CERTIFICATE
of Conformity

TÜVRheinland®

Registration No.: AK 50538793 0001

Report No.: CN22EOEK 001

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

Product:
PV-Inverter
Grid-Connected PV Inverter

Identification:
Type Designation: R6-15K-T2-32, R6-17K-T2-32, R6-20K-T2-32, R6-22K-T2-32, R6-25K-T2-32
Serial No. : R6T2503G2112E00002
Firmware version: V1.020
Remark: Refer to test report CN22EOEK 001 for details.

Tested acc. to:
UNE 206006 IN:2011
UNE 206007-1 IN:2013
RD 1699:2011
RD 661:2007
RD 413:2014

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 30.03.2022

A. Chen

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

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

TÜVRheinland®
Precisely Right.

Guangzhou Sanjing Electric Co.,
Ltd.

Date : 30/03/2022
Our ref. : 02
Your ref.: 168346650

No.9, Lizhishan Road, Science City,
Guangzhou High-tech Zone,
Guangdong
P.R. China

Ref : AK Certificate of Conformity

Type of Equipment : Grid-Connected PV Inverter
Model Designation : See Certificate
Certificate No. : AK 50538793 0001
Report No. : CN22EOEK 001

Dear Ladies and Gentlemen,

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

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

EC Council Directive 2014/30/EU

Electromagnetic Compatibility

TÜVRheinland®

Registration No.: AE 50538832 0001

Report No.: CN21ESNZ 001

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

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

Identification:

R6-15K-T2-32	R6-17K-T2-32	R6-20K-T2-32
R6-22K-T2-32	R6-25K-T2-32	R6-5K-T2-32-LV
R6-6K-T2-32-LV	R6-8K-T2-32-LV	R6-10K-T2-32-LV
R6-15K-T2-32-LV		

Serial No.: n.a.
Remark: Refer to above-listed test report for details.

Tested acc. to:
EN IEC 61000-6-2:2019
EN IEC 61000-6-4:2019

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.

TÜV Rheinland LGA Products GmbH Zertifizierungsstelle TÜVRheinland®

Certification Body

Tongle Lee

Date 31.03.2022

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

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

TÜVRheinland®
Precisely Right.

Guangzhou Sanjing Electric Co., Ltd.

Date : 31.03.2022
Our ref. : AOFEL 02
Your ref.:

No.9, Lizhishan Road, Science City,
Guangzhou High-tech Zone,
Guangdong
P.R. China

Ref : AE Certificate of Conformity EMC

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : AE 50538832 0001
Report No. : CN21ESNZ 001

Dear Ladies and Gentlemen,

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

Tongle Lee

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 C, CATIC Plaza , No. 15, Ronghua South Road, Beijing Economic-Technological Development Area, 100176, Beijing

北京市北京经济技术开发区荣华南路15号院中航技广场C座3层301室、12层1203室
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

CERTIFICATE

TÜVRheinland®

of Conformity
Low Voltage Directive 2014/35/EU

Registration No.: AN 50542094 0001

Report No.: CN22SWUP 001

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

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

Identification:

Type Designation: R6-25K-T2-32,R6-22K-T2-32, R6-20K-T2-32,
R6-17K-T2-32,R6-15K-T2-32,R6-15K-T2-32-LV,
R6-10K-T2-32-LV,R6-8K-T2-32-LV,
R6-6K-T2-32-LV, R5K-T2-32-LV
Serial Number : Engineering samples
Remark : Refer to test report CN22SWUP 001
for details.

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 28.04.2022

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.

Guangzhou Sanjing Electric Co., Ltd.

Date : 28.04.2022
Our ref. : 02
Your ref.: 168346650

No.9, Lizhishan Road, Science City,
Guangzhou High-tech Zone,
Guangdong
P.R. China

Ref : AN Certificate of Conf. Low Voltage D.

Type of Equipment : Grid-connected PV Inverter
Model Designation : See Certificate
Certificate No. : AN 50542094 0001
Report No. : CN22SWUP 001

Dear Ladies and Gentlemen,

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

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 C, CATIC Plaza , No. 15, Ronghua South Road, Beijing Economic-Technological Development Area, 100176, Beijing

北京市北京经济技术开发区荣华南路15号院中航技广场C座3层301室、12层1203室
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

Certificado de Conformidad

Número de Certificado: CN-PV-220133

Conforme a los ensayos realizados, la muestra<s> del producto que se detalla a continuación se ajusta a los requisitos de la especificación<s>/norma<s> de referencia en el momento en que se realizaron los ensayos. Esto no implica que Intertek haya realizado ningún tipo de vigilancia o control de la(s) fabricación(es). El o los fabricantes se asegurarán de que el proceso de fabricación cumpla con los productos examinados mencionados en este certificado.

Solicitante:	Guangzhou Sanjing Electric Co., Ltd. No.9, Lizhishan Road, Science City, Guangzhou High-tech Zone, Guangdong, P.R.China
Producto:	Inversor Fotovoltaico Conectado a la Red
Calificaciones y Características Principales:	Véase el apéndice del Certificado de Conformidad
Modelo:	R6-15K-T2-32, R6-17K-T2-32, R6-20K-T2-32, R6-22K-T2-32, R6-25K-T2-32
Nombre de la Marca<s>:	SAJ
Producto Conforme con:	NTS-631:2020 Norma técnica para el control de conformidad de los módulos de generación de energía según el Reglamento UE 2016/631
Nombre y Dirección de la Oficina Emisora del Certificado:	Intertek Testing Services Ltd.Shanghai West Area, 2nd Floor, No.707, Zhangyang Road China (Shanghai) Pilot Free Trade Zone, Shanghai, P.R.China Acreditado por ACCREDIA de conformidad con la norma ISO/IEC 17065:2012
Informe de la Prueba<s> Nº.:	220614052GZU-001

Información Complementaria en el Apéndice.

Firma

Responsable de la Certificación: Grady
Fecha: 06 de julio de 2022

SHANGHAI FOREIGN AFFAIRS SERVICE CENTER 上海外事服务中心 翻译专用章 (2) CERTIFIED TRANSLATION

ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO

PRD N° 306B

APÉNDICE: Certificado de Conformidad

.

Este es un Apéndice del Certificado de Conformidad Número:CN-PV-220133.

Unidad / Tipo.....:	R6-15K-T2-32	R6-17K-T2-32	R6-20K-T2-32	R6-22K-T2-32	R6-25K-T2-32
Versión de hardware / Número de serie (examinado)..... :	Main Power board: V1.3; Control board: V1.0				
Versión del firmware / Versión del software (examinado) ..... :	V1.020				
Rango de Corriente Continua MPP a plena carga [V]..... :	460-900	460-900	480-900	500-900	520-900
Rango de entrada de Corriente Continua [V]..... :	180-1000				
Entrada de Corriente Continua [A]..... :	max.32A x 2				
ISC PV [A] ..... :	38,4A x 2				
Tensión nominal de salida de CA [V] ..... :	230/400V (3~ + N + PE, 50/60Hz)				
Salida máxima de Corriente Alterna [A] :	25.0	28.4	33.4	36.7	41.7
Potencia activa nominal de salida [kW] :	15	17	20	22	25
Potencia de salida máxima aparente [kVA] ..... :	16,5	18,7	22,0	24,2	27,5

APÉNDICE: Certificado de Conformidad

Este es un Apéndice del Certificado de Conformidad Número: CN-PV-220133.

Requisito / Requirement	NTS	Tipo / Type	Cumplimiento / Complicant	Nombre Entidad Emisora / Name of issuing Entity	Ev.(*)
Modo regulación potencia-frecuencia limitado sobrefrecuencia (MRPFL-O) / Power-frequency regulation mode limited to overfrequency (MRPFL-O)	5.1	≥A	*YES* (TRF No.220614052GZU-001)	Intertek	P
Modo regulación potencia-frecuencia limitado-subfrecuencia (MRPFL-U) / Power-frequency regulation mode limited to underfrequency (MRPFL-U)	5.2	≥C	NO APPLICABLE	--	--
Modo regulación potencia-frecuencia (MRPF) / Power-frequency regulation mode (MRPF)	5.3	≥C	NO APPLICABLE	--	--
Control de potencia-frecuencia / Frequency Control	5.4	≥C	NO APPLICABLE	--	--
Capacidad de control y el rango de control de la potencia activa en remote / Active Power Requirements	5.5	≥C	NO APPLICABLE	--	--
Emulación de inercia durante variaciones de frecuencia muy rápidas / Intertia Emualtions	5.6	≥C	NO APPLICABLE	--	--
Capacidad de potencia reactiva a la capacidad máxima y por debajo / Reactive power capabilities at the EUT rated power and below	5.7	≥B	NO APPLICABLE	--	--
Modos de control de la potencia reactiva / Reactive power control modes	5.8	≥B	NO APPLICABLE	--	--
Control de amortiguamiento de oscilaciones / Control of oscillation damping	5.10	≥C	NO APPLICABLE	--	--
Capacidad para soportar huecos de tensión de los MPE conectados por debajo de 110 kV / Capability to withstand voltage grid faults for POC below 110 kV	5.11	≥B	NO APPLICABLE	--	--
Capacidad para soportar huecos de tensión de los MPE conectados por encima de 110 kV / Capability to withstand voltage grid faults for POC above 110 kV	5.11	D	NO APPLICABLE	--	--
Recuperación de la potencia activa después de una falta / Active power recovery after a grid fault	5.11	≥B	NO APPLICABLE	--	--
Inyección rápida de corriente de falta en el punto de conexión en caso de faltas trifásicas) simétricas / Rapid current injection control	5.11	≥B	NO APPLICABLE	--	--
Capacidad de participar en el funcionamiento en isla / Islanding requirements	5.13	≥C	NO APPLICABLE	--	--
(*) Evaluado por / Evaluated by: P: Prueba de conformidad / Test of compliance S: Simulación de conformidad / Simulation of compliance					

Declaration: It is an accurate translation of the original document.

Certificate of Conformity

Certificate Number: CN-PV-230100

On the basis of the tests undertaken, the sample<s> of the below product have been found to comply with the requirements of the referenced specification<s>/standard<s> at the time the tests were carried out. It does not imply that Intertek has performed any surveillance or control of the manufacture(s). The manufacturer(s) shall ensure that the manufacturing process assures compliance of the production units with the examined products mentioned in this certificate.

Applicant:	Guangzhou Sanjing Electric Co., Ltd. No.9, Lizhishan Road, Science City, Guangzhou High-tech Zone, Guangdong P.R. China
Product:	Grid-Connected PV Inverter
Ratings & Principle Characteristics:	See appendix of Certificate of Conformity
Model:	R6-25K-T3-32, R6-30K-T3-32, R6-33K-T3-32, R6-36K-T3-32, R6-40K-T4-32, R6-50K-T4-32
Brand Name<s>:	SAJ
Product Complies with:	UNE 217001:2020 Tests for systems that avoid the discharge of energy to the distribution network
Certificate Issuing Office Name & Address:	Intertek Testing Services Ltd. Shanghai West Area, 2nd Floor, No. 707, Zhangyang Road China (Shanghai) Pilot Free Trade Zone, Shanghai, P. R. China Accredited by ACCREDIA in accordance with ISO/IEC 17065:2012
Test Report No.<s>:	220411134GZU-004

Additional information in Appendix.

Signature

Certification Manager: Grady Ye
Date: 14 March 2023

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

PRD N° 306B

APPENDIX: Certificate of Conformity

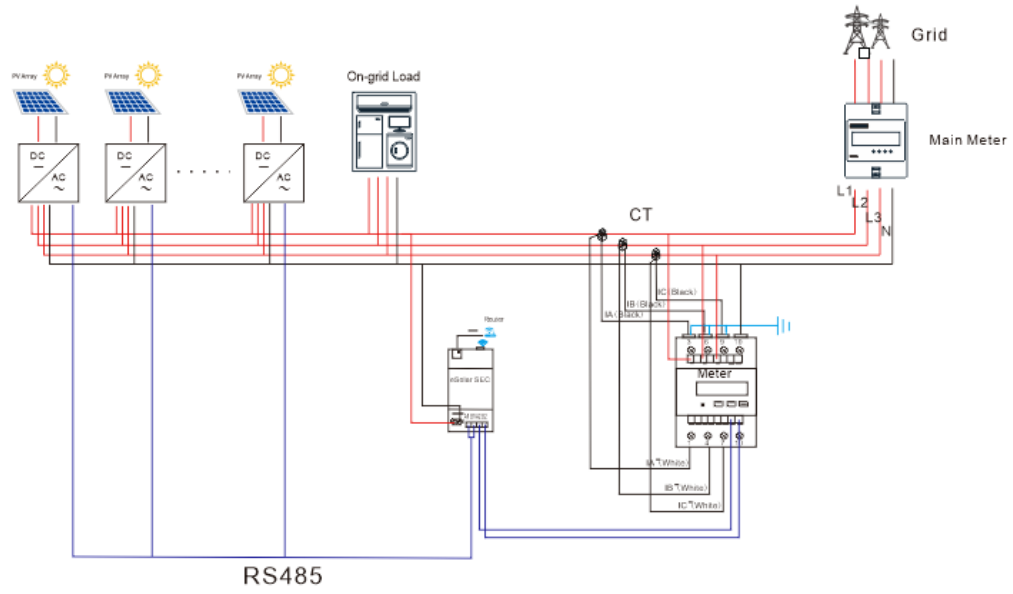
This is an Appendix to Certificate of Conformity Number: CN-PV-230100.

Model list		R6-50K-T4-32	R6-40K-T4-32	R6-36K-T3-32	R6-33K-T3-32	R6-30K-T3-32	R6-25K-T3-32
PV INPUT	VMAX PV[Vdc]	1100					
	ISC PV[A]	38.4/38.4/38.4/38.4		38.4/38.4			
	MPPT Voltage Range VMPP[Vdc]	180-1000					
	Max. Input Current IMAX [A]	32/32/32/32		32/32/32			
	MPPT Full Power Voltage Range [Vdc]	530-900	500-900	540-900	520-900	500-900	480-900
	Number of MPPT	2					
	String per MPPT	4		3			
	Backfeed Current [A]	0					
	Overvoltage Category[OVC]	II					
AC Side (ON-Grid)	Rated Output Voltage Ur[Vac]	3L/N/PE,230/400					
	Rated Output Frequency FNETZ [Hz]	50/60					
	Rated Output Power PE [KW]	50	40	36	33	30	25
	Max. Apparent power SEmax [KVA]	50	44	39.6	36.3	33	27.5
	Rated Output Current Ir [A]	3*72.5	3*58.0	3*52.2	3*47.8	3*43.5	3*36.3
	Max. Output Current Imax [A]	3*75.8	3*66.7	3*60.0	3*55.0	3*50.0	3*41.7
	Power Factor (cosϕ)	0.8 leading ~ 0.8 lagging					
	Max. Efficiency	98.8%					
	Euro Efficiency	98.5%					
	THD [V/I](100% full power	< 3%					
	Acoustic Noise[dB]	< 50					
	Overvoltage Category[OVC]	III					

APPENDIX: Certificate of Conformity

This is an Appendix to Certificate of Conformity Number: CN-PV-230100.

Installation scheme:



Maximum number of inverters to be connected in parallel is:

Using energy meter CHINT DTSU666, maximum number of inverters connected in parallel are 10

Certificate of Conformity

Certificate Number: CN-PV-220133

On the basis of the tests undertaken, the sample<s> of the below product have been found to comply with the requirements of the referenced specification<s>/standard<s> at the time the tests were carried out. It does not imply that Intertek has performed any surveillance or control of the manufacture(s). The manufacturer(s) shall ensure that the manufacturing process assures compliance of the production units with the examined products mentioned in this certificate.

Applicant:	Guangzhou Sanjing Electric Co., Ltd. No.9, Lizhishan Road, Science City, Guangzhou High-tech Zone, Guangdong, P.R.China
Product:	PV Grid-connected Inverter
Ratings & Principle Characteristics:	See appendix of Certificate of Conformity
Model:	R6-15K-T2-32, R6-17K-T2-32, R6-20K-T2-32, R6-22K-T2-32, R6-25K-T2-32
Brand Name<s>:	SAJ
Product Complies with:	NTS-631:2020 Technical standard for monitoring the compliance of power generating modules according to EU Regulation 2016/631
Certificate Issuing Office Name & Address:	Intertek Testing Services Ltd. Shanghai West Area, 2nd Floor, No. 707, Zhangyang Road China (Shanghai) Pilot Free Trade Zone, Shanghai, P. R. China Accredited by ACCREDIA in accordance with ISO/IEC 17065:2012
Test Report No.<s>:	220614052GZU-001

Additional information in Appendix.

Signature

Certification Manager: Grady Ye
Date: 06 July 2022

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

PRD N° 306B

APPENDIX: Certificate of Conformity

This is an Appendix to Certificate of Conformity Number:CN-PV-220133.

Unit / Type .....:	R6-15K-T2-32	R6-17K-T2-32	R6-20K-T2-32	R6-22K-T2-32	R6-25K-T2-32
Hardware version / Serial No. (tested) :	Main Power board: V1.3; Control board: V1.0				
Firmware version / Software version (tested) ..... :	V1.020				
Full-load MPP DC voltage range [V] .... :	460-900	460-900	480-900	500-900	520-900
Input DC voltage range [V] ..... :	180-1000				
Input DC current [A] ..... :	max. 32A x 2				
ISC PV [A] ..... :	38,4A x 2				
Nominal output AC voltage [V] ..... :	230/400V (3~ + N + PE, 50/60Hz)				
Max. Output AC current [A] ..... :	25.0	28.4	33.4	36.7	41.7
Nominal active output power [kW]..... :	15	17	20	22	25
Max. apparent output power [kVA] .... :	16,5	18,7	22,0	24,2	27,5

APPENDIX: Certificate of Conformity

This is an Appendix to Certificate of Conformity Number: CN-PV-220133.

Requisito / Requirement	NTS	Tipo / Type	Cumplimiento / Complicant	Nombre Entidad Emisora / Name of issuing Entity	Ev. (*)
Modo regulación potencia-frecuencia limitado sobrefrecuencia (MRPFL-O) / Power-frequency regulation mode limited to overfrequency (MRPFL-O)	5.1	≥A	*YES* (TRF No. 220614052GZU-001)	Intertek	P
Modo regulación potencia-frecuencia limitado-subfrecuencia (MRPFL-U) / Power-frequency regulation mode limited to underfrequency (MRPFL-U)	5.2	≥C	NO APPLICABLE	--	--
Modo regulación potencia-frecuencia (MRPF) / Power-frequency regulation mode (MRPF)	5.3	≥C	NO APPLICABLE	--	--
Control de potencia-frecuencia / Frequency Control	5.4	≥C	NO APPLICABLE	--	--
Capacidad de control y el rango de control de la potencia activa en remote / Active Power Requirements	5.5	≥C	NO APPLICABLE	--	--
Emulación de inercia durante variaciones de frecuencia muy rápidas / Intertia Emualtions	5.6	≥C	NO APPLICABLE	--	--
Capacidad de potencia reactiva a la capacidad máxima y por debajo / Reactive power capabilities at the EUT rated power and below	5.7	≥B	NO APPLICABLE	--	--
Modos de control de la potencia reactiva / Reactive power control modes	5.8	≥B	NO APPLICABLE	--	--
Control de amortiguamiento de oscilaciones / Control of oscillation damping	5.10	≥C	NO APPLICABLE	--	--
Capacidad para soportar huecos de tensión de los MPE conectados por debajo de 110 kV / Capability to withstand voltage grid faults for POC below 110 kV	5.11	≥B	NO APPLICABLE	--	--
Capacidad para soportar huecos de tensión de los MPE conectados por encima de 110 kV / Capability to withstand voltage grid faults for POC above 110 kV	5.11	D	NO APPLICABLE	--	--
Recuperación de la potencia activa después de una falta / Active power recovery after a grid fault	5.11	≥B	NO APPLICABLE	--	--
Inyección rápida de corriente de falta en el punto de conexión en caso de faltas trifásicas) simétricas / Rapid current injection control	5.11	≥B	NO APPLICABLE	--	--
Capacidad de participar en el funcionamiento en isla / Islanding requirements	5.13	≥C	NO APPLICABLE	--	--
(*) Evaluado por / Evaluated by: P: Prueba de conformidad / Test of compliance S: Simulación de conformidad / Simulation of compliance					

Certificate of Conformity

Certificate Number: CN-PV-230136

On the basis of the tests undertaken, the sample<s> of the below product have been found to comply with the requirements of the referenced specification<s>/standard<s> at the time the tests were carried out. It does not imply that Intertek has performed any surveillance or control of the manufacture(s). The manufacturer(s) shall ensure that the manufacturing process assures compliance of the production units with the examined products mentioned in this certificate.

Applicant:	Guangzhou Sanjing Electric Co., Ltd. No.9, Lizhishan Road, Science City, Guangzhou High-tech Zone, Guangdong P.R. China
Product:	Grid-Connected PV Inverter
Ratings & Principle Characteristics:	See appendix of Certificate of Conformity
Model:	R6-15K-T2-32, R6-17K-T2-32, R6-20K-T2-32, R6-22K-T2-32, R6-25K-T2-32
Brand Name<s>:	SAJ
Product Complies with:	UNE 217001:2020 Tests for systems that avoid the discharge of energy to the distribution network
Certificate Issuing Office Name & Address:	Intertek Testing Services Ltd. Shanghai West Area, 2nd Floor, No. 707, Zhangyang Road China (Shanghai) Pilot Free Trade Zone, Shanghai, P. R. China Accredited by ACCREDIA in accordance with ISO/IEC 17065:2012
Test Report No.<s>:	220411134GZU-003

Additional information in Appendix.

Signature

Certification Manager: Grady Ye
Date: 30 March 2023

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

PRD N° 306B

APPENDIX: Certificate of Conformity

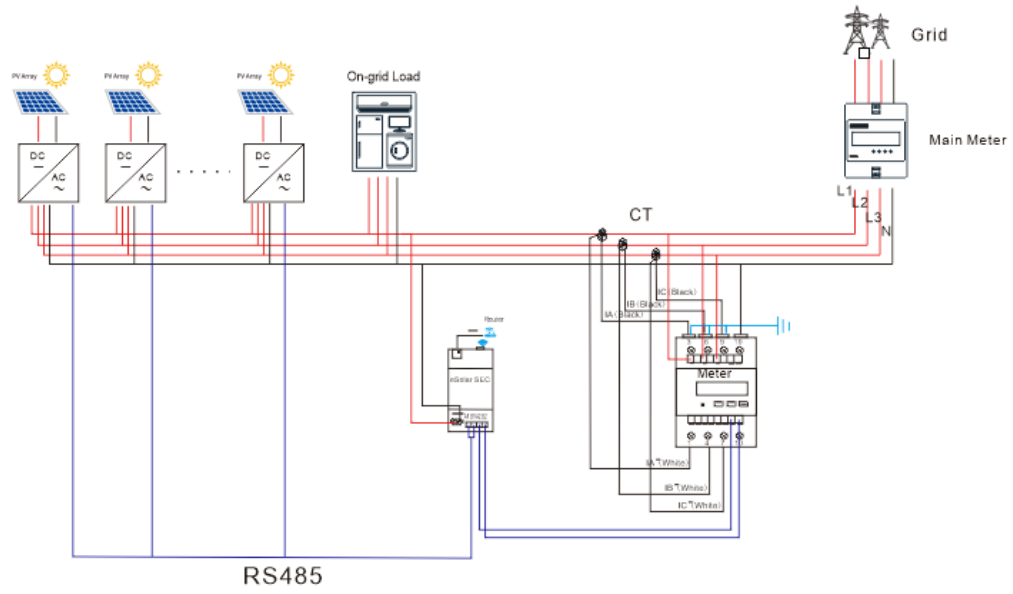
This is an Appendix to Certificate of Conformity Number: CN-PV-230136

Model list		R6-25K-T2-32	R6-22K-T2-32	R6-20K-T2-32	R6-17K-T2-32	R6-15K-T2-32
PV INPUT	VMAX PV[Vdc]	1100				
	ISC PV[A]	38.4/38.4				
	MPPT Voltage Range VMPP[Vdc]	180-1000				
	Max. Input Current IMAX [A]	32/32				
	MPPT Full Power Voltage Range [Vdc]	520-900	500-900	460-900	460-900	460-900
	Number of MPPT	2				
	String per MPPT	1/1				
	Backfeed Current [A]	0				
	Overvoltage Category[OVC]	II				
AC Side (ON-Grid)	Rated Output Voltage Ur[Vac]	3L/N/PE,230/400				
	Rated Output Frequency FNETZ [Hz]	50/60				
	Rated Output Power PE [KW]	25	22	20	17	15
	Max. Apparent power SEmax [KVA]	27.5	24.2	22	18.7	17
	Rated Output Current Ir [A]	3*36.2	3*31.9	3*29.0	3*24.6	3*21.7
	Max. Output Current Imax [A]	3*41.7	3*36.7	3*33.3	3*28.3	3*25.0
	Power Factor (cosϕ)	0.8 leading ~ 0.8 lagging				
	Max. Efficiency	98.8%				
	Euro Efficiency	98.5%				
	THD [V/I](100% full power	< 3%				
	Acoustic Noise[dB]	< 50				
	Overvoltage Category[OVC]	III				

APPENDIX: Certificate of Conformity

This is an Appendix to Certificate of Conformity Number: CN-PV-230136

Installation scheme:



Maximum number of inverters to be connected in parallel is:

Using energy meter CHINT DTSU666, maximum number of inverters connected in parallel are 9

广州三晶电气股份有限公司
Guangzhou Sanjing Electric Co.,Ltd.
Tel：400-159-0088 Fax：020-66608589
Web：www.saj-electric.cn / www.saj-electric.com
地址：广州高新技术产业开发区科学城荔枝山路9号三晶创新园
Add: SAJ Innovation Park, No.9, Lizhishan Road, Science City, Guangzhou High-tech Zone, Guangdong, P.R.China.

Declaración de conformidad de la UE

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

Declaramos bajo nuestra responsabilidad que el producto

Nombre/Marca:

Modelo:

Inversor monofásico: R6-5K-S2-X, R6-6K-S2-X, R6-7K-S2-X, R6-8K-S2-X, R6-9K-S2-X, R6-10K-S2-X, R6-5K-S3, R6-6K-S3, R6-7K-S3, R6-8K-S3, R6-9K-S3, R6-10K-S3

Inversor trifásico: R6-3K-T2, R6-4K-T2, R6-5K-T2, R6-6K-T2, R6-8K-T2, R6-10K-T2, R6-12K-T2, R6-15K-T2, R6-15K-T2-32, R6-17K-T2-32, R6-20K-T2-32, R6-22K-T2-32, R6-25K-T2-32, R6-25K-T3-32, R6-30K-T3-32, R6-33K-T3-32, R6-36K-T3-32, R6-36K-T4-32, R6-40K-T4-32, R6-50K-T4-32

Cumpla las siguientes directivas y reglamentos:

- 2014/35/UE (Directiva sobre baja tensión)
- 2014/30/UE (Directiva CEM)
- 2011/65/UE (Directiva RoHS)
- DIRECTIVA (UE) 2015/863
- Reglamento de la Comisión (UE) 2016/631 (RFG)

Para la evaluación del cumplimiento de estas Directivas y Reglamentos, se aplicaron las siguientes normas/requisitos:

Safety:	EN 62109-1:2010, EN 62109-2:2011
EMC:	EN 61000-6-1:2019
	EN 61000-6-2:2019
	EN 61000-6-3:2021
	EN 61000-6-4:2019
	EN 61000-3-2:2014(Maximum AC current ≤ 16A)
	EN 61000-3-3:2013(Maximum AC current ≤ 16A)
	EN 61000-3-11:2000(Maximum AC current > 16A)
	EN 61000-3-12:2011(Maximum AC current > 16A)
RoHS:	EN 50581: 2012
RFG:	NTS Version 2.1: 2021,
	NTS Version 2.1–Correction 1.0
Organismo notificado:	TÜV Rheinland
	INTERTEK

Guangzhou	15 de abril de 2023	Director de Nuevas Energías
Lugar	Fecha	Firma

Test Report

Technical standard for monitoring the compliance of power generating modules according to EU Regulation 2016/631

For the unit(s)	R6-15K-T2-32, R6-17K-T2-32, R6-20K-T2-32, R6-22K-T2-32, R6-25K-T2-32
Test report no	220614052GZU-001
Date	2022-6-29

Test report number.....:	220614052GZU-001
Date of issue.....:	2022-6-29
Total number of pages.....:	28 pages
Testing laboratory .....:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Address.....:	Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China
Applicant's name .....:	Guangzhou Sanjing Electric Co., Ltd.
Address.....:	No.9, Lizhishan Road, Science City, Guangzhou High-tech Zone, Guangdong, P.R.China
Test specification	
Standard .....:	NTS-631:2020 Type approval for Type A
Test report form number.....:	NTS-631_V2.0
Test report form(s) originator.....:	Intertek
Master TRF.....:	Dated 2022-06-24
Test item description.....:	PV Grid-connected Inverter
Trademark .....:	SAJ
Manufacturer.....:	Same as applicant
Factory.....:	Same as applicant
Model / Type reference.....:	R6-15K-T2-32, R6-17K-T2-32, R6-20K-T2-32, R6-22K-T2-32, R6-25K-T2-32
Technical data .....:	See section 3.1.1 on p.5
Testing location / address.....:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2. Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China
Dates of testing.....:	2022-6-14 – 2022-6-24

Tested by

Jason Fu

Jason Fu
Supervisor

Approved by

Tommy

Tommy Zhong
Technical Manager

1 General information of test report

1.1 Revision history

Revision	Date	Editor	Modification / Change	Status
1	2022-6-29	Jason Fu	Initial report was written	active

2 General remarks for documentation

The test results presented in this report relate only to the object(**s**) tested.

Throughout this report a ☒ comma ',' / ☐ point '.' is used as decimal separator and a ☐ point '.' / ☐ comma ',' as thousands separator.

The following **suffixes/indices** are used for variables in tables and figures:

0,2	gliding average values over 200 milliseconds
10	gliding average values over 10 seconds
60	gliding average values over 60 seconds
600	gliding average values over 10 minutes
+	positive sequence system values
-	negative sequence system values
0	zero sequence system values
1	fundamental component (main frequency). In case of power values (P, Q, S) this is the sum of the 3 phase values
Lx	index of phase x
LxLy	phase-to-phase voltages of phase x and phase y
s	apparent
p	active
q	reactive

Abbreviations

AC	:	Alternating Current
DC	:	Direct Current
EUT	:	Equipment Under Test
MP	:	Measurement Point
MPP	:	Maximum Power Point
N_{10}	:	Maximum number of switching operations within a time period of 10 minutes
N_{120}	:	Maximum number of switching operations within a time period of 120 minutes
PGU	:	Power Generating Unit
PGS	:	Power Generating System
PCC	:	Point of Common Coupling (grid connection point)
THC	:	Total Harmonic Current Distortion
$THDS_U$	:	Total demand distortions of voltage harmonics

General remarks for testing

3.1 General product information

3.1.1 Technical data of the unit(s)

Unit / Type ..... :	R6-15K-T2-32	R6-17K-T2-32	R6-20K-T2-32	R6-22K-T2-32	R6-25K-T2-32
Hardware version / Serial No. (tested) .. :	Main Power board: V1.3; Control board: V1.0				
Firmware version / Software version (tested) ..... :	V1.020				
Full-load MPP DC voltage range [V] ..... :	460-900	460-900	480-900	500-900	520-900
Input DC voltage range [V] ..... :	180-1000				
Input DC current [A]..... :	max. 32A x 2				
ISC PV [A] ..... :	38,4A x 2				
Nominal output AC voltage [V] ..... :	230/400V (3~ + N + PE, 50/60Hz)				
Max. Output AC current [A] ..... :	25.0	28.4	33.4	36.7	41.7
Nominal active output power [kW]..... :	15	17	20	22	25
Max. apparent output power [kVA] ..... :	16,5	18,7	22,0	24,2	27,5

The solar inverter converts DC voltage, generated by photovoltaic modules, into AC voltage.
The units are three-phase.

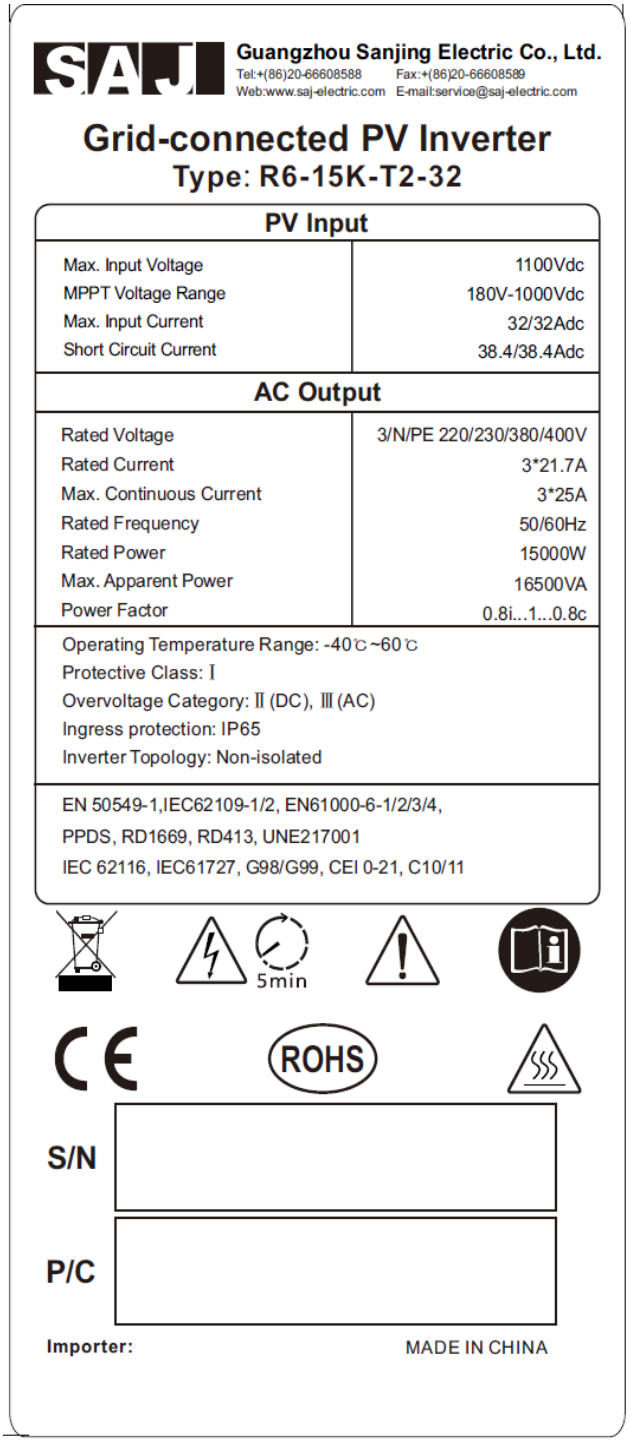
Equipment mobility ..... :	Permanent connection
Operating condition..... :	Continuous
Class of equipment ..... :	Class I
Protection against ingress of water ..... :	IP65 according to EN 60529
Mass of equipment [kg] ..... :	23,7kg

3.1.2 Description of the differences of the models within the product series

The models R6-15K-T2-32, R6-17K-T2-32, R6-20K-T2-32, R6-22K-T2-32, R6-25K-T2-32are same as the construction and hardware excepted the different as below table and the output power are different with adjusted by software. Details can be found below:

Model / Parts	R6-15K-T2-32	R6-17K-T2-32	R6-20K-T2-32	R6-22K-T2-32	R6-25K-T2-32
BOOST IGBT	RBN75H125S1FP4-A0/ FGY75T120SQDN/IKQ75N120CH3			FGY75T120SQDN/IKQ75N120CH3	
INV IGBT	RBN75H125S1FP4-A0/ FGY75T120SQDN/IKQ75N120CH3 IkW75N60T/IkW75N60TA/IKW75N65ET7			FGY75T120SQDN/IKQ75N120CH3 IkW75N60T/IkW75N60TA/IKW75N65ET7	

3.1.3 Copy of marking plate



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Grid-connected PV Inverter
Type: R6-15K-T2-32

PV Input	
Max. Input Voltage	1100Vdc
MPPT Voltage Range	180V-1000Vdc
Max. Input Current	32/32Adc
Short Circuit Current	38.4/38.4Adc

AC Output	
Rated Voltage	3/N/PE 220/230/380/400V
Rated Current	3*21.7A
Max. Continuous Current	3*25A
Rated Frequency	50/60Hz
Rated Power	15000W
Max. Apparent Power	16500VA
Power Factor	0.8i...1...0.8c

Operating Temperature Range: -40℃~60℃
Protective Class: Ⅰ
Overvoltage Category: Ⅱ (DC), Ⅲ (AC)
Ingress protection: IP65
Inverter Topology: Non-isolated

EN 50549-1,IEC62109-1/2, EN61000-6-1/2/3/4,
PPDS, RD1669, RD413, UNE217001
IEC 62116, IEC61727, G98/G99, CEI 0-21, C10/11

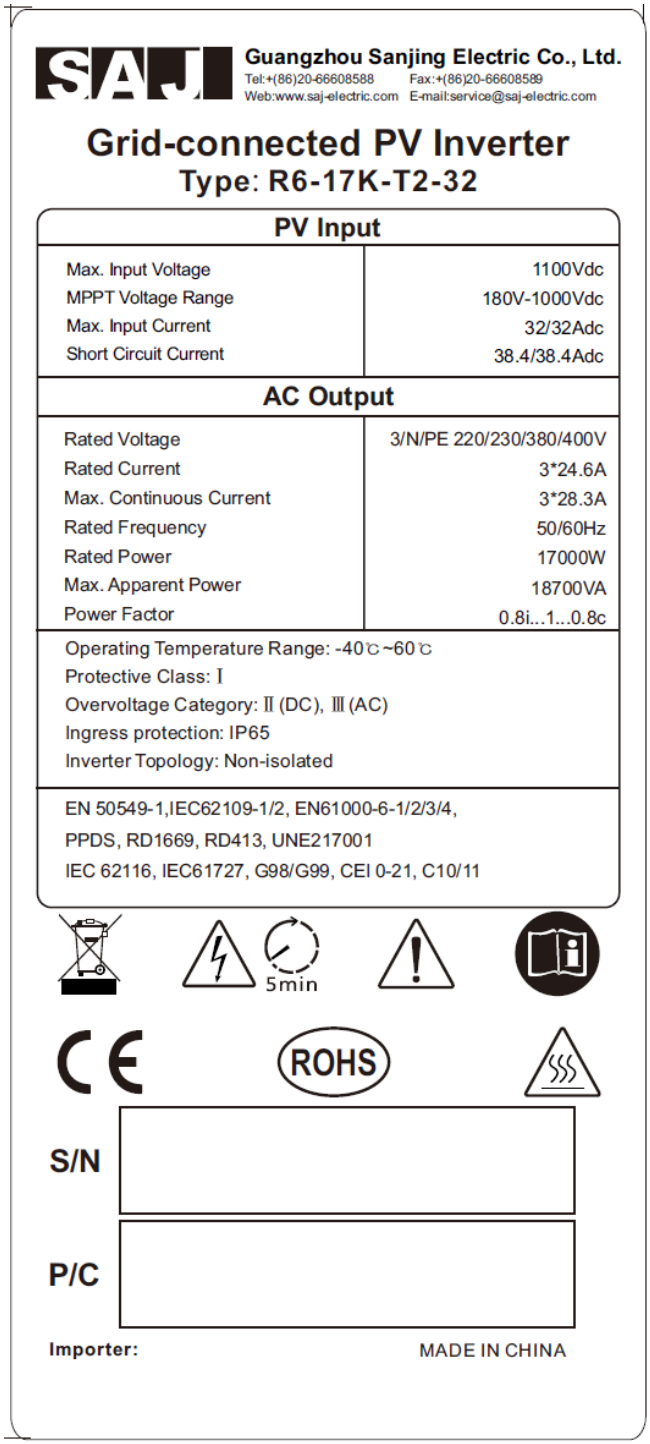
5min

ROHS

S/N

P/C

Importer: MADE IN CHINA



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Grid-connected PV Inverter
Type: R6-17K-T2-32

PV Input	
Max. Input Voltage	1100Vdc
MPPT Voltage Range	180V-1000Vdc
Max. Input Current	32/32Adc
Short Circuit Current	38.4/38.4Adc

AC Output	
Rated Voltage	3/N/PE 220/230/380/400V
Rated Current	3*24.6A
Max. Continuous Current	3*28.3A
Rated Frequency	50/60Hz
Rated Power	17000W
Max. Apparent Power	18700VA
Power Factor	0.8i...1...0.8c

Operating Temperature Range: -40℃~60℃
Protective Class: Ⅰ
Overvoltage Category: Ⅱ (DC), Ⅲ (AC)
Ingress protection: IP65
Inverter Topology: Non-isolated

EN 50549-1,IEC62109-1/2, EN61000-6-1/2/3/4,
PPDS, RD1669, RD413, UNE217001
IEC 62116, IEC61727, G98/G99, CEI 0-21, C10/11

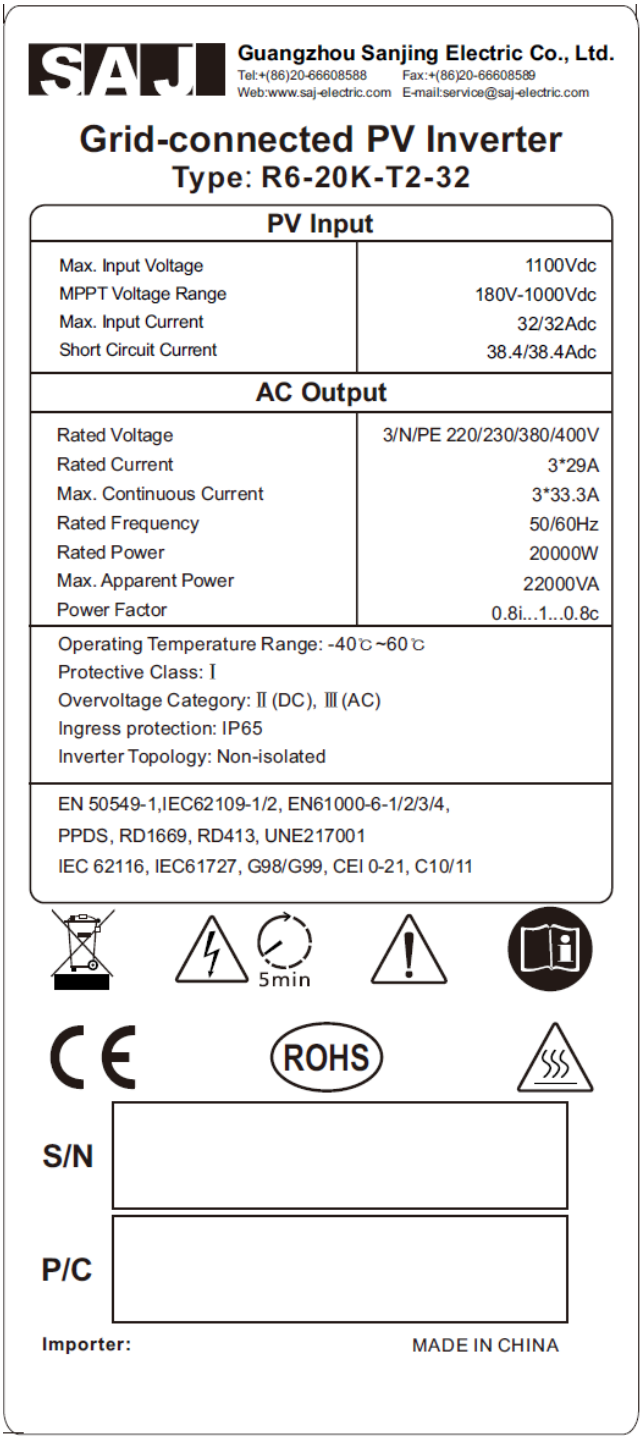
5min

ROHS

S/N

P/C

Importer: MADE IN CHINA



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Grid-connected PV Inverter
Type: R6-20K-T2-32

PV Input	
Max. Input Voltage	1100Vdc
MPPT Voltage Range	180V-1000Vdc
Max. Input Current	32/32Adc
Short Circuit Current	38.4/38.4Adc

AC Output	
Rated Voltage	3/N/PE 220/230/380/400V
Rated Current	3*29A
Max. Continuous Current	3*33.3A
Rated Frequency	50/60Hz
Rated Power	20000W
Max. Apparent Power	22000VA
Power Factor	0.8i...1...0.8c

Operating Temperature Range: -40℃~60℃
Protective Class: Ⅰ
Overvoltage Category: Ⅱ (DC), Ⅲ (AC)
Ingress protection: IP65
Inverter Topology: Non-isolated

EN 50549-1,IEC62109-1/2, EN61000-6-1/2/3/4,
PPDS, RD1669, RD413, UNE217001
IEC 62116, IEC61727, G98/G99, CEI 0-21, C10/11

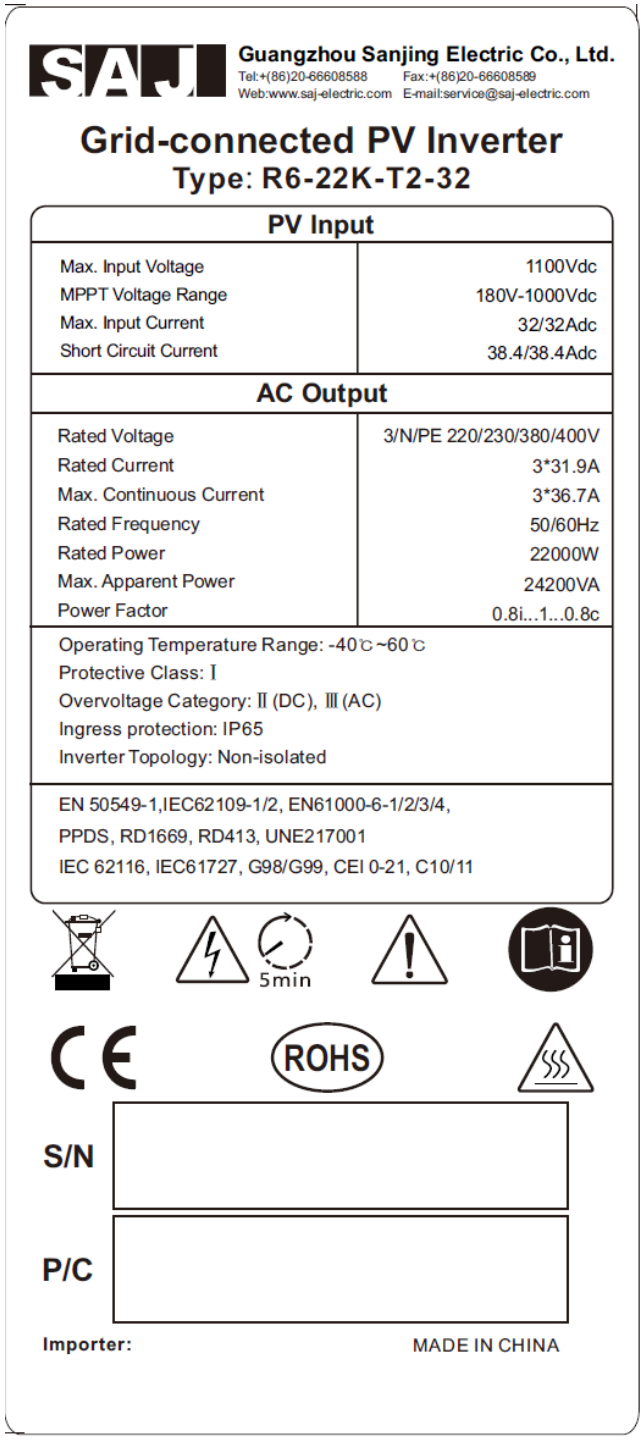
5min

ROHS

S/N

P/C

Importer: MADE IN CHINA



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Grid-connected PV Inverter
Type: R6-22K-T2-32

PV Input	
Max. Input Voltage	1100Vdc
MPPT Voltage Range	180V-1000Vdc
Max. Input Current	32/32Adc
Short Circuit Current	38.4/38.4Adc

AC Output	
Rated Voltage	3/N/PE 220/230/380/400V
Rated Current	3*31.9A
Max. Continuous Current	3*36.7A
Rated Frequency	50/60Hz
Rated Power	22000W
Max. Apparent Power	24200VA
Power Factor	0.8i...1...0.8c

Operating Temperature Range: -40℃~60℃
Protective Class: Ⅰ
Overvoltage Category: Ⅱ (DC), Ⅲ (AC)
Ingress protection: IP65
Inverter Topology: Non-isolated

EN 50549-1,IEC62109-1/2, EN61000-6-1/2/3/4,
PPDS, RD1669, RD413, UNE217001
IEC 62116, IEC61727, G98/G99, CEI 0-21, C10/11

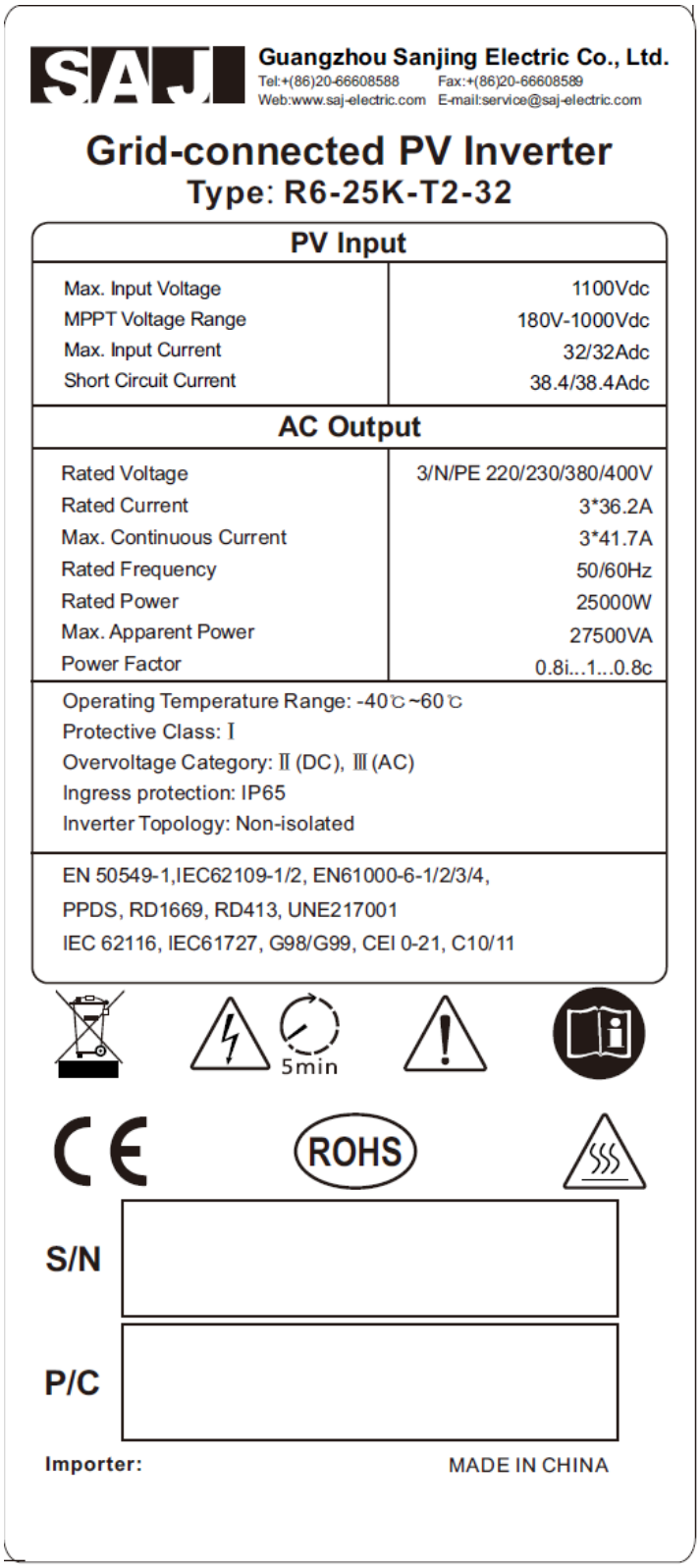
5min

ROHS

S/N

P/C

Importer: MADE IN CHINA



SAJ

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Grid-connected PV Inverter

Type: R6-25K-T2-32

PV Input	
Max. Input Voltage	1100Vdc
MPPT Voltage Range	180V-1000Vdc
Max. Input Current	32/32Adc
Short Circuit Current	38.4/38.4Adc

AC Output	
Rated Voltage	3/N/PE 220/230/380/400V
Rated Current	3*36.2A
Max. Continuous Current	3*41.7A
Rated Frequency	50/60Hz
Rated Power	25000W
Max. Apparent Power	27500VA
Power Factor	0.8i...1...0.8c

Operating Temperature Range: -40℃~60℃
Protective Class: Ⅰ
Overvoltage Category: Ⅱ (DC), Ⅲ (AC)
Ingress protection: IP65
Inverter Topology: Non-isolated

EN 50549-1,IEC62109-1/2, EN61000-6-1/2/3/4,
PPDS, RD1669, RD413, UNE217001
IEC 62116, IEC61727, G98/G99, CEI 0-21, C10/11

5min

ROHS

S/N

P/C

Importer: MADE IN CHINA

3.1.4 Description of the power circuit

The equipment is a three-phase public interactive photovoltaic inverter, which will be installed and connected to the grid after installation.

It contains filters for smoothing output voltage and EMC, switching and control circuits. Electronic circuits are mounted on multiple PCBs interconnected by appropriate connectors and wires.

The power board including the electronic components is mounted on the radiator and grounded through metal screws and spring washers.

Communication ports include USB, DRM and RS485, which are connected to a monitor to monitor the status of the inverter through proprietary software.

PV input combiner with 2 strings of MPPT tracers, each MPPT tracer includes 4 PV input terminals (2 PV+ and 2PV-).

The AC output is directly connected to the power grid, and the protective grounding is provided by a dedicated grounding terminal.

The grid-connected protection combines the two series of relays as a redundant construction to ensure that the inverter can independently disconnect from the grid when the relay fails.

In the case of a fault defined in this standard, after the DSP receives an abnormal signal from the relevant protection detection circuit, the relay will act to automatically disconnect the active circuit of the photovoltaic inverter from the grid, when any grid fault occurs, the master DSP and the slave DSP have the ability to disconnect from the grid independently.

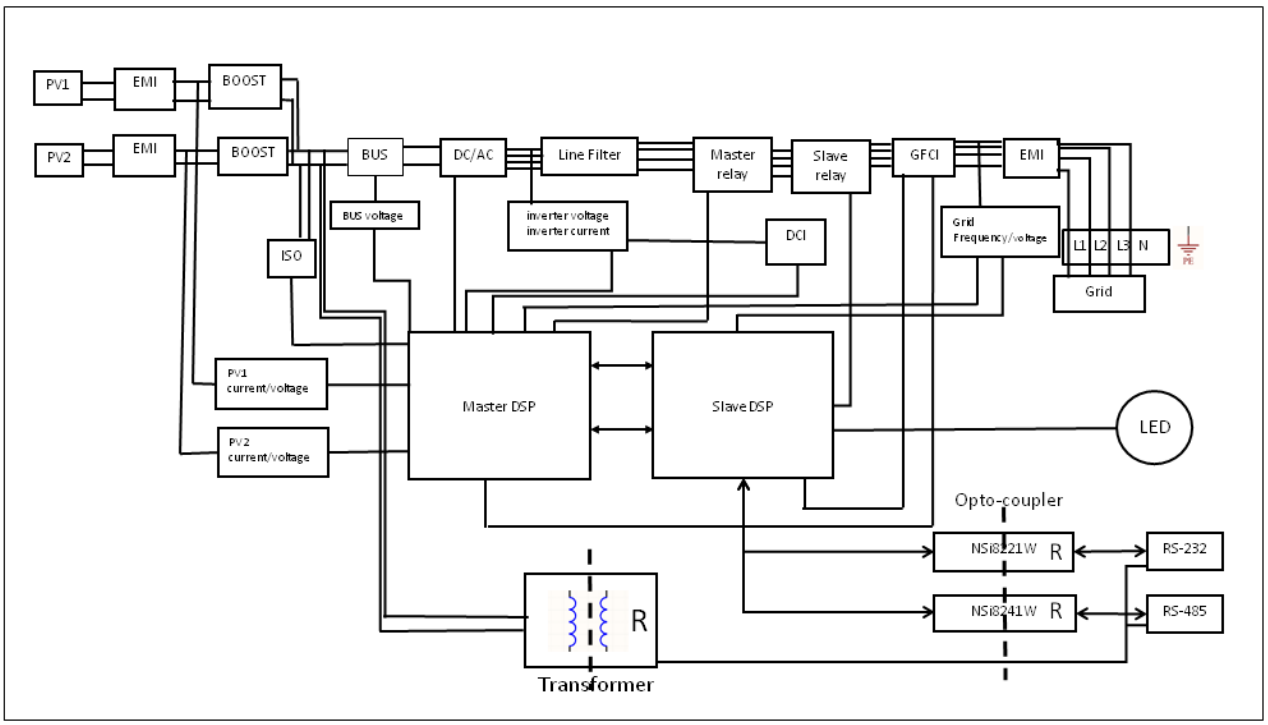


Figure 1 – Block diagram of the power circuit

3.2 Scope of measurements

NTS SECTION	CHAPTER OF THE STANDARD NTS	TYPE (1)	RESULT
--	**Frequency Requirements**	**--**	P
--	Active power feed-in as a function of frequency	--	P
5.1	Power-frequency regulation mode limited to overfrequency (MRPFL-O)	≥A	P
5.2	Power-frequency regulation mode limited to underfrequency (MRPFL-U)	≥C	N/A
5.3	Power-frequency sensitive mode (MRPF)	≥C	N/A
5.4	Power-Frequency Control	≥C	N/A
5.5	**Active Power Requirements**	≥C	N/A
5.5	Power gradient Constraint	≥C	N/A
5.5	Absolute Production Constraint	≥C	N/A
5.6	**Synthetic inertia**	≥C	N/A
--	**Reactive Power Requirements**	**--**	N/A
5.7	Reactive power capabilities at the EUT rated power and below	≥B	N/A
5.8	Reactive power control modes	≥B	N/A
5.10	**Control of oscillation damping**	≥C	N/A
--	**Robustness Requirements**	**--**	N/A
5.11	Capability to withstand voltage grid faults for POC below 110 kV	≥B	N/A
5.11	Capability to withstand voltage grid faults for POC above 110 kV	D	N/A
5.11	Rapid current injection control	≥B	N/A
5.11	Active power recovery after a grid fault	≥B	N/A
5.13	**Islanding requirements**	≥C	N/A

3.3 Reference values

Representative sample for testing

Reference values for the p.u. or percentage calculations:

	R6-25K-T2-32
Rated active power, P_n [kW]	25,0
Max. apparent and active output power, S_{max} / P_{max} [kVA]	27,5
Rated voltage (phase-to-phase), U_n [V]	400
Rated current, I_n [A]	36,2
Maximum current, I_{max} [A]	41,7

3.4 Measurement setup

Tests documented in this test report were performed using the following test configuration:

☐ Measurements in the field on real grid

☐ Test bench tests on real grid

☒ Test bench tests on an AC grid simulator

The PGU is connected on the DC-side to a PV-simulator and on the AC-side to an AC-grid simulator. The AC-grid simulator is operated with nominal conditions of U_n = 230 (phase-to-neutral) and f_n = 50 Hz unless stated otherwise by the applied test requirement.

Available primary power is modified by adapting the short circuit current (I_{sc}) value of the I-V curve. Following example shows a PV-curve (I_{sc} = 61,31 A, U_{oc} = 719,3 V) simulated according to EN50530:

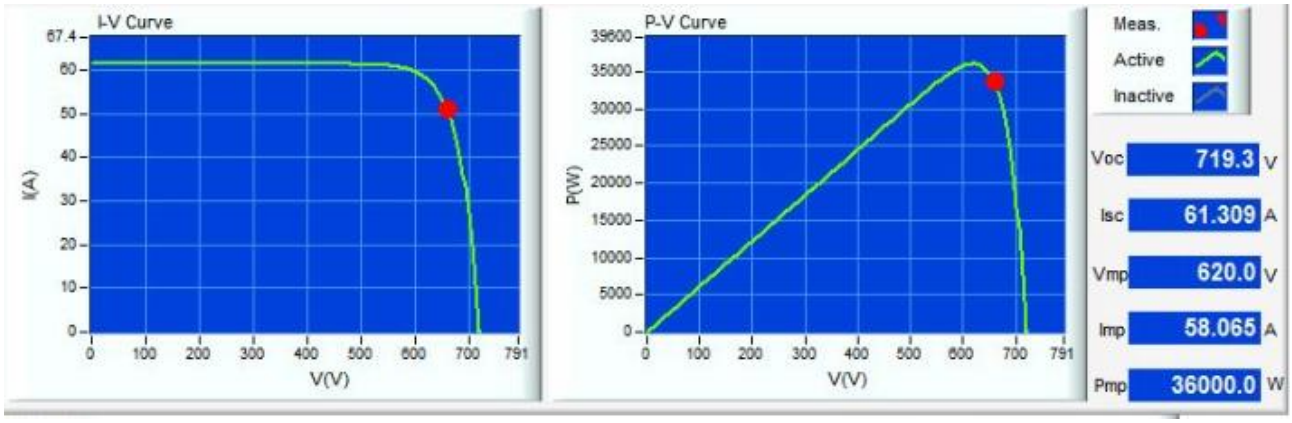


Figure 2 – DC characteristics for testing

The measurement setup is shown in Figure 3. The specific test and measurement devices are stated in section 3.5.

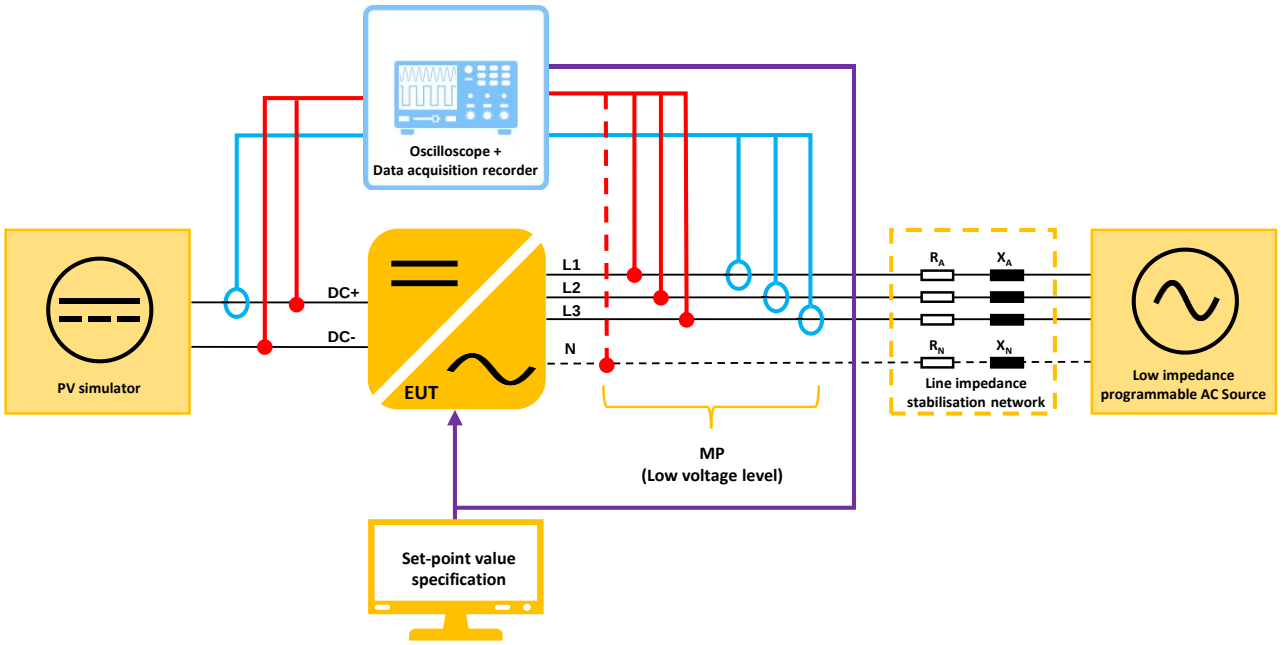


Figure 3 – Measurement setup scheme

3.5 Measurement equipment

Equipment	Internal No.	Manufacturer	Type	Serial No.	Last Calibration
DC power supply [1]	SA200-18	REGATRON	TC.P.32.1000.400.PV.HMI	1244CC683	--
AC Simulator [1]	SA200-52	Chroma	61860	618603800386	--
Oscilloscope	SA050-33	YOKOGAWA	DL850E	91S416984	2022-01-06
Power analyser	SA200-16	YOKOGAWA	WT3000	91LB24254	2021-08-07
Current sensor	SA200-16-01	YOKOGAWA	751552	141215	2021-08-07
	SA200-16-02	YOKOGAWA	751552	141221	2021-08-07
	SA200-16-03	YOKOGAWA	751552	141224	2021-08-07
	SA200-16-04	CT1000	CT1000	9112570083	2021-08-07

Note:
All measurement equipment was used within the calibration period. Copy of calibration certificates are available at the laboratory for reference.

3.6 Sampling rates

Following sampling rates were used for the measurement:

	Chapter according to	Voltages, currents	Setpoint and actual value signals
Power-frequency regulation mode limited to overfrequency (MRPFL-O)	5.1	10 kHz	10 kHz

[1] The AC simulator and DC sources are not need to be calibrated, since the AC voltage and current is measured and determined using the calibrated oscilloscope and power analyser.

3.7 Measurement uncertainties

Measurement category	Measurement uncertainty (k=2)
AC Current (50 Hz signal)	±0,33%
AC Voltage (50 Hz signal)	±0,36%
AC Powers	±0,38%
DC Current	±0,41%
DC Voltage	±0,50%
DC Power	±0,33%
Frequency	±0,01%

Note:

The data and results within this document are accurate. For the uncertainty calculation a confidence level of 95% is assessed.

All stated uncertainties are worst case values due to the definition of uncertainty calculation. The shown uncertainties are equal or lower than the shown values depending on the equipment used for measurements which is stated in this report.

The variability of the components and processes used for manufacturing of devices similar to the tested one can contribute to additional deviation. It is the responsibility of the manufacturer to assure compliance for these devices.

Conformity statements are decided in accordance with IEC GUIDE 115:2021 Procedure 2 (accuracy method), unless otherwise normatively specified or contractually agreed.

3.8 Test conditions

Condition / Requirement	Determined value / Description	Remarks
Point of measurement	☐ medium-voltage side ☒ low-voltage side	Measurement at output terminals of the PGU, see Figure 3.
Data medium-voltage system (if applicable)	N/A	Measurement on LV side
• Short Circuit Power	N/A	---
• Network impedance phase angle	N/A	---
• Agreed service voltage UC	N/A	---
Transformer data (if existing):	N/A	Measurement on LV side, no transformer existing
• Nominal power of transformer	N/A	---
• rel. short-circuit voltage of transformer uk	N/A	---
• Tap position of transformer	N/A	---
Grid frequency:		
• within $f_n \pm 1\% f_n$	Requirement met	Stable AC source used
• $df/dt < 0{,}2\% f_n$ / (0,2 s)	Requirement met	Stable AC source used
Voltage at PGU terminals within $U_n \pm 10\% U_n$	Requirement met	Checked before testing
The voltage unbalance < 2%	Requirement met: 0,04%	Determined according to IEC 61000-4-30, measured as a 10-minute mean at the PGU terminals.
Environmental conditions must correspond to the manufacturer's requirements of the measuring instruments	Requirement met	During the test period following environmental data were recorded: • Temperature: 20,3 ~ 25,2°C • Rel. humidity: 36,5 ~ 57,3%RH • Air pressure: 985,2 ~ 1003,6 hPa

4 Measurement result

4.1 Frequency requirements

4.1.1 Active power feed-in as a function of frequency

The aim of the test is to demonstrate the response of the EUT due to a deviation in grid frequency from rated value in terms of speed (rise/settling time) and the active power gradient.

4.1.1.1 Overfrequency (LFSM-O)

This test has been done to verify the capacity of the EUT of activating the automatic response for active power reduction due to over frequency variations according to section 5.1.2 of the standard.

Different tests have been carried out, regarding different droop levels and activation thresholds:

- OS2F2: droop of 2% and activation threshold of Δf = 0.2 Hz (50.2 Hz).
- OS2F5: droop of 2% and activation threshold of Δf = 0.5 Hz (50.5 Hz).
- OS12F2: droop of 12% and activation threshold of Δf = 0.2 Hz (50.2 Hz).
- OS12F5: droop of 12% and activation threshold of Δf = 0.5 Hz (50.5 Hz).

Active power variation for a specific step is calculated using the following expression:

$$|\Delta P| = \frac{|\Delta f| - |\Delta f_1|}{f_n} \times \frac{P_{max}}{s_2} \times 100$$

The following conditions have been evaluated for each test performed

Criteria	Comments	Result
CONDITIONS DURING MEASUREMENTS		
A power supply connected to the terminals of the UGE when the UGE is disconnected from the mains.		P
UGE is connected to the mains.		N/A
Frequency variation method		P
A device (internal or external) introducing a digital or analog input into the UGE control system.		N/A
A direct change of the frequency reference value in the control system of the PGU.		N/A
Direct modification of the frequency in the terminals of the UGE when the power supply has the capacity to modify the output frequency.		P
Test conditions		P
LFSM-U and FSM have been deactivated		P
Voltage has been at Un+-5% during tests		P
Tests have been performed at Pn with set Q=0		P
Every step should be measured during >1min.		P
GENERAL		
No undamped oscillations occur in the response in the transition between test points.		P
Maximum deviations of active power according to the measured level of frequency shall not deviate more than 5%Pn.		P
Results comply with the following criteria from reference standards.		P
APPLICABLE FOR ACTIVE POWER REDUCTIONS		
Ta requirements		P
For type C & D Ta is less than or equal to the power response activation time set for the MRPF mode (max 0.5 s MGE without inertia) because it defines the technical capability of the MPE power response.		P
Tr Requirements		P
For MGES UGE: less than or equal to 8 s for an active power variation of up to 45% of the maximum power.	UGE MPE Evaluated	N/A
For MPE UGE: less than or equal to 2 s for an active power variation of up to 50% of the maximum power.		P
Te Requirements		P
For MGES UGE: less than or equal to 30 s.	UGE MPE Evaluated	N/A

Criteria	Comments	Result
For MPE UGE: less than 20 s.		P
APPLICABLE FOR ACTIVE POWER INCREMENTS		
Ta requirements		P
For type C & D Ta is less than or equal to the power response activation time set for the MRPF mode (max 0.5 s MGE without inertia) because it defines the technical capability of the MPE power response.		P
Tr Requirements		P
For MGES UGE: less than or equal to 5 minutes for an active power variation of up to 20% of the maximum power. This slow behaviour will not be acceptable when the direction of the frequency variation is reversed a few seconds before, in which case response times similar to the case of active power reduction will be expected.	UGE MPE Evaluated	N/A
For non-wind MPE UGE: less than or equal to 10 s for an active power variation of up to 50% of the maximum power.		P
For wind MPE UGE: less than or equal to 5 s for an active power variation of up to 20% of the maximum power if the power is above 50% of the maximum power. For powers less than 50% of the maximum power, the response time will be as low as technically possible.	Non-wind MPE UGE evaluated	N/A
Te Requirements		P
For MGES UGE: less than or equal to 6 minutes. This slow behaviour will not be acceptable when the direction of the frequency variation has reverted a few seconds before, in which case, response times similar to the case of active power reduction will be expected.	UGE MPE Evaluated	N/A
For MPE UGE: less than 30 s.		P

Results are presented in the following graphs and tables, where:

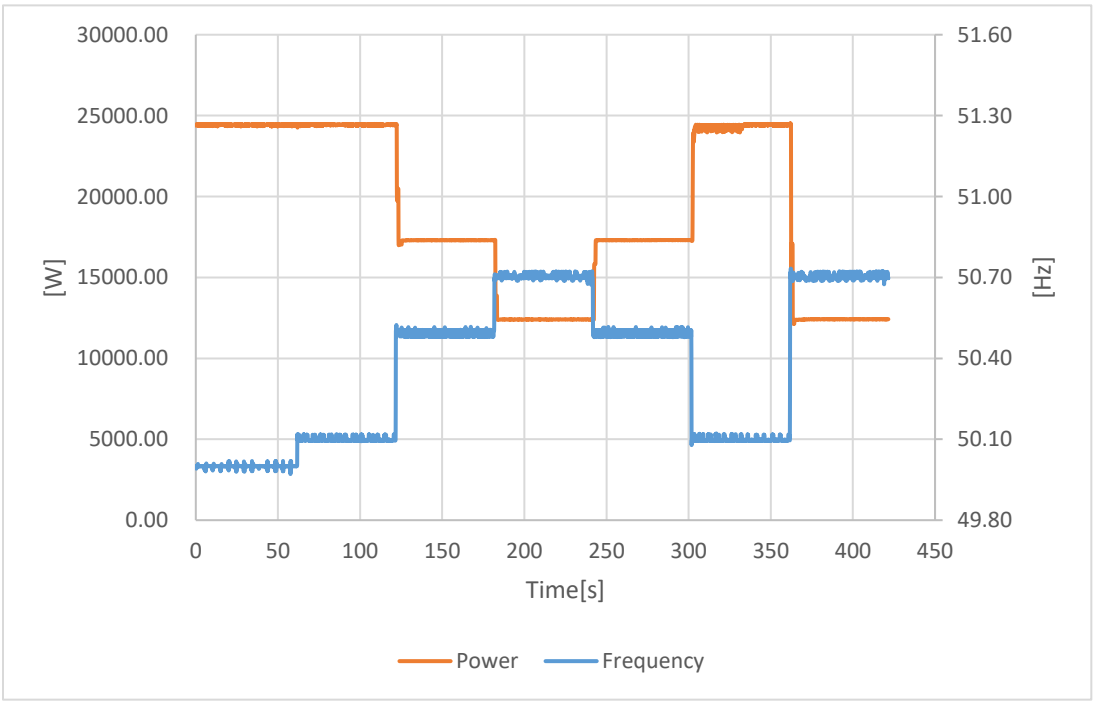
Ta Activation time: Time from a change on frequency that leads to a power frequency change of more than 1%, to the start of active power response.

Tr Response time: Time to reach the 90% of the measured active power response (ΔP), without including Ta.

Te Settling time: Time of settling of active power on a tolerance of ± 5% of the measured active power response (ΔP).

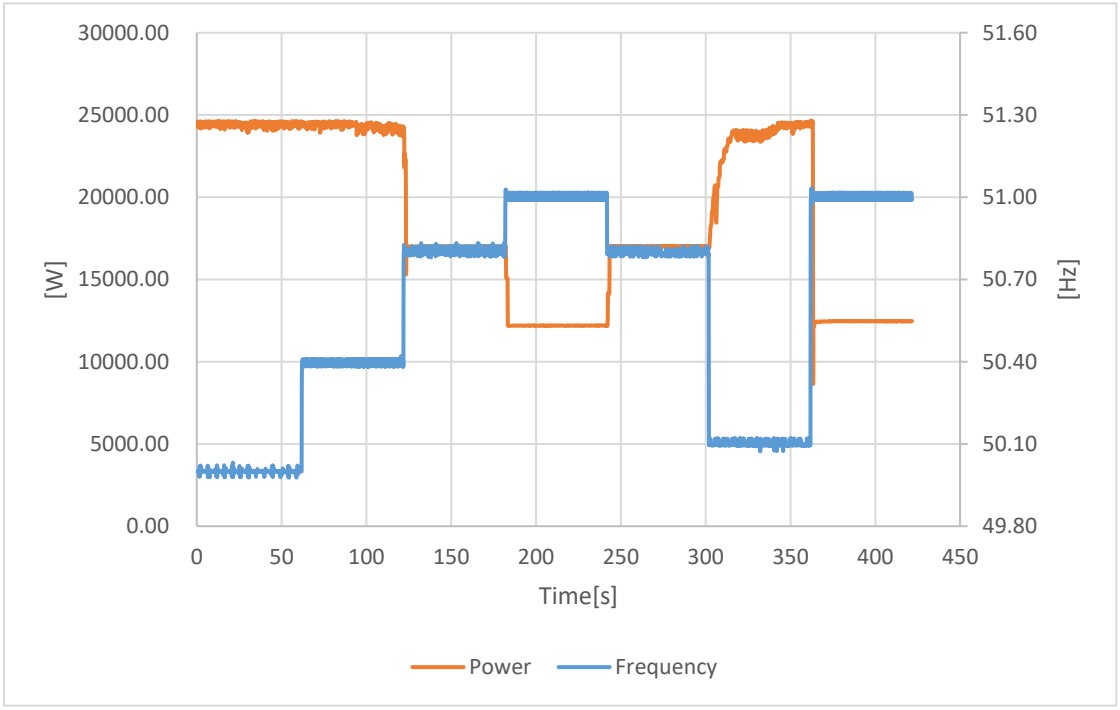
LFSM-O Tests. 2% droop and 50.2 Hz frequency threshold.										
OS2F2: No. of test point	**f_0 (Hz)**	**f_{end} (Hz)**	**ΔPtest expected (%Pmax)**	**ΔPtest recorded (%Pmax)**	**Deviation (%Pmax) (<5%Pmax)**	**90% ΔPtest recorded (%Pmax)**	**t_r(s) (at 90% ΔP (%) recorded)**	**t_a (s)**	**t_e (s)**	**Range of ΔP/Pmax (%) admissible (error ±5% of Pmax)**
1	50,00	50,10	0%	-2,31%	-2,31%	N/A	N/A	N/A	N/A	-5% to 5%
2	50,10	50,50	-30%	-30,83%	-0,83%	-27,13%	1,8	0,7	2,0	-25% to -35%
3	50,50	50,70	-20%	-20,38%	-0,38%	-17,41%	0,9	0,7	1,7	-15% to -25%
4	50,70	50,50	+20%	19,22%	-0,78%	18,15%	1,8	0,7	1,9	15% to 25%
5	50,50	50,10	+30%	27,05%	-2,95%	N/A	N/A	N/A	N/A	25% to -35%
6	50,10	50,70	-50%	-50,36%	-0,36%	-45,68%	1,6	0,4	2,0	-45% to -55%

S=2%; F start=50,2 Hz



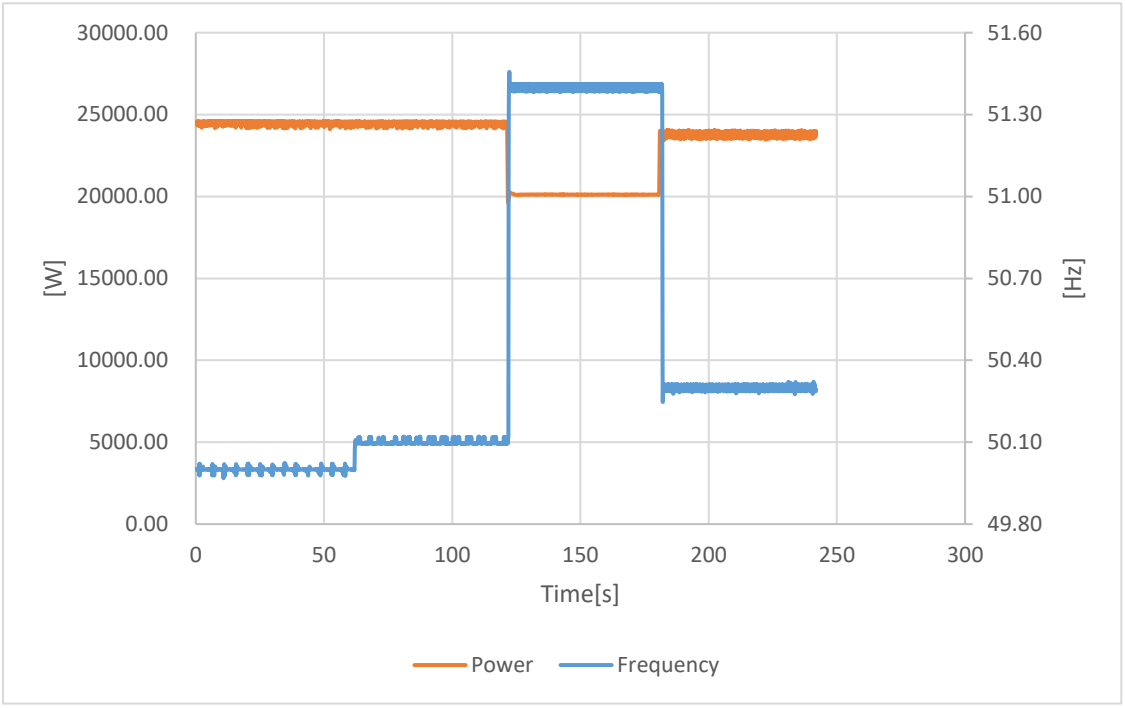
LFSM-O Tests. 2% droop and 50.5 Hz frequency threshold.										
OS2F5: No. of test point	**f_0 (Hz)**	**f_{end} (Hz)**	**ΔPtest expected (%Pmax)**	**ΔPtest recorded (%Pmax)**	**Deviation (%Pmax) (<5%Pmax)**	**90% ΔPtest recorded (%Pmax)**	**t_r(s) (at 90% ΔP (%) recorded)**	**t_a (s)**	**t_e (s)**	**Range of ΔP/Pmax (%) admissible (error ±5% of Pmax)**
1	50,00	50,40	0%	-2,45%	-2,45%	N/A	N/A	N/A	N/A	-5% to 5%
2	50,40	50,80	-30%	-31,97%	-1,97%	-28,78%	1,5	0,4	1,9	-25% to -35%
3	50,80	51,00	-20%	-21,23%	-1,23%	-17,96%	1,5	0,4	1,6	-15% to -25%
4	51,00	50,80	+20%	18,05%	-1,95%	18,03%	1,7	0,4	1,9	15% to 25%
5	50,80	50,10	+30%	26,49%	-3,51%	N/A	N/A	N/A	N/A	25% to -35%
6	50,10	51,00	-50%	-50,18%	-0,18%	-45,13%	1,6	0,5	1,5	-45% to -55%

S=2%; F start=50,5Hz



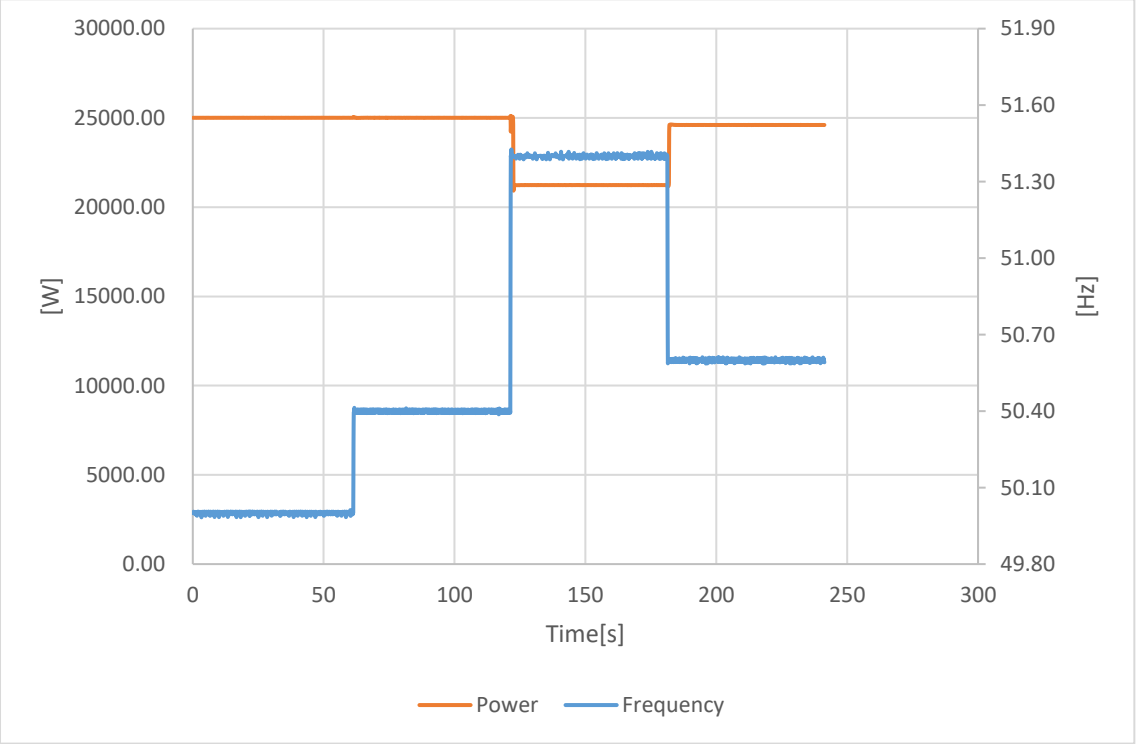
LFSM-O Tests. 12% droop and 50.2 Hz frequency threshold.										
OS12F2: No. of test point	**f_0 (Hz)**	**f_{end} (Hz)**	**ΔPtest expected (%Pmax)**	**ΔPtest recorded (%Pmax)**	**Deviation (%Pmax) (<5%Pmax)**	**90% ΔPtest recorded (%Pmax)**	**t_r(s) (at 90% ΔP (%) recorded)**	**t_a (s)**	**t_e (s)**	**Range of ΔP/Pmax (%) admissible (error ±5% of Pmax)**
1	50,00	50,10	0%	-2,18%	-2,18%	N/A	N/A	N/A	N/A	-5% to 5%
2	50,10	51,40	-20%	-19,27%	0,73%	-18,90%	0,5	0,3	0,8	-15% to -25%
3	51,40	50,30	+18,33%	15,05%	-3,28%	16,79%	0,7	0,4	2,1	13,33% to 23,33%

S=12%; F start=50,2Hz



LFSM-O Tests. 12% droop and 50.5 Hz frequency threshold.										
OS12F2: No. of test point	**f_0 (Hz)**	**f_{end} (Hz)**	**ΔPtest expected (%Pmax)**	**ΔPtest recorded (%Pmax)**	**Deviation (%Pmax) (<5%Pmax)**	**90% ΔPtest recorded (%Pmax)**	**t_r(s) (at 90% ΔP (%) recorded)**	**t_a (s)**	**t_e (s)**	**Range of ΔP/Pmax (%) admissible (error ±5% of Pmax)**
1	50,00	50,40	0%	0,02%	0,02%	N/A	N/A	N/A	N/A	-5% to 5%
2	50,40	51,40	-15%	-15,06%	-0,06%	-13,31%	1,3	0,4	1,5	-10% to -20%
3	51,40	50,60	+13,33%	13,41%	0,08%	11,91%	0,7	0,5	1,0	8,33% to 18,33%

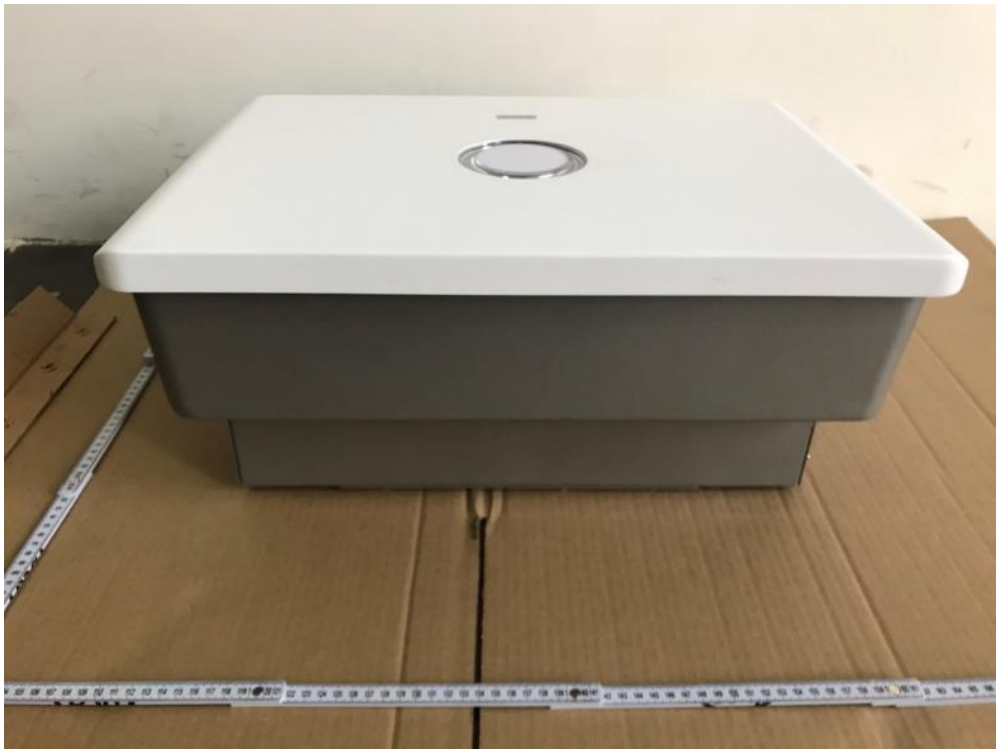
S=12%; F start=50,5Hz



Annex 1- Photo of the unit

Enclosure front view

Enclosure side view-1

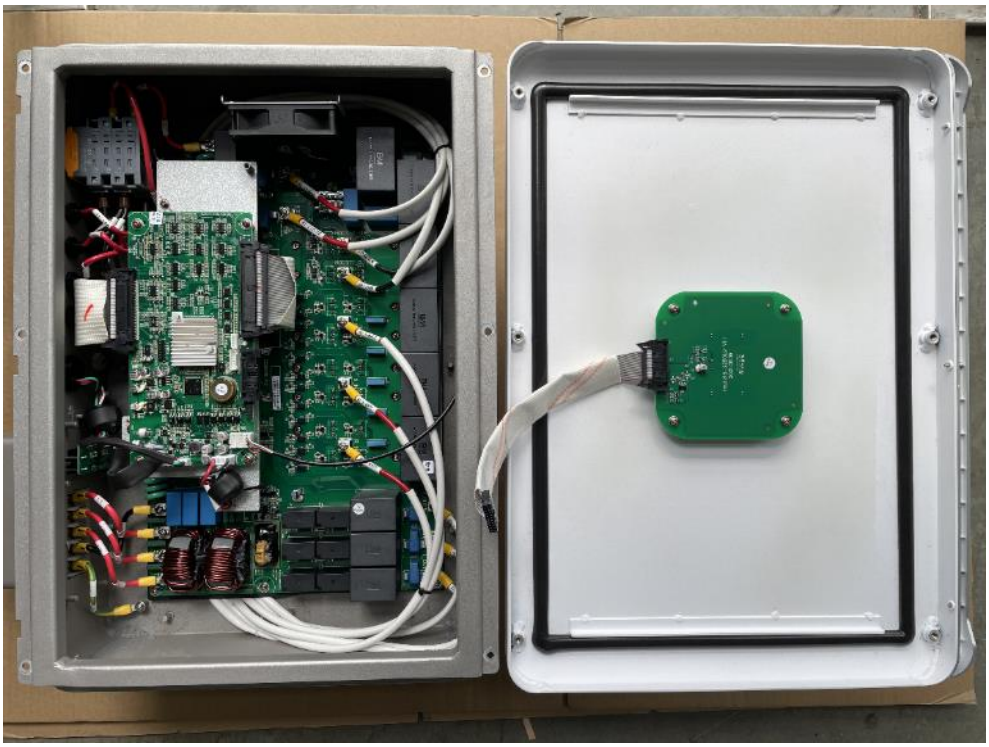


Enclosure side view-2

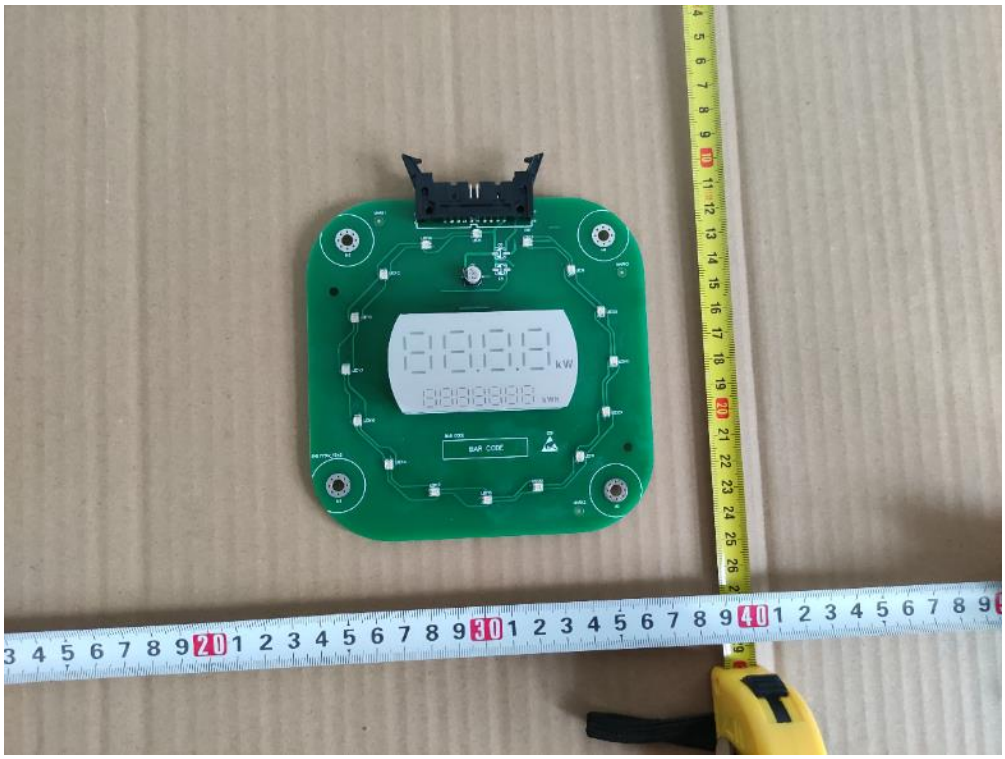
Enclosure side view-3

Enclosure rear view

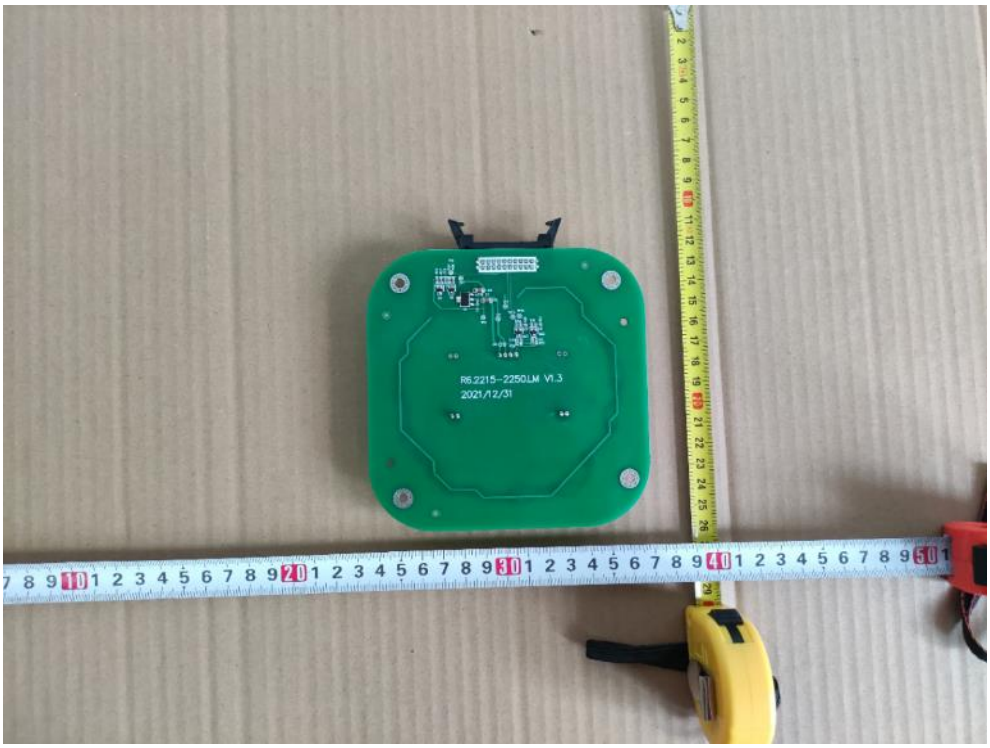
Terminal view



Internal view

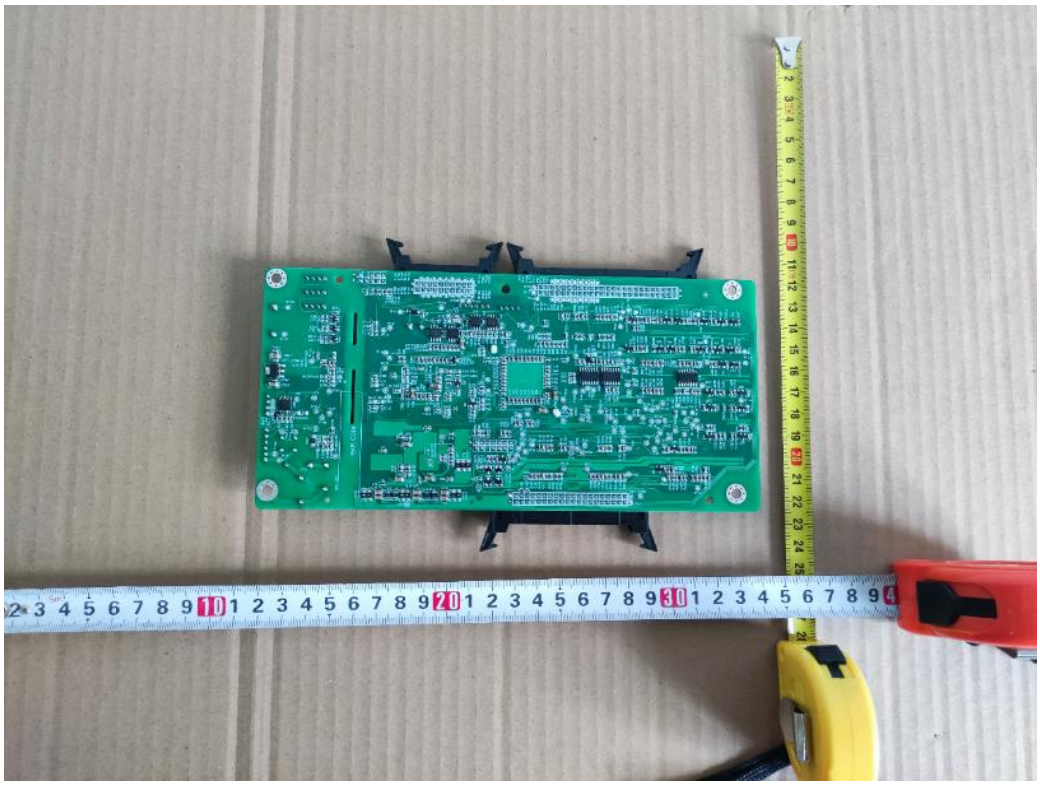


Display board component side view

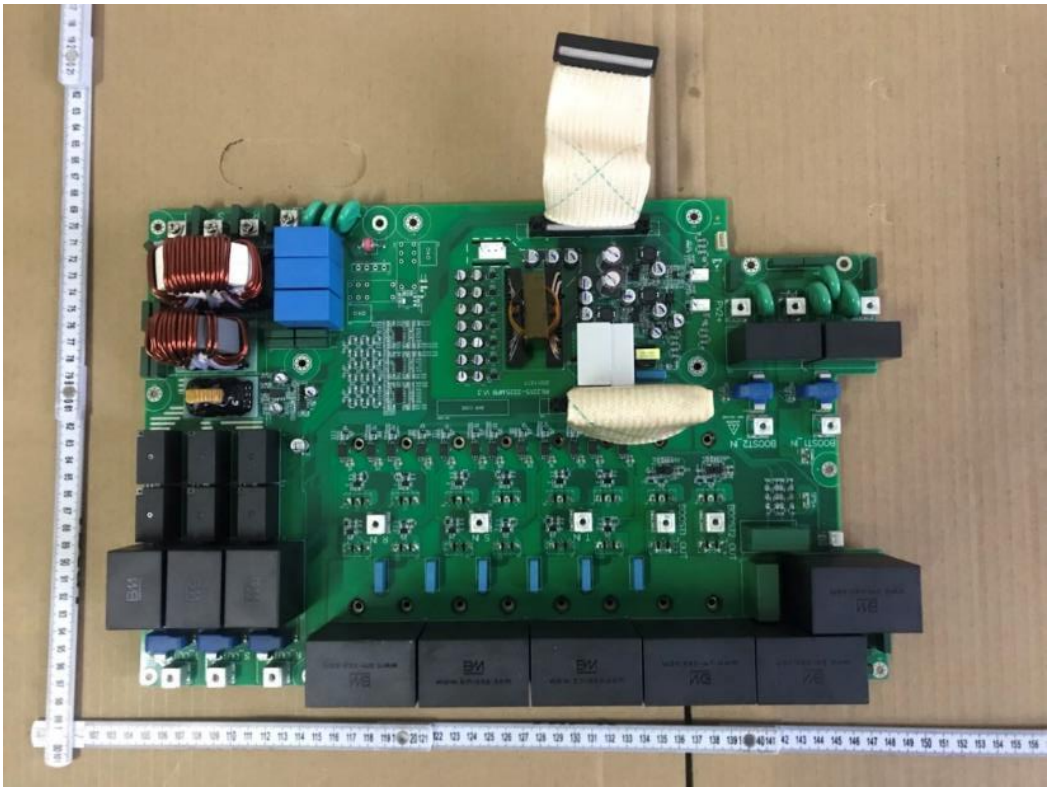


Display board solder side view

I/O board component side view



I/O board solder side view



Main power board component side view

End of Test Report