

Manufacturer's declaration. Compliance with ENA EREC (Engineering Recommendation) G100

Export Limitation Systems (ELS)

G100 Compliance Certificate

Manufacturer: GivEnergy Ltd

EM115/EM418 Meter with Modbus connection.

To implement export limitation in a GivEnergy Hybrid or AC Coupled Inverter, an Energy Meter EM115 with a current transformer or EM418 100A Mains Meter with Modbus communication is used directly connected to the inverter.

The meter has an integrated RS485 port hard wired to the following inverters: GIV-AC-3.0, GIV-HY-3.6, GIV-HY-5.0. UK DNO's require a fail-safe operation hard-wired between the components (Inverters, electricity meter and power controller) of the export limiter scheme and specific power quality.

REQUIREMENT: The scheme has hard wired communication links between the various components

The communication is made via Modbus RS485 output

REQUIREMENT: The export limitation scheme operates signals to the generation to reduce output within 1 second.

The EM115/EM418 transmits measured Active Power values, one averaged value per second to the GivEnergy EMS (Energy Management System). The GIV-EMS sends new set points and controls the AC output power from the inverter. The MPPT controller adjusts the power transfer from the panels to the inverter output (Hybrid Range) and From Battery on AC Coupled. If the maximum allowed exported power has been reached the MPPT will reduce the production from the PV panels (Hybrid) or Battery from AC Coupled .

REQUIREMENT. The scheme is fail safe and limits export if the export limiter fails or loses its power supply

If the GIV-EMS or the EM115/EM418 fails, the export energy will remain to the agreed level or less as originally set.

REQUIREMENT: When the export limitation scheme operates, it will reduce the exported active power to a value equal to or less than, the agreed export capacity.

Power export peaks of typical load steps are limited by the export control circuit within 5 sec.

Note: In order to run 0-watt closed loop control with PV system, it is required to operate a base load (self-consumption) of at least 0.5% of the rated output power of the solar inverter.

The EM115/EM418 meter is the power measurement unit and the export limitation is solely calculated by the inverter and communication protocol and no other hardware. Any schematic will therefore not comprise of additional discrete units such as detailed in G100 (Load Control Unit, Interface Unit, Generator Interface Unit or Control Unit).

The Hybrid Inverter adjusts the power from the PV Modules by controlling the operating points so that the inverter does not generate energy it does not need from the solar PV panels.

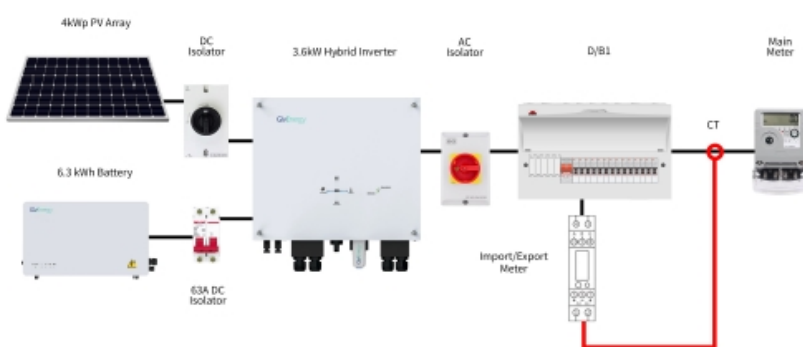
The GivEnergy Inverters do not make use of resistive, inductive or any other type of load to dump excessive energy, including water heaters, therefore there are not additional harmonics due to the Export Limitation System functioning.

The inverter generated harmonics are stated in the respective G98/G99 certification.

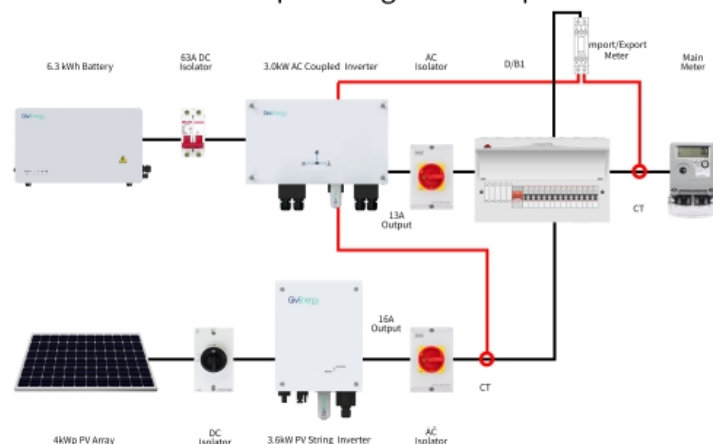
The ELS may be programmed with a site export limit in W and is can only be set by engineering level access to prevent system owner override. The limit can also be set to zero, upon which the inverters output relays will open circuit the inverter to give a true zero output.

There is also the option to set P(V) limits should the DNO specifically request this to prevent exported power above statutory voltage limits. The regulation states The ELS must detect an excursion and reduce the export to the Agreed Export Capacity or less within 5 seconds.

Schematic -12
Hybrid Diagram Example



Schematic -13
AC Coupled Diagram Example



Failure Modes – the following detail describes why the GivEnergy ELS is a failsafe scheme

1. As the Energy meter is located at the grid connection point, a power failure would naturally isolate the PV system through standard G98/G99 methods.
2. If the Energy meter itself were to fail, the RS485 communications would be lost and the inverters would permanently reduce to the site export limit which has been set.
3. If the EMS were to lose its power supply/fail then the inverters would permanently reduce to any export limit which has been set due to communications failure from the unit.
4. If the RS485 communication connections/cable is damaged, then the RS485 signal would be lost and the inverters would permanently reduce to the export limit which has been set.
5. If an individual inverter fails, then that inverter is bypassed due to a parallel connection and does not affect the operation of other components which would continue to limit the system to the export limit which has been set.
6. If the current transformer wiring is removed, or the signal is lost, the inverters would permanently reduce to the site export limit which has been set. Requires the installer to enable the CT loss feature instead of Meter Type in Remote settings page.

Technical Director

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7th of February 2020

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