Appendix B – Manufacturer's CLS Product Information

This form is available in a Microsoft Word version from the ENA's website.

G100/2 - Form B - Compliance Verification Report for Customer Export or Import Limitation Schemes

This form shall be used by the **Manufacturer** to demonstrate and declare compliance with the requirements of EREC G100. The form can be used in a variety of ways as detailed below:

1. For **Fully Type Tested** status

   The **Manufacturer** can use this form to obtain **Fully Type Tested** status for a **CLS** by registering this completed form with the Energy Networks Association (ENA) Type Test Register.

2. To obtain **Type Tested** status for a product

   The **Manufacturer** can use this form to obtain **Type Tested** status for one or more **Components** which are used in a **CLS** by registering this form with the relevant parts completed with the Energy Networks Association (ENA) Type Test Register.

3. One-off Installation

   The **Installer** can use this form to confirm that the **CLS** has been tested to satisfy the requirements of this EREC G100. This form shall be submitted to the **DNO** before commissioning.

A combination of (2) and (3) can be used as required, together with Form C where compliance of the **CLS** is to be demonstrated on site.

Note:

If the **CLS** is **Fully Type Tested** and registered with the Energy Networks Association (ENA) Type Test Register, Form C shall include the **Manufacturer**'s reference number (the Type Test Register system reference), and this form does not need to be submitted.

Where the **CLS** is not registered with the ENA Type Test Register or is not **Fully Type Tested** this form (all or in parts as applicable) shall be completed and provided to the **DNO**, to confirm that the **CLS** has been tested to satisfy all or part of the requirements of this EREC G100.

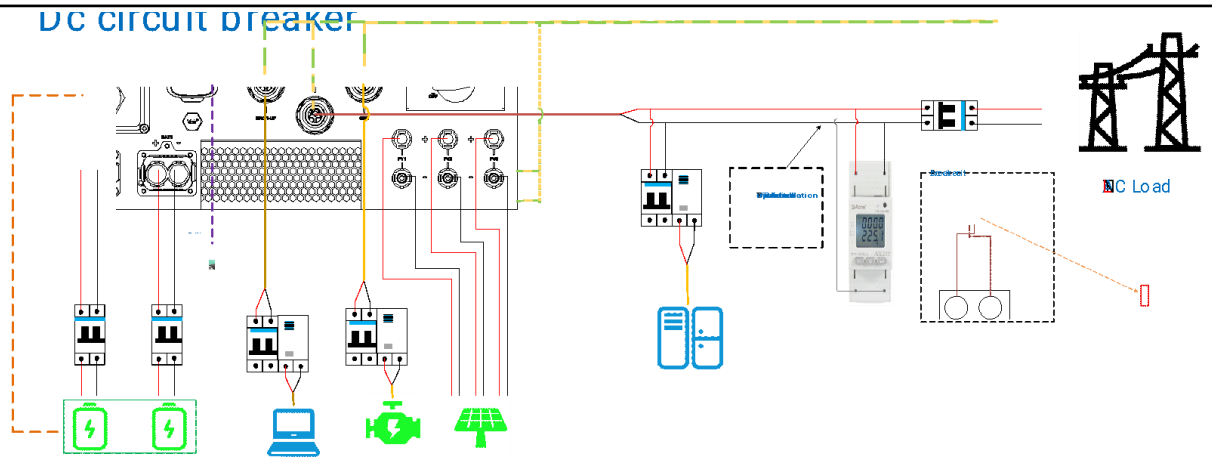
CLS Designation	G100 CSL Control System
Manufacturer name	Eleven Energy Ltd
Address	28 Chesterton Road Cambridge United Kingdom CB4 3AZ

Tel	+44 1638 750 660	Web site	https://www.elevenenergy.co.uk/
Email	info@elevenenergy.co.uk		
Installer's name			
Address			
Tel		Web site	
Email			

Export/Import capabilities			
Export	**Y** / ~~**N**~~	Import	**Y** / ~~**N**~~

Description of Operation

EREC G100 section 4.2 requires a description of the **CLS**, and schematic diagram, to be provided to the **Customer**. Please provide that description and the diagram here.



CLS Operation

The Customer Limitation Scheme (CLS) incorporates an Acrel ADL200n-CT meter connected via MODBus. This meter uses a Current Transformer (CT) to monitor the incoming grid supply. Every second, it transmits averaged Active Power measurements to the Energy Management System (EMS) located on the inverter's control board. The EMS processes this data to generate setpoints and control the inverter's AC output power.

The Maximum Power Point Tracking (MPPT) controller optimizes power transfer from the photovoltaic (PV) panels to the inverter. As the system approaches the maximum permitted export limit, the MPPT adjusts by reducing power from the PV panels or curtailing battery export to maintain compliance with the agreed limits.

CLS Configuration

A site-specific export limit (in watts) is programmed into the CLS. Configuration is restricted to users with engineering-level access, ensuring compliance with G100/2 requirements (paragraph 4.2) and preventing unauthorized modification by system owners.

CLS Response Time

The CLS detects and corrects export limit excursions within a response time of **5 seconds**, thereby ensuring adherence to the Agreed Export Capacity (AEC).

CLS State Compliance

The Acrel ADL200n-CT meter meets the timing and excursion thresholds defined for States 1, 2, and 3 under the G100/2 framework.

- **State 1**: Normal operation with currents within set limits.
- **State 2**: Temporary excursions, corrected within defined response times.
- **State 3**: A fail-safe mode activated by prolonged or severe excursions.

CLS Connection Method

A hard-wired connection is used between the Acrel ADL200n-CT meter and the inverter, guaranteeing reliable communication under all operating conditions.

Power Quality Compliance

The integrated Acrel ADL200n-CT meter and inverter system fully comply with the power quality requirements of the G100/2 standard, including voltage stability and harmonic distortion mitigation.

CLS Modes of Operation

The CLS operates in accordance with **G100** requirements, with configured **Maximum Export Limit (MEL)** and **Export Import Limit (EIL)** values. The system functions in three defined states:

State 1: Normal Operation

- The inverter continuously monitors data from the meter.
- Based on this data, the inverter regulates its output or input to keep power within the predefined MEL and EIL limits.

State 2: Load Adjustment

- If load fluctuations or other factors trigger State 2, the meter rapidly adjusts the inverter settings.
- The inverter returns to State 1 within **2 seconds**, maintaining compliance with agreed limits.

State 3: Safety Shutdown

- In cases of communication failure, grid voltage abnormalities, or other critical faults:
  - The inverter shuts down or stops output within **5 seconds**.
  - Operation remains suspended until the installer verifies that the operating environment meets required conditions.
- Once confirmed, the inverter is restarted and normal operation resumes.

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.

Internal Communication

All internal components of the CLS communicate with the inverter via the following hard-wired methods:

1. **ModBus RS485 Protocol**: Ensures robust and reliable data transmission between devices.
2. **Dedicated Current Transformer (CT)**: Provides accurate and consistent current measurement.

External Communication

External communication is facilitated through a datalogging device with the following features:

- **Secure Setup**: During commissioning, the Eleven Energy App automates the setup process and secures all access settings. A login password is created and stored securely in the database, along with a generated Wi-Fi encryption key for potential future use.
- **Secure Data Transmission**: Communication between the datalogging device and the customer's network occurs over a secure Wi-Fi connection. All data exchanged over the Internet between the inverter and the cloud servers is encrypted using TLS v3
- **Heartbeat Monitoring**: A continuous "heartbeat" signal is maintained between the datalogging device and the cloud server to ensure the connection remains active.

Error Handling

In the event of an internet connection failure:

- The CLS system marks the system status as **"Offline."**
- The user is promptly notified of the communication issue to enable timely resolution.

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.

The energy storage system adheres to the cybersecurity standards specified in **ETSI EN 303 645 V2.1.1**. A detailed cybersecurity declaration is provided separately.

Password Security and Commissioning

- **Compliance with Provision 5.1-1**: The system enforces secure password practices during commissioning. The user is required to set a new password before the process can be completed.

Protection Against Brute-Force Attacks

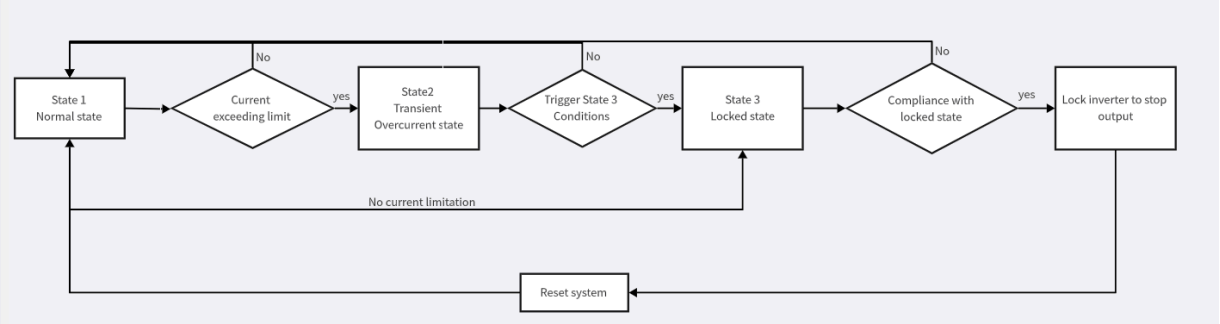
In accordance with **ETSI Provision 5.1-5**, the system implements robust measures to prevent brute-force attacks on login credentials:

- After **three consecutive failed administrative login attempts**, the system imposes a lockout. The duration of this lockout increases incrementally with each subsequent failed attempt.
- This mechanism significantly mitigates the risk of sustained attacks by making successive unauthorized login attempts progressively more difficult and time-consuming.

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.
Power quality requirements are met in the respective G99 declarations. Separately provided, along with full test reports.

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.
Fail safe design and operation:



The system incorporates robust fail-safe mechanisms to address various failure scenarios, ensuring safety and compliance with operational standards.

Grid Power Failure:

- As the energy meter is installed at the grid connection point, a loss of grid power will automatically isolate the PV system via standard G99 disconnection protocols.

Energy Meter Failure:

- Meter failure disrupts the RS485 communication link.
- The inverter will respond by:
    - Immediately reducing its power output to 0W.
    - Triggering an alarm to notify the user with a "Meter Communication Error" message.

EMS Power Loss or Failure:

- If the Energy Management System (EMS) loses power or fails, the inverter will be unable to generate output, resulting in an effective shutdown.

RS485 Communication Failure:

- Damage or disconnection of the RS485 communication cable causes signal loss.
- The inverter will respond by:
    - Reducing its output to 0W.
    - Notifying the user with a "Meter Communication Error" alarm.

Current Transformer (CT) Signal Loss:

- Disconnection or signal loss from the CT wiring causes the inverter to permanently reduce its output to 0W. Operation cannot resume without a valid grid power reference.

Operational Records

Note: Record of entering state 2 for the first time

2026-1-12 14:30:50: ################## Publishing CLS state ##################

2026-1-12 14:31:32: info cls: MIL: 82, MEL: 60

2026-1-12 14:31:32: info cls: export Curr: 62.840000 A

2026-1-12 14:31:32: info cls: cls state: 2 -- WARNING

2026-1-12 14:31:32: info cls: import out of range: false

2026-1-12 14:31:32: info cls: export out of range: true

2026-1-12 14:31:32: info cls: meter coms lost: false

2026-1-12 14:31:32: info cls: inv coms lost: false

2026-1-12 14:31:32: info cls: --state2: enter state time :2026-1-12 14:31:22

2026-1-12 14:31:32: info cls: --cnt in state2: 1

Note: Resets state 1

################## Publishing CLS state ##################

2026-1-12 14:31:52: info cls: MIL: 82, MEL: 60

2026-1-12 14:31:52: info cls: cls state: 1 -- NORMAL

2026-1-12 14:31:52: info cls: import out of range: false

2026-1-12 14:31:52: info cls: export out of range: false

2026-1-12 14:31:52: info cls: meter coms lost: false

2026-1-12 14:31:52: info cls: inv coms lost: false

Note: Record of entering state 2 for the second time

################## Publishing CLS state ##################

2026-1-12 14:31:59: info cls: MIL: 82, MEL: 60

2026-1-12 14:31:59: info cls: export Curr: 61.420000 A

2026-1-12 14:31:59: info cls: cls state: 2 -- WARNING

2026-1-12 14:31:59: info cls: import out of range: false

2026-1-12 14:31:59: info cls: export out of range: true

2026-1-12 14:31:59: info cls: meter coms lost: false

2026-1-12 14:31:59: info cls: inv coms lost: false

2026-1-12 14:31:59: info cls: --state2: enter state time :2026-1-12 14:31:49

info cls: --cnt in state2: 2

Note: Resets state 1

################## Publishing CLS state ##################

2026-1-12 14:32:19: info cls: MIL: 82, MEL: 60

2026-1-12 14:32:19: info cls: cls state: 1 -- NORMAL

2026-1-12 14:32:19: info cls: import out of range: false

2026-1-12 14:32:19: info cls: export out of range: false

2026-1-12 14:32:19: info cls: meter coms lost: false

2026-1-12 14:32:19: info cls: inv coms lost: false

Note: Record of entering state 2 for the third time

################## Publishing CLS state ##################

2026-1-12 14:32:25: info cls: MIL: 82, MEL: 60

2026-1-12 14:32:25: info cls: import Curr: 62.380000 A

2026-1-12 14:32:25: info cls: cls state: 2 -- WARNING

2026-1-12 14:32:25: info cls: import out of range: false

2026-1-12 14:32:25: info cls: export out of range: true

2026-1-12 14:32:25: info cls: meter coms lost: false

2026-1-12 14:32:25: info cls: inv coms lost: false

2026-1-12 14:32:25: info cls: --state2: enter state time :2026-1-12 14:32:15

info cls: --cnt in state2: 3

Note: Resets state 1

################## Publishing CLS state ##################

2026-1-12 14:32:50: info cls: MIL: 82, MEL: 60

2026-1-12 14:32:50: info cls: cls state: 1 -- NORMAL

2026-1-12 14:32:50: info cls: import out of range: false

2026-1-12 14:32:50: info cls: export out of range: false

2026-1-12 14:32:50: info cls: meter coms lost: false

2026-1-12 14:32:50: info cls: inv coms lost: false

Note: The CSL system directly enters state 3:

The fourth occurrence of state 2 within 24 hours is greater than 10 seconds

################## Publishing CLS state ##################

2026-1-12 14:32:57: info cls: MIL: 82, MEL: 60

2026-1-12 14:32:57: info cls: import Curr: 63.420000 A

2026-1-12 14:32:57: info cls: cls state: 3 -- ERROR

2026-1-12 14:32:57: info cls: import out of range: false

2026-1-12 14:32:57: info cls: export out of range: true

2026-1-12 14:32:57: info cls: meter coms lost: false

2026-1-12 14:32:57: info cls: inv coms lost: false

2026-1-12 14:32:57: info cls: --state3: enter state time :2026-1-12 14:32:52:

2026-1-12 14:32:57: info cls: --cnt in state3: Inverter shutdown

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Communication and power supply failures between **Components** and **Devices**. Please document here compliance with EREC G100 section 5.5.

Component/Device	Communication failure test	Power supply failure test
CLS Monitoring Meter	Inverter disconnects from grid in **<5 sec**	Inverter disconnects from grid in **<5 sec**
RS485 Communication Port	Inverter disconnects from grid in **<5 sec**	Inverter disconnects from grid in **<5 sec**
Inverter	Inverter disconnects from grid in **<5 sec**	Inverter disconnects from grid in **<5 sec**
Communication Cable	Inverter disconnects from grid in **<5 sec**	/

Operational Tests

In accordance with EREC G100 section undertake the tests A and B 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:	60A
Nominal Import Limit (for type tests this will be at maximum, minimum and one intermediate setting) in Amp:	82A

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	Below export limit(EL)	105% of EL	**Yes**	**Yes**	60seconds	Yes
2	Below export limit(EL)	110% of EL	**Yes**	**Yes**	60seconds	Yes

3	Below export limit(EL)	120% of EL	**Yes**	**Yes**	60seconds	Yes
4	Below import limit(IL)	105% of IL	**Yes**	**Yes**	60seconds	Yes
5	Below import limit(IL)	110% of IL	**Yes**	**Yes**	60seconds	Yes
6	Below import limit(IL)	120% of IL	**Yes**	**Yes**	60seconds	Yes
Test B						
Nominal Export Limit:						60A
Nominal Import Limit						82A
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	Below export limit(EL)	105% of EL	**Yes**	**Yes**	60seconds	Yes
8	Below import limit(IL)	105% of IL	**Yes**	**Yes**	60seconds	Yes
Test C						
Nominal Voltage						230V
No	Starting voltage	Step value	**CLS** registers change in voltage?	**CLS** and/or **Component** and/or **Device** initiates correct response?	Duration of step in test	Correct state 1/ state 2 operation
9	100% Vn	Voltage 112% of nominal	**Yes**	**Yes**	60seconds	Yes
10	100% Vn	Voltage 87% of nominal	**Yes**	**Yes**	60seconds	Yes
11	100% Vn	Voltage 108% of nominal	**Yes**	**Yes**	60seconds	Yes
12	100% Vn	Voltage 92% of nominal	**Yes**	**Yes**	60seconds	Yes
Test D						
Nominal Voltage						230V
No	Starting voltage	Step value	**CLS** registers change in voltage?	**CLS** and/or **Component** and/or **Device** initiates	Duration of step in test	Correct state 3 operation

				correct response?		
13	100% Vn	Voltage 112% of nominal	**Yes**	**Yes**	60seconds	Yes
14	100% Vn	Voltage 87% of nominal	**Yes**	**Yes**	60seconds	Yes
15	100% Vn	Voltage 108% of nominal	**Yes**	**Yes**	60seconds	Yes
16	100% Vn	Voltage 92% of nominal	**Yes**	**Yes**	60seconds	Yes

State 3 Reset
These tests are to demonstrate compliance with section EREC G100. 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.
When **State 3** is triggered, the system records the event in its internal log, marking the state as active. The following steps outline the reset process: 1. **Confirmation of Operating Conditions**: ● After the permitted time period has elapsed, the installer must confirm with the user that the operating environment complies with all requirements. **2. Reset Procedure:** ● Once compliance is verified, the system can be reset to **State 1** via the associated app. ● The reset process ensures that the system is operating within the agreed **Export Limit (EL)** and/or **Import Limit (IL)** range before transitioning back to normal operation.

Note:

This report covers EL5K-1PH, EL6K-1PH, EL8K-1PH, EL9.9K-1PH, EL10K-1PH, EL12K-1PH

series of Hybrid Inverter products.