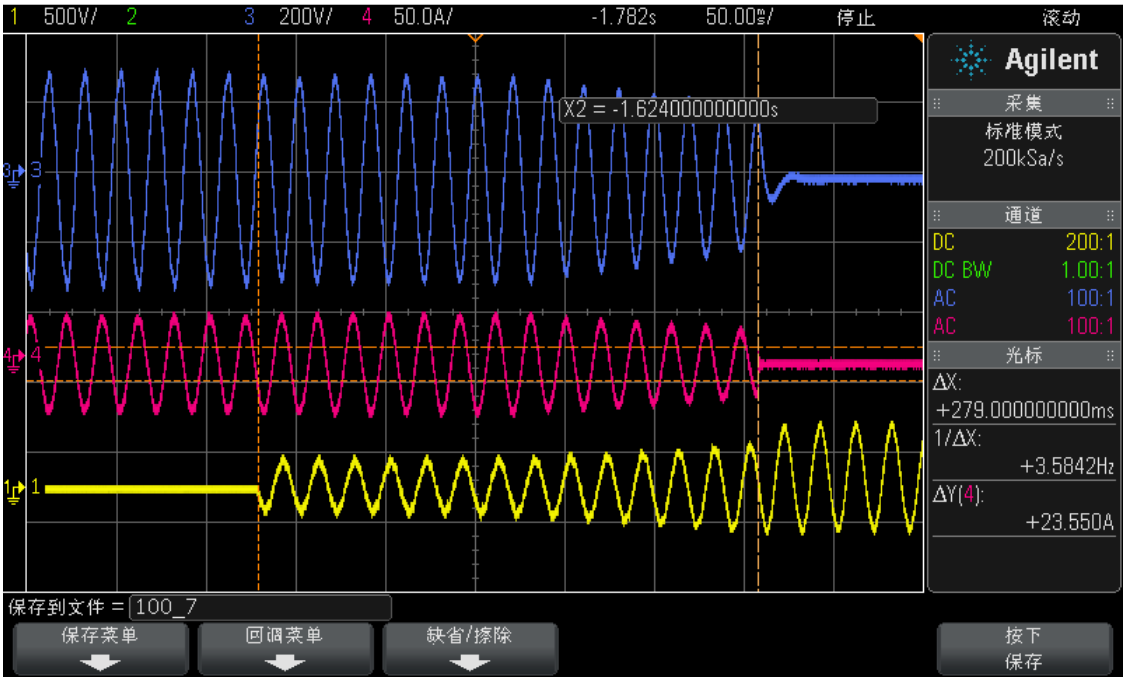
Disconnection limit	2,0 s

No	P_{EUT} [a] (% of EUT rating)	Reactive load (% of Q_L in 6.1.d) 1)	P_{ac} [b] (% of nominal)	Q_{ac} [c] (% of nominal)	Run on Time (ms)	P_{EUT} (kW)	Actual Q_f	V_{DC} [d]	Remarks[e]
1	33	33	0	- 5	183	1,52	0,96	160	Test C at IB
2	33	33	0	- 4	204	1,52	0,97	160	Test C at IB
3	33	33	0	- 3	232	1,52	0,98	160	Test C at IB
4	33	33	0	- 2	295	1,52	0,98	160	Test C at IB
5	33	33	0	- 1	213	1,52	0,99	160	Test C at IB
6	33	33	0	0	202	1,52	1,00	160	Test C at BL
7	33	33	0	+ 1	178	1,52	1,01	160	Test C at IB
8	33	33	0	+ 2	192	1,52	1,02	160	Test C at IB
9	33	33	0	+ 3	182	1,52	1,03	160	Test C at IB
10	33	33	0	+ 4	182	1,52	1,04	160	Test C at IB
11	33	33	0	+ 5	174	1,52	1,05	160	Test C at IB

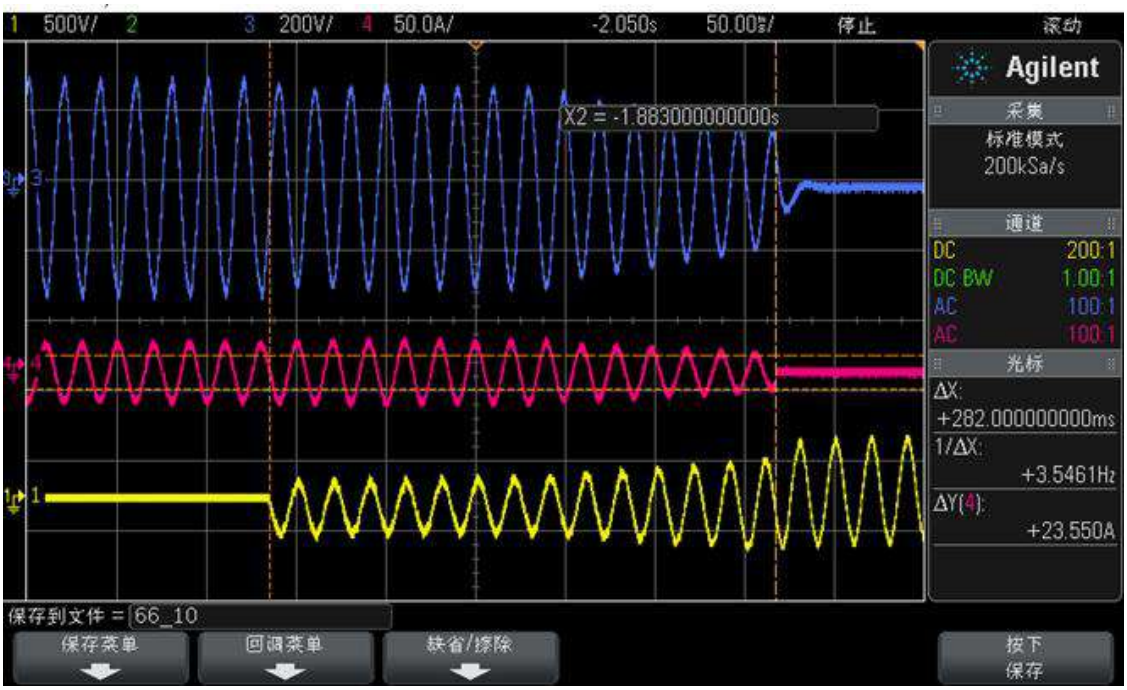
Note:
[a] *P*EUT: EUT output power
[b] *P*ac: Active power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0 % test condition value.
[c] Q_{ac}: Reactive power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0 % test condition value.
[d] For test condition A, > 75 % of rated input voltage range used, for test condition B, 50 % of rated input voltage range, ±10 % used, for test condition C, < 20 % of rated input voltage range used. Based on EUT rated input operating range. For example, if range is between X volts and Y volts, 75 % of range = X + 0,75 × (Y – X). Y shall not exceed 0,8 × EUT maximum system voltage (i.e., maximum allowable array open circuit voltage). In any case, the EUT should not be operated outside of its allowable input voltage range.
[e] BL: Balance condition, IB: Imbalance condition.
The tests were performed on model Solis-1P4.6K-4G are also applicable for all other models stated in this report.

NRS 097-2-1:2017			
Clause	Requirement – Test	Result – Remark	Verdict

Graph of disconnection at balance condition (P_{AC} 0 and Q_{AC} 0 reactive load) @100% nominal power



Graph of disconnection at balance condition (P_{AC} 0 and Q_{AC} -1% reactive load) @66% nominal power



NRS 097-2-1:2017			
Clause	Requirement – Test	Result – Remark	Verdict

Graph of disconnection at balance condition (P_{AC} 0 and Q_{AC} -2% reactive load) @33% nominal power

Appendix 1: Specification of the relay

AZSR131

35 AMP MINIATURE POWER RELAY

FEATURES:

- Dielectric strength 4500Vrms
- 35 Amp switching
- Contact gap : 1.8mm/2.3 mm available
- Clearance / creepage > 6.4 / 7.5mm
- UL CUR file：E469841
- TUV Pending
- CQC Pending

CONTACTS

Arrangement	SPST (1 Form A)
Ratings	Resistive load: Max. switched power: 9695VA Max. switched current: 35A Max. switched voltage: 277VAC
Rated Load **UL** **TUV**	26A at 277 VAC, resistive, 85°C, 50k cycles 31A at 277 VAC, resistive, 85°C, 30k cycles 35A at 277 VAC, resistive, 85°C, 30k cycles 26A at 277 VAC, resistive, 85°C, 50k cycles 31A at 277 VAC, cos phi 0.8, 85°C, 30k cycles * 35A at 277 VAC, cos phi 0.8, 85°C, 30k cycles * * duty factor: 0.1 seconds on / 10 seconds off
Material	Silver tin oxide
Resistance	< 100 mΩ initially (at 6V, 1A, voltage drop method)

Coil

Power	
At pickup Voltage	790 mw (typical)
Max. Continuous Dissipation	2.0 W at 20℃(68℉) ambient
Temperature Rise	70℃ Max. at Rated voltage,35A,85℃
Temperature	Max. 155℃(311℉) class F

Notes

1.All values at 20℃(68℉)
2.Relay may pull in with less than "Must Operate" value
3.Specifications subject to change without notice.

GENERAL DATA

Life Expectancy: Mechanical Electrical	Minimum operations 100,000 cycles Min. (2.3mm gap) 300,000 cycles Min. (1.8mm gap) 30k cycles @35A 277VAC Res. 30k cycles @35A 277VAC cos phi 0.8
Operate Time(typical)	20 ms Max. at nominal coil voltage
Release Time(typical)	10 ms Max. at nominal coil voltage (with no coil suppression)
Dielectric Strength (at sea level for 1min.)	4500 Vrms(coil to contacts) 3500 Vrms(between open contacts)
Surge Voltage	10KV @1.2/50μs (coil to contacts)
Insulation Resistance	1,000MΩ min. at 20℃ 500VDC 50% RH
Holding voltage	Greater than 35% of nominal coil voltage
Dropout	Greater than 5% of nominal coil voltage
Ambient Temperature Operating Storage	At rated coil voltage -40℃(-40F)to 85℃(140℉) -40℃(-40F)to 105℃(221℉)
Vibration	1.5mm DA at 10-55 Hz,
Shock	20g
Enclosure	P.B.T, Polyester
Terminals	Tinned copper alloy, P.C.
Max. Solder Temp.	270℃(518℉)
Max. solder time	5 seconds
Weight	25g

ZETTLER RELAY (XIAMEN) CO., LTD. ***www.zettlercn.com***
East of 3/F, Yinfeng Building No. 48-50 Huli Road Huli District, Xiamen Tel:(0592)6151211 Fax: (0592)6151221

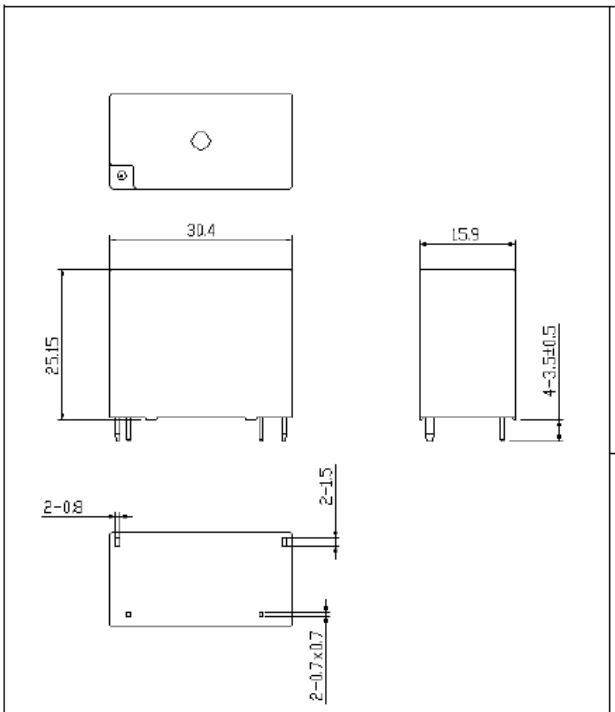
AZSR131

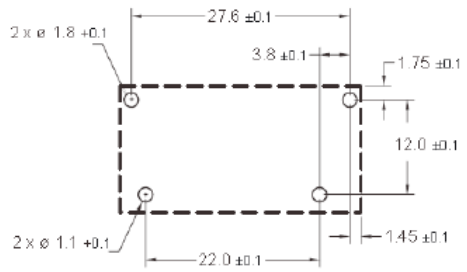
Relay ordering data

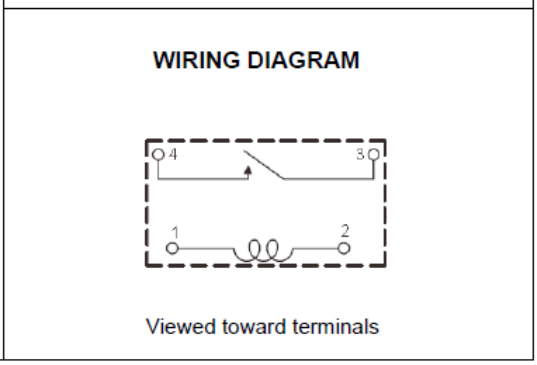
COIL SPECIFICATIONS					ORDER NUMBER
Nominal Coil VDC	Must Operate VDC	Min holding VDC	Max. Continuous VDC	Coil Resistance Ω±10%	
5	3.75	1.75	6	18	AZSR131-1AE-5D
9	6.75	3.15	10.8	58	AZSR131-1AE-9D
12	9	4.2	14.4	103	AZSR131-1AE-12D
18	13.5	6.3	21.6	230	AZSR131-1AE-18D
24	18	8.4	28.8	410	AZSR131-1AE-24D
48	36	16.8	57.6	1650	AZSR131-1AE-48D

Add suffix "GW" after "D" for glow wire version. Add suffix "（200）" for 2.3mm gap version.
All values at 20℃

Mechanical data







Tolerance: ±0.3mm

Appendix 2: Photo documentation

Enclosure – Front View

Enclosure – Rear View

Enclosure – Left Side View

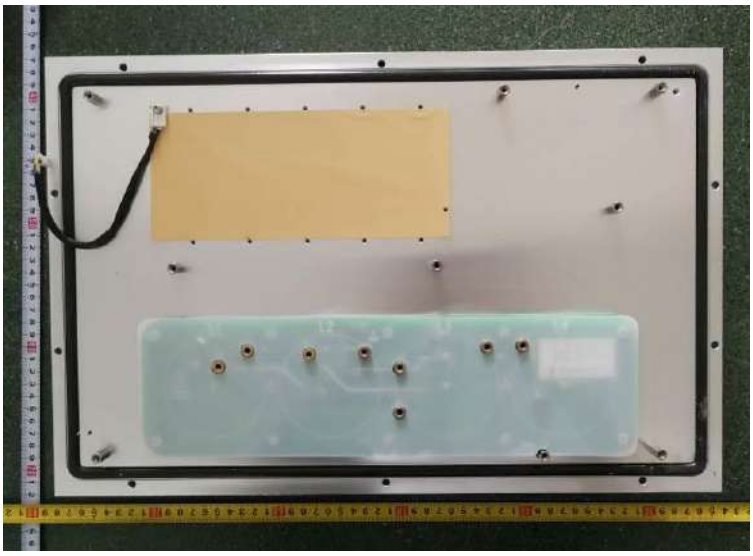
Enclosure – Right Side View

Enclosure – Bottom View (Dual Channel MPPT Input)

Enclosure – Bottom View (Single Channel MPPT Input)

Enclosure – Top View

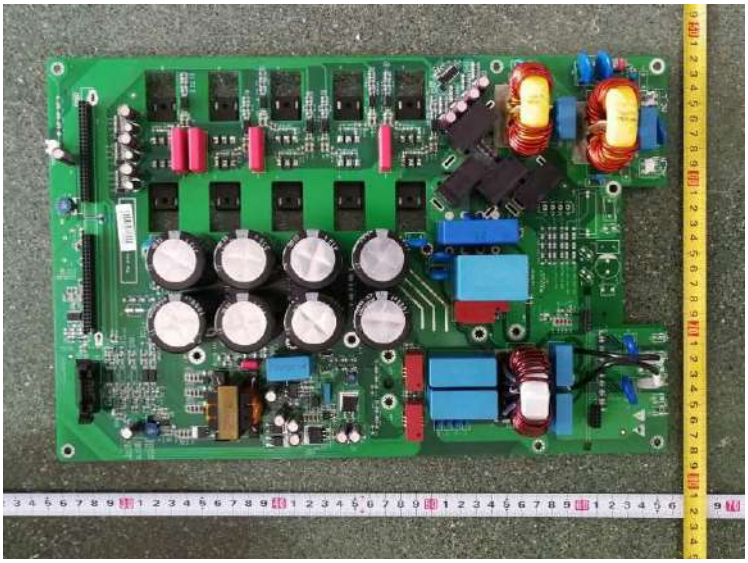
Heat-sink Internal View



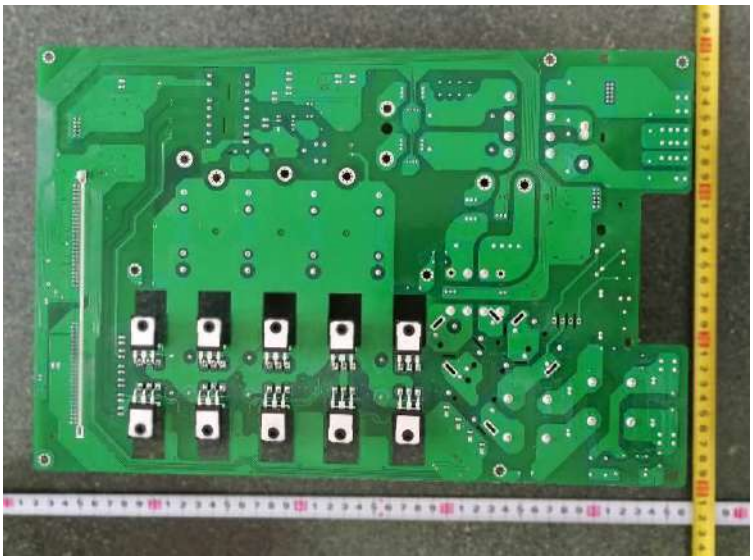
Internal View of Open Top Cover

Internal View of Open Top Cover

Main Board - Component Side

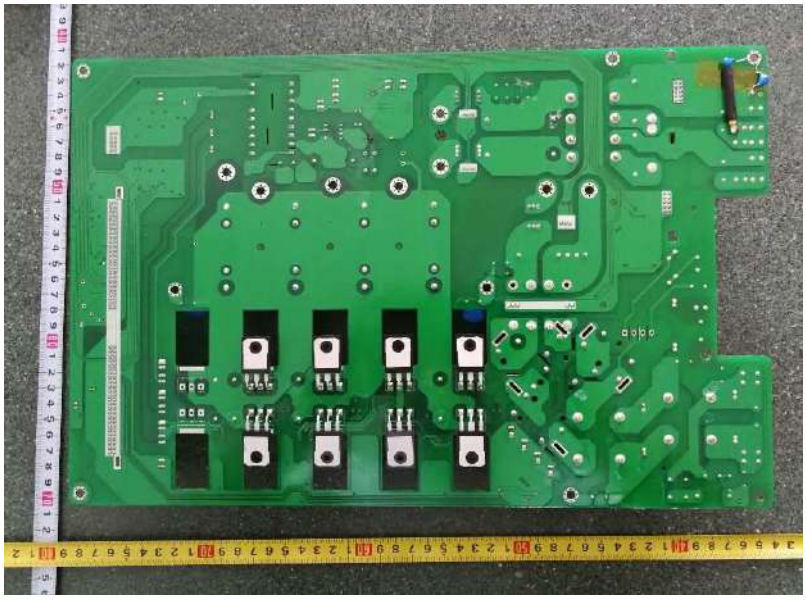


Main Board - Solder Side



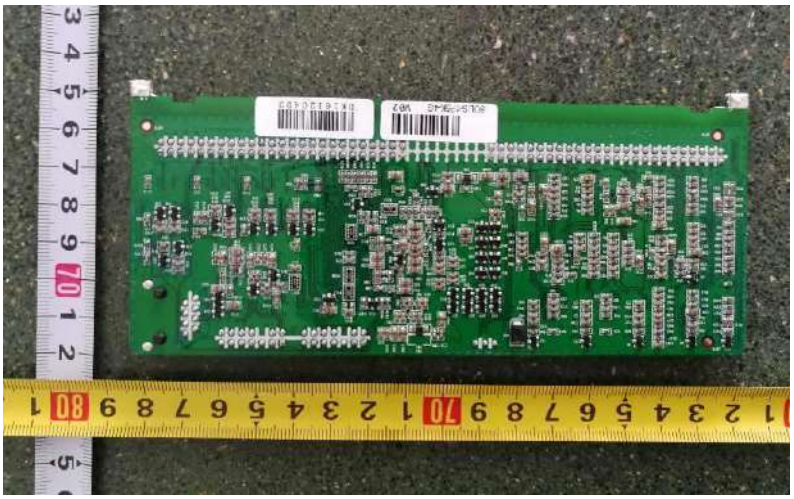
Main Board - Component Side

Main Board - Solder Side

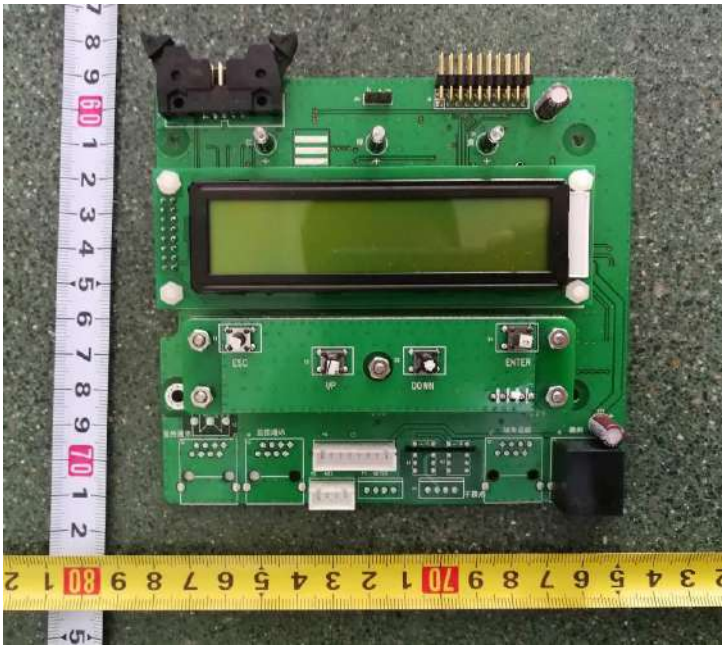


Control Board - Component Side

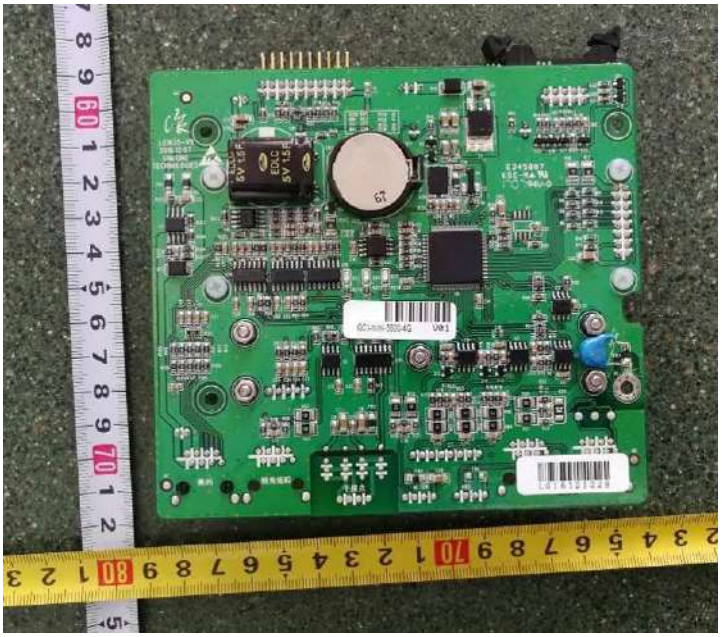
Control Board - Solder Side



LCD Board - Component Side



LCD Board - Solder Side



Appendix 3:
EMC Report of Conducted Emission in the frequency band 30 kHz to 150 kHz

Test Report

Product Name	:	PV Grid-Tied Inverter
Model No.	:	Solis-1P4.6K-4G
Applicable Standard	:	IEC 61000-2-2:2002+A1:2017+A2:2018 (Clause 4.12.3:30KHz-150KHz)
Test Result	:	PASS
Report No.	:	20C0120R-V2

Applicant	:	Ginlong Technologies Co., Ltd.
Address	:	No.57 Jintong Road, Binhai Industrial Park, Xiangshan, Ningbo, Zhejiang, PEOPLE'S REPUBLIC OF CHINA

Test Laboratory	:	DEKRA Testing and Certification (Suzhou) Co., Ltd.
Address	:	No.99 Hongye Rd., Suzhou Industrial Park, Suzhou,215006, Jiangsu,China
Tel / Fax	:	0512-6251-5088 / 0512-6251-5098

Documented By : Hui Yu
(Project Assistant: Hui Yu)

Reviewed By : Star Wang
(Supervisor: Star Wang)

Approved By : Jerry Pan
(Manager: Jerry Pan)

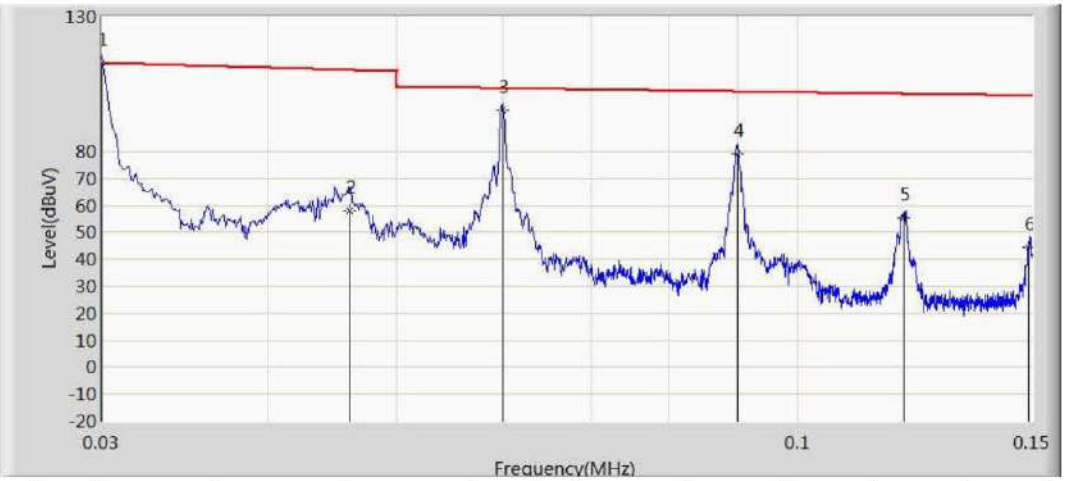
Note: The test results relate only to the samples tested.

1. Overview of results

EMISSION TESTS			
Requirement – Test case	Basic standard(s)	Verdict	Remark
Conducted disturbance voltage at AC mains power port	IEC 61000-2-2	PASS	---

2. Conducted Emission
2.1. Test Result

Engineer: Yves	
Site: AC1	Time: 2020/12/01
Limit: IEC61000-2-2-CE-Mains(30KHz-150KHz)	Margin: 0
Probe: NNLK 8129(0.009-30MHz)	Polarity: Line
EUT: PV Grid-Tied Inverter	Power: Input :400V DC, Output : 230Vac,50Hz
Note: PV Mode	

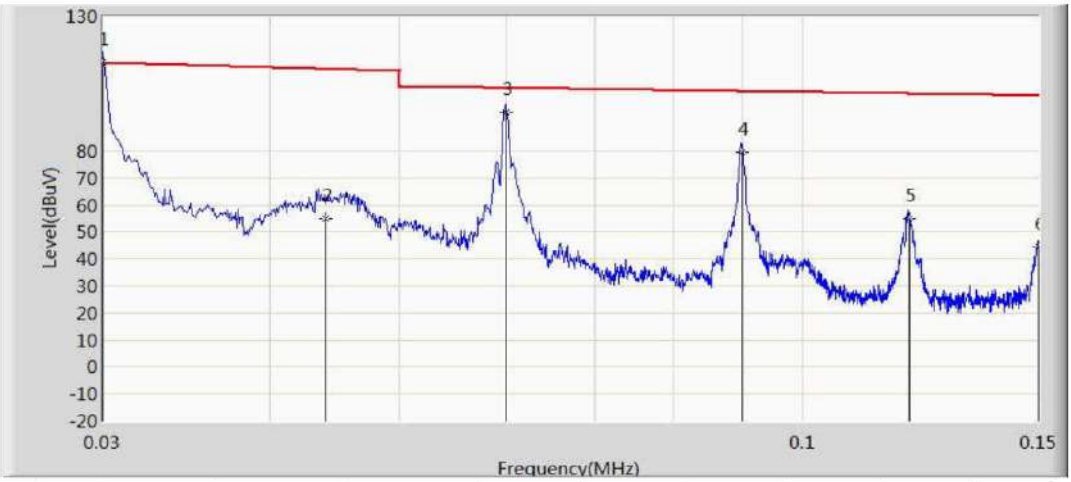


No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1	*	0.030	112.736	112.348	-0.264	113.000	0.359	0.029	0.000	QP
2		0.046	57.860	57.764	-52.610	110.469	0.067	0.029	0.000	QP
3		0.060	95.441	95.358	-8.013	103.453	0.054	0.029	0.000	QP
4		0.090	79.013	78.945	-23.222	102.235	0.039	0.029	0.000	QP
5		0.120	55.425	55.361	-45.939	101.364	0.035	0.029	0.000	QP
6		0.149	44.658	44.597	-56.061	100.720	0.033	0.029	0.000	QP

Note:

1. " * ", means this data is the worst emission level.
2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Engineer: Yves	
Site: AC1	Time: 2020/12/01
Limit: IEC61000-2-2-CE-Mains(30KHz-150KHz)	Margin: 0
Probe: NNLK 8129(0.009-30MHz)	Polarity: Neutral
EUT: PV Grid-Tied Inverter	Power: Input :400V DC, Output : 230Vac,50Hz
Note: PV Mode	



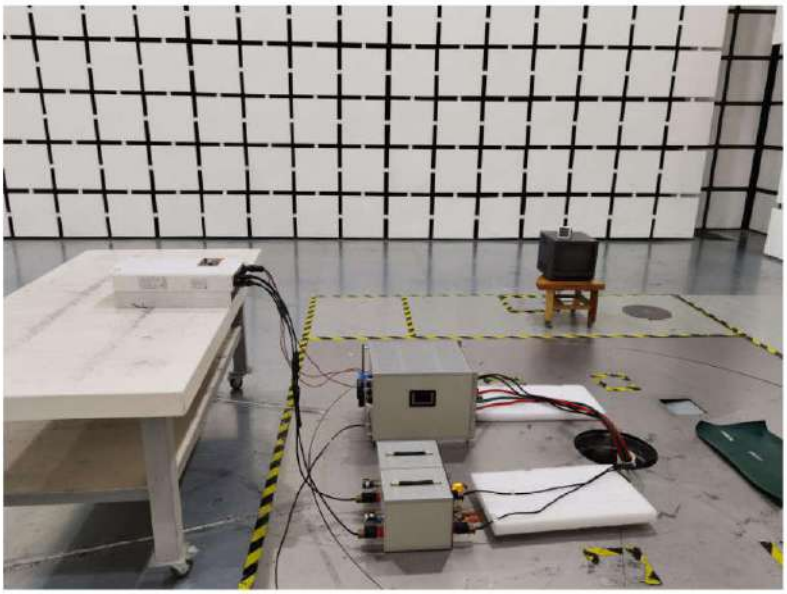
No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1	*	0.030	112.880	112.496	-0.120	113.000	0.355	0.029	0.000	QP
2		0.044	54.802	54.703	-56.013	110.815	0.071	0.029	0.000	QP
3		0.060	94.670	94.587	-8.783	103.453	0.055	0.029	0.000	QP
4		0.090	79.763	79.694	-22.478	102.241	0.040	0.029	0.000	QP
5		0.120	55.042	54.978	-46.338	101.380	0.035	0.029	0.000	QP
6		0.150	44.467	44.405	-56.246	100.713	0.033	0.029	0.000	QP

Note:

1. " * ", means this data is the worst emission level.
2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Test Photograph

Description: Conducted Emission Test Setup



3. Test and measure equipment list

Conducted disturbance voltage (AC mains port)

Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
EMI Test Receiver	R&S	ESCI	100906	2021.04.17
Artificial Mains Network	SCHWARZBECK	NNLK 8129	8129-282	2021.04.16
Coaxial Cable	Huber+Suhner	RG 223	TR1-C1	2021.08.26
Temperature/Humidity Meter	RTS	RTS-8S	AC1-TH	2021.08.18

4. EUT PHOTOS

EUT PHOTOS (1)

EUT PHOTOS (2)

EUT PHOTOS (3)

EUT PHOTOS (4)

The End

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