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Power line communication for DC shutdown equipment - Communication signal, physical layer

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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IEC 63257 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems. It is an International Standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
82/2189/FDIS	82/2593/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

– reconfirmed,
– withdrawn, or
– revised.

INTRODUCTION

This document defines the communication requirements for reducing the output voltage of the DC cables that leave a PV array. This output voltage reduction function can support emergency responders during firefighting operations. For this function, communication is necessary from the inverter / initiator to the PV-modules. Today there are many ways to accomplish this communication task and it is possible to use either wired or wireless solutions. With wireless solutions issues with range and/or communication robustness may occur. Although robustness can be tackled with protocols and modulation schemes, it is sometimes hard to get the necessary range due to physical limitations and normative regulations. With wired communication the need of an additional wire which has to be installed along with the DC power cabling is often a problem. A solution for this is to use power line communication so that the DC power and the information signal are on the same cable and therefore installation requirements and costs are low because the necessity of laying an extra communication cable is eliminated. This document has been developed to set rules for such a power line communication.

1 Scope

This document applies to photovoltaic (PV) system components and communication networks supporting the communication of the DC shutdown equipment using power line communication.

This document defines how to propagate the operational state of the entire PV system (normal / shutdown) to the individual power production components comprising the PV system. The document also describes requirements and constraints associated with power line communication networks that are used to support this application.

NOTE 1 It is possible to have systems communicating in different ways to the method covered in this document. E.g., in systems where all components of the PLC communication are from the same manufacturer. For those systems this document does not apply.

NOTE 2 Not included in the scope of this document are requirements for DC shutdown initiator mechanism, disconnection and de-energization.

NOTE 3 This document does not address whether DC shutdown is required or not.

NOTE 4 EMC requirements are not included in this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC TS 61836, *Solar photovoltaic energy systems - Terms, definitions and symbols*

IEC 62548:2016, *Photovoltaic (PV) arrays - Design requirements*

CISPR 11:2015, *Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement*
CISPR 11:2015/AMD1:2016
CISPR 11:2015/AMD2:2019

Bibliography

IEC 63027, *Photovoltaic power systems - DC arc detection and interruption*

SunSpec Communication Signal for Rapid Shutdown, Version 40

SunSpec Communication Signal for Rapid Shutdown Test specification, Version 19

Report IEA-PVPS T12-09:2017: “Photovoltaics and Firefighters’ Operations: Best Practices in Selected Countries”
https://iea-pvps.org/wp-content/uploads/2020/01/Task_12_Report_Photovoltaics_and_Firefighters__Operations_July_2017.pdf

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