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MANUFACTURER'S ELS PRODUCT DECLARATION FOR ESB NETWORKS FORM NC7-03-R1

ESB Networks DAC requires the information requested on this form to manage your electricity supply connection. As the Distribution System Operator, this information is also required to enable ESB Networks DAC to manage the electricity network. The data controller is ESB Networks DAC. Please refer to our privacy policy at https://esbnetworks.ie/privacy

All mandatory requirements in this form are as those required by ESB Networks Standard 'Conditions Governing the Connection and Operation of Export Limiting Schemes' (DOC-250221-GBT)

'Conditions Governing the Connection and Operation of Export Limiting Schemes' (DOC-250221-GBT) defines the technical design requirements for Export Limitation Schemes which limit the net site export to below an agreed maximum and are installed on the Customer's side of the Connection Point.

While DOC-250221-GBT does not describe a type test procedure, it does describe a number of system requirements. This document describes how the ELS product (outlined in Part 1 below) performs relative to key ESB Networks ELS requirements.

Please complete Parts 1 to 9 below

PART 1: PRODUCT DETAILS

Name of Product: Hybrid Inverter	Model No.: RHI-3P(5-10)K-HVES-5G;S6-EH3P(5-10)K-H-EU S6-EH3P(5-10)K2-H
Manufacturer: Ginlong Technologies Co. Ltd	Make: Solis

Where Manufacturer's ESB Networks ELS Product Declaration Form is unavailable an Export Limiting Relay shall be installed as per ESB Networks Standard 'Conditions Governing the Connection and Operation of Export Limiting Schemes' (DOC-250221-GBT)

PART 2: DESCRIPTION OF OPERATION

ESB Networks ELS Requirement: *A description of the scheme, its settings, and a single line diagram shall be permanently displayed on site.*

When installed, the ELS product (as outlined in Part 1) operates as described below:

Please insert details of operation below or if attached as PDF to this form tick here: ☐

https://www.solisinverters.com/uploads/file/Solis_Manual_RHI-3P(3-10)K-HVES-5G_EUR_V1,7(20230321).pdf

https://www.solisinverters.com/uploads/file/Solis_Manual_S6-EH3P(3-10)K-H-EU_EUR_V1,3(20230818).pdf

PART 3: POWER QUALITY REQUIREMENTS

ESB Networks ELS Requirements:

Where the ELS product (as outlined in Part 1) relies on power electronics (e.g. Converters etc) to control the load it shall also provide information demonstrating compliance with the harmonics standards (I.S. EN 61000-3-2 and/or I.S. EN 61000-3-12) or provide data on the harmonic currents produced in accordance with the format in the Distribution Code i.e. individual harmonic current and Total Harmonic Distortion.

It is necessary to confirm the ELS product(as outlined in Part 1) complies with harmonic standards cited in the Distribution Code and product standards cited in I.S. EN 50549-1. The Manufacturer (as outlined in Part 1) confirms that the ELS product (as outlined in Part 1) complies with the requirements of the harmonics standards listed above or that the harmonic data has been provided.	Yes ☑ No ☐

PART 4: SYSTEM SCHEMATIC

The ELS product (as outlined in Part 1) is formed of the following main elements:

Document the main elements and provide a system schematic or if attached as PDF to this form tick here: ☐

1. Main elements:

Meter: SDM630MCT

CT:ESCT-TA16 120A/40mA

Hybrid Inverter:RHI-3P(5-10)K-HVES-5G;S6-EH3P(5-10)K-H-EU;S6-EH3P(5-10)K2-H

2. System Schematic

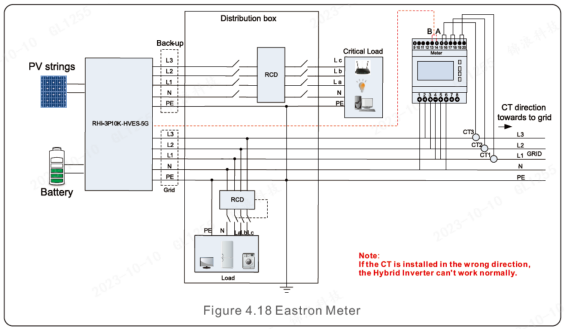

Figure 4.18 Eastron Meter

PART 5: COMPONENT INTERCONNECTION/FAILSAFE OPERATION

ESB Networks ELS Requirements: The ELS product (as outlined in Part 1) may be formed of discrete units or integrated into a single packaged scheme. Where discrete units are used, they should preferably be interconnected using metallic or fibre optic cables. Other means of connection such as Wi-Fi are not deemed 'Fail Safe' and require installation of Export Limiting Relay. Irrespective of the media used for interconnecting between the discrete units, if the communication path fails the generation output shall be reduced to the allowed MEC within 5 seconds time to prevent the Agreed Export Capacity from being exceeded.

Description of the fail-safe functionality (Interruption of sensor signals, disconnection of load, loss of power, internal fault detection etc.)

5.1 Describe Component Interconnection here:

Text or diagram or if attached as PDF to this form tick here: ☐

Ginlong was designed with a fail safe mechanism , ensuring that in the event of communication failure or loss of source in any component, reducing the component generation to zero.
All components of the system are hardwired and will monitor in real-time whether the system is functioning properly. If a fault is detected, the system will immediately reduce the output power to zero for protection.

5.2 System Fail Safe Test Results:

Please indicate appropriate answer

No.	Test	System Response	Time <5s	Pass
1	Remove Power Supply to PMU	Reduce output power to 0W	Yes √ No ☐	Yes √ No ☐
2	Remove Power Supply to CU	Reduce output power to 0W	Yes √ No ☐	Yes √ No ☐
3	Remove Power Supply to all Energy Source Units	Reduce output power to 0W	Yes √ No ☐	Yes √ No ☐
4	Remove power Supply to all DCUs	N/A-no demand control used	Yes ☐ No ☐	Yes √ No ☐
5	Remove Power Supply to all Communication Hub Switches	N/A-no demand control used	Yes ☐ No ☐	Yes √ No ☐
6	Unplug PMU- CU Communications Cable	Reduce output power to 0W	Yes √ No ☐	Yes √ No ☐
7	Unplug CU – ESIU Communications Cable (at ESIU end)	N/A-no demand control used	Yes ☐ No ☐	Yes √ No ☐
8	Unplug all ESIU –Communication Cables in turn	N/A-no demand control used	Yes ☐ No ☐	Yes √ No ☐
9	Unplug CU – DCU Comms. Cable for each DCU unit (at DCU end)	N/A-no demand control used	Yes ☐ No ☐	Yes √ No ☐
10	Unplug DCU – Load Comms cable	Reduce output power to 0W	Yes √ No ☐	Yes √ No ☐

The purpose of the 'Fail Safe' Tests is to ensure that if any part of the ELS fail, the exported power does not exceed the MEC by more than 5% for more than 5 seconds.

It is a fixed requirement that at no time during the 'Fail Safe' sequence shall the exported power rise above the MEC by more than 5% for more than 5 seconds.

PART 6: ACCURACY AND RESPONSE TIME

ESB Networks ELS requirements:
The overall accuracy of the ELS product (as outlined in Part 1) with regard to measurement and control of MEC shall be determined by the manufacturer of the system and published within its operating manual. In carrying out the functional tests these tolerances shall be taken into account.

Functional testing – Injection testing
Export limit conditions can be simulated by temporarily connecting the PMU to a calibrated injection test set.

When using an injection test set, there is no feedback loop between the ELS product (as outlined in Part 1) and the injection test set. This has two significant implications for the test process:

1. As soon as the ELS begins to operate, because it sees no corresponding decrease in export levels, the control loop continues running until the Energy Source Units output is reduced to the programmed export capacity or below.
2. To ensure that the ELS is reacting by the correct amount and within an acceptable time period, a step change needs be applied by the test set to the PMU.

The following Step Change test sequence shall be performed:

Please indicate appropriate answer

No.	Test	Step Change Final Value	Outcome	Pass / Fail
1.	Step change A 95% to 105%	Export = 105% of programmed export limit value	At 95% Voltage	Pass √ Fail ☐
			At 100% Voltage	Pass √ Fail ☐
			At 110% Voltage	Pass √ Fail ☐
	Step change A 95% to 110%	Export = 105% of programmed export limit value	At 95% Voltage	Pass √ Fail ☐
			At 100% Voltage	Pass √ Fail ☐
			At 110% Voltage	Pass √ Fail ☐
	Step change A 95% to 120%	Export = 105% of programmed export limit value	At 95% Voltage	Pass √ Fail ☐
			At 100% Voltage	Pass √ Fail ☐
			At 110% Voltage	Pass √ Fail ☐
2.	Step change B 95% to 105%	Export = 110% of programmed export limit value	At 95% Voltage	Pass √ Fail ☐
			At 100% Voltage	Pass √ Fail ☐
			At 110% Voltage	Pass √ Fail ☐
	Step change B 95% to 110%	Export = 110% of programmed export limit value	At 95% Voltage	Pass √ Fail ☐
			At 100% Voltage	Pass √ Fail ☐
			At 110% Voltage	Pass √ Fail ☐
	Step change B 95% to 120%	Export = 110% of programmed export limit value	At 95% Voltage	Pass √ Fail ☐
			At 100% Voltage	Pass √ Fail ☐
			At 110% Voltage	Pass √ Fail ☐
3.	Step change C 95% to 105%	Export = 120% of programmed export limit value	At 95% Voltage	Pass √ Fail ☐
			At 100% Voltage	Pass √ Fail ☐
			At 110% Voltage	Pass √ Fail ☐
	Step change C 95% to 110%	Export = 120% of programmed export limit value	At 95% Voltage	Pass √ Fail ☐
			At 100% Voltage	Pass √ Fail ☐
			At 110% Voltage	Pass √ Fail ☐
	Step change C 95% to 120%	Export = 120% of programmed export limit value	At 95% Voltage	Pass √ Fail ☐
			At 100% Voltage	Pass √ Fail ☐
			At 110% Voltage	Pass √ Fail ☐

The procedure for performing the test is as follows:

- Initially apply 100% of nominal voltage and inject current (at unity power factor) to mimic an exported Active Power equivalent to 95% of the export limit setting. Check that the ELS product(as outlined in Part 1) does not operate.
- Step up the current to give an export Active Power equivalent to 105% of the export Active Power limit (for Test A), Check that change in export level is “seen” by the PMU.
- Check that the Active Power exported by the generation reduces to a value at least 5% below the export limit setting within the specified reaction time. The test shall be repeated at the maximum statutory voltage (i.e. at 110% of nominal voltage at LV) and also at the minimum voltage limit (i.e. 90% of nominal voltage for LV connections).
- All the above tests shall also be repeated for step increases from 95% to 110% of the export limit and from 95% to 120% of the export limit as detailed above.

When injection testing is complete, the correct orientation of any current monitoring connections (including CT orientations) which may have been removed for the test shall be checked and verified as correct.

PART 6A: CONFIRMATION OF OPERATION OF ELS TO LIMIT EXPORT AS REQUIRED

ESB Networks ELS requirements:
The ELS product(as outlined in Part 1) shall detect an excursion and reduce the export to the MEC or less, within 5 seconds.
Under normal operating conditions, the ELS product (as outlined in Part 1) response time is less than 5 seconds.
Under loss of communications, or loss of power to any part of the ELS product (as outlined in Part 1), response time is less than 5 seconds.

Operation of above is confirmed	Yes √ No ☐
Operating Manual is available	Yes √ No ☐
The settings applied to ELS product(as outlined in Part 1) have taken account of the published (DOC-250221-GBT) tolerances to ensure the required export limits and voltage limits shall be maintained.	Yes √ No ☐

PART 7: PASSWORD PROTECTION

ESB Networks ELS requirement:

Once installed and commissioned, the ELS product(as outlined in Part 1) settings shall not be capable of being readily altered by the Customer and shall only be changed with the written agreement of ESB Networks.	Yes √ No ☐
All settings of the ELS product(as outlined in Part 1) are password protected and cannot be altered by the customer.	Yes √ No ☐

PART 8: INSTALLATION REQUIREMENTS

ELS Installation Requirements for ELS Product(as outlined in Part 1):

Please insert installation requirements or if attached as PDF to this form tick here: ☐

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https://www.solisinverters.com/uploads/file/Solis_Manual_S6-EH3P(3-10)K-H-EU_EUR_V1,3(20230818).pdf

PART 9: MANUFACTURERS ELS PRODUCT DECLARATION FOR ESB NETWORKS

ESB Networks ELS requirement: Once installed and commissioned, the scheme settings shall not be capable of being readily altered by the Customer and shall only be changed with the written agreement of ESB Networks.

The ELS product (as outlined in Part 1) complies with the 'Conditions Governing the Connection and Operation of Export Limiting Schemes' (DOC-250221-GBT) when installed and commissioned in accordance with the product documentation.

Manufacturer's (as outlined in Part 1) Representative Details

Representative Name: Pan Ruyi

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Signature: PanRuyi

Date: 2023/10/10