TEST REPORT
Engineering Recommendation G100
Issue 2 2022 Amendment 1
Technical Requirements for Customers' Export and Import Limitation Schemes

Testing Laboratory : Shenzhen Lux Power Technology Co., Ltd

Address : Floors 1-5, Building C, Donghua Industrial Park, No. 5003 Bao'an Avenue, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, 518126, China.

Tel : +86 0755 8520 9056 Web site : www.luxpowertek.com

Test specification:

Standard : G100 Issue 2 Amendment 1

Test procedure : Type approval

Non-standard test method : N/A

Test item description **: Three- Phase Hybrid Inverter**

Trade Mark :

Manufacturer : **Shenzhen Lux Power Technology Co., Ltd**

Model/Type reference : Trip-HB-EU 6K、Trip-HB-EU 8K、Trip-HB-EU 10K、Trip-HB-EU 12K、Trip-HB-EU 15K、Trip-HB-EU 20K

List of installation components (CLS):

Type of appliance/ Installation : Three-Phase Smart Meter

Manufacturer / Distributor / Installer : Zhejiang Zhengtai Instrument Co., LTD

Brand……: CHNT

Model/Type……..: DTSU666

Rating……: AC 3x230/400V , 0.25~5(80) A

50/60Hz, 400imp/kWh, CI.1 (CI.B)

Power accuracy:1%

Firmware Version: 02 01.02

Test item particulars :

Temperature range : -25°C ~60°C

IP protection class : IP 65

Possible test case verdicts:

- test case does not apply to the test object : N/A
- test object does meet the requirement : P(Pass)
- test object does not meet the requirement : F(Fail)

The power of the test model： Trip-HB-EU 20K

Testing time :

Date (s) of performance of tests : 19 March 2024 – 23 March 2024

Signed :

wan xiong Hu

General remarks:

The test results presented in this report relate only to the object (single inverter unit) tested and base on Low Voltage connected on small power station. The information about Generating Plant is not consider and testing.

Installer and relevant persons shall comply with G100 and relevant standard and Grid Code in G100

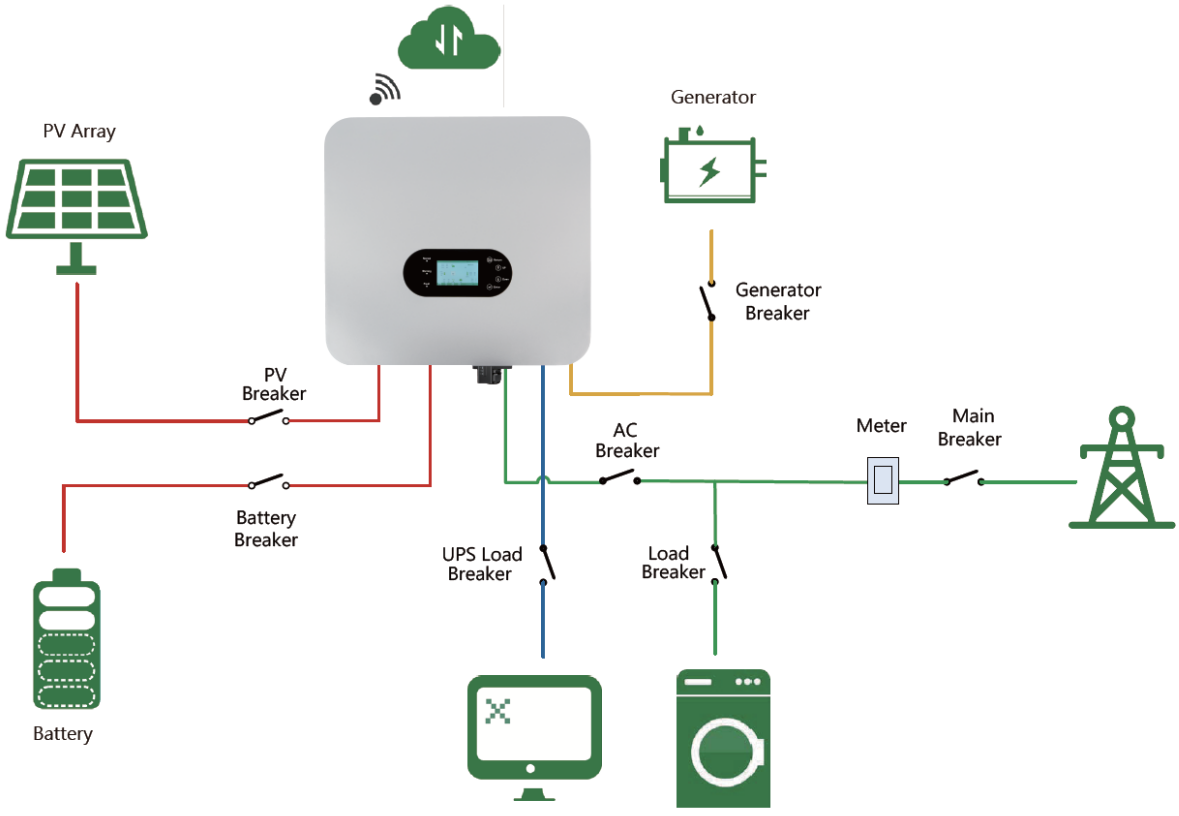
Determination of the test result includes consideration of measurement uncertainty from the test equipment and methods.

The test results presented in this report relate only to the item tested. The results indicate that the specimen partially complies with standard"ER G100/2-1: 2022". See general product information next for details information.

General product information:

The System comprising of smart meter providing control signals that communication with the Hybrid inveter the RS485 interface in real time, the smart meter will install at the Connection Point and sense the power (measures the current and voltage) send to inverter, so that can control the net flow of electricity into the Distribution Network at the connection Point so as not to exceed the MEL.

Basic outline of the system as following:

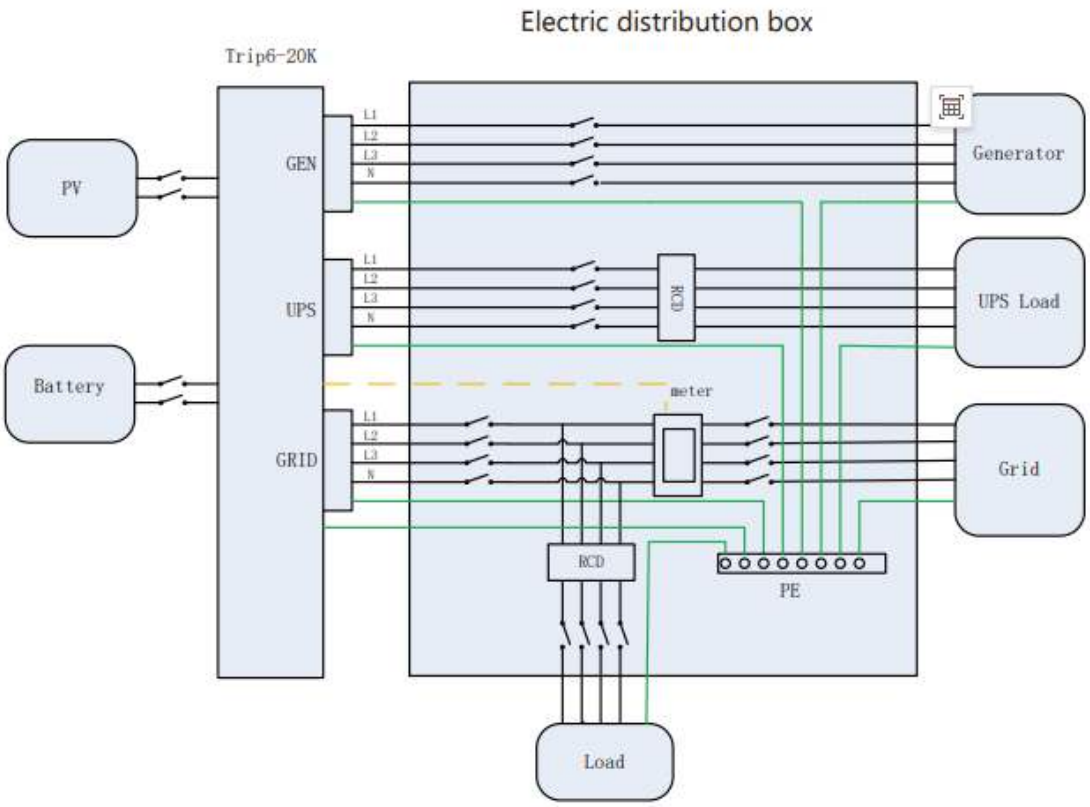


Factory information:

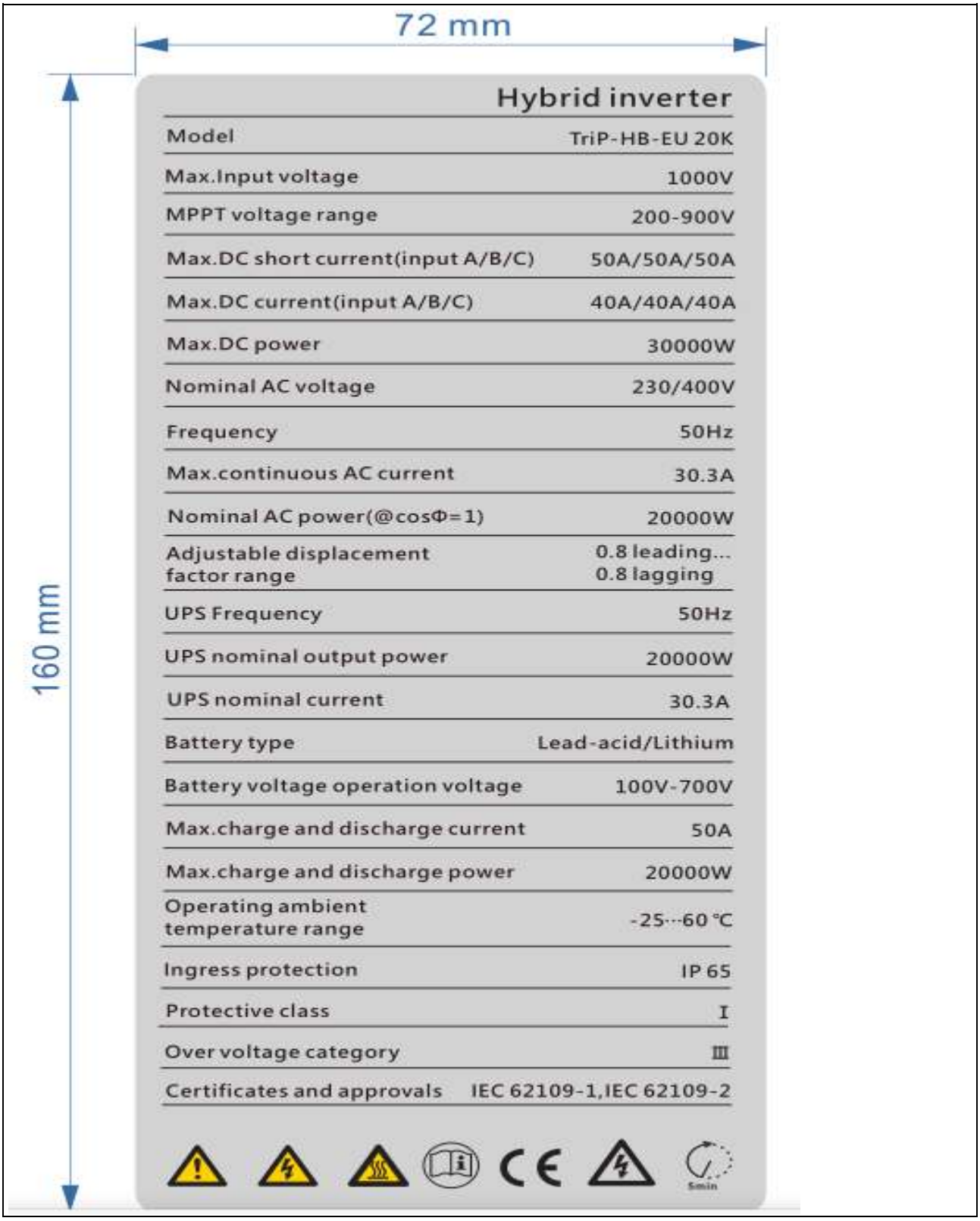
Factory and address: **Shenzhen Lux Power Technology Co., Ltd**

Floors 1-5, Building C, Donghua Industrial Park, No. 5003 Bao'an Avenue, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, 518126, China.

Test of setup-Injection testing:



Copy of marking plate: The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective certification body that owns these marks.


72 mm
160 mm
Hybrid inverter
Model TriP-HB-EU 20K
Max.Input voltage 1000V
MPPT voltage range 200-900V
Max.DC short current(input A/B/C) 50A/50A/50A
Max.DC current(input A/B/C) 40A/40A/40A
Max.DC power 30000W
Nominal AC voltage 230/400V
Frequency 50Hz
Max.continuous AC current 30.3A
Nominal AC power(@cosΦ=1) 20000W
Adjustable displacement factor range 0.8 leading... 0.8 lagging
UPS Frequency 50Hz
UPS nominal output power 20000W
UPS nominal current 30.3A
Battery type Lead-acid/Lithium
Battery voltage operation voltage 100V-700V
Max.charge and discharge current 50A
Max.charge and discharge power 20000W
Operating ambient temperature range -25···60 °C
Ingress protection IP 65
Protective class I
Over voltage category III
Certificates and approvals IEC 62109-1,IEC 62109-2
5min

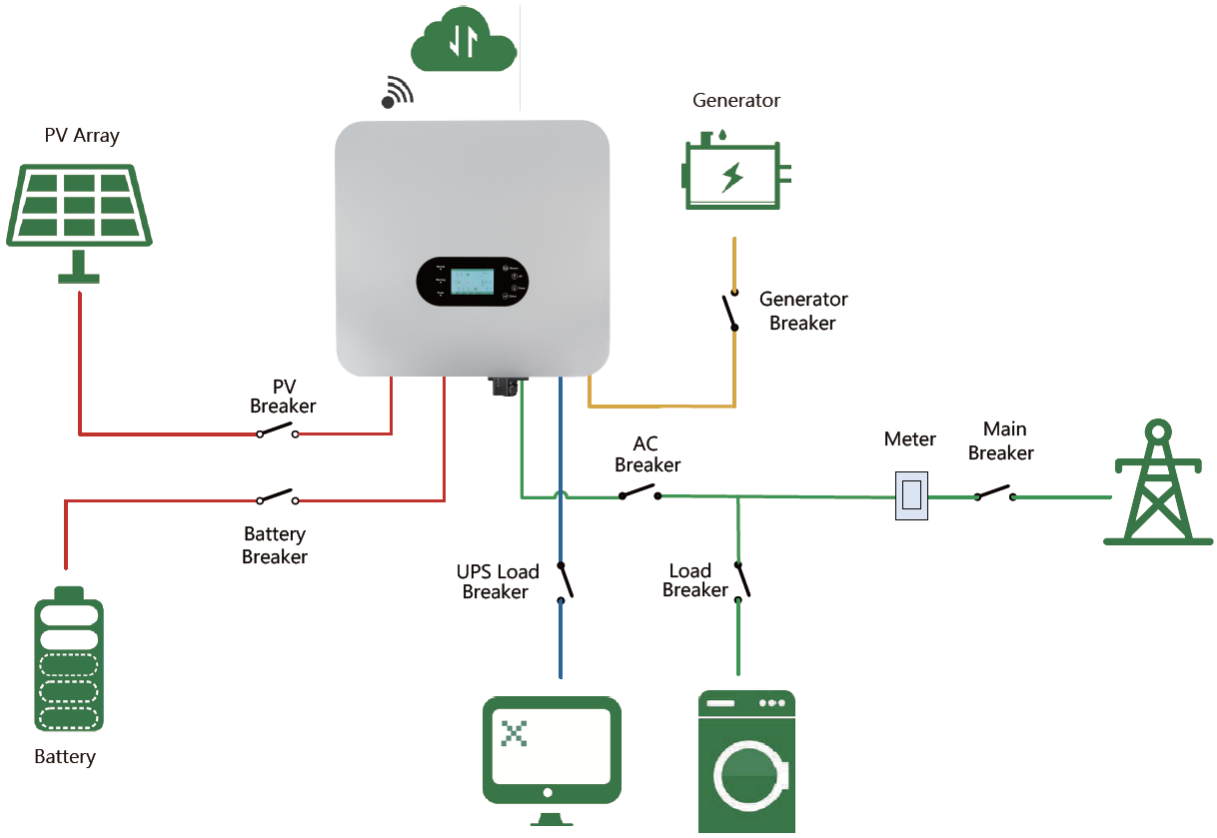
Export/Import capabilities			
Export	Y	Import	N

Description of Operation

EREC G100 section **Error! Reference source not found.** requires a description of the **CLS**, and schematic diagram, to be provided to the **Customer**. Please provide that description and the diagram here.

The System comprising of smart meter providing control signals that communication with the Hybrid inverter the RS485 interface in real time, the smart meter will install at the Connection Point and sense the power (measures the current and voltage) send to inverter, so that can control the net flow of electricity into the Distribution Network at the connection Point so as not to exceed the MEL.

Basic outline of the system as following:



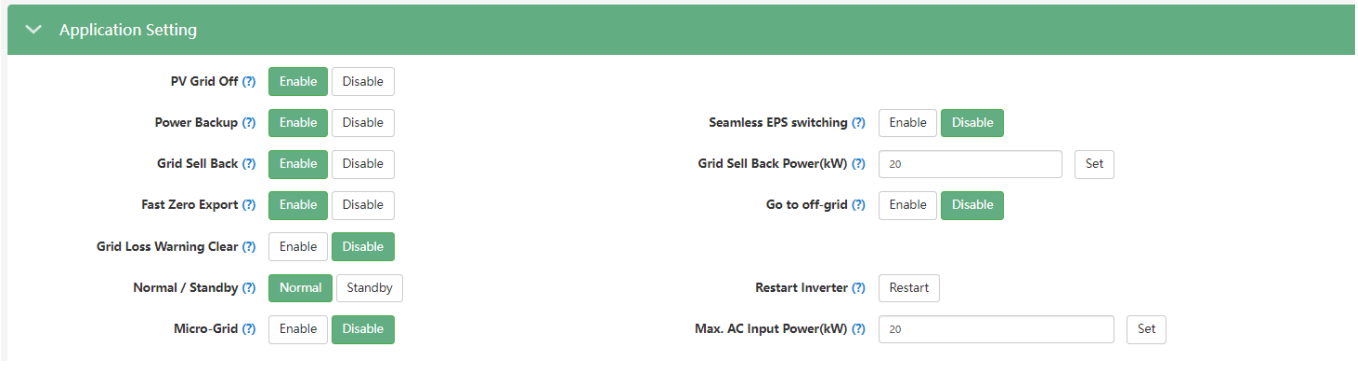
How to set and control:

Zero export function could be configured via Web Page

Grid sell back : for zero export mode , it should be selected to stop export power

Grid sell back power(%): Allowed the maximum output power to flow to grid.

Fast Zero-export : for zero-export mode, it should be selected to ensure the AC storage inverter won' t feed power to grid.



Communications Media

Document the provisions made for the use of various communication media, and both the inherent characteristics and the design steps made to ensure security and reliability.

Communication mode	Baud rate (bps)	Communication object
RS485	9600	Meter and inverter
RS485	19200	Data logger and inverter
CAN	500K	Battery BMS and inverter
SCI TTL	19200	Inverter internal communication

1. Inverter internal communication

The communication between DSP and ARM is realized by SCI serial port communication,which is connected by "hard wiring" in a short distance with a high communication speed. All data transmission is with data-length checksums defined by the protocol and CRC checksums, which ensure the communication secure and reliable. Also, Inter-chip communication is with real-time communication anomaly detection, strong real-time performance, and fault redundancy capability。 The chip is powered by a dedicated isolated power supply, which has strong anti-interference ability.

2. CLS communication

The communication between the energy meter (CLS) and the inverter is realized by means RS485 differential signals. As with the inverter's internal communication, all data transfers a subject to CRC checksums and data length checksums specified by the protocol to ensure that the data information is safe, secure and error-free during transmission. At the same time,FLASH will store the data, there is no dependence on the power supply, the data storage is highly reliable with strong anti-interference ability.

3. Battery communication

The battery BMS system and the inverter are communicating with each other via CAN,and the communication is with high real-time and high priority nodes without delay. Its messages are used for short frame structure with small interference probability and very low data error rate. Automatic detection of whether the message is sent successfully, the hardware can automatically retransmit the transmission reliability is very high.

4. Data logger and inverter

The communication between the Data logger and the inverter is realized by means RS485 differential signals. As with the inverter's internal communication, all data transfers a subject to CRC checksums and data length checksums specified by the LUXPOWER protocol to ensure that the data information is safe, secure and error-free during transmission.

Cyber Security

Confirm that the Manufacturer or Installer of the **CLS** has provided a statement describing how the **CLS** has been designed to comply with **cyber security** requirements, as detailed in **section 4.7.**

The following statements declared by Manufacturer

1）Luxpowertek smart monitoring management system

WiFi Data logger　　Router　　Cloud server　　Luxpowertek smart monitoring

Subject	Meaning	Operations
End-user	mobile device (App), PC (web portal)	monitoring of historical data, settings for special functions
Service	PC (via web portal)	remote diagnosis, system behaviour monitoring, remote updates, remote settings

2)　All communications between internal components of the inverter, and supplied External Power Meter(s), take place via appropriate serial lines (RS485) .
3)　The only communication port between the inverter and the outside is constituted by the monitoring device on the system; the communication between inverter and the outside world can take place via an Ethernet line, WiFi or GPRS router according to the customer's request.
4)　All communications between the Luxpowertek server and the subjects/parties are cyber-protected by SSL technology.
5)　The Cyber security assessment of the Luxpowertek was performed according to the ETSI EN 303 645 standard.
6)　Please refer to the attached document “Luxpowertek statement for Cyber Security requirement”

Power Quality Requirements

Where the **CLS** includes the power electronics that controls generation or loads (as opposed to the power electronics being included in **Devices** that are subject to their own power quality compliance requirements) please submit the harmonic and disturbance information here as required by EREC G5 and EREC P28.

The CLS does not include the power electronics.

Hybrid inverter will submit to comply with EREC G98 (less than 16A) and EREC G99

Please see separate report for details.

Fail Safe

CLS internal failure: please submit here the description of the internal Fail Safe design and operation. Please also document how it has been demonstrated, including the non-volatile recording of times and numbers of state 2 operations, and confirm the overall response of the CLS to this internal failure.

The energy meter (CLS) will communicate with control device (inverter) via through RS 485 interface, if any part of the energy meter failure, which will return to inverter shown communication fail, Once inverter received communication fail code, it will force into state 3 of fail-safe state and switch off the power to ensure the current does not exceed MEL through the connection point.

If the failure will cause the current exceed the MEL into the state 2 operations, the CLS can also communicate with inverter for recording, the numbers of state 2 and time will record in the ROM of inverter, even if power off or removed, the ROM is still kept in MCU and waiting for inverter to start-up and reading the state again from the ROM.

The inverter will keep in the state 3 operation until the failure is fixed, once fixed then the CLS and inverter immediate reset into the state 1 operation.

Communication and power supply failures between Components and Devices. Please document here compliance with EREC G100 section .

Component/Device number/description	Communication failure test	Power supply failure test
The energy meter (CLS)	--	Power supply removed (Inverter shown communication failure, which is forced into state 3, if the issue fixed, inverter and CLS immediately reset into state 1 operation)
Inverter	--	MCU of inverter Power supply removed (Inverter shutdown immediately, if the issue fixed, inverter and CLS immediately reset into state 1 operation)
Communication between CLS and inverter	Remove/interrupt communication of RS 485 interface (Inverter shown communication failure, which is forced into state 3, if the issue fixed, inverter and CLS immediately reset into state 1 operation)	--

Operational Tests

In accordance with EREC G100 section undertake the tests A to D to confirm correct operation in state 1 and state 2, that transition into state 3 occurs as required, and that behaviour in state 3 is also as required.

Test A

Nominal Export Limit (for type tests this will be at maximum, minimum and one intermediate setting) in Amp:	50%In (45.45A)
Nominal Import Limit (for type tests this will be at maximum, minimum and one intermediate setting) in Amp:	N/A

No	Starting level	Step value	**CLS** registers change in level?	**CLS** and/or **Component** and/or **Device** initiates correct response of ≥ 5%?	Duration of step in test	Correct state 1/ state 2 operation
1	45.36A	47.69A	Yes, Register in State 2 excursion	Yes	58s	State 1
2	45.43A	49.94A	Yes, Register in State 2 excursions	Yes	58s	State 1
3	45.41A	54.51A	Yes, Register in State 2 excursions	Yes	58s	State 1
4	45.37A	--	--	--	--	--
5	45.42A	--	--	--	--	--
6	45.39A	--	--	--	--	--

Test B

Nominal Export Limit:	45.45A
Nominal Import Limit	N/A

No	Starting level	Step value	**CLS** registers change in level?	**CLS** and/or **Component** and/or **Device** initiates correct response of ≥ 5%?	Duration of step in test	Correct state 3 operation

7	45.40A	47.62A	Register in state 2 has exceeded 1 minute	Yes (The **CLS** will continue to drive the output of the **Device** away from its original set point.)	62s	State 3 (fail safe functionality)
8	45.37A	47.58A	Register in state 2 has exceeded 1 minute	Yes (The **CLS** will continue to drive the output of the **Device** away from its original set point.)	62s	State 3 (fail safe functionality)

State 3 Reset

These tests are to demonstrate compliance with section EREC G100 4.5.2.

Please document how the reset from state 3 to state 1 has been demonstrated. Please include how the reset is achieved.

Please confirm that for **CLSs** to be installed in **Domestic installations** three (3) resets causes lockout or that for non-domestic installations lockout can only be reset after four hours. Please explain how lockout is reset.

If the state 3 is locked out, it should reset by Manufacturers or installers via remote controlled, or the manuafacturers will provide a facility APP to reset.
it should be sent a command to inverter via remote or facility App to set register 231 of MCU to 1, the MCU will clear out the records of ROM and exit the state 3 operation.
This CLS and inverter are only valid for Domestic installations, when 3 resets has been exceeded in any 30-day period. which will lead to lock out in state 3 operation too, the reset should be folowed the samme operation as above

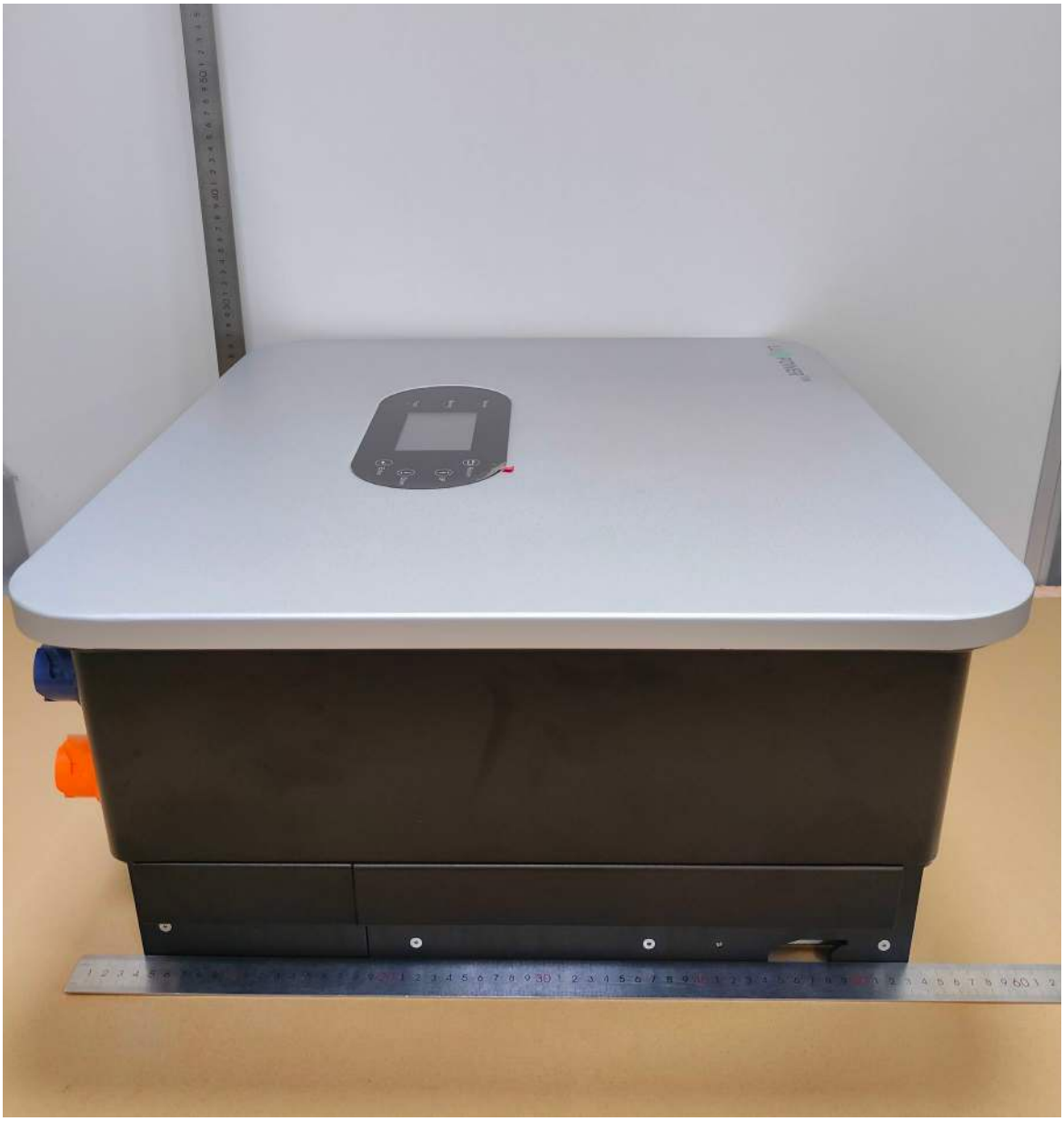
o

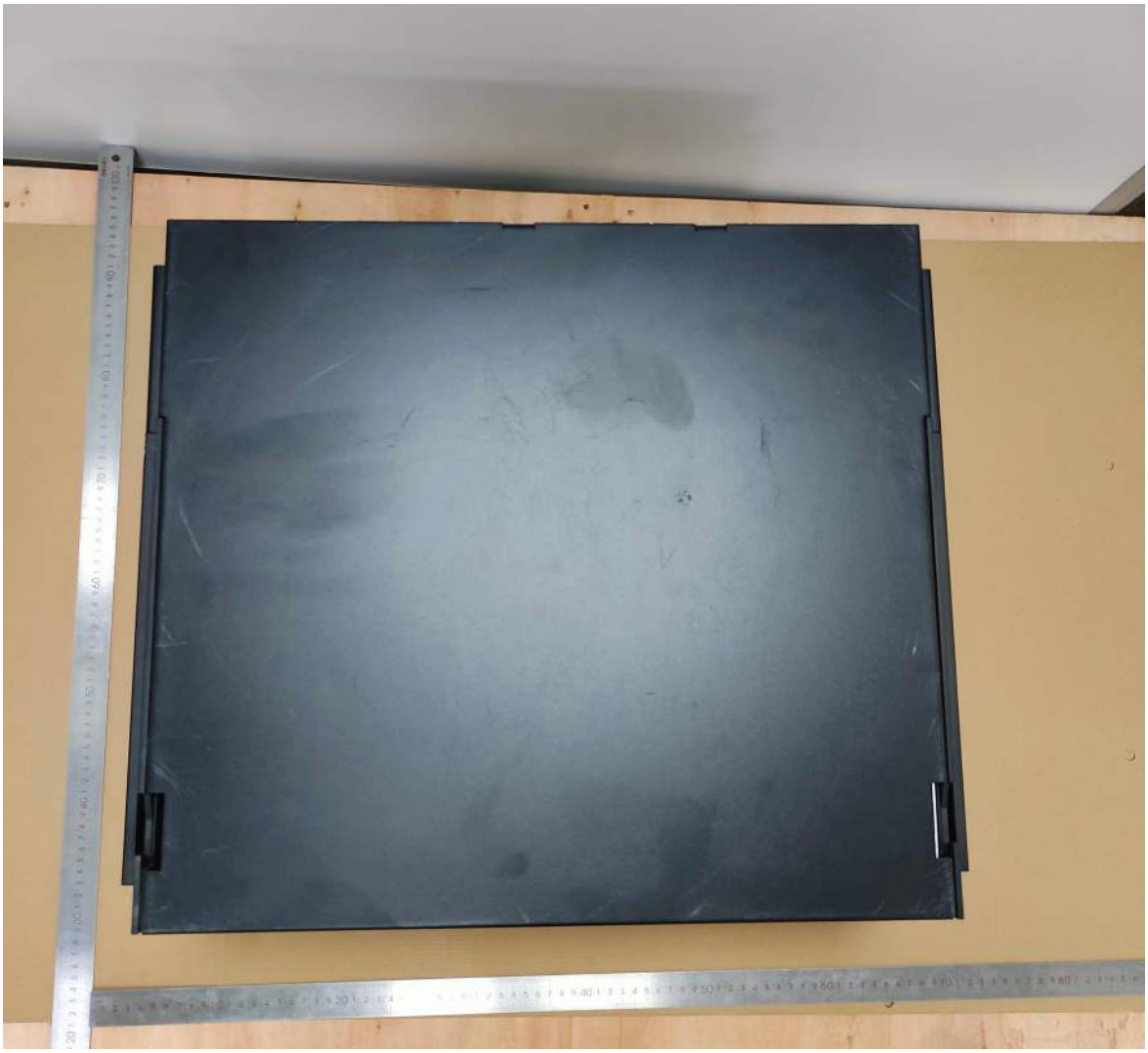
Appended photos：


SWITCH
OFF
ON
PV1
PV2
PV3
BAT
WiFi
Bat/CAN Meter
DRM Parallel
USB
GRID
GEN

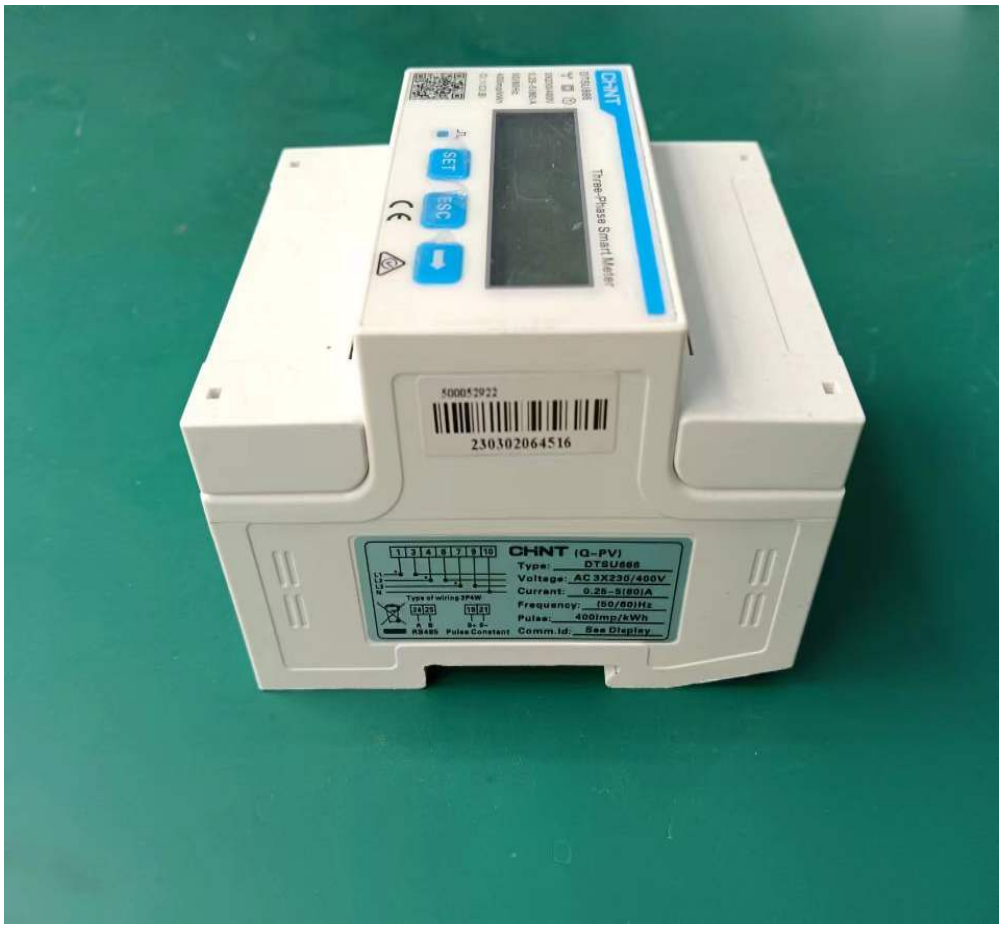

LUX POWER TEK


LL POWERTEK





The energy meter (CLS) view



The energy meter (CLS) view

(End of Report)