

Sundial AC Battery Storage System: **SDM: M2,M6,M8**

Export Limiting Compliance: **EREC G100**

Introduction

The PowerFlow Energy Sundial battery storage system is designed to proportionally divert exported power into an internally controlled lithium iron phosphate battery pack. The Sundial system is fundamentally design to increase self consumption and there for will not export power from the battery to the local network. In addition, the Sundial system is fundamentally designed to reduce export from the solar PV generator. In this way no output power will occur when the building is in an export state, Therefore it cannot contribute to the total export power of a solar PV generator in normal operation.

Charging Mode

The Sundial system actively charges each battery cell pack individually thus reducing export power and acting as a grid balancer. The main supply is CT metered to determine the amount of export energy available. Each pack is charged in discrete 50 watt stages. As the export power increases, more stages of charge are connected to reduce export still further. In order to account for fluctuations in supply voltage, the Sundial system will always leave approximately 70 watts of export in place to act as a buffer to ensure no grid energy is imported to charge the battery. When each pack reaches its fully charged state, the internal system controller will limit charge only to those packs still demanding charge. Therefore, during its charge cycle and when the system is approaching full charge, the full charge power will be reduced slowly until all packs are fully charged. At this point, the system cannot reduce export power for the solar PV generator. All Sundial charging systems contain power factor correction as standard

Output Mode

The Sundial system actively discharges each battery pack only when the building is in a net import state of 175 Watts or greater based on the CT measurement. The Sundial system modulates its output power in discrete 125 Watt stages. As the import power increases, more stages of output are connected to reduce import still further. Should import reduce, the system backs off stages within 0.6 seconds to ensure output power is not feed back to the network. In order to account for fluctuations in supply voltage, the Sundial system will always leave approximately 70 watts of import in place to act as a buffer to ensure no energy from the battery is exported to the network. In this way, Sundial again works as an active grid balancer when outputting. All Sundial output systems contain build in reactive power control as standard.

The PowerFlow Sundial battery system complies with the DNO's requirements as follows:

EREC G100 Requirement:

The Export Limitation Scheme is fail-safe and limits export if any of the discrete units or communication links that comprise the Export Limitation Scheme fail or lose their source of power. All components have been tested in line with section 7

Compliance: The Sundial system uses an internal hard wired RS485 communication network to connect and control all connected battery modules from an internal central master control computer. Each module controls its own input and output power via its own connected battery management system. Should any of the modules lose communication with the system master controller, or should the power to the device fail, the module is designed to shut down within 2 seconds.

EREC G100 Requirement:

When the Export Limitation Scheme operates it reduces the exported Active Power to a value that is equal to, or less than, the Agreed Export Capacity within 5s.

Compliance: PowerFlow Sundial uses its own Focus Point method of measurement, referred to as F-POINT technology. This is a measurement technique which uses half cycle data capture to obtain a true RMS real power value accounting for power quality issues within the sine wave. The Sundial system captures measurement information over a 200 millisecond period and further commands sent through the hard wired RS485 data network take a further 400ms. When in output mode, once the Sundial system detects 0W, it reduces an output stage and thus generation within the period stated above to prevent export. The measurement system is based on a hard wired connected CT placed at the origin of the supply. Should the communication with the CT fail, the system will automatically shutdown any output within the stated time period. The F-POINT technology measurement method has been externally tested and verified by the University of Gloucestershire.

EREC G100 Requirement:

A reverse power relay is fitted which will disconnect the generation if the export goes 5% above the Agreed Export Capacity for longer than 5s (not required for fail-safe LV metered connections).

Compliance: The output system of Sundial is fundamentally not designed to output should measurement system read that the building is in an export state, therefore, the output power cannot be added to any export power from the onsite solar generation system. Should the Sundial system fail, all software protocols are designed to shut output down. In addition, a reverse N/O power relay is fitted to the DC supply side of the AC inverter. Should the export reach the G83/3 limit and the system is in output mode, the system relay will open and the system will disconnect from the network. If voltage is disconnected from the system, it will also disconnect from the network in addition to the G83 protection relays as part of the inverter control.

EREC G100 Requirement:

On completion of commissioning, all settings are restored to normal operating values and password protected or sealed to prevent Customer access. A description of the scheme, its settings, and a single line diagram is displayed on site.

Compliance: Yes, the internal settings cannot be changed and are password protected to prevent this. A line diagram of the Sundial system can be seen in appendix one of this document.

EREC G100 Requirement:

The system must not rely on wireless communications (e.g. Bluetooth, Wi-Fi etc.) between the various components of the export limiter system (e.g. the sensors, the export limiter and the inverters).

Compliance: All internal RS485 communication is hard wired using CAT5e or CAT6 cabling. The external CT measurement also uses hard wired twisted pair cabling and PowerFlow do not offer any wireless communication for system control.

EREC G100 Requirement:

The installations must meet all relevant power quality requirements and ENA recommendations for G5, P28, P29, and comply with BS7671.

Compliance: All PowerFlow Sundial devices have been certified to the relevant standard of harmonics and flicker and EMI radiated emissions. A compliance statement is available to download from www.powerflowenergy.com and specific regulatory testing certification can be supplied on request from the DNO.

I confirm that the above mentioned products adhere to the current requirements of the DNO for G100 export limiting devices.



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(3.68kW Example)

