

Manufacturer's G100 Product Declaration

Declaration of Conformity in line with Engineering Recommendation G100

Reference: A. Electricity Networks Association (ENA) Engineering Recommendation G100 Issue 1 2016, Technical Guidance for Customer Export Limiting Schemes.

The manufacturer **Moixa Energy Holdings** hereby confirms that the **Moixa V4 Smart Battery** storage system complies with Engineering Recommendation G100 Issue 1 Amnd 2 2018, Technical Guidance for Customer Export Limiting Schemes, when installed in accordance with the Engineering G100 application guidance notes **provided at Appendix 1.**

The Engineering G100 application guidance notes should be read in conjunction with the Moixa Energy Holdings installation and operation instructions.



Chris Wright (CTO)

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1. Introduction

Engineering Recommendation G100: Technical Guidance for Customer Export Limiting

Schemes “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”.

These guidance notes describe how the installation of a **Moixa V4 Smart Battery** meets the requirements outlined by EREC G100.

2. Description of Operation

*As required by Clause 5.1 of EREC G100, “a description of the scheme, its settings, and a single line diagram should be permanently displayed on site alongside” the **Moixa V4 Smart Battery**.*

During normal operation, the **Moixa V4 Smart Battery** operates in ‘balance mode’. While in ‘balance mode’, the **Moixa V4 Smart Battery** monitors local consumption and generation collecting telemetrics and transmitting these to our machine learning platform in the cloud. The **Moixa V4 Smart Battery** receives recommendations on the best state to be in from the cloud i.e. charge or discharge. Telemetrics are collected from meters installed at the following key points of the system: PV generation point; point of grid connection; and interally from our inverter charger.

While in the ‘balance mode’ state of operation the **Moixa V4 Smart Battery** device has a local ‘control loop’ operating without dependency on the cloud. This control loop reviews any information received from the cloud and actuates if all predetermined control variables are affirmed to be in a predefined state.

The **Moixa V4 Smart Battery** has secure communication links between the various component parts of the system in accordance with the stated requirements of EREC G100 Clause 5.1. The interconnection between the Power Measurement Unit and the **Moixa V4 Smart Battery** system is only achievable via a hardwired RS-485 conenction. Interruption to this connection results in the system automatically disabling discharge or charge. **The system reaction speed under these conditions is less than 5 seconds.**

3. Power Quality Requirements

Where the **Moixa V4 Smart Battery** relies on power electronics (e.g. Converters etc) to control the load it shall also provide information demonstrating compliance with relevant harmonics standards (e.g. BSEN 61000-3-2 and/or BSEN 61000-3-12) or provide data on the harmonic produced in accordance with ER G5.

Moixa Energy Holdings confirms that the Moixa V4 Smart Battery complies with the requirements of the relevant harmonics standards and that the relevant harmonic data has been provided as required by ER G5. Harmonic values are attached with all G98/G99 applications and are available upon request.

4. System Schematic

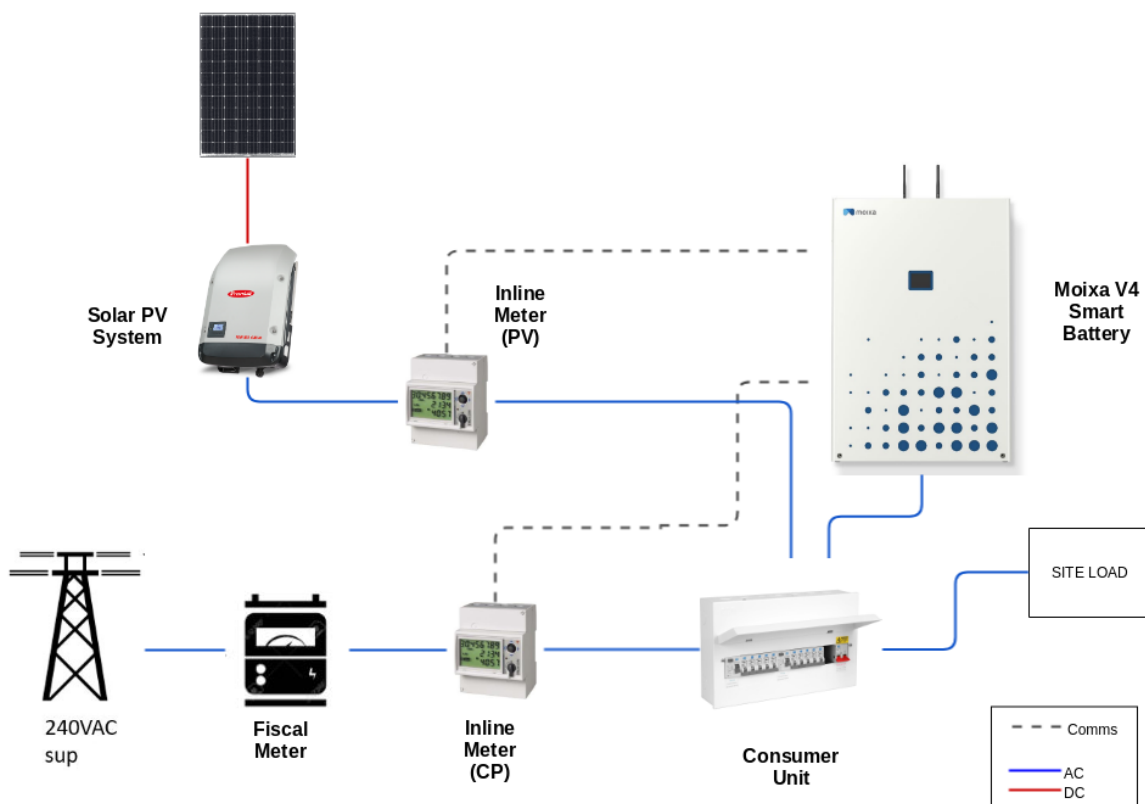
A Moixa V4 Smart Battery installation is formed of four main elements:

1. Main elements:

- A Solar PV System;
- A Moixa V4 Smart Battery System;
- An RS-485 metering unit monitoring grid export and import.
- An RS-485 metering unit monitoring PV generation.

2. System Schematic:

*The following single line diagram provides an overview of the operation of the **Moixa V4 Smart Battery** when installed as an AC-coupled system in conjunction with a solar PV system.*



5. Component Interconnection/Fail Safe Operation

The ELS 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. Alternatively the units may be interconnected using secure radio links but where this is the case these links should be licensed (by OFCOM) and have a planned availability of 99.9% or higher. Irrespective of the media used for interconnecting between the discrete units, if the communication path fails the generation output should be reduced to a nominal value stipulated by the DNO within a set response time to prevent the Agreed Export Capacity from being exceeded.

The system is made up of multiple discrete components. Each component of the system communicates via galvanically connected metallic cables.

5.1 Describe Component Interconnection here:

When installed in conjunction with a Solar PV System the **Moixa V4 Smart Battery** is able to operate in 'ELS Mode'. The following text can be used to describe this operational mode:

When export to grid is detected to be above the preagreed limit for generation capacity (set by the DNO on an install-by-install basis), the **Moixa V4 Smart Battery** will reduce its generation to a value that results in an aggregate generation capacity less than this limit within 5 seconds.

This is achieved through: the monitoring of export to grid at the consumer unit of the household with an in-circuit or CT Power Monitoring Unit; monitoring of PV generation capacity with an in-circuit or CT Power Monitoring Unit; the controlling of local generation capacity of the **Moixa V4 Smart Battery** system.

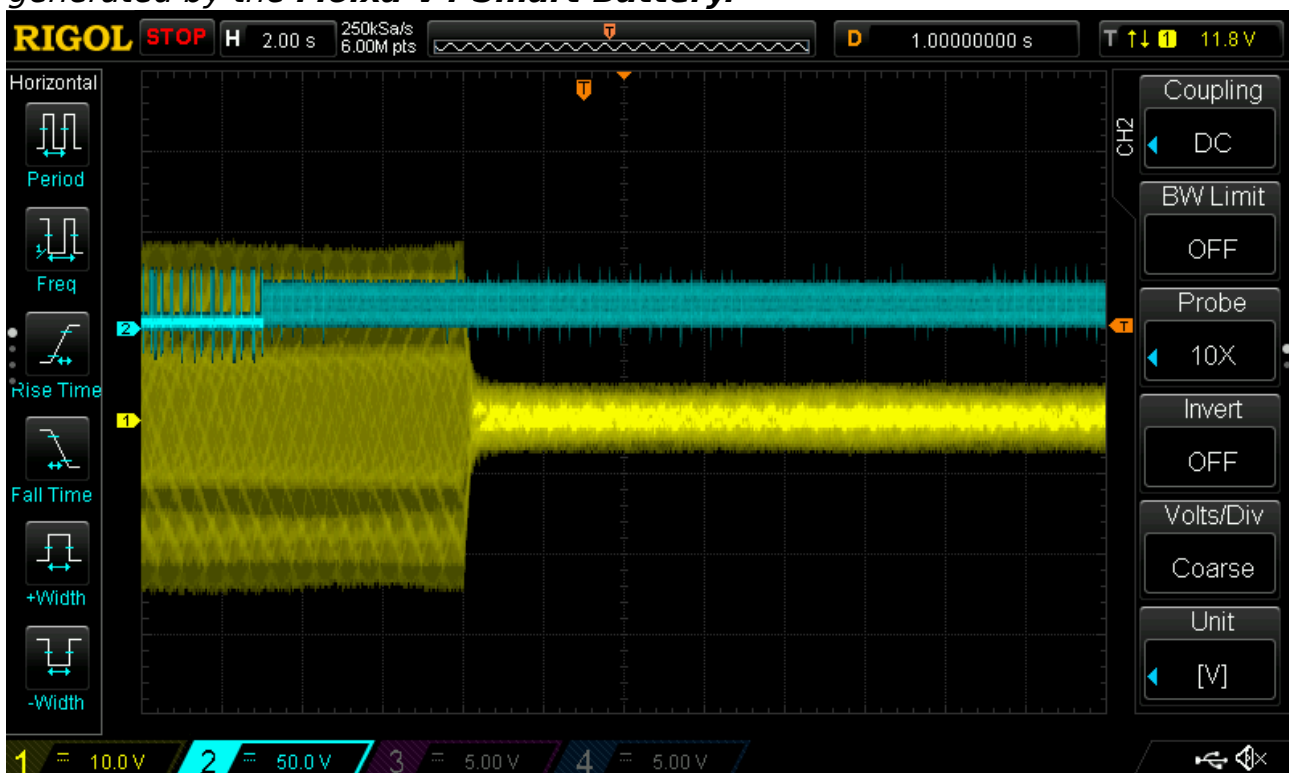
5.2 System fail-safe test results

As required by EREC G100 clause 5.5, the **Moixa V4 Smart Battery** will detect an excursion and reduce the export to the Agreed Export Capacity or less within 5 seconds.

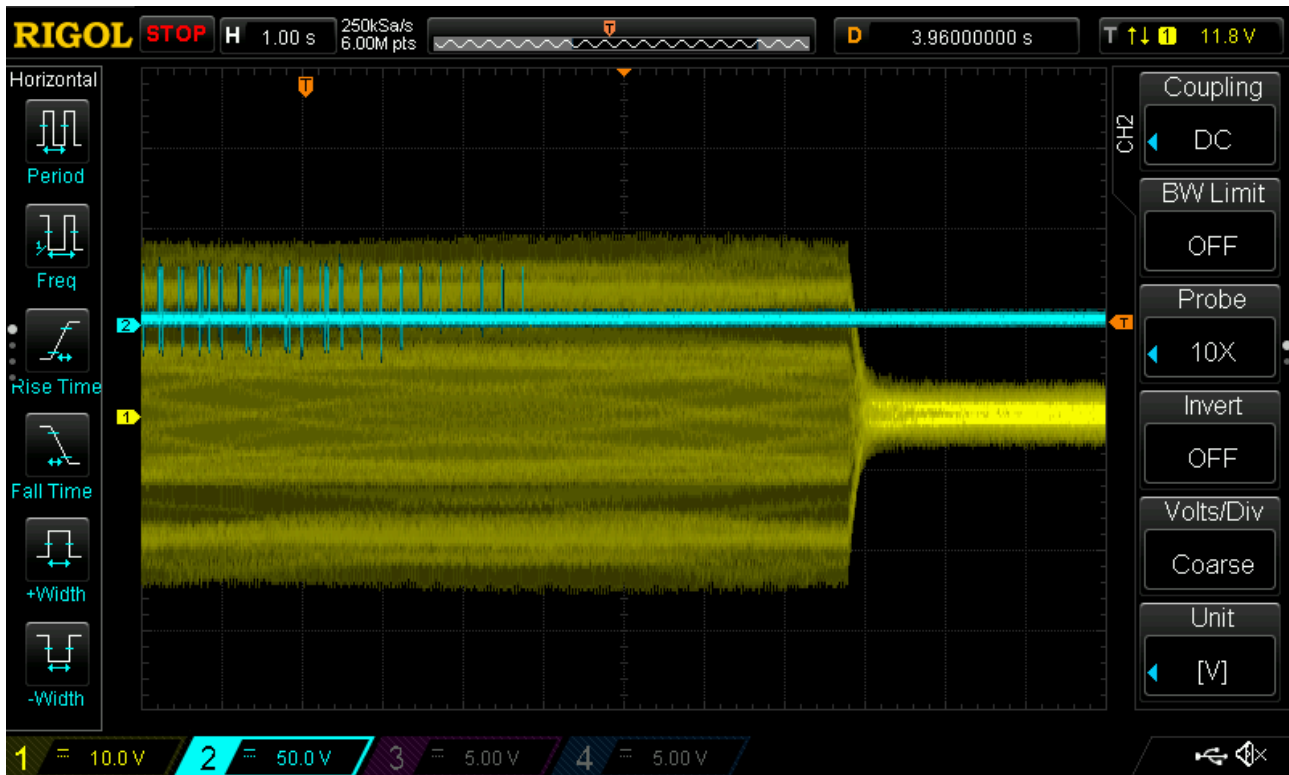
Additionally the Moixa V4 Smart Battery behaves in the following way:

No	Test	System Response	Time	Pass
1	Disconnection of power to Control Unit.	Loss of 12 V power supplies detected and the system switches off.	< 60s	Yes
2	Disconnection of power to meter	Loss of meter data is detected and the system switches off.	< 5s	Yes
3	Disconnection of communication cable between Control Unit and Power Metering Unit.	Loss of meter data is detected and the system switches off.	< 5s	Yes

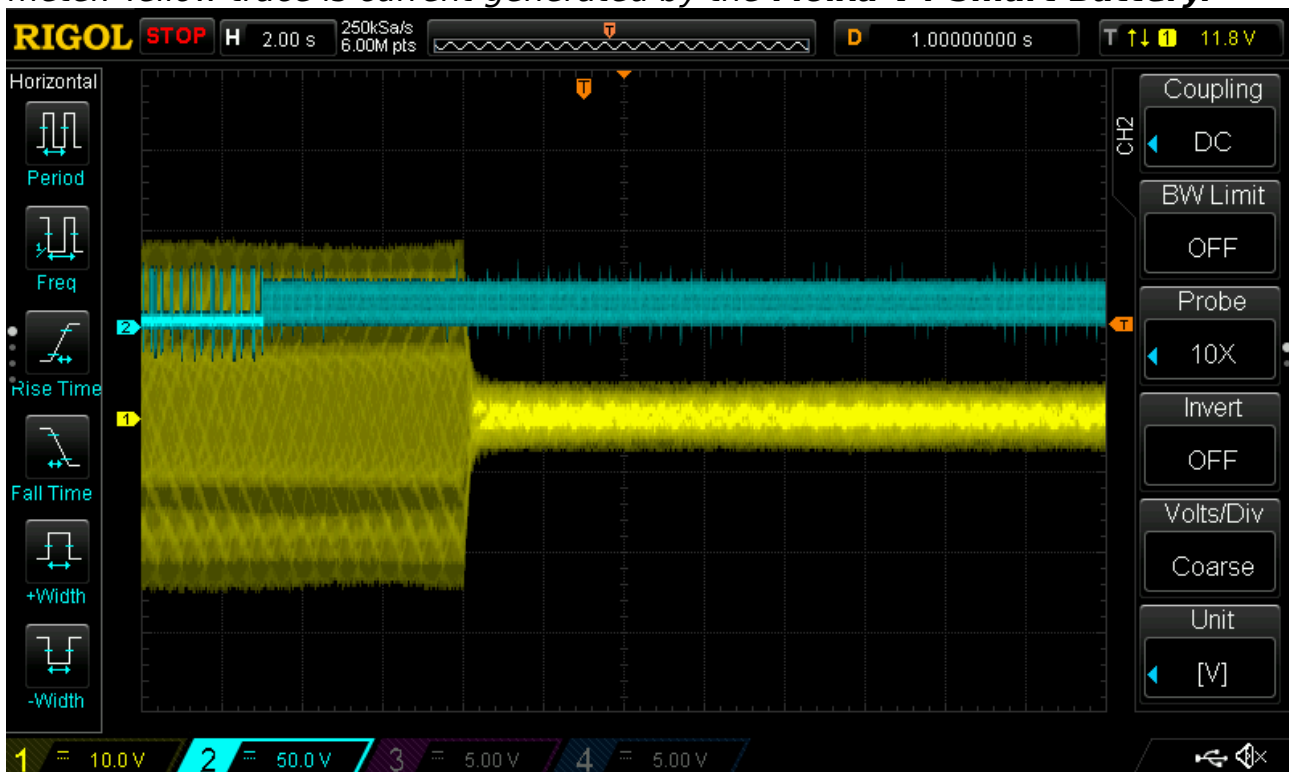
*Test 1 result: Channel 2 blue trace is CU power. Yellow trace is current generated by the **Moixa V4 Smart Battery**.*



*Test 2 result: Channel 2 blue is communication from the CU to the meter; communication stops due to power down of meter. Yellow trace is current generated by the **Moixa V4 Smart Battery**.*



*Test 3 result: Channel 2 blue trace is communication between the CU and meter. Yellow trace is current generated by the **Moixa V4 Smart Battery**.*



6. Accuracy & Response time

The overall accuracy of ELS with regard to measurement and control of Active Power and, where applicable, Voltage, shall be determined by the manufacturer of the system and published within its operating manual. The **Moixa V4 Smart Battery** has been tested for the following function errors:

Test	Result
Sensing passed test	Yes
Measurement passed test	Yes
Processing passed test	Yes
Communication passed test	Yes
Control passed	Yes
Environmental factors passed test (expected ambient temperature range)	Yes
Operating Manual is available	Yes
The settings applied to Moixa V4 Smart Battery have taken account of the published tolerances to ensure the required export limits and voltage limits will be maintained.	Yes

7. Password Protection

As stated by Clause 5.1, once installed and commissioned, the scheme settings should not be capable of being readily altered by the Customer and shall only be changed with the written agreement of the DNO.

All **Moixa V4 Smart Battery** settings are password protected and cannot be altered by the customer.

8. Moixa V4 Smart Battery G100 Installation Requirements

The capability for the **Moixa V4 Smart Battery** to limit aggregate export capacity is limited by the ability of the system to limit only the export capacity of the **Moixa V4 Smart Battery**. If the export limit agreed by the DNO for the installation is below the rated maximum export of any other component of the system i.e. Solar PV System the **Moixa V4 Smart Battery** is unable to limit the export to an acceptable capacity.

9. Contact information

Moixa Technology
m. +44 (0)75 9770 7495
e. sean.whittaker@moixa.com
Ground Floor, 29-31 Saffron Hill, London, EC1N 8FH