TEST REPORT

NTS 631 SENP

Norma Técnica de Supervisión (NTS) de la conformidad de los módulos de generación de electricidad según el PO 12.2 SENP. Revisión 1.1 de 09/07/2021 + Corrección de errores 08/10/2021

Report reference number ..... :	**PVES2408WDG0290-1**
Date of issue ..... :	2024-11-01
Total number of pages ..... :	27
Testing laboratory name ..... :	**Bureau Veritas Consumer Products Services Germany GmbH**
Address ..... :	Businesspark A96, 86842 Türkheim, Germany
Accrediation ..... :	ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12024-03-00
Applicant's name ..... :	**Guangdong Felicity New Energy Co., Ltd.**
Address ..... :	(KongGangBaiYun)No. 2, Donghua Huaye Road, Renhe Town, Baiyun Area Guangzhou Guangdong P.R. China
Test specification	
Standard ..... :	Norma Técnica de Supervisión (NTS) de la conformidad de los módulos de generación de electricidad según el PO 12.2 SENP. Revisión 1.1 de 09/07/2021 + Corrección de errores 08/10/2021 (Type A)
Certificate ..... :	**Certificate of compliance**
Test report form number. ..... :	NTS 631 SENP
Master TRF ..... :	Bureau Veritas Consumer Products Services Germany GmbH
Test item description ..... :	**Photovoltaic (PV) and battery inverter**
Trademark ..... :	FelicityESS
Model / Type ..... :	T-REX-25KHP3G01, T-REX-29K9HP3G01, T-REX-30KHP3G01, T-REX-40KHP3G01, T-REX-50KHP3G01

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Ratings .....:	**T-REX-25KHP3G01**	**T-REX-29K9HP3G01**	**T-REX-30KHP3G01**
Max. input DC voltage [V].....:	1000		
MPP DC voltage range [V] .....:	200-850		
Max. Input DC current [A].....:	36/36	36/36/36	36/36/36
Output AC voltage .....:	230Vac, 50Hz, 3L/N/PE		
Nominal. Output AC current [A] :	36,3	43,4	43,5
Max. Output AC current [A] .....:	39,9	43,4	47,8
Rated Output power [kW] .....:	25,0	29,9	30,0
Max. Output power [kVA].....:	27,5	29,9	33,0
Battery Voltage Range[V] .....:	160-800		
Max. Battery Current[A] .....:	50/50		

Ratings .....:	**T-REX-40KHP3G01**	**T-REX-50KHP3G01**
Max. input DC voltage [V].....:	1000	
MPP DC voltage range [V] .....:	200-850	
Max. Input DC current [A].....:	36/36/36/36	
Output AC voltage .....:	230Vac, 50Hz, 3L/N/PE	
Nominal. Output AC current [A] :	58,0	72,5
Max. Output AC current [A] .....:	63,8	79,7
Rated Output power [kW] .....:	40,0	50,0
Max. Output power [kVA].....:	44,0	55,0
Battery Voltage Range[V] .....:	160-800	
Max. Battery Current[A] .....:	50/50	

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Testing Location ..... :	**Guangdong Felicity New Energy Co., Ltd.**
Address ..... :	(KongGangBaiYun)No. 2, Donghua Huaye Road, Renhe Town, Baiyun Area Guangzhou Guangdong P.R. China
Tested by (name and signature) ..... :	Chason Ye **Chason Ye** PV Project Engineer Digitally signed by Chason Ye DN: cn=Chason Ye, o=Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch, ou=New Energy, email=chason.ye@bureauveritas.com, c=CN Date: 2024.11.01 09:14:25 +08'00'
Approved by (name and signature) ..... :	
Manufacturer's name ..... :	**Guangdong Felicity New Energy Co., Ltd.**
Manufacturer address ..... :	(KongGangBaiYun)No. 2, Donghua Huaye Road, Renhe Town, Baiyun Area Guangzhou Guangdong P.R. China
Factory's name ..... :	**Guangdong Felicity New Energy Co., Ltd.**
Factory address ..... **:**	(KongGangBaiYun)No. 2, Donghua Huaye Road, Renhe Town, Baiyun Area Guangzhou Guangdong P.R. China

Document History			
Date	**Internal reference**	**Modification / Change / Status**	**Revision**
2024-11-01	Chason Ye	Initial report was written	0
Supplementary information:			

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Test items particulars

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]..... :	Approx. 85,6kg

Test case verdicts

Test case does not apply to the test object..... :	N/A
Test item does meet the requirement..... :	P(ass)
Test item does not meet the requirement..... :	F(ail)

Testing

Date of receipt of test item ..... :	2024-08-26
Date(s) of performance of test ..... :	2024-08-26 to 2024-10-31

General remarks:

The test result presented in this report relate only to the object(s) tested. The report shall state compliance of the tested objects with the requirements of NTS 631 SENP. This report shall not be reproduced in part or in full without the written approval of the issuing testing laboratory.

”(see Annex #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a comma is used as the decimal separator.

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This Test Report consists of the following documents:

1. Test Report

   5.1 Limited frequency sensitive mode--overfrequency
2. Annex No. 1 – Datasheet of the relay
3. Annex No. 2 – Pictures of the unit
4. Annex No. 3 – Test equipment list

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Copy of marking plate

FelicityESS™

T-REX-25KHP3G01

Product Type	Hybrid Inverter
Protection Degree	IP65
Overvoltage-category	DC II; AC III
Ambient Temperture	–25°C~60°C,>50°C Derating
Warranty	5 years
Battery Input Data	
Battery Voltage Range	160~800Vd.c.
Max. Charging Current	50+50(A)
Max. Discharging Current	50+50(A)
PV String Input Data	
Max. DC Input Power	32.5 kW
Max. DC Input Voltage	1000Vd.c.
Min. DC Input Voltage	150Vd.c.
MPPT Range	200~850Vd.c.
Full Load DC Voltage Range	450~850Vd.c.
PV Input Current	36+36(A)
Max. PV Isc	55+55(A)
AC Output Data	
Rated AC Output Power	25 kW
Max. AC Output Power	27.5 kW
AC Output Rated Current	36.3 A
Max. AC Current	39.9 A
Rated AC Voltage	220/380,230/400 Vac(-20%~+15%)
AC Wiring Mode	L1/L2/L3/N/PE
Rated AC Frequency	50 /60 Hz(45~55Hz/55~65Hz)
Power Factor	0.8(leading) to 0.8(lagging)
Efficiency	
Max. Efficiency	97.60%
Euro Efficiency	97.00%
MPPT Efficiency	99.90%

CE RoHS

CAUTION:
- High Voltage,warning electric shock
- Keep the equipment well ventilated
- The capacitors store hazardous energy Do not touch while working!

Manufacturer:
Guangdong Felicity New Energy Co., Ltd
Address:
(KongGangBaiYun)No. 2, Donghua Huaye Road, Renhe Town, Baiyun Area, Guangzhou, Guangdong, P. R. CHINA

FelicityESS™

T-REX-29K9HP3G01

Product Type	Hybrid Inverter
Protection Degree	IP65
Overvoltage-category	DC II; AC III
Ambient Temperture	–25°C~60°C,>50°C Derating
Warranty	5 years
Battery Input Data	
Battery Voltage Range	160~800Vd.c.
Max. Charging Current	50+50(A)
Max. Discharging Current	50+50(A)
PV String Input Data	
Max. DC Input Power	38.87 kW
Max. DC Input Voltage	1000Vd.c.
Min. DC Input Voltage	150Vd.c.
MPPT Range	200~850Vd.c.
Full Load DC Voltage Range	360~850Vd.c.
PV Input Current	36+36+36(A)
Max. PV Isc	55+55+55(A)
AC Output Data	
Rated AC Output Power	29.9 kW
Max. AC Output Power	29.9 kW
AC Output Rated Current	43.4 A
Max. AC Current	43.4 A
Rated AC Voltage	220/380,230/400 Vac(-20%~+15%)
AC Wiring Mode	L1/L2/L3/N/PE
Rated AC Frequency	50 /60 Hz(45~55Hz/55~65Hz)
Power Factor	0.8(leading) to 0.8(lagging)
Efficiency	
Max. Efficiency	97.60%
Euro Efficiency	97.00%
MPPT Efficiency	99.90%

CE RoHS

CAUTION:
- High Voltage,warning electric shock
- Keep the equipment well ventilated
- The capacitors store hazardous energy Do not touch while working!

Manufacturer:
Guangdong Felicity New Energy Co., Ltd
Address:
(KongGangBaiYun)No. 2, Donghua Huaye Road, Renhe Town, Baiyun Area, Guangzhou, Guangdong, P. R. CHINA

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T-REX-30KHP3G01

Product Type	Hybrid Inverter
Protection Degree	IP65
Overvoltage-category	DC II; AC III
Ambient Temperture	–25°C~60°C,>50°C Derating
Warranty	5 years
Battery Input Data	
Battery Voltage Range	160~800Vd.c.
Max. Charging Current	50+50(A)
Max. Discharging Current	50+50(A)
PV String Input Data	
Max. DC Input Power	39 kW
Max. DC Input Voltage	1000Vd.c.
Min. DC Input Voltage	150Vd.c.
MPPT Range	200~850Vd.c.
Full Load DC Voltage Range	360~850Vd.c.
PV Input Current	36+36+36(A)
Max. PV Isc	55+55+55(A)
AC Output Data	
Rated AC Output Power	30 kW
Max. AC Output Power	33 kW
AC Output Rated Current	43.5 A
Max. AC Current	47.9 A
Rated AC Voltage	220/380,230/400 Vac(-20%~+15%)
AC Wiring Mode	L1/L2/L3/N/PE
Rated AC Frequency	50 /60 Hz(45~55Hz/55~65Hz)
Power Factor	0.8(leading) to 0.8(lagging)
Efficiency	
Max. Efficiency	97.60%
Euro Efficiency	97.00%
MPPT Efficiency	99.90%

CE RoHS

CAUTION:
- High Voltage,warning electric shock
- Keep the equipment well ventilated
- The capacitors store hazardous energy Do not touch while working!

Manufacturer:
Guangdong Felicity New Energy Co., Ltd
Address:
(KongGangBaiYun)No. 2, Donghua Huaye Road, Renhe Town, Baiyun Area, Guangzhou, Guangdong, P. R. CHINA

FelicityESS™

T-REX-40KHP3G01

Product Type	Hybrid Inverter
Protection Degree	IP65
Overvoltage-category	DC II; AC III
Ambient Temperture	–25°C~60°C,>50°C Derating
Warranty	5 years
Battery Input Data	
Battery Voltage Range	160~800Vd.c.
Max. Charging Current	50+50(A)
Max. Discharging Current	50+50(A)
PV String Input Data	
Max. DC Input Power	52 kW
Max. DC Input Voltage	1000Vd.c.
Min. DC Input Voltage	150Vd.c.
MPPT Range	200~850Vd.c.
Full Load DC Voltage Range	360~850Vd.c.
PV Input Current	36+36+36+36(A)
Max. PV Isc	55+55+55+55(A)
AC Output Data	
Rated AC Output Power	40 kW
Max. AC Output Power	44 kW
AC Output Rated Current	58 A
Max. AC Current	63.8 A
Rated AC Voltage	220/380,230/400 Vac(-20%~+15%)
AC Wiring Mode	L1/L2/L3/N/PE
Rated AC Frequency	50 /60 Hz(45~55Hz/55~65Hz)
Power Factor	0.8(leading) to 0.8(lagging)
Efficiency	
Max. Efficiency	97.60%
Euro Efficiency	97.00%
MPPT Efficiency	99.90%

CE RoHS

CAUTION:
- High Voltage,warning electric shock
- Keep the equipment well ventilated
- The capacitors store hazardous energy Do not touch while working!

Manufacturer:
Guangdong Felicity New Energy Co., Ltd
Address:
(KongGangBaiYun)No. 2, Donghua Huaye Road, Renhe Town, Baiyun Area, Guangzhou, Guangdong, P. R. CHINA

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FelicityESS™

T-REX-50KHP3G01

Product Type	Hybrid Inverter
Protection Degree	IP65
Overvoltage-category	DC II; AC III
Ambient Temperture	–25°C~60°C,>50°C Derating
Warranty	5 years
Battery Input Data	
Battery Voltage Range	160~800Vd.c.
Max. Charging Current	50+50(A)
Max. Discharging Current	50+50(A)
PV String Input Data	
Max. DC Input Power	65 kW
Max. DC Input Voltage	1000Vd.c.
Min. DC Input Voltage	150Vd.c.
MPPT Range	200~850Vd.c.
Full Load DC Voltage Range	450~850Vd.c.
PV Input Current	36+36+36+36(A)
Max. PV Isc	55+55+55+55(A)
AC Output Data	
Rated AC Output Power	50 kW
Max. AC Output Power	55 kW
AC Output Rated Current	72.5 A
Max. AC Current	79.7 A
Rated AC Voltage	220/380,230/400 Vac(-20%~+15%)
AC Wiring Mode	L1/L2/L3/N/PE
Rated AC Frequency	50 /60 Hz(45~55Hz/55~65Hz)
Power Factor	0.8(leading) to 0.8(lagging)
Efficiency	
Max. Efficiency	97.60%
Euro Efficiency	97.00%
MPPT Efficiency	99.90%

RoHS

CAUTION:

- High Voltage,warning electric shock
- Keep the equipment well ventilated
- The capacitors store hazardous energy Do not touch while working!

Manufacturer:
Guangdong Felicity New Energy Co., Ltd
Address:
(KongGangBaiYun)No. 2, Donghua Huaye Road, Renhe Town, Baiyun Area, Guangzhou, Guangdong, P. R. CHINA

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General product information:

Hybrid inverter

358-S010005-02

FelicityESS™

USER GUIDE

T-REX-50KHP3G01
T-REX-40KHP3G01
T-REX-30KHP3G01
T-REX-29K9HP3G01
T-REX-25KHP3G01



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Hybrid inverter

Appendix

Model	T-REX -50KHP3G01	T-REX -40KHP3G01	T-REX -30KHP3G01	T-REX -29K9HP3G01	T-REX -25KHP3G01
Battery Input Data					
Battery Type	LFP (LiFePO4)				
Battery Voltage Range	160~800Vd.c.				
Max. Charging Current	50+50(A)				
Max. Discharging Current	50+50(A)				
Number of battery input	2				
PV String Input Data					
Max. DC Input Power	65 kW	52 kW	39 kW	38. 87 kW	32. 5 kW
Max. DC Input Voltage	1000Vd.c.				
Min. DC Input Voltage	150Vd.c.				
Start-up Voltage	250Vd.c.				
Rated DC Input Voltage	600Vd.c.				
MPPT Range	200~850Vd.c.				
Full Load DC Voltage Range	450~850Vd.c.	360~850Vd.c.	360~850Vd.c.	360~850Vd.c.	450~850Vd.c.
PV Input Current	36+36+36+36(A)		36+36+36(A)		36+36(A)
Max. PV Isc	55+55+55+55(A)		55+55+55(A)		55+55(A)
No.of MPP Trackers	4		3		2
No.of Strings per MPP Tracker	2		2		2
AC Output Data					
Rated AC Output Power	50 kW	40 kW	30 kW	29. 9 kW	25 kW
Max. AC Output Power	55 kW	44 kW	33 kW	29. 9 kW	27. 5 kW
AC Output Rated Current	72.5 A	58 A	43. 5 A	43. 4 A	36.3 A
Max. AC Current	79.7 A	63.8 A	47. 9A	43. 4 A	39.9 A
Rated AC Voltage	220/380,230/400 Vac (-20%~+15%)				
AC Wiring Mode	3W+N+PE				
Rated AC Frequency	50 /60 Hz (45~55Hz/55~65Hz)				
THDI	<3% (At Rated Power)				
Power Factor	0.8(leading) to 0.8(lagging)				
Efficiency					
Max. Efficiency	97.60%				
Euro Efficiency	97.00%				
MPPT Efficiency	99.90%				

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Hybrid inverter

Protection	
PV Input Lightning Protection	Integrated
PV String Input Reverse Polarity Protection	Integrated
Battery Input Lightning Protection	Integrated
Battery Input Reverse Polarity Protection	Integrated
Insulation Resistor Detection	Integrated
Residual Current Monitoring Unit	Integrated
Output Over Current Protection	Integrated
Output Shorted Protection	Integrated
Output Over Voltage Protection	Integrated
Anti-islanding Protection	Integrated
AC Output Lightning Protection	Integrated
Certification and Standards	
Grid Regulation	NRS 097-2-1,VDE4105,EN50549-1,AS 4777.2, G99/1,CEI 0-21,NC.RFG
Safety EMC / Standard	IEC/EN 61000-6-1/2/3/4,IEC/EN 62109-1,IEC/EN 62109-2
General Data	
Net Weight	85.6KG
Gross Weight	98.4KG
Product Dimension	940*582*340mm
Package Dimension	1110*770*463mm
Protection Degree	IP65
Operating Temperature Range	-25 to 60 ℃ (> 50 ℃ derating)
Humidity	0 ~ 95 % (No condensation)
Cooling	Smart cooling
Altitude	3000 m (> 2000 m derating)
Communication with BMS	RS485,CAN
Monitor module	WiFi/GPRS
Installation Style	Wall-mounted
Warranty[1]	10 years

[1]Conditions apply, refer to FelicityESS Warranty policy.

Description of the power circuit:

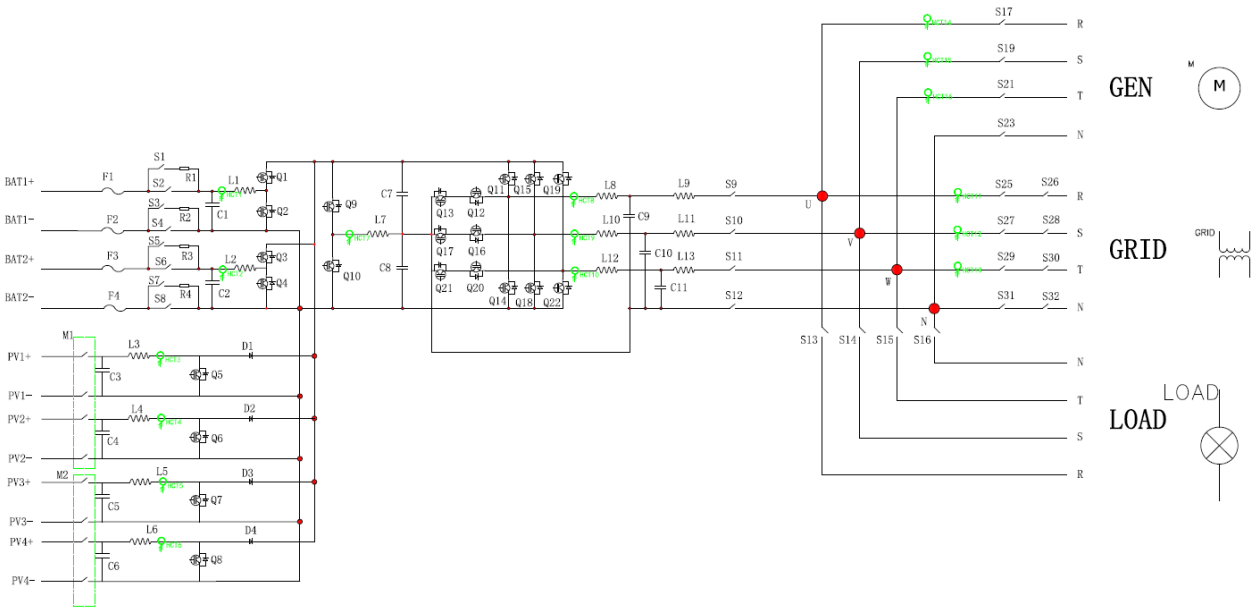


Figure 3 – Block Diagram

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Differences of the models:

The PGUs including model T-REX-25KHP3G01, T-REX-29K9HP3G01, T-REX-30KHP3G01, T-REX-40KHP3G01 and T-REX-50KHP3G01. All the models use the same control unit, control system, software, and similar hardware platform. The different powers are realized by software derating. The model T-REX-25KHP3G01 is equipped with two DC inputs and with two MPP trackers. The models T-REX-29K9HP3G01 and T-REX-30KHP3G01 are equipped with two DC inputs and with three MPP trackers. The models T-REX-40KHP3G01 and T-REX-50KHP3G01 are equipped with two DC inputs and with four MPP trackers.

The product was tested on:

Model:	T-REX-50KHP3G01	Serial number:	10020200824350074



Hardware version: V100

Master DSP Software (FW) version: V201

Slave DSP Software (FW) version: V101

All tests were performed on T-REX-50KHP3G01.Tests of the EUT of T-REX-50KHP3G01 not applicable for the models T-REX-25KHP3G01, T-REX-29K9HP3G01, T-REX-30KHP3G01 and T-REX- 40KHP3G01 were performed on the concerned models and a statement is given at the relevant test.

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General remarks:

The test results presented in this report relate only to the object(s) tested.
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”(see Annex #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a comma is used as the decimal separator.

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

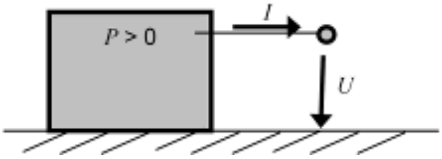
The following suffixes are used for variables in tables and figures:

- “P_n” for the nominal active power:
  $P_n = U_n \times I_n \times \cos \varphi_n$ (single-Phase); $P_n = \sqrt{3}\, U_n \times I_n \times \cos \varphi_n$ (three-Phase)
- “P_M” for the momentary power
- “(c)” for over-excited
- “(i)” for under-excited

Active and reactive power:

The regarded system of the voltage and current vectors is the load view (Figure 2):

- If the inverter feeds to the grid the active power is measured with negative sign. For the sake of reading the document the measured active infeed power has a positive sign



- If the inverter consumes inductive reactive power the reactive power is marked “inductive” or has a positive sign.
- If the inverter consumes capacitive reactive power the reactive power is marked “capacitive” or has a negative sign.

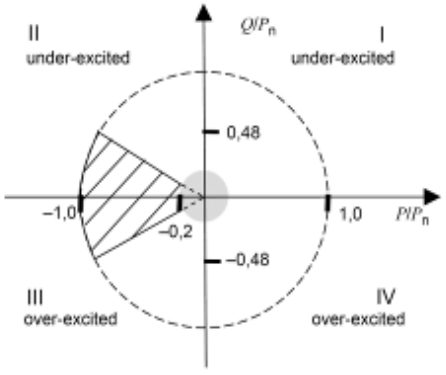


Figure 4

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NTS 631 SENP: Tests		
Clause	**Test requirement**	**Result**
5.1	Limited frequency sensitive mode--overfrequency	**P**
5.2	Limited frequency sensitive mode--underfrequency	**N/A**
5.3	Power frequency sensitive mode (MRPF)	**N/A**
5.4	Limited frequency sensitive mode—response time	**N/A**
5.5	Active power controllability and contorl range	**N/A**
5.6	Inertia emulation	**N/A**
5.7	Reactive Power Capability	**N/A**
5.8	Reactive Power Control modes	**N/A**
5.9	Reactive power control in MPE	**N/A**
5.10	Damping of power oscillations in MPE	**N/A**
5.11	Fault-right Through capability	**N/A**

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5.1 Limited frequency senstive mode--overfrequency	P

Test : T-REX-50KHP3G01

Table 3: F_{start}: 50,2Hz; s=2%; Pini=Pmax

Test point No.	f_0(Hz)	f_{fin}(Hz)	ΔP expected (%Pmax)	ΔP Registred (%Pmax)	Dev.(%Pmax)(< 5%Pmax)	90%ΔP reg. (%Pmax)	tr (s) (at 90% ΔP reg.)	ta(s)	te (s) (Band±5% ΔPmax)
1	50,00	50,10	0,00	-0,06	-0,06	--	--	--	--
2	50,10	50,50	-30,00	-29,88	-0,12	-26,89	0,300	0,050	0,350
3	50,50	50,70	-20,00	-20,11	0,11	-18,10	0,300	0,050	0,350
4	50,70	50,50	20,00	20,14	-0,14	18,13	0,300	0,050	0,350
5	50,50	50,10	30,00	29,91	0,09	26,92	--	--	--
6	50,10	50,70	-50,00	-50,01	0,01	-45,01	0,550	0,050	0,600

Table 4: F_{start}: 50,5Hz; s=2%; Pini=Pmax

Test point No.	f_0(Hz)	f_{fin}(Hz)	ΔP expected (%Pmax)	ΔP Registred (%Pmax)	Dev,(%Pmax)(< 5%Pmax)	90%ΔP reg, (%Pmax)	tr (s) (at 90% ΔP reg.)	ta(s)	te (s) (Band±5% ΔPmax)
1	50,00	50,40	0,00	-0,10	0,10	--	--	--	--
2	50,40	50,80	-30,00	-30,10	0,10	-27,09	0,400	0,050	0,450
3	50,80	51,00	-20,00	-20,01	0,01	-18,01	0,350	0,050	0,400
4	51,00	50,80	20,00	20,05	-0,05	18,04	0,250	0,050	0,300
5	50,80	50,10	30,00	29,98	0,02	26,98	--	--	--
6	50,10	51,00	-50,00	-50,03	0,03	-45,03	0,350	0,050	0,400

Table 5: F_{start}: 50,2Hz; s=12%; Pini=Pmax

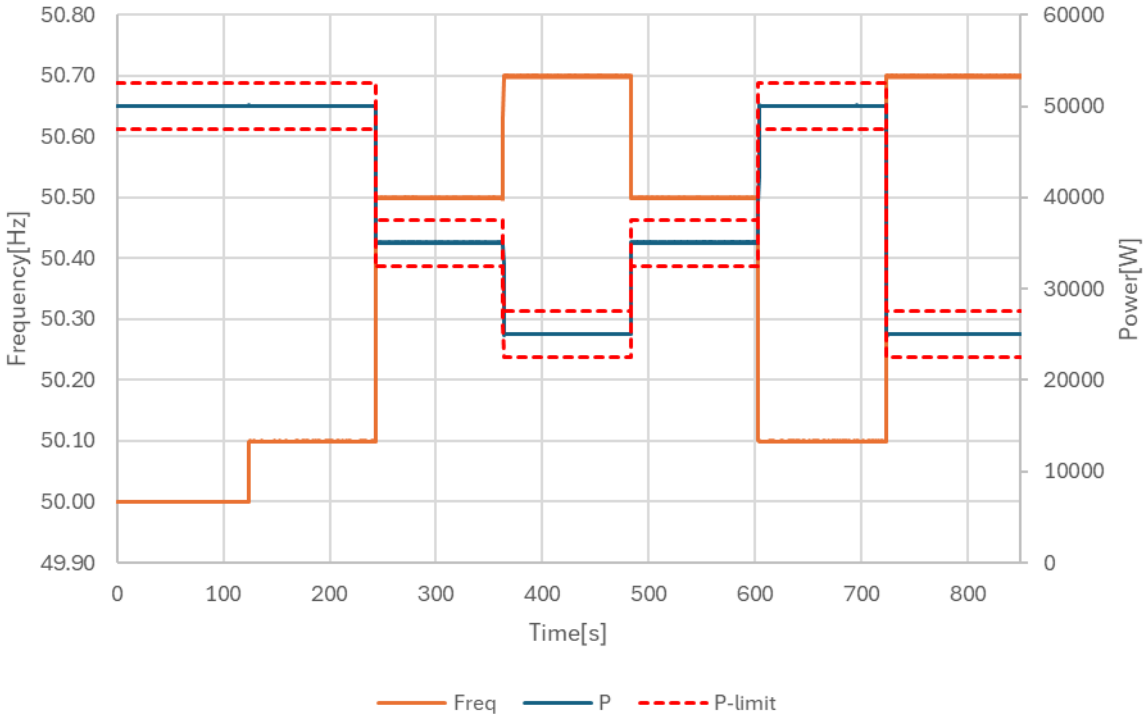
Test point No.	f_0(Hz)	f_{fin}(Hz)	ΔP expected (%Pmax)	ΔP Registred (%Pmax)	Dev,(%Pmax)(< 5%Pmax)	90%ΔP reg, (%Pmax)	tr (s) (at 90% ΔP reg.)	ta(s)	te (s) (Band±5% ΔPmax)
1	50,00	50,10	0,00	-0,05	0,05	--	--	--	--
2	50,10	51,40	-20,00	-19,59	-0,41	-17,64	0,300	0,050	0,350
3	51,40	50,30	18,33	18,11	0,22	16,30	0,250	0,050	0,300

Table 6: F_{start}: 50,5Hz; s=12%; Pini=Pmax

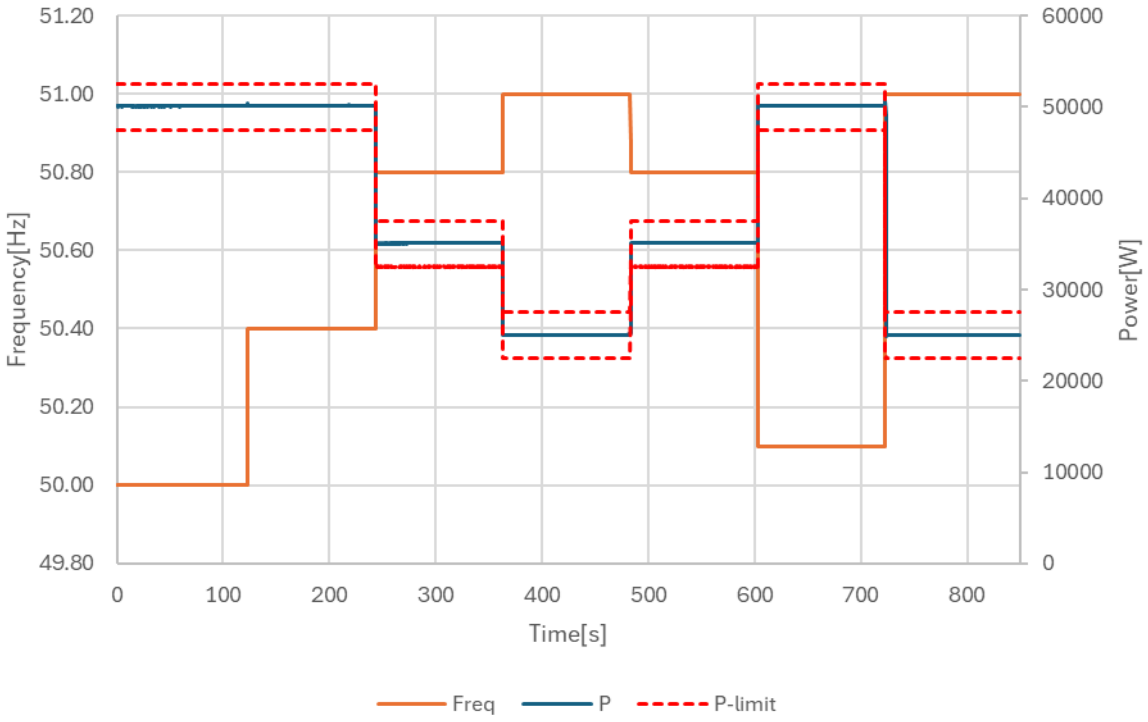
Test point No.	f_0(Hz)	f_{fin}(Hz)	ΔP expected (%Pmax)	ΔP Registred (%Pmax)	Dev,(%Pmax)(< 5%Pmax)	90%ΔP reg, (%Pmax)	tr (s) (at 90% ΔP reg.)	ta(s)	te (s) (Band±5% ΔPmax)
1	50,00	50,40	0,00	0,09	0,09	--	--	--	--
2	50,40	51,40	-15,00	-14,79	-0,21	-13,31	0,250	0,050	0,300
3	51,40	50,60	13,33	13,09	0,24	11,78	0,400	0,050	0,450

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Graph Table 3: F_{start}: 50,2Hz; s=2%; Pini=Pmax

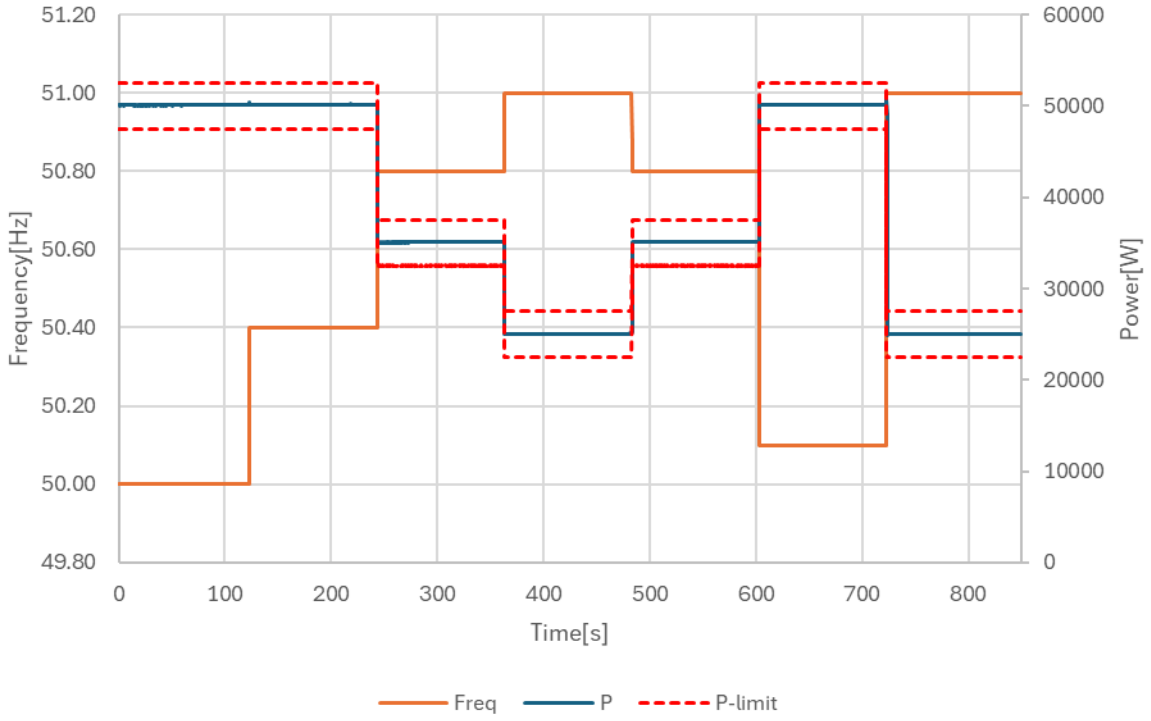


Graph Table 4: F_{start}: 50,5Hz; s=2%; Pini=Pmax

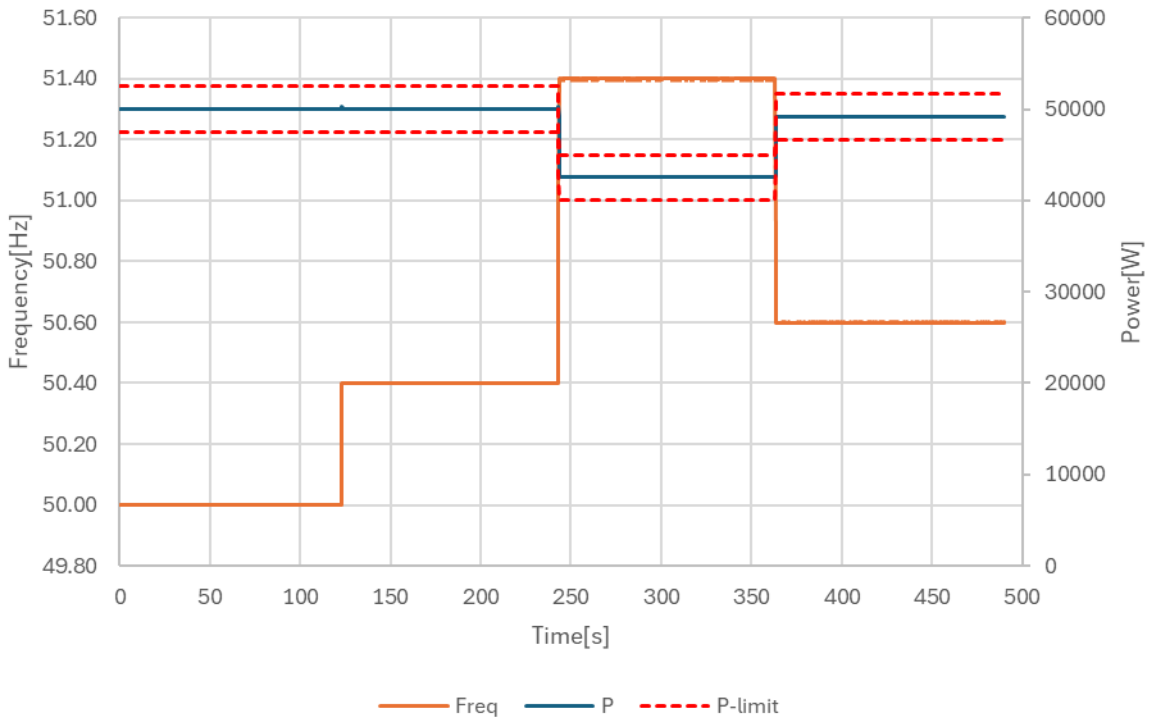


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Graph Table 5: F_{start}: 50,2Hz; s=12%; Pini=Pmax



Graph Table 6: F_{start}: 50,5Hz; s=12%; Pini=Pmax



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Assessment criterion:

ta: Time since frequency changes until power initiates automatic response at least 1%Pmax

tr: Time since the beginning of automatic response until power reaches 90% |ΔP|

te: Time until power stabilizes within a band of ±5% |ΔP| (expected power value)

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

In the event of active power reductions during frequency rise and when the MRPFL-O is active:

ta limit = 0,15 s (in case of Ta > 2s, the electric generation module owner shall be justified by tests to the network operator this value).

tr limit = 2 s for ≤50% maximum active power variations

te limit = 20 s for active power increments.

In the event of active power increases during frequency dropping and when the MRPFL-O is active:

ta limit = 0,15 s (in case of Ta > 2s, the electric generation module owner shall be justified by tests to the network operator this value).

tr limit = 10 s for ≤50% maximum active power variations

te limit = 30 s for active power increments.

for adjustable PGUs:

To verify this condition, the following test is performed with the following sequence:

1 Connect the generator to a power source that feeds the generator and that is capable of supplying a power equal to or greater than the power of the generator to be tested.

2 Connect the generator to the grid to be tested.

3 Perform the source frequency change in Table 3-6.

4 Measure the power exchanged with the network, with an uncertainty better than or equal to 5% Pmax, making measurements of 50 ms in a time window of 2 min every point.

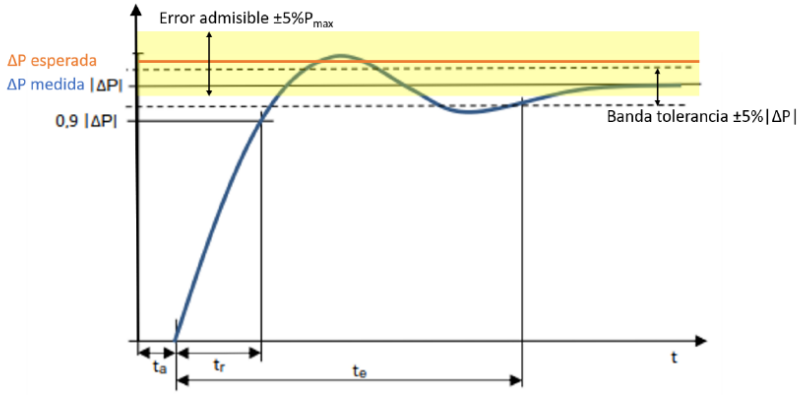


Figura 11. Ejemplo de respuesta en potencia que ilustra los tiempos t_a, t_r, y t_e definidos más arriba.

Note:

The tests had been performed on the T-REX-50KHP3G01 are valid for the T-REX-25KHP3G01, T-REX-29K9HP3G01, T-REX-30KHP3G01 and T-REX-40KHP3G01 since it is almost same as in hardware and just power derated by software.

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Annex No. 1

Datasheet of the relay

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CHAR Series 150A/200A LARGE POWER RELAY

Churod Electronics

FEATURES

- Outline dimension(47.7mm×40.1mm×51.8mm)
- 1 Form X arrangement
- Contact gap,4.0mm Min.
- Designed to meet UL/cUL,TUV requirements
- PCB terminal for the mounting
- RoHS compliance
- REACH SvHC compliance



File NO. E341422

File NO. R50316974

APPLICATION

Solar inverter

Inverter precharging circuit control

Industrial Control

COIL PARAMETER

Coil voltage	12VDC,24VDC,48VDC
Coil power	3.2W

CONTACT DATA

Type	CHAR-A200	CHAR-A150H
Contact arrangement	1 Form X	
Contact material	Ag Alloy	
Initial contact resistance	1mΩ max.@DC20A	
Max. switching voltage	830VAC	
Max. switching current	220A	180A
Max. switching power	182,600VA	149,400VA
Contact rating	Make 50A, Carry 200A, Break 50A 830VAC	Make 50A, Carry 150A, Break 50A 830VAC
Mechanical endurance	1,000,000 ops Min.(no load)	
Electrical endurance	30,000 ops Min.(Resistive load)	
Minimum load (reference value)	100mA @48VAC	

COIL DATA @23℃

CHAR				
Nominal coil voltage (VDC)	Nominal Current (mA)	Coil Resistance (Ω±10%)	Operate Voltage (VDC Max.)	Release Voltage (VDC Min.)
12	267	45	9	0.6
24	133	180	18	1.2
48	67	720	36	2.4

NOTE:

1) The above values is the initial values.

CHARACTERISTICS

Operate voltage		75% of nominal voltage or less
Release voltage		5% of nominal voltage or more
Operate time (At nominal voltage)		35ms max.
Release time(At nominal voltage)		30ms max.
Insulation resistance		1,000MΩ min. (at 1000 VDC)
Dielectric strength	Between coil and contacts	4,500 VAC, 50/60Hz (1min)
	Between open contacts	2,500 VAC, 50/60Hz (1min)
Surge voltage between coil and contacts		6,000V(1.2/50μs)
Vibration resistance	Destruction	10 to 55 Hz.,1.5mm double amplitude
	Malfunction	10 to 55 Hz.,1.5mm double amplitude
Shock resistance	Destruction	1,000 m/s2(100G approximately)
	Malfunction	100 m/s2(10G approximately)
Ambient temperature		Operating: -40~+85℃ (without icing or condensation)
Ambient humidity		Operating: 20% to 85% RH
Terminal		PCB terminals
Enclosure (94V-0 Flammability Ratings)		V: Vented(Flux-tight),plastic cover.(RT II)
Weight		Approx. 194g

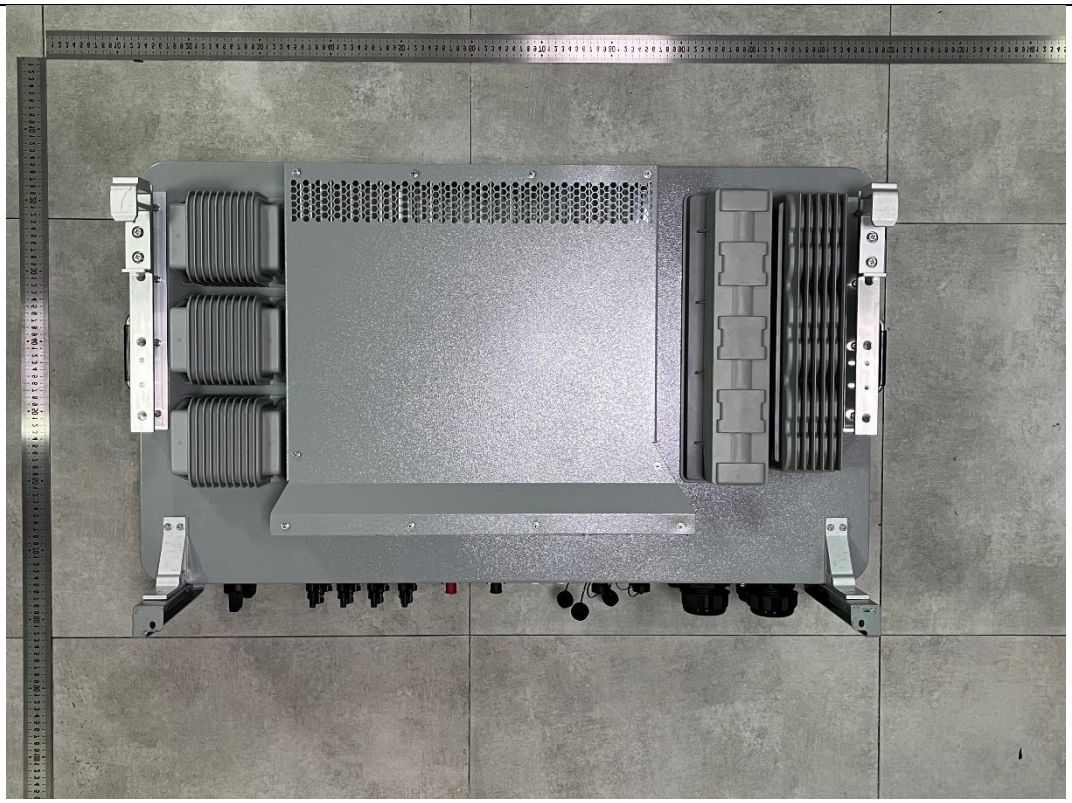
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Annex No. 2

Pictures of the unit

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Photo of EUT
Enclosure front view

Enclosure rear view


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Photo of EUT

Enclosure left view



Enclosure right view



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Photo of EUT

Enclosure top view



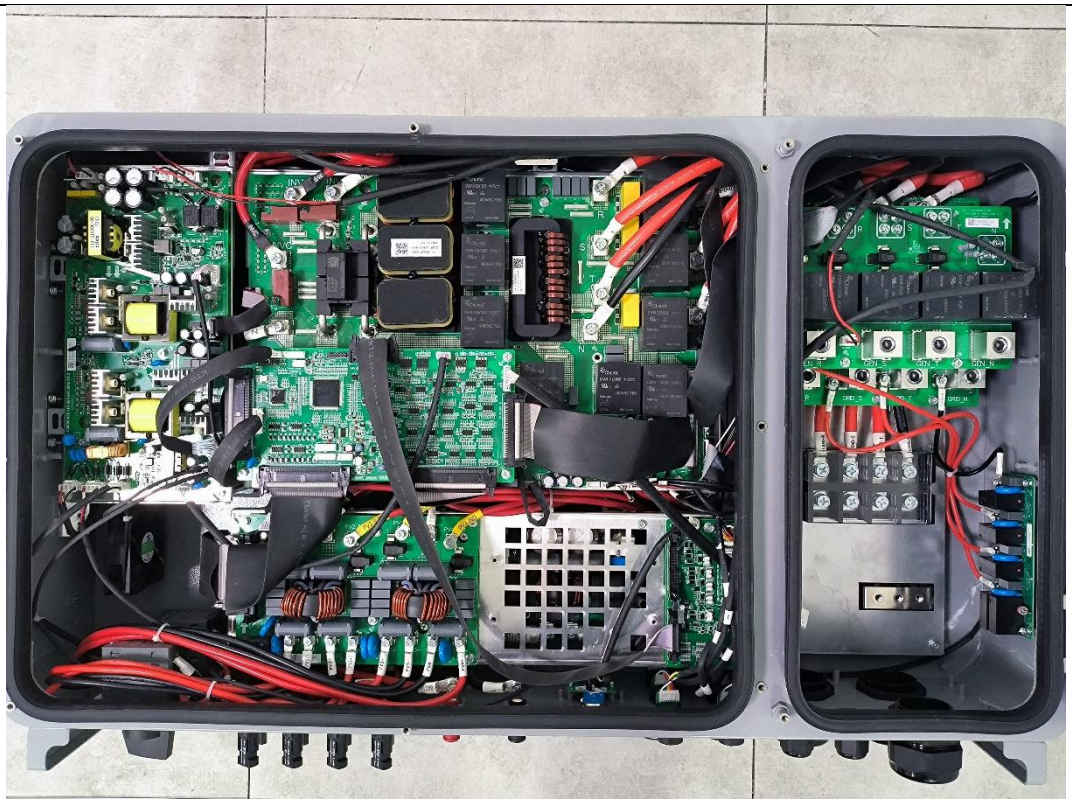
Enclosure bottom view



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Photo of EUT

Internal view



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Annex No. 3

Test Equipment list

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Date(s) of performance test: 2024-08-26 to 2024-10-31

Equipment	Internal No.	Manufacturer	Type	Serial No.	Next Calibration
Power Analyzer	FLS*YF0033	DEWESoft	TRTONet+1820-PA	C9220196-CHN	May. 25, 2025
AC Source	XNYYF0068	ACTIONPOWER	AGS-20-4505N	F2042D0013	Monitored by Power Analyzer
DC Simulation Power Supply	XNYYF0081	ACTIONPOWER	PRD1503E	B1042E1023	
	FLS*YF0196	ACTIONPOWER	PRD1503E	B2032I1977	
	FLS*YF0194	ACTIONPOWER	PRD1503E	B2032I1979	
	FLS*YF0191	ACTIONPOWER	PRD1503E	B2032I1990	
RLC Load	A7150027DG	EMAX	IMAX3350-100KW	202409023	
Current transducer	FLS*YF0046	CYBERTEK	CTA 200	CTA2200456	May. 25, 2025
	FLS*YF0049	CYBERTEK	CTA 200	CTA2100425	May. 25, 2025
	FLS*YF0051	CYBERTEK	CTA 200	CTA2200432	May. 25, 2025
	FLS*YF0040	CYBERTEK	CTA 200	CTA2100515	May. 25, 2025
	FLS*YF0045	CYBERTEK	CTA 200	CTA2100512	May. 25, 2025
	FLS*YF0047	CYBERTEK	CTA 200	CTA2100482	May. 25, 2025

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END OF TEST REPORT

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