Prüfbericht-Nr.: *Test Report No.*:	**CN23349R 001**	**Auftrags-Nr.:** *Order No.*:	244466490	Seite 1 von 18 *Page 1 of 18*
Kunden-Referenz-Nr.: *Client Reference No.*:	1344616	**Auftragsdatum:** *Order date*:	06.12.2022	
Auftraggeber: *Client*:	**SolaX Power Network Technology (Zhejiang) Co., Ltd.** No.288,Shizhu Road, Tonglu Economic Development Zone, Tonglu City, Zhejiang Province, 310000 P. R. CHINA			
Prüfgegenstand: *Test item*:	Grid-Connected PV Inverter			
Bezeichnung / Typ-Nr.: *Identification / Type No.*:	X1-MINI-3.0K-G4			
Auftrags-Inhalt: *Order content*:	Test report			
Prüfgrundlage: *Test specification*:	Zero Export Controller test program by MEA			

Wareneingangsdatum: *Date of receipt*:	06.12.2022
Prüfmuster-Nr.: *Test sample No.*:	A003332966-001
Prüfzeitraum: *Testing period*:	06.12.2022-13.01.2023
Ort der Prüfung: *Place of testing*:	TÜV Rheinland (Shanghai) Co., Ltd.
Prüflaboratorium: *Testing laboratory*:	TÜV Rheinland (Shanghai) Co., Ltd.
Prüfergebnis*: *Test result**:	Pass

geprüft von / *tested by*:			**kontrolliert von /** *reviewed by*:		
13.01.2023	Allen Hu / PE	Allen Hu	13.01.2023	Jingge Pan / Reviewer	Jingge Pan
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / *Other*:

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery*:	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar	5 = mangelhaft N/T = nicht getestet
Legend:	*1 = very good P(ass) = passed a.m. test specification(s)*	*2 = good*	*3 = satisfactory F(ail) = failed a.m. test specification(s)*	*4 = sufficient N/A = not applicable*	*5 = poor N/T = not tested*

Test Data / Test Plan

TÜV Rheinland (Shanghai) Co., Ltd. Document No.: MS-0025001-appendix 13

Zero Export Controller test program by MEA		Report No:	CN23349R 001
Order No. :	244466490	Product:	Grid-Connected PV Inverter
Client Name :	SolaX Power Network Technology (Zhejiang) Co., Ltd.	Model designation:	X1-MINI-3.0K-G4

Issue Date:	2022.01.23	Project Engineer:	Allen Hu
Lab Target:	TÜV Rheinland (Shanghai) Co., Ltd	Signature:	

Testing Location:	
Name:	**TÜV Rheinland (Shanghai) Co., Ltd**
Address:	*No. 177, Lane 777 West Guangzhong Road, Jing'an District, Shanghai, 200072 P.R.China*

Electrical rating of the equipment:	
Rated Input:	See appended rating label
Rated Output:	See appended rating label for more detail.
Firmware version:	Master:1.00,Manager:1.00
Phase:	☒ Single-phase ☐ Three-phase
Protection class:	☐ Class 0 ☒ Class I ☐ Class II ☐ Class III
Overvoltage Category(OVC):	☐ OVC I ☒ OVC II (PV) ☒ OVC III (Mains) ☐ OVC IV
Pollution degree (PD):	☐ PD 1 ☒ PD 2 (Inside) ☒ PD 3 (Outside)
Max. operating temperature:	See appended rating label

Documents attached:	Remark
☒ Rating label	See following page.
☒ Product photo	See attachment 3.
☒ Test equipment list	See attachment 2.
☒ Wave diagram in test	See attachment 1.

Test Data / Test Plan

TÜV Rheinland (Shanghai) Co., Ltd. | Document No.: | MS-0025001-appendix 13

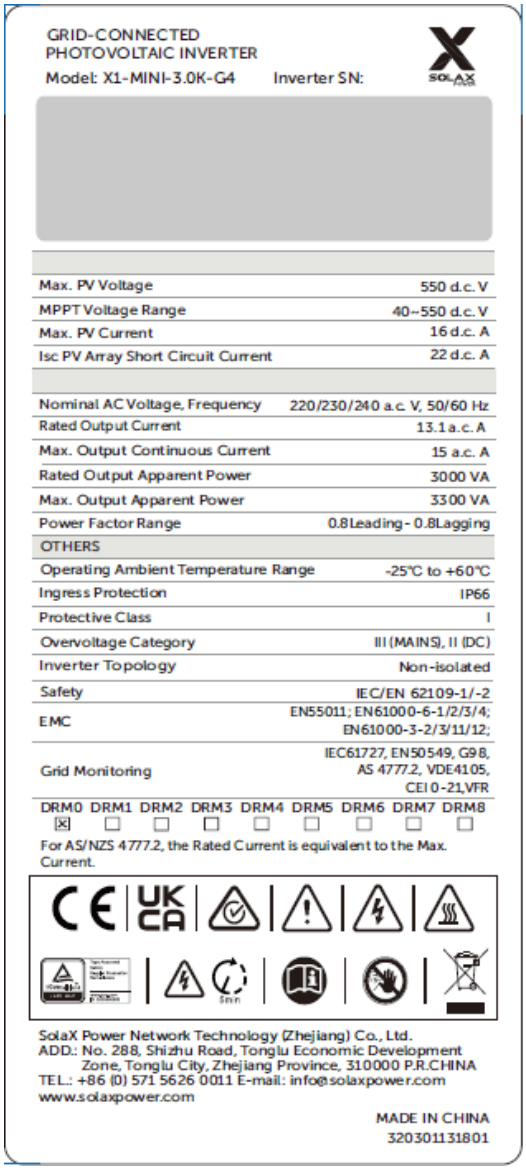
Zero Export Controller test program by MEA		Report No:	CN23349R 001
Order No. :	244466490	Product:	Grid-Connected PV Inverter
Client Name :	SolaX Power Network Technology (Zhejiang) Co., Ltd.	Model designation:	X1-MINI-3.0K-G4

Test Data / Test Plan

TÜV Rheinland (Shanghai) Co., Ltd. | Document No.: MS-0025001-appendix 13

Zero Export Controller test program by MEA		Report No:	CN23349R 001
Order No. :	244466490	Product:	Grid-Connected PV Inverter
Client Name :	SolaX Power Network Technology (Zhejiang) Co., Ltd.	Model designation:	X1-MINI-3.0K-G4

Copy of marking plate:



GRID-CONNECTED
PHOTOVOLTAIC INVERTER

Model: X1-MINI-3.0K-G4 Inverter SN:

Max. PV Voltage	550 d.c. V
MPPT Voltage Range	40~550 d.c. V
Max. PV Current	16 d.c. A
Isc PV Array Short Circuit Current	22 d.c. A
Nominal AC Voltage, Frequency	220/230/240 a.c. V, 50/60 Hz
Rated Output Current	13.1 a.c. A
Max. Output Continuous Current	15 a.c. A
Rated Output Apparent Power	3000 VA
Max. Output Apparent Power	3300 VA
Power Factor Range	0.8Leading - 0.8Lagging
OTHERS	
Operating Ambient Temperature Range	-25℃ to +60℃
Ingress Protection	IP66
Protective Class	I
Overvoltage Category	III (MAINS), II (DC)
Inverter Topology	Non-isolated
Safety	IEC/EN 62109-1/-2
EMC	EN55011; EN61000-6-1/2/3/4; EN61000-3-2/3/11/12;
Grid Monitoring	IEC61727, EN50549, G98, AS 4777.2, VDE4105, CEI 0-21,VFR

DRM0	DRM1	DRM2	DRM3	DRM4	DRM5	DRM6	DRM7	DRM8
☒	☐	☐	☐	☐	☐	☐	☐	☐

For AS/NZS 4777.2, the Rated Current is equivalent to the Max. Current.

SolaX Power Network Technology (Zhejiang) Co., Ltd.
ADD.: No. 288, Shizhu Road, Tonglu Economic Development Zone, Tonglu City, Zhejiang Province, 310000 P.R.CHINA
TEL.: +86 (0) 571 5626 0011 E-mail: info@solaxpower.com
www.solaxpower.com

MADE IN CHINA
320301131801

Requirements to the Measurement Precision of the Measuring Devices

The used measuring devices must fulfill at least the following measuring precisions.

Minimum measuring precisions

Measured Variable	Frequency Range	Measuring Precision relative to the Measuring Range
Voltage up to 1 000 V	50 Hz DC to 1 kHz (except for 50 Hz) 1 kHz to < 5 kHz 5 kHz to < 20 kHz ≥ 20 kHz	± 0.1 % ± 1.0 % ± 1.5 % ± 2.5 % ± 5.0 %
Current < 5A Current > 5A	50 Hz DC to < 60 Hz (except for 50 Hz) 60 Hz to < 5 kHz 5 kHz to < 20 kHz 50 Hz ≥ 20 kHz (except for 50 Hz) DC to < 5 kHz 5 kHz to < 20 kHz ≥ 20 kHz	± 0.5 % ± 1.0 % ± 1.5 % ± 2.5 % ± 0.5 % ± 5.0 % ± 1.5 % ± 3.5 % ± 5.0 %
Frequency	DC to < 60 Hz 60 Hz to 5 kHz 5 kHz to < 20 kHz ≥ 20 kHz	± 0.01 Hz ± 0.2 % ± 0.5 % ± 1 %
Displacement Factor cosφ		0.001
Time	10 ms to < 200 ms 200 ms to <1 s ≥ 1 s	± 5 % of the measured value ± 10 ms ± 1 % of the measured value
Temperature	> -35°C to 100°C	± 2°C
Relative humidity	30 % to 95 % RH	± 6 % RH
Barometric air pressure		± 10 kPa

1 Test Procedure

1.1 Install Inverter and connect to Programmable DC Power Supply (PV-Simulator), Programmable AC Power Supply (Grid -Simulator) and Programmable RLC Load (Load-Simulator) as shown in Figure 1.

1.2. Install Zero injection system and connect to Inverter according to manufacturer's recommendation.

1.3. Install a Power analyzer to measure the following parameters
- 1.3.1. Voltage L (VDC), Current L (IDC) and Power (PDC) of the PV-Simulator
- 1.3.2. Voltage L (VINV), current (IINV) and power (PINV) of the inverter.
- 1.3.3. Voltage (VG), current (IG) and power (PG) Grid -Simulator
- 1.3.4. Voltage L (VL), Current L (IL) and Power (PL) Load-simulator

1.4. Install Storage Oscilloscope to record waveform of parameters as follows.
- 1.4.1. Current Waveform of Inverter
- 1.4.2. Current Waveform of Grid-Simulator
- 1.4.3. Current Waveform of Load-simulator

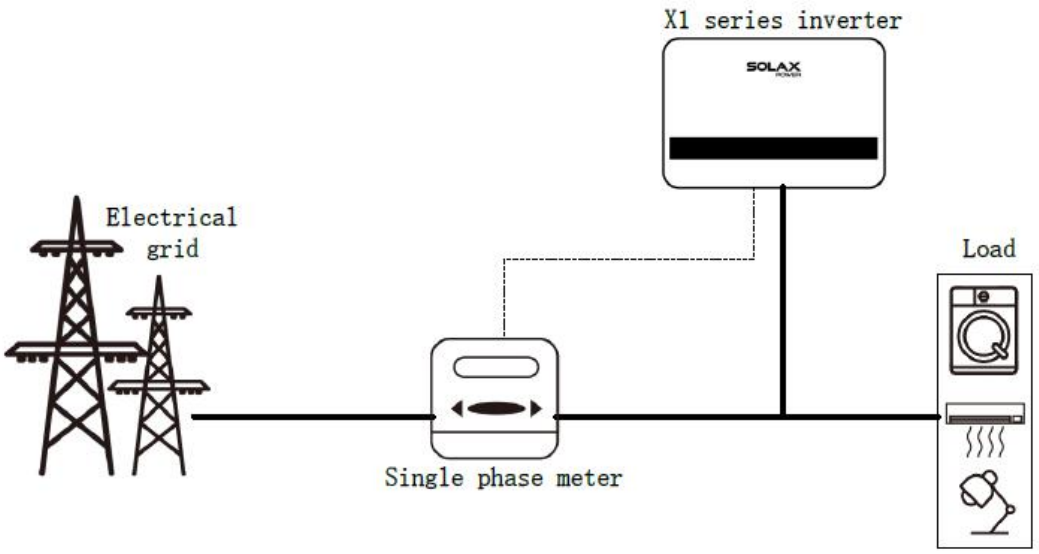
1.5. Adjust the voltage of the Grid-Simulator at 230 V, 50Hz and connect the Inverter to the Grid–Simulator. Ready for both settings Voltage of PV-Simulator must be A in MPPT range of Inverter so that A Inverter will supply voltage to Grid-Simulator at 100% (PINV+PG=0)

1.6. Add Load-simulator until the grid -Simulator(PG) power is zero (PINV=PL) or (PINV+PG-PL=0)

1.7. Open the Zero injection system with A and record the parameters in A 3 and A 4.

1.8. Reduce the power of the Load-simulator 1%, 25% and 100% of (PL recorded A in A 6) every 30 s until Power Load-simulator equal to zero Prompt A is both recording parameters in A 3 and A 4 over time.

2 Function



An Energy Meter DDSU666-CT is used in zero injection system with the X1-MINI-3.0K-G4 to control the active power.

Energy Meter Used in the zero injection system

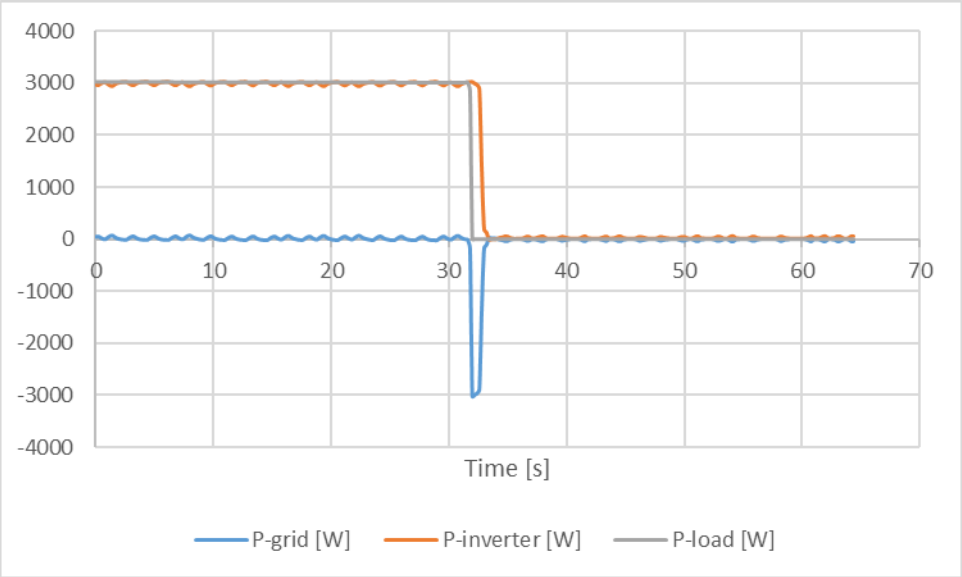
3 Test Requirement

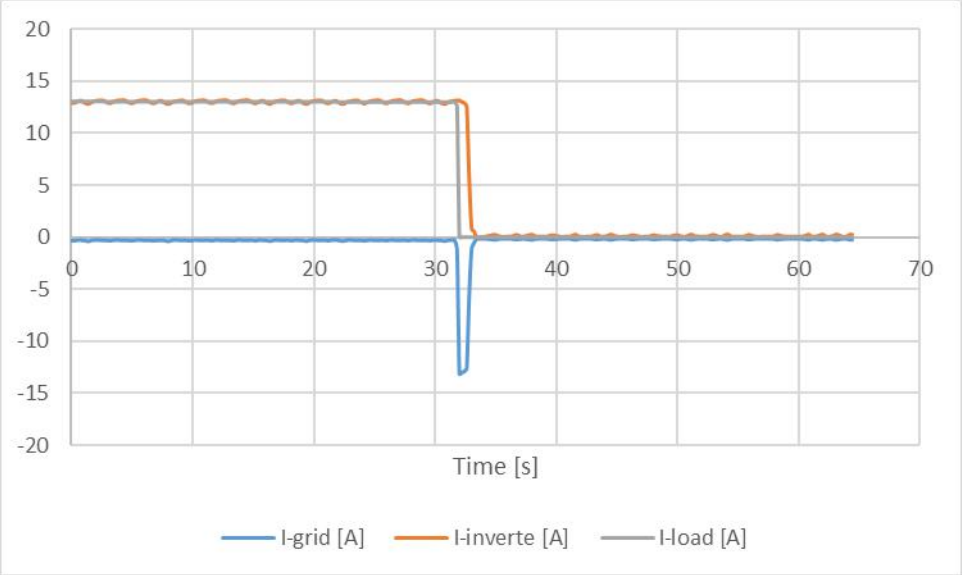
Consideration of the test results of the Zero injection system
a) During the test according to A. 8, the electric current (IG) and power (PG) of the Grid -Simulator must always be equal to zero.
test period
b) Consider Current Waveform of Load-simulator and Current Waveform of Inverter to find repoint.
time by considering the Current Waveform of the Inverter. How long will it take A to make A equal to the waveform of
Load-simulator When the Load-simulator's Current Waveform has changed
However, the test A with this method will include the Repoint time of the Inverter with A.

4 Test Results

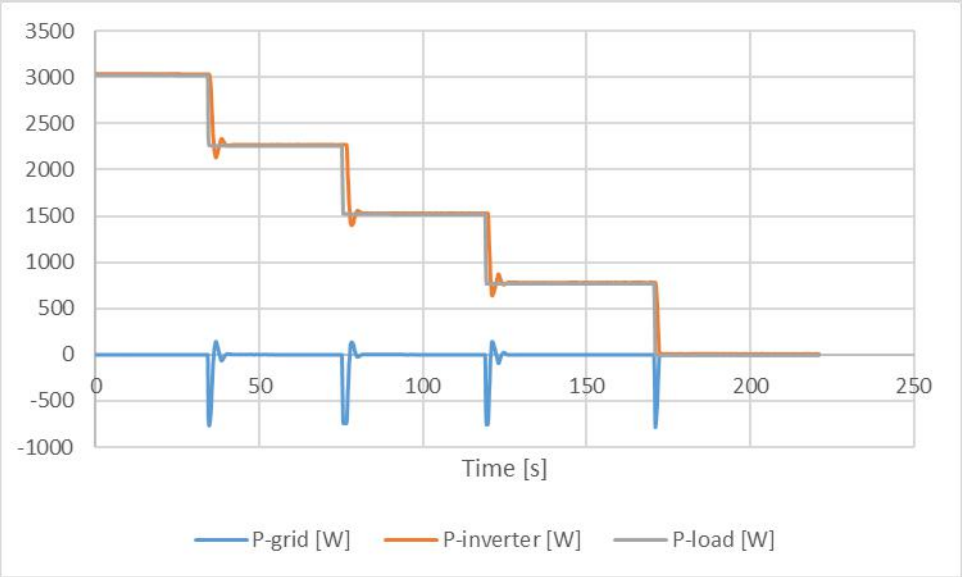
Load Step Setting (W)	Max. P-INV at load step (W)	Max. P-GRID at load step (W)	Max response tiem at load step (s)	P-GRID after Load Step (W)
3000 (100%)	3031	-2970	1.8	-4.2
1500 (25%)	3034	-738	2.0	-4.2
300 (1%)	3035	-57	3.2	-4.0

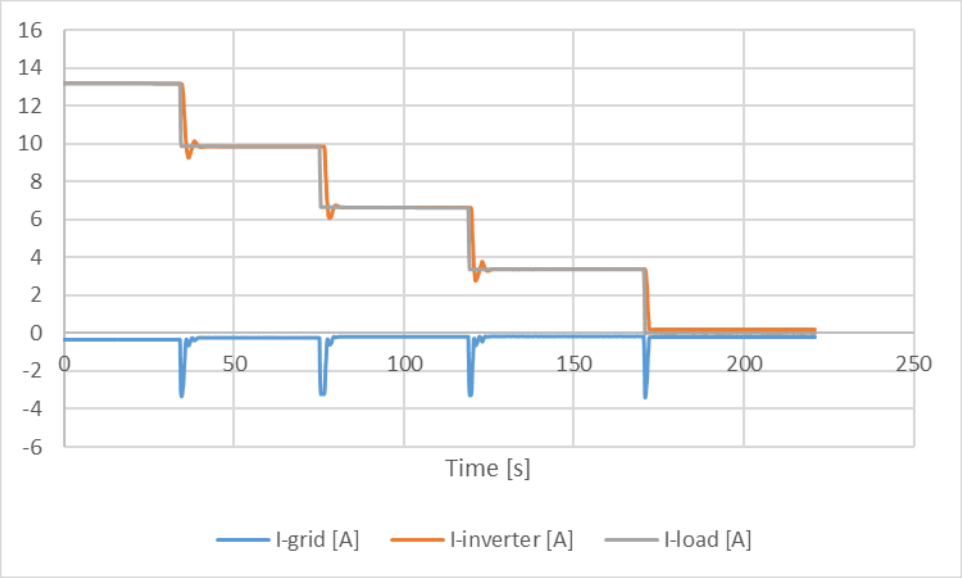
Load step 100% of rated per 30 second

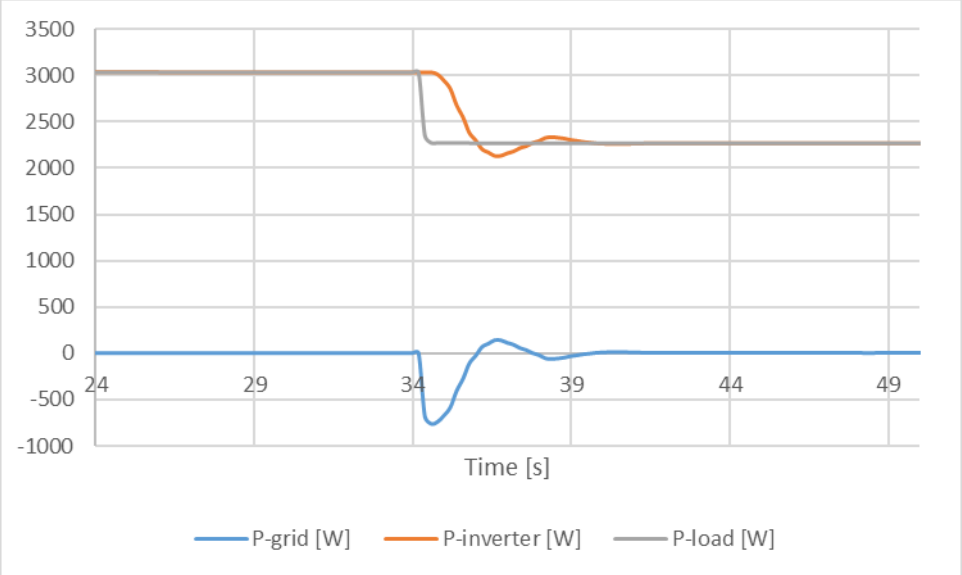




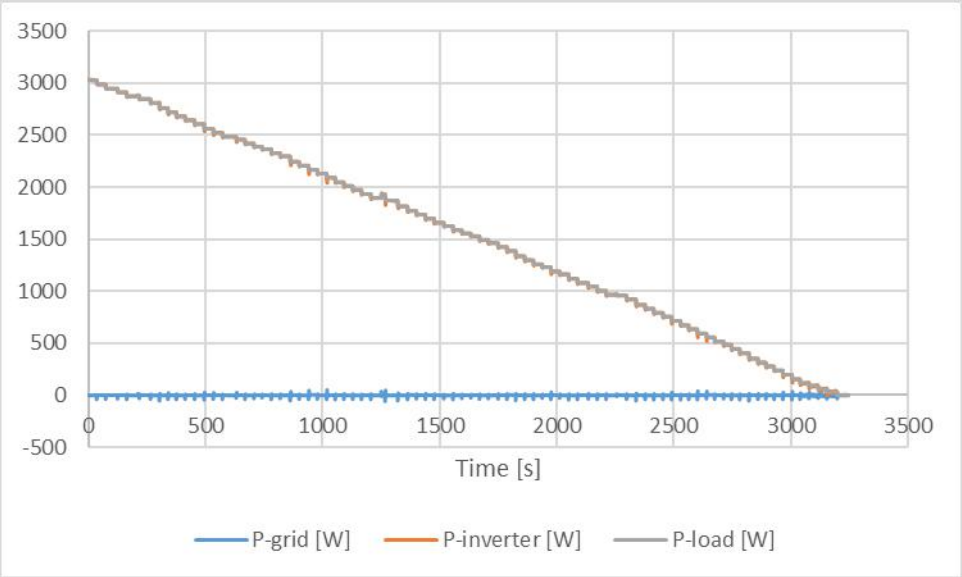
Load step 25% of rated per 30 second

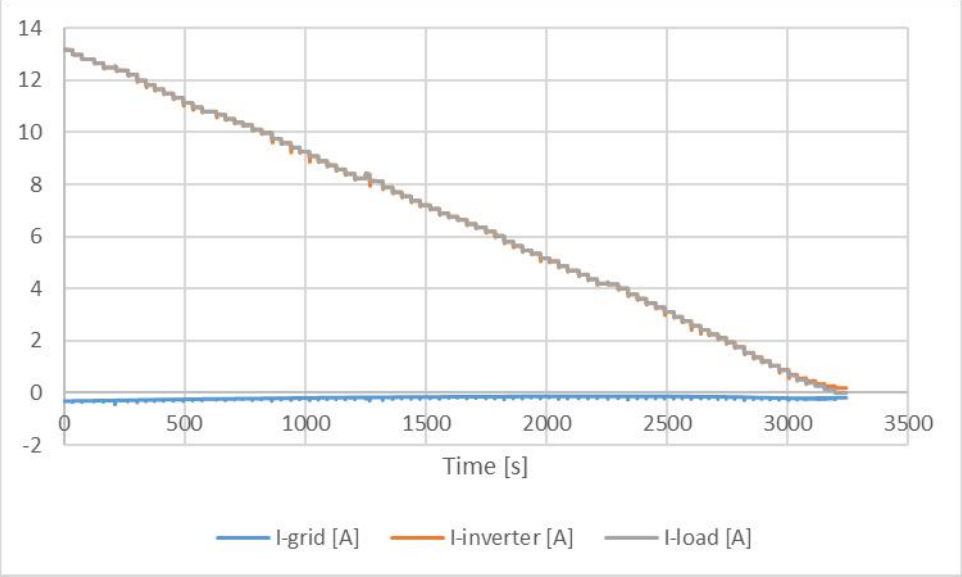





3500
3000
2500
2000
1500
1000
500
0
-500
-1000
24
29
34
39
44
49
Time [s]
P-grid [W]
P-inverter [W]
P-load [W]

Load step 1% of rated per 30 second





Test Data / Test Plan

TÜV Rheinland (Shanghai) Co., Ltd.

Document No.: MS-0025001-appendix 13

Zero Export Controller test program by MEA		Report No:	CN23349R 001
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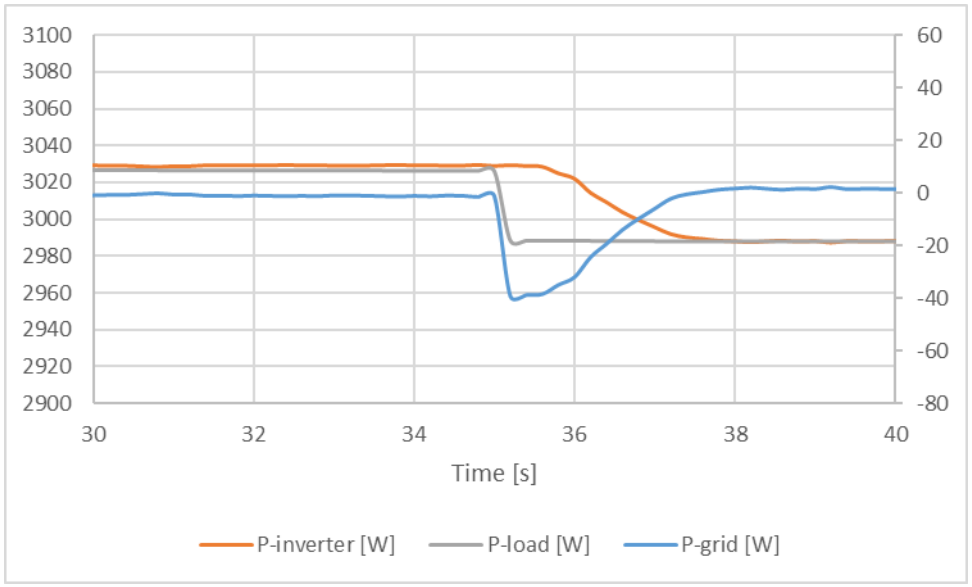
Client Name :	SolaX Power Network Technology (Zhejiang) Co., Ltd.	Model designation:	X1-MINI-3.0K-G4



Measurement and Test Equipment List

Used MTE

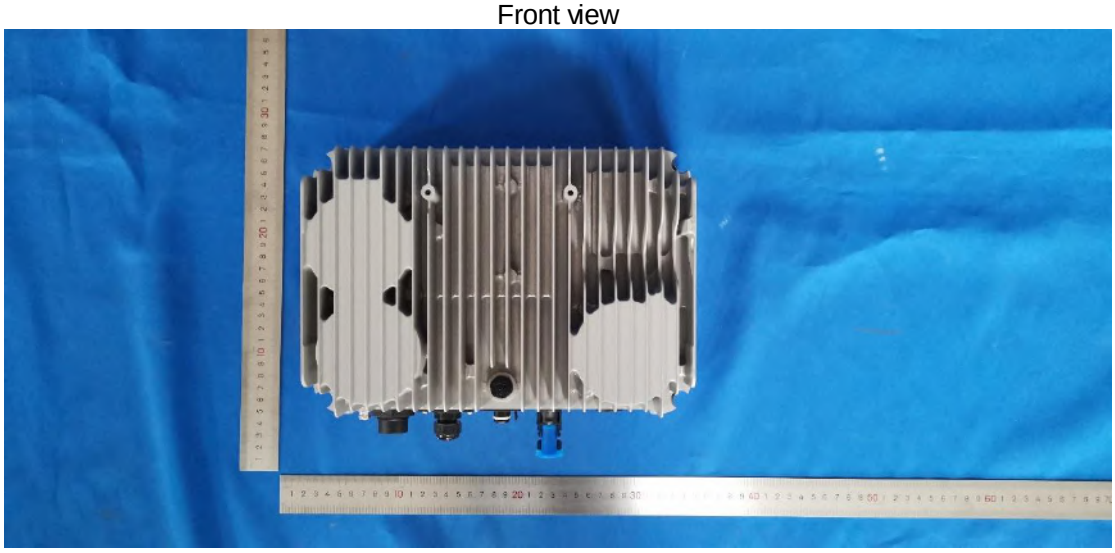
Revision: 20 July, 2007/ G.Luebken

Attachment: 1

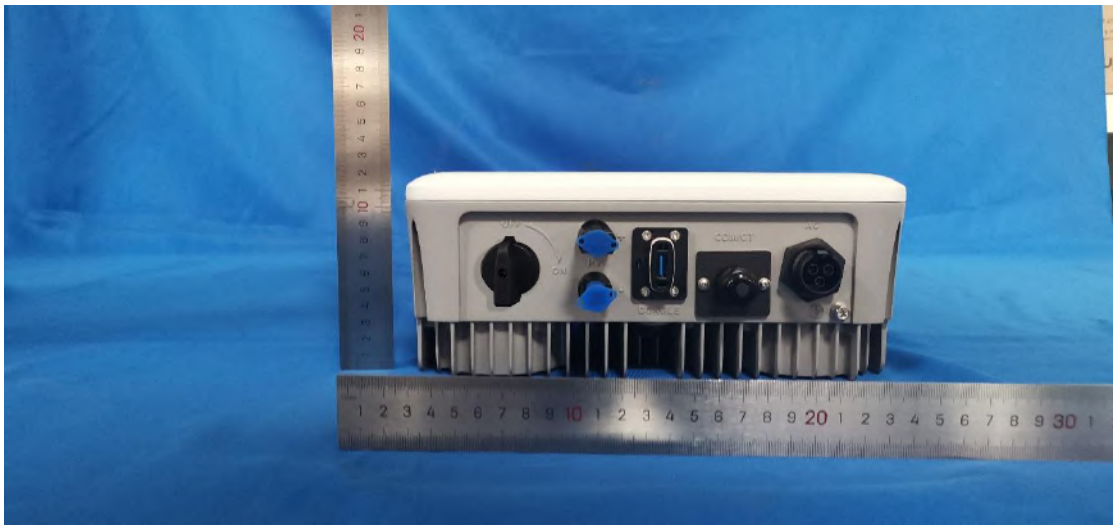
Report No.: CN23349R 001 **Order No.: 244466490**

Equip.	Description	Model	Manufacturer
9017073	Power Analyser(DEWETRON)	DEWE2-PA7	Austria, DEWETRON
9017074	Current Sensor(For WT3000)	IT 200-S	LEM
9017075	Current Sensor(For WT3000)	IT 200-S	LEM
9017076	Current Sensor(For WT3000)	IT 200-S	LEM
9017077	Current Sensor(For WT3000)	IT 200-S	LEM
9017078	Programmable AC Source(61860)	61860	Chroma ATE INC.
9017080	Oscilloscope	MDO3024	Tektronix
G1819265	ScopeCoder	DL850	JAPAN, Yokogawa
G1819266	Power Analyser(WT3000)	WT3000	JAPAN, Yokogawa
G1819267	T-Power Software	TP100-P-LVHA/STP	JAPAN, Yokogawa
G1819268	Anti-islanding test detection devices	ACLT-4830H	QUNLING Energy Resources
G1819269	Harmonic impedance analog flicker system	ACLT-6150	QUNLING Energy Resources
G1819277	PV array simulator	62150H-1000S	Chroma Co.
G1819278	PV array simulator	62150H-1000S	Chroma Co.
G1819279	PV array simulator	62150H-1000S	Chroma Co.
G1819280	PV array simulator	62150H-1000S	Chroma Co.

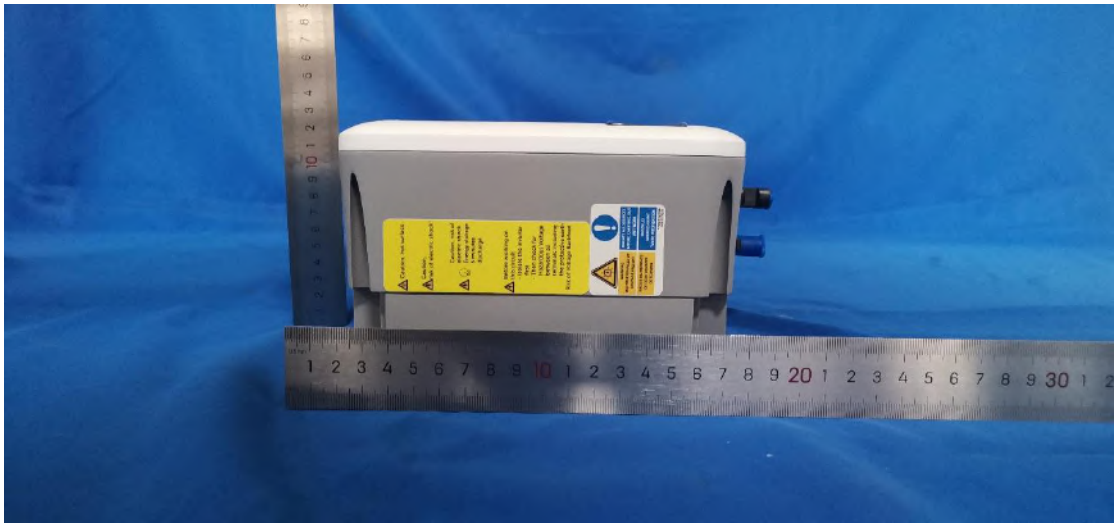
Front view



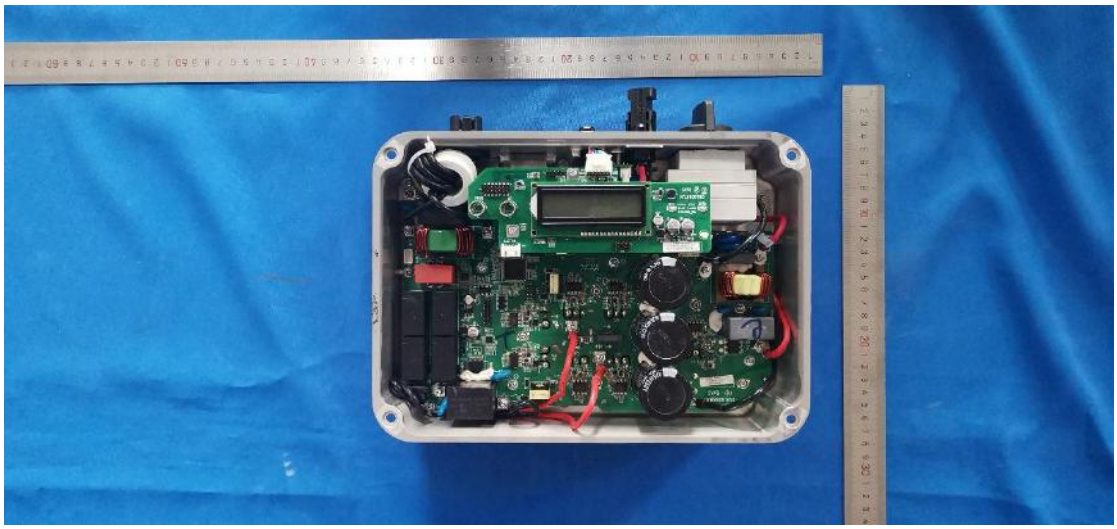
Back view



Bottom view



Side view



Internal view