UK Government

Plug-in Solar Device Interim Product Specification

Version 1.0, June 2026

Technical and safety requirements for plug-in solar photovoltaic devices

Department for Energy Security and Net Zero (2026)

Acknowledgements

The Department for Energy Security and Net Zero (DESNZ) acknowledges the contributions of stakeholders including Ofgem, Energy Networks Association (ENA), UK Power Networks and the G98 working group.

Contents

Introduction

This product specification defines specific product requirements for plug-in solar photovoltaic systems intended for connection to an existing low-voltage electrical installation using standard UK mains plug and socket without requiring installation of a separate electrical circuit for export.

This specification should be read in conjunction with:

- DIN VDE V 0126-95, which, with modifications for the UK context, is the primary technical and safety reference case for allowing plug-in solar PV systems in the United Kingdom (UK).[1] For purposes of international compatibility, this specification and DIN VDE V 0126-95 are equivalent in most technical areas but where they differ this specification takes priority.
- Engineering Recommendation G98 Issue 2 Amendment 1 2026 which lists the requirements for the connection of Fully Type Tested Micro-generators (up to and including 16 A per phase) in parallel with public Low Voltage Distribution Networks.[2],[3]
- The IET Wiring Regulations BS 7671 which sets out the national standard for electrical installations in the UK.[4]
- The study commissioned by DESNZ to look at the electrical safety of plug-in solar products on UK circuits. This concluded that plug-in solar products currently used in Germany and elsewhere are safe on UK circuits under defined limits and conditions. This product specification defines those limits and the circumstances in which their use is considered safe. [5]

All plug-in solar equipment supplied for use in the United Kingdom shall comply with the product specifications defined in this document. This specification may be modified from time to time or superseded to allow for new technical innovations in plug-in solar as they arise and to reflect future British Standards related specifically to plug-in solar products.

1 Scope

This document specifies product safety and technical requirements for plug-in solar intended for installation and operation by ordinary persons in parallel with low voltage electrical

[1] DIN VDE V 0126-95 (VDE V 0126-95):2025-12: Plug-in solar devices for mains parallel operation Part 95: Safety requirements and tests
[2] Energy Networks Association Engineering Recommendation G98, Issue 2 Amendment 1: Requirements for the connection of Fully Type Tested Micro-generators (up to and including 16 A per phase) in parallel with public Low Voltage Distribution Networks on or after 27 April 2019
[3] Engineering Recommendation G98 applies to Great Britain only. In Northern Ireland, connection requirements are set out separately by Engineering Recommendation G98/NI. Application of this specification to Northern Ireland is subject to further consideration and may require amendment.
[4] BS 7671:2018+A4:2026: Requirements for Electrical Installations. IET Wiring Regulations
[5] Plug-in PV Systems in the United Kingdom: Electrical Safety, Compatibility and Implementation Considerations

installation. These devices are designed to supply electrical energy to a low voltage electrical installation via a plug connection to a final circuit originally designed for electricity import from the grid according to the BS 7671 electrical standard.

Plug-in solar comprises of at least one PV module, a grid-following microinverter, a connection lead fitted with a plug complying with BS 1363 and a mounting system. The device is designed to be connected to a UK mains socket solely by the manufacturer-supplied plug.

In line with the proposed amendments to the Electricity Safety, Quality and Continuity Regulations 2002 and the Plugs and Sockets etc. (Safety) Regulations 1995, this specification defines the conditions under which plugs designed to BS 1363 shall be permitted to be used for the connection of plug-in solar for power generation and electrical circuits designed to BS7671 shall be permitted to be used for plug-in solar electrical generation export.

This specification applies to single-phase plug-in solar intended for use in domestic environment, with a rated voltage of up to 253 V (AC), a rated frequency of 50Hz and a maximum apparent power not exceeding 800 VA. Only one plug-in solar product shall be used per household[6] to ensure the currents flowing through the electrical connection to the consumer unit remain within safe levels.

This document does not apply to:

- PV systems according to BS 7671 Section 712;
- Building-integrated PV (BIPV);
- Plug-in battery systems;
- Plug-in solar PV devices integrated with battery systems;
- Plug in electricity generation from sources other than solar PV panels.

2 Applicable standards and regulations

DIN VDE V 0126-95 (VDE V 0126-95):2025-12 – *Plug-in solar devices for mains parallel operation, Part 95: Safety requirements and tests*

Engineering Recommendation G98 Issue 2 Amendment 1 – *Requirements for the connection of Fully Type Tested Micro-generators in parallel with public low voltage distribution networks*

BS 7671:2018+A4:2026 – *Requirements for Electrical Installations (IET Wiring Regulations)*

BS 1363 Series – *13 A plugs, socket-outlets, adaptors and connection units*

[6] NOTE: This may be changed to per circuit depending on outcome of consultation

BS 1362 – *General purpose fuse links for domestic and similar purposes*

BS EN 61140 – *Protection against electric shock – Common aspects for installation and equipment*

BS EN IEC 60664-1:2020+A1:2025 – *Insulation coordination for equipment within low-voltage supply systems*

BS EN IEC 61000-6-1 – *Electromagnetic compatibility (EMC) – Immunity for residential, commercial and light-industrial environments*

BS EN IEC 61000-6-3 – *Electromagnetic compatibility (EMC) – Emission standard for residential, commercial and light-industrial environments*

BS EN 60529 – *Degrees of protection provided by enclosures (IP Code)*

BS EN 61032:1998 – *Protection of persons and equipment by enclosures – Probes for verification*

BS EN IEC 61730-1:2018 – *Photovoltaic (PV) module safety qualification – Requirements for construction*

BS EN IEC 61730-2 – *Photovoltaic (PV) module safety qualification – Requirements for testing*

BS EN IEC 61215-1:2021 – *Terrestrial photovoltaic (PV) modules – Design qualification and type approval*

BS EN 50618 – *Electric cables for photovoltaic systems*

BS EN 62852 – *Connectors for DC application in photovoltaic systems*

BS EN IEC 62790 – *Junction boxes for photovoltaic modules*

BS EN IEC 62109-1 – *Safety of power converters for use in photovoltaic power systems – General requirements*

BS EN IEC 62109-2 – *Particular requirements for inverters*

BS EN IEC 62109-3 – *Particular requirements for module-level power electronics*

BS EN 62116 – *Test procedure of islanding prevention measures for utility-interconnected PV inverters*

BS EN IEC 62368-1:2024+A11:2024 – *Audio/video, information and communication technology equipment – Safety requirements*

BS EN 1991-1-3:2025 – *Eurocode 1: Actions on structures – Snow loads*

NA to BS EN 1999-1-3:2023 - *UK National Annex to Eurocode 9: Design of aluminium structures*

BS EN 1991-1-4:2005+A1:2010 – *Eurocode 1: Actions on structures – Wind actions*

NA to EN 1991-1-4:2005+A1:2010 - *UK National Annex to Eurocode 1 – Actions on structures*

PD 6688-1-4:2015 – *Guidance on the application of BS EN 1991-1-4 in the UK*

BS EN 61701 – *Salt mist corrosion testing of photovoltaic modules*

BS EN 62716 – *Ammonia corrosion testing of photovoltaic modules*

BS EN 50524:2021 – *Data sheet and nameplate for photovoltaic inverters*

ISO 7010-M002:2011-05 – *General mandatory action sign "Refer to instruction manual/booklet"*

BS EN 50438 – *Requirements for micro-generating plants to be connected in parallel with public low-voltage distribution networks*

BS EN 62920 – *Power conversion equipment connected to public low-voltage networks*

BS EN IEC 50618 / IEC 62930 – *Cables and connectors for photovoltaic systems*

BS EN IEC 52305-3:2024 – *Protection against lightning – Physical damage to structures and life hazard*

UK Electrical Equipment (Safety) Regulations 2016 as amended

Waste Electrical and Electronic Equipment Regulations (WEEE) 2013 as amended

3 Terms and definitions

The following terms and definitions apply.

3.1 Fastening components

Components of the mounting system that provide the mechanical connection to the supporting structure and/or the load-bearing components of the supporting structure

3.2 Household

A single dwelling unit with its own electricity supply and consumer unit. In buildings containing multiple dwellings (e.g. blocks of flats, converted houses), each dwelling with its own consumer unit is treated as a separate household.

3.3 Maximum PV module DC power (P_{max})

Maximum power output of a PV module under standard test conditions according to BS EN IEC 61215-1:2021), as declared by the manufacturer

3.4 Maximum apparent power (S_{max})

Highest 10-minute average value of the measured apparent output power of a plug-in solar device

3.5 Mounting system

The interface between plug-in solar and supporting structure designed to withstand the applied loads and adjust the tilt angle of the PV modules, comprising of fixing elements, anchoring components, ballast elements, supporting frame and fastening components.

3.6 Mounting type

Configuration of the plug-in solar mounting depending on the type of supporting structure to which it is attached (e.g. balcony, ground, wall or fence).

3.7 Plug

A fused plug with half-insulated pins designed to BS1363-1 intended for connection to BS 1363-2 socket outlets.

3.8 Plug-in solar device

A photovoltaic system, designed as a device that comprises of at least one PV module, a grid-following microinverter, a factory assembled connection line fitted by the manufacturer with a plug designed to BS 1363 and designed to be connected to UK mains socket only via the manufacturer’s plug, as well as a mounting system

3.9 Power connector

Non-permanent connection assembly incorporating a plug and matching socket, intended for the connection of components or associated cables, that can be disconnected manually

3.10 PV module

A packaged, interconnected assembly of solar cells that converts sunlight into direct electrical power.

4 General

4.1 Power and current limitation

Plug-in solar devices shall be designed such that the maximum apparent power S_{max} supplied to the mains installation does not exceed 800 VA and the maximum current does not exceed 3.5 A.

The maximum permissible sum of PV module DC power output (P_{max} according to BS EN IEC 61730-1-2018) is 2000 W. Plug-in solar devices with a total PV module maximum power above 960W should consider professional assessment of the electrical wiring prior to installation.

4.2 Classifications

4.2.1 According to protection class

Plug-in solar devices shall be classified in accordance to BS EN 61140 as Class I or Class II equipment.

4.2.2 According to device types

Plug-in solar can be classified into the following device types:

- Compact device (Figure 4- 1)
- Two-component device (Figure 4- 2)
- Multi-component device (Figure 4- 3)

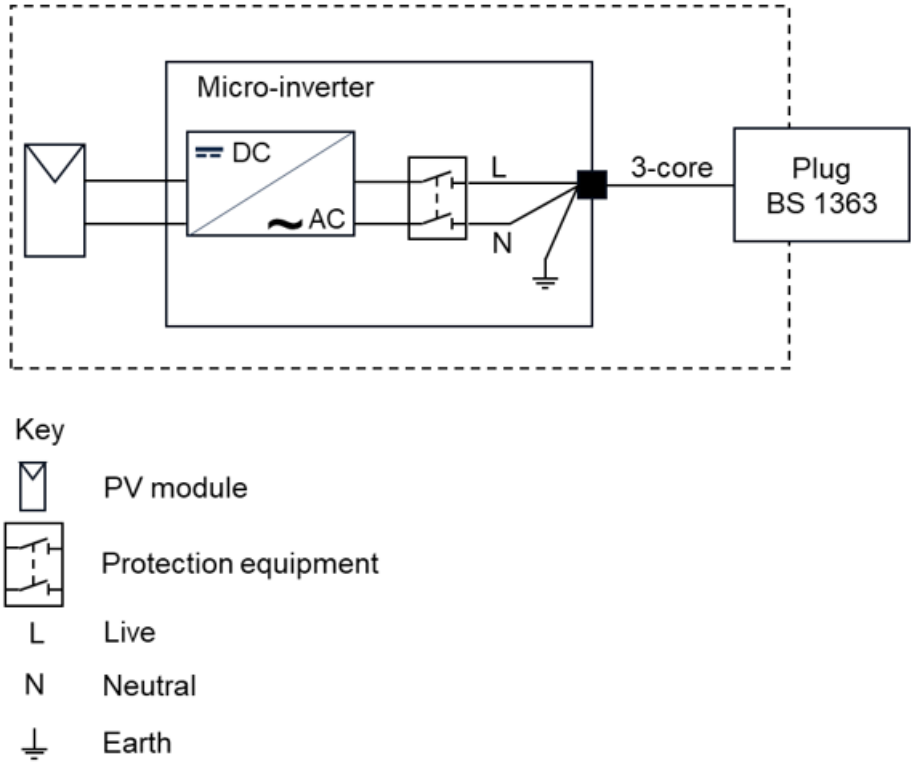


Figure 4- 1. Diagram of compact plug-in solar device consisting of a single PV module with an integrated inverter. The DC-side connections are already established in the plug-in solar device supplied to the user.

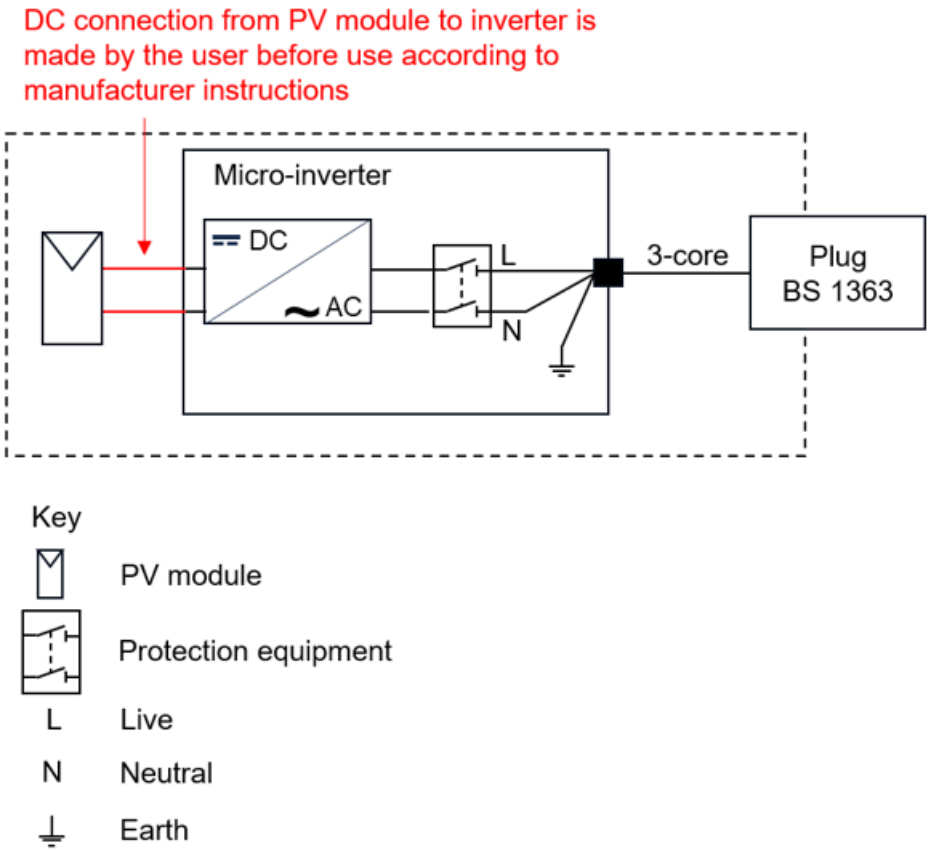
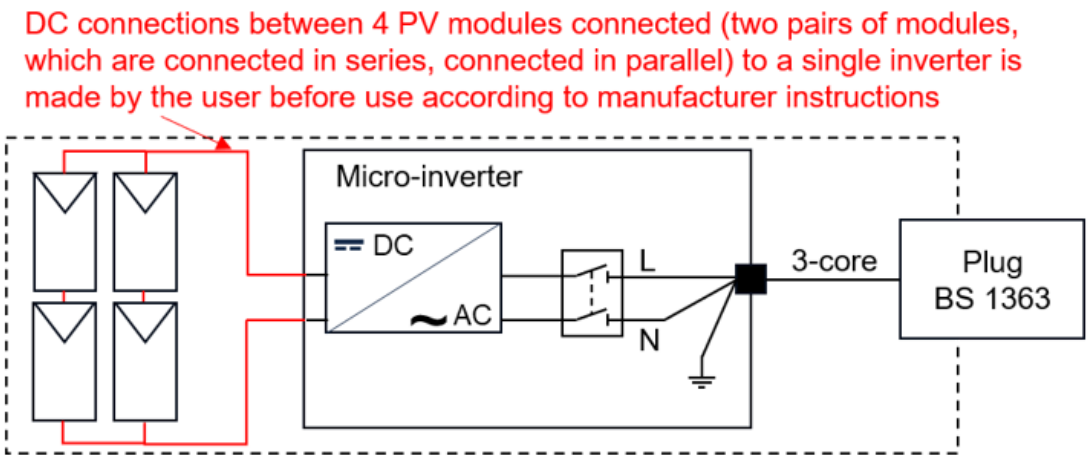
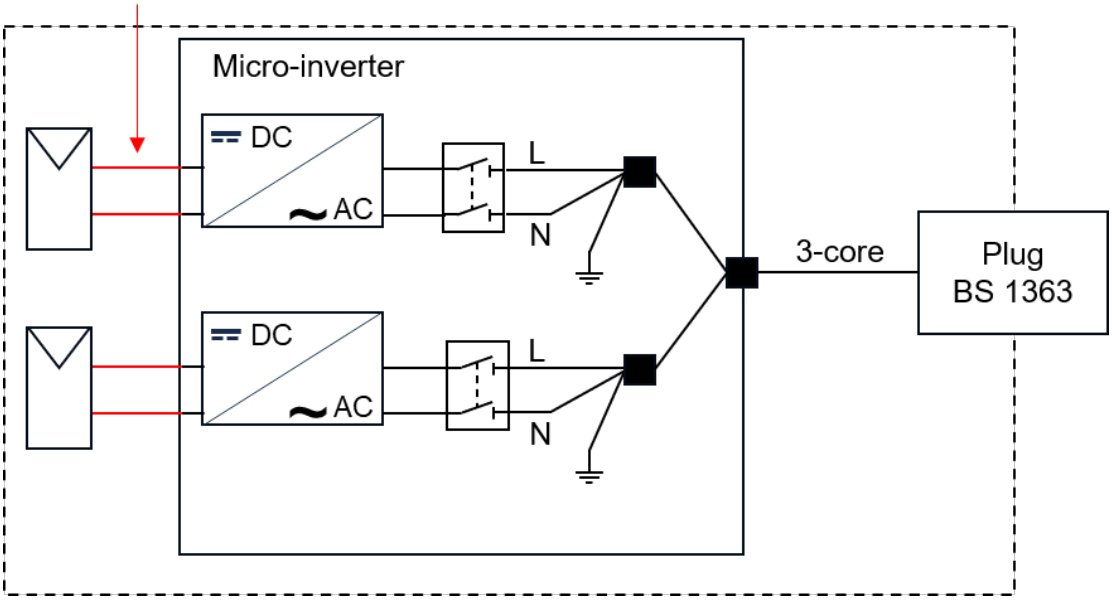


Figure 4- 2. Diagram of two-component plug-in solar device. In two-component devices, the plug-in solar device is supplied to the user as a kit consisting of a module and an inverter. The DC-side connections are made by the user in accordance with the manufacturer instructions.

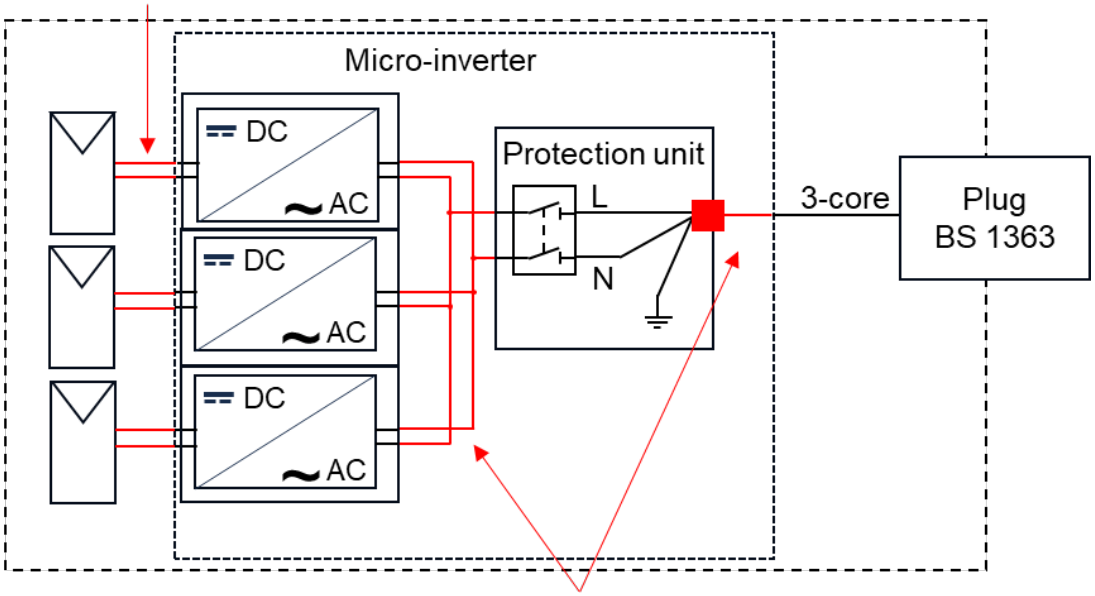
a)



b) DC connections between each PV module into the inverter is made by the user before use according to manufacturer instructions



c) DC connections between each PV module into each DC/AC power conversion unit is made by the user before use according to manufacturer instructions



AC connections between each DC/AC power conversion unit into the protection control unit, and from the protection control unit into the 3-core cable and BS1363 plug is made by the user before use according to manufacturer instructions

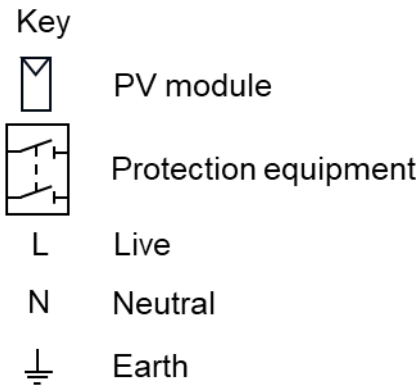


Figure 4- 3. Diagram showing examples of multi-component plug-in solar devices, where the plug-in solar device is supplied as a kit of one or more PV modules and an inverter. The DC-side connections are made by the user in accordance with the manufacturer instructions. (a) depicts a multi-component device with four PV modules and one microinverter. (b) depicts a multi-component device with two PV modules and a two-port microinverter. (c) depicts a multi-component device with three PV modules and a three-port microinverter

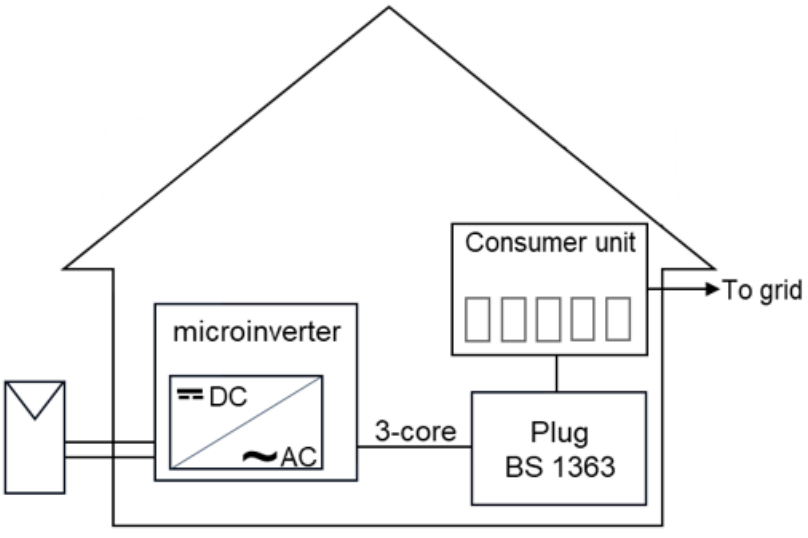
Multiple PV modules shall be connected to the inverter either by means of individual cables and connectors or be connected either in series or parallel providing suitable interconnecting cables between panels are provided by the manufacturer.

Multiple panels connected in series can produce harmful DC voltages at the inverter input. The PV modules shall therefore be configured such that open circuit voltage at the inverter input does not exceed 120 V DC.

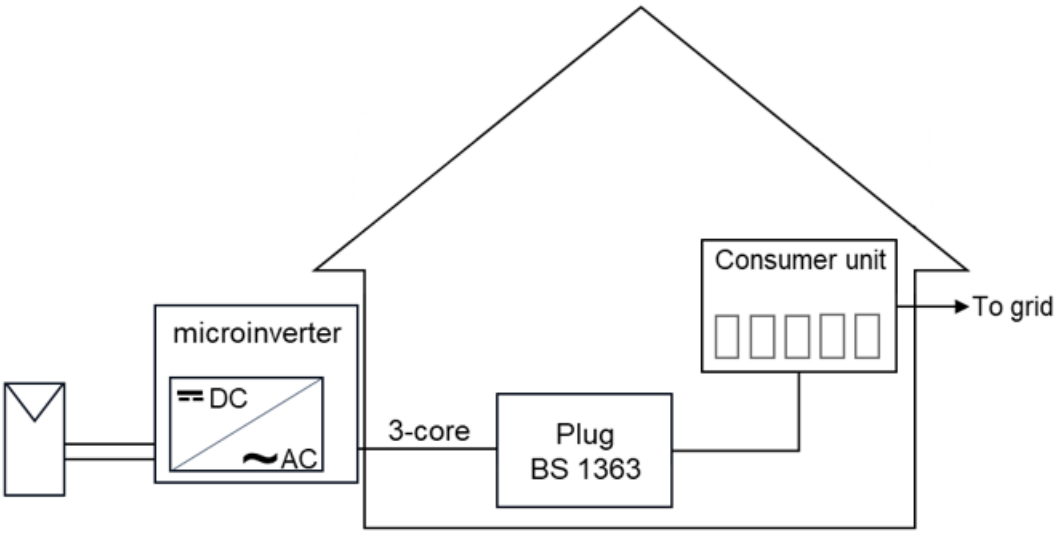
4.2.3 According to mounting position

The inverter and the BS1363 plug and socket outlet may be mounted internal or external to the premises, shown in Figure 4- 4.

a)



b)



c)

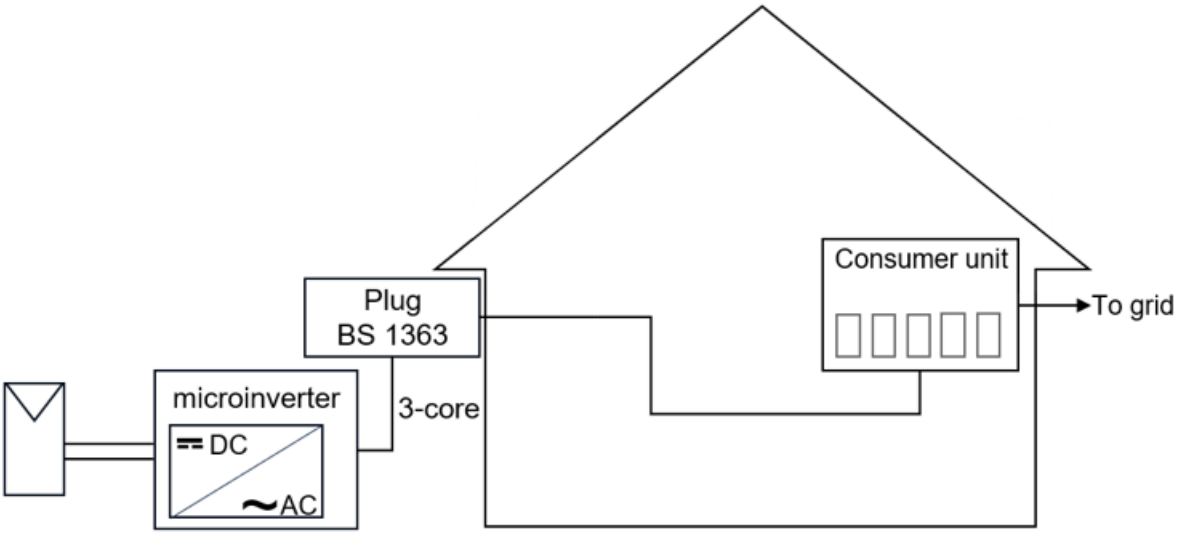


Figure 4- 4. Illustrations of plug-in solar mounting arrangements in relation to the premises. In (a) the microinverter is mounted internal to the premises and in (b) the microinverter is mounted external to the premises. In (c) both the microinverter and the BS 1363 plug socket is mounted external to the premises and requires an ingress protection rating of IP 55 or better.

5 Requirements

5.1 General

Plug-in solar shall be designed, constructed and assembled such that they can withstand electrical, mechanical, thermal and environmental stresses during intended use and shall not present a danger to persons or property. This chapter defines the specific requirements for individual components. The requirements in this section apply to the complete device and to the individual components that form part of the plug-in solar assembly.

5.2 Overvoltage category (OVC)

Plug-in solar devices shall be designed for a minimum overvoltage category II in accordance with BS EN IEC 60664-1:2020+A1:2025.

5.3 Electromagnetic compatibility (EMC)

Immunity limits shall be tested in accordance with BS EN IEC 61000-6-1. The manufacturer-declared performance shall meet the following criteria:

- Performance criteria A and B shall apply.
- Tests shall be conducted at maximum power, S_{max}, that the inverter is capable of delivering (S_{max} ≤800VA).
- Performance criteria A is considered to be met when power is over 75% of S_{max} during the test.

Emissions shall be tested in accordance with BS EN IEC 61000-6-3. Tests shall be carried out at maximum power that the inverter is capable of across the declared DC input voltage.

5.4 IP degree of protection

Components of the plug-in solar device and connections between components that are intended for installation in outdoor locations shall have a degree of ingress protection of at least IP55, in accordance with BS EN 60529. Outdoor plugs and socket-outlets shall have a degree of protection of at least IP55.

If non-IP55 individual components are used, the design of the complete assembly shall ensure that IP55 is achieved.

For components that are only intended to be used internal to a property, they should have ingress protection of better than IP44 to avoid electrical hazard if water is spilled upon them.

Verification shall be carried out in accordance with BS EN 60529:2014, Clauses, 12, 13.4 and 13.5 under the following conditions:

- The device shall be mounted as for normal use in accordance with the manufacturer's instructions.
- Cable screw connections, grommets and sealing plugs shall be fitted with cables or conduits of the smallest and largest cross-sectional areas or diameters specified by the manufacturer.
- Cable and conduit entry systems shall be installed in accordance with the manufacturer's instructions.
- Parts removable without a tool shall be removed.
- Cable glands shall not be filled with sealing compounds or similar materials.
- Testing shall be caried out in accordance with BS EN 60529 Category 1.
- For protection against hazardous parts, test shall be carried out with test probe B as specified in BS EN 61032:1998, Figure 4, with a test force of 1 N. Protection is fulfilled if the test probe does not contact hazardous parts.
- After testing, the device shall be inspected for ingress of water and comply with the acceptance conditions according to BS EN 60529 Clause 14.3.

5.5 Protection against mechanical hazards

The assembly, mounting and operation of plug-in solar shall not lead to mechanical hazards under any conditions. Edges, projections, corners, openings and any accessible features shall be smooth and deburred to prevent injury to persons and damage to conductor insulation. Compliance shall be verified by testing in accordance with BS EN IEC 61730-2, Clause 10.7 (MST 06), applied to the complete assembly and components of the plug-in solar device.

5.5.1 Mounting system and structural integrity

A mounting system should be supplied as part of a complete plug-in solar kit depending in customer mounting requirements.

Unsecured mounting arrangements shall not be permitted.

The manufacturer shall provide a complete specification of the mounting system in detail, including individual components, and shall provide a structural analysis to demonstrate that the system is safe for its intended use.

The manufacturer shall define the permitted mounting configurations and installation environments for the mounting system. The permitted mounting configuration shall be defined such that installation does not introduce additional fire risk, including by avoiding placing the device in close proximity to combustible materials. The manufacturer shall specify the minimum clearance between the PV module and mounted surface, and the minimum spacing between adjacent PV module required to ensure adequate ventilation and minimise heat accumulation. Where necessary to achieve adequate ventilation, the manufacturer shall specify that PV modules are installed at an angle to the mounting surface.

The manufacturer or retailer shall include in the installation instruction any restrictions relating to installation including, but not limited to, escape routes and publicly available spaces. The installation instructions shall specify that the plug-in solar unit shall not compromise fire compartmentation of the performance of external walls in according with Building Regulations (Approved Document B), including separation between flats and the control of external fire spread

The mounting system shall be demonstrated, through structural analysis, to meet the load requirements associated with all permitted mounting configurations, including wind loads and snow load, under environmental conditions relevant in the UK. Snow loads shall be determined in accordance with BS EN 1991-1-3 and the UK National Annex to BS EN 1991-1-3. Wind loads shall be determined in accordance with BS EN 1991-1-4:2005+A1:2010, the UK National Annex to BS EN 1991-1-4 and PD 6688-1-4:2015.

The mounting system shall be designed such that foreseeable wind and snow loading does not result in detachment, instability and falling components capable of causing injury or property damage.

The mounting system shall be designed to ensure that the mechanical stability of the device including all externally mounted components does not endanger anyone in the vicinity of the device.

The mounting system and permitted configurations shall minimise reliance on user behaviour to ensure safety.

5.5.2 Corrosion

5.5.2.1 General

The mounting system shall be constructed from materials that are resistant to corrosion and suitable for the expected lifetime and operating conditions of the device.

Fixings and fastening methods shall not adversely affect the corrosion resistance of the mounting system.

Materials shall be appropriately chosen and assembled to prevent galvanic corrosion caused by different metals surface, including at interfaces between the mounting system and supporting structure and connection elements. Where necessary, spacers such as Nylon washers and rubber isolators, shall be used.

5.5.2.2 Corrosive environments

The mounting system shall be suitable for the intended installation environment, including environments with increased corrosion risk such as marine, industrial and agricultural (corrosive gases and ammonia).

Where materials are not inherently corrosion resistant, appropriate protective measures shall be provided to ensure safety over the expected lifetime and operating conditions of the device.

Where the device is not suitable for installation in specific corrosive environments, this shall be clearly stated in the manufacturer's documentation.

Plug-in solar devices intended for use in corrosive environments shall be demonstrated to withstand such conditions through testing:

- Salt mist corrosion test according to BS EN 61701;
- Ammonia resistance test according to BS EN 62716.

5.5.3 Resistance to weathering

All components exposed to the environment shall be resistant to weathering including UV. Further requirements for specific components are specified in their respective standards as referenced in Clause 6 of this document.

5.6 Protection against electric shock

5.6.1 General

Plug-in solar devices shall be designed such that live parts are not accessible before, during, and after installation. Compliance shall be demonstrated with testing carried out in accordance with BS EN 60529, with Test Probe B in accordance with BS EN 61032. This degree of protection shall not be impaired by deformation of the enclosure and covers resulting from mechanical and thermal stresses under normal conditions of use.

Removable parts shall be secured against loss or displacement where they could endanger persons, animals, or property.

5.7 Influence of residual current devices (RCDs)

Plug-in solar shall comply with the requirements relating to DC residual current components in accordance with BS EN 62109-1, Clause 7.3.8.

The device shall be designed such that it does not adversely affect the operation of upstream residual current devices.

5.8 Protection against fire risk

Fire safety shall be considered at system level, including the PV module, mounting system and the surface to which it is intended to be installed.

The inverter of the plug-in solar device shall be designed to minimise fire risk under normal and fault conditions in accordance with BS EN IEC 62109-1:2010, Clause 9.

The PV modules shall comply with the fire safety requirements in accordance with BS EN IEC 61730.

6 Requirements for components and systems

6.1 Cables

AC and DC cables shall be:

- Suitable for the intended installation environment and operating conditions to minimise the risk of electric shock and fire under normal and fault conditions;
- Suitable for outdoor use where exposed to outdoor environment;
- Where DC cables are intended to be installed outdoors, they shall be resistant to outdoor weather conditions in accordance with BS EN 50618;
- Supplied as part of the complete plug-in solar device or manufactured to a standard compatible to the same specification and quality as specified by the plug-in manufacturer.

6.2 Plug, sockets and connector systems

6.2.1 General

Where the consumer is responsible for making connections during installation, the product shall be supplied with pre-assembled cables and connectors fitted with cord sets that can be operated by a layperson.

Exposed connectors, connector components and plug devices shall be effectively protected against dirt, moisture, for example with a protective cap.

On the DC side, requirements for connectors are specified in 6.2.2.

On the AC side, requirements for plug connections are specified in 6.2.3.

6.2.2 Connectors on the DC side

On the DC side, the connectors shall be designed such that:

- All connectors shall fulfil the requirements of BS EN 62852 and shall be supplied pre-assembled with cables by the manufacturer. Only matching connector pairs from the same product family shall be used. This also applies to any adaptor lines and cables.
- Where an adaptor is used to form a compatible connection, it shall be pre-assembled by the manufacturer.

  NOTE Adaptor cables are used when the PV module connectors are not of the same type as the as the as the inverter connector system.
- The connector pairs shall have an interlocking mechanism that can be released only with a tool, with the test according to BS EN 62852.
- Connector pairs shall be designed to be protected against shear and tensile stress at the terminations even when they are not fixed to a mounting surface by consumers
- Y-connectors shall not be used.

6.2.3 Plug devices on the AC side

6.2.3.1 General

On the AC side, the plug device for connection to the consumer’ s electrical installation shall comply with one of the following subclauses 6.2.3.2 to 6.2.3.4.

Where detachable AC connector systems are installed between the inverter and the connecting cable, they shall:

- Have a relevant ingress rating equivalent to the inverter rating;
- Be labelled according to section 8.2.3.2;
- If a mechanically interlocked connecting system is used a secondary contact protection according to Section 6.2.3.2, then any other connecting system used between the inverter and connecting cable should be also similarly mechanically interlocked.

The use of multi-way adaptors, travel adaptors and plug convertors shall not be permitted.

6.2.3.2 Plug devices according to BS 1363 series and BS 1362 with additional contact protection

Plug-in solar intended for connection to UK sockets shall use plugs designed to BS 1363-1. In addition, the plug shall:

- Incorporate partially insulated pins to prevent access to live conductive parts;
- Incorporate non-rewireable moulded plug fitted with a BS 1362 fuse not exceeding 5A.

Socket outlets for the use of plug-in solar device shall comply with BS 1363-2.

The use of a plug designed to BS 1363-1 and socket outlet complying with BS 1363-2 shall be permitted for plug-in solar.

The inverter should be designed to isolate the output if the grid frequency lock is lost according to Clause 6.2.3.3 preventing electrical hazard from contacting the plug pins. In event of failure of the circuit providing this primary contact protection, additional contact protection shall be achieved by one of the following measures:

- A mechanical solution employing a locking mechanism, protective covers or enclosures according to Clause 5.2.3 of BS EN IEC 61140 that prevents removal of the plug without the use of a tool or before disconnection of the output from the inverter.
- An electromechanical solution providing automatic disconnection or separation of hazardous voltages during insertion or withdrawal of the plug. This must operate independently of the main method of anti-islanding as described in Clause 6.2.3.3.3. This should remove any dangerous voltages from the contacts within 2 seconds of disconnection.

Any additional protective components, including covers or switches or fuses, shall comply with the respective BS, EN, or IEC standards.

6.2.3.3 Anti-Islanding Provisions

6.2.3.3.1 General

A plug-in solar device with a plug connection designed to BS 1363-1 and for use with a socket-outlet according to BS 1363-2 has a mains connection that cannot be touched when inserted. The user shall be protected against hazardous voltages in these plug contacts if the plug is removed.

Loss of power in the circuits supplying the socket shall also remove voltage coming from the inverter in order to prevent back feeding voltage into the grid being a safety hazard.

Measurements in the inverter of the plug-in solar device that prevent hazardous voltages in these plug contacts shall comply with the requirements in subclauses 6.2.3.4.2 to 6.2.3.4.5.

NOTE: A plug-in solar device can produce a hazardous voltage. Therefore, the goal is electrical safety that is comparable to or better than devices for household use (BS EN 60335-1) and equipment for audio/visual, information, and communication technology (BS 62368).

6.2.3.3.2 Protective measures

After unplugging the mains plug, the following measures shall be required:

- fast interruption of the internal power conversion;
- fast discharge of capacitors that are not isolated from plug contacts;
- safe isolation of remaining hazardous voltage from plug contacts.

The following potentially hazardous voltages shall be security isolated from the plug contacts or quickly discharged:

- Capacitors that cannot be switched off;
- Capacitors that can be switched off;
- PV generators.

The first requirement to isolate capacitors that cannot be switched off can be realized by observing certain discharge times as with consumer devices. The second requirement to isolate capacitors that can be switched off and third requirement to isolate PV generators can be realised through quick interruption of the power conversion.

This isolation function shall be ensured even in the case of a fault in the device.

A fault in the device shall not result in a hazardous condition.

The isolation between hazardous voltages and the plug contacts shall comply with a) requirements for double or reinforced insulation in the error-free case; and b) requirements for

basic insulation in the case of an error in accordance with BS EN 62109-1:2010. If software is used to fulfil the requirements, it shall comply with BS EN 62109-1:2010, Annex B.

The requirements are not influenced by inverter structure or topology.

NOTE: According to G98 Engineering Recommendation Issue 2 Amendment 1, interface protection and loss-of-mains protection are intended to disconnect the generating unit from the network during over/under voltage, over/underfrequency and loss-of-mains conditions. The protective functions of the network and plant protection do not however refer to protection against electrical shock.

6.2.3.3.3 Disconnection and isolation

Following disconnection from the mains supply, the inverter shall prevent hazardous voltages from being present at accessible plug pins. The test shall be performed according to BS EN IEC 62368-1:2024+A11:2024:

Anti-islanding and termination of power supply

An external resistance of greater than 2000 Ω must be applied across the plug pins of the mains plug at least 40 s after disconnection - this delay allows the inverter to detect loss of mains supply. In deviation of ES1 (for laypersons) of Table 5 of BS EN IEC 62368-1:2024+A11:2024, the inverter shall automatically disconnect from the mains supply within 100 ms. The voltage at accessible plug pins shall decrease to below 34 V within 100 ms following disconnection from mains supply.

Protection against live plug pins contact

For plug pins without contact protection, there is a risk that the internal capacitor may maintain hazardous voltage on the plug pins for a short period following AC disconnection. For normal operation, the voltages at accessible plug pins shall comply with the ES1 limits (for laypersons) in Table 5 of BS EN IEC 62368-1:2024. Following disconnection from mains supply, capacitors larger than 100nF shall discharge to a voltage not exceeding 34 V within 1 s. The test must be conducted at mains rated voltage and the following operating power:

- Maximum apparent power (S_{Amax})
- 0.5 S_{Amax}
- Minimum continuous operating power

The residual voltage shall be measured directly on the capacitors. For Class I equipment (with protective earth), the voltages shall additionally be measured between output conductor, neutral conductor and protective conductor. For Class II equipment (double insulated), the voltages shall additionally be measured between output conductor and neutral conductor.

Isolation between live parts and accessible plug pins shall provide double or reinforced insulation under normal conditions and at least basic insulation under single fault conditions, in accordance with BS EN 62109-1.

6.2.3.4 Plug device on the AC side on the inverter

When engaged, the plug and socket shall provide a degree of protection of at least IP4XD for devices intended for outdoor installation. When not engaged, they shall provide a degree of protection of at least IP2XB.

Conformity shall be demonstrated by testing parts that can be removed without the use of a tool and this testing shall take place after removal.

Clearance and creepage distances shall be measured according to BS EN IEC 60664-1:2020+A1:2025 for overvoltage category II.

AC interconnection or connection of multiple inverter units to the same circuit by means of extension cables, plug couplers or in-line connector systems to shall not be permitted.

NOTE 1: At the international level, a standard for the requirements for coupler systems on the AC-side of PV systems, e.g. inverters, is currently under development (IEC 61535-1). General requirements for installation couplers are provided in BS EN IEC 61535:2024.

NOTE 2: The requirements in this clause are intended to ensure protection against electric shock in accordance with the principles of IEC 61140.

6.3 PV modules

The PV modules and their components shall fulfil the following standards:

- BS EN IEC 61730-1 / IEC 61730-1:2023;
- BS EN IEC 61730-2 / IEC 61730-2:2023/COR1:2024;
- BS EN IEC 62790 for the junction box;
- BS EN 50618 or IEC 62930 for the connecting cables;
- BS EN 62852 for the connectors;
- BS EN IEC 62109-3;
- PV modules shall fulfil protection class II according to BS EN IEC 61730-1 unless protection is by means of Safety Extra Low Voltage (SELV) or Protective Extra Low Voltage (PELV). For Protection class III, see 6.4.4.

In addition to the requirements in BS EN IEC 61730-1 and BS EN IEC 61730-2, the methods of attachment used for the PV modules shall be resilient in the event of fire. The PV module shall be portable and shall not require permanent fixing, structural attachment, or integration into the building fabric or structure.

6.4 Inverter

6.4.1 General

The inverter for the plug-in solar devices shall fulfil the following standards:

- BS EN IEC 62109-1 for the power converters in the PV systems;
- BS EN IEC 62109-2 for PV inverters;
- BS EN IEC 62109-3 for module-based electronics, if the PV module and inverter a supplied as a mechanical unit;
- BS EN 62116 for PV inverters for the connection to the mains.

The following specifications apply:

- The environmental category “Outdoor”, according to BS EN 62109-1:2010 Table 4;
- The basic protection shall be ensured according to BS EN 62109-1-:2010 7.3.4, with the decisive voltage class DVC C.

The inverter shall be capable of handling the specified maximum permitted DC input and shall not exceed the declared rated maximum apparent power.

The inverter shall have a declared maximum apparent power not exceeding 800 VA. The inverter shall be tested to determine its maximum apparent power output at supply voltages of 0.94 U_n, 1 U_n and 1.1 U_n, where U_n is the nominal supply voltage (230V). The inverter shall be controlled such that under all test conditions, the current at the point of connection does not exceed 3.5 A.

Compliance shall be verified by circuit analysis and fault simulation, including the simulation of single fault conditions. Reasonable foreseeable faults, including common cause faults, shall be considered. For Class I equipment (as defined under BS EN 61140), a fault in the basic insulation between live parts and protective conductor shall not result in an unsafe condition.

Where programmable electronic controls are used to fulfil these requirements, they shall comply with the safety requirements specified in BS EN 62109-1, Annex B.

6.4.2 AC side connection

The EMC properties of the inverter shall be fulfilled according to 5.3 of this document.

If an additional unutilized AC connection is available, such as for the parallel connection of additional inverters, it shall be closed with a cap that can only be removed with a tool.

6.4.3 Fault display and messages

The inverter shall be provided with an interface, either integrated on the device or accessible via a third-party device like a mobile phone, that can display status information and error messages to users together with mitigation guidance. Fault display and messages shall be implemented according to BS EN IEC 62109-3.

7 Network-technical requirements

Plug-in solar shall comply with the technical requirements for connection and parallel operation with low-voltage distribution networks in Great Britain in accordance with the Engineering Recommendation G98 Issue 2 Amendment 1.

Manufacturers shall ensure that the device has been type tested in accordance with Engineering Recommendation G98 Issue 2 Amendment 1 requirements. Manufacturers shall register compliant devices on the ENA Type Test Register (ENA Direct Connect platform) prior to placing them on the market.

8 Marking and documentation

8.1 General

Instructions and references shall be provided in English.

8.2 Marking

8.2.1 General

Markings and identifications shall comply with the requirements of BS EN IEC 62109-1:2010, sections 5.2.1 and 5.1.2.

Compliance is checked by inspection.

8.2.2 Warning markings

Warning markings shall comply with the requirements of BS EN IEC 62109-1:2010, section 5.2.1.

Compliance is checked by inspection.

8.2.3 Marking

8.2.3.1 General

The individual components shall be identified in accordance with their applicable product standard.

The product as a whole shall be permanently marked with the following information:

- the names, registered trade names or registered trademarks, as well as the postal address, email address of the manufacturer;
- a model number, name or other designation for marking the product;
- a serial number, a code or other marking to ensure that the user can clearly identify the device;
- the following rated values:
    - mains voltage,
    - mains frequency,
    - highest continuous current,
    - rated power;
- IP degree of protection (in accordance with BS EN 60529);
- protective class;

NOTE where components of different protective classes are combined, the protective class of the overall product is determined by the lower one. For example, a system incorporating a protection class II PV module with a protection class I inverter shall be considered class I.

- symbol for class II equipment where applicable in accordance with BS EN IEC 62109-1;
- statement that a maximum of one (1) microinverter may be plugged in per household[7];
- statement that notification to distribution network operator (DNO) about connection and disconnection is mandatory, including a link to instructions on how to do so.

Where components of the product are removable or replaceable, the product shall include a warning in a suitable location:

“Changes and replacement of any part shall only be performed according to manufacturer’s instructions to avoid hazards.”

The warning may additionally be accompanied by symbol 15 from BS EN 62109-1:2010, Table C.1 and a reference in the documentation.

[7] NOTE: This may be changed to per circuit depending on outcome of consultation

All components shall be labelled in a manner compliant with the UK Electrical Equipment (Safety) Regulations 2016[8]. All labels shall be affixed visibly, legibly, and indelibly to the equipment itself.

The product shall be supplied with a durable label intended to be affixed at or near the consumer unit, indicating the presence of a plug-in generation device on the installation.

Compliance is checked by inspection.

8.2.3.2 Marking of the plug for connection with the domestic installation

The following information shall be provided on the plug:

- Only one plug-in solar device may be connected per household[9];
- The rated current (I_n) of the device;
- Mandatory sign M002: Observe the instructions for use (ISO 7010-M002:2011-05);
- A warning that plug-in solar devices shall not be connected to extension cable or multi-way adaptor;
- All AC plugs shall be marked and labelled in accordance with BS 1363-1:2023 Clause 8.

This permanent marking may be provided, for example, by means of a durable label or band positioned close to the plug.

Compliance is checked by inspection.

8.3 Documentation

8.3.1 General

The documentation supplied with the product shall include the information needed for the safe assembly, operation and (where applicable) maintenance of the product. The documentation shall contain the required information in 8.2.2 to 8.3.4 and the following additional information:

- Information on the intended and proper use of the product;
- Explanations of markings and symbols on the product;
- Identification and function of all connections, display and control elements;
- All ratings or specifications that are necessary for safe installation and operation, including the following environmental ratings as well as an explanation of their meaning:

[8] Electrical Equipment (Safety) Regulations 2016: Great Britain - GOV.UK
[9] NOTE: This may be changed to per circuit depending on outcome of consultation

    - Permissible ambient temperature range,
    - Guidance on selection of the installation location, including wind load and snow load zones,
    - If applicable, any limitations relating to corrosive environments, e.g. marine environment, livestock farming,
    - Where the device is not suitable for installation in specific corrosive environments, this shall be clearly stated in the manufacturer's documentation,
    - Whether the inverter is designed to be installed outside or inside the property or can be installed in either;
- The details of the DC connectors used, including type and manufacturer, to ensure compatibility between modules, inverter and other components;
- Declaration of compliance with applicable standards;
- Contact details of the manufacturer or retailer for technical support;
- Assembly instructions for the product shall be provided including safe installation locations to minimise the risk of the product or components falling or becoming detached, obstructing escape routes and endangering occupants, neighbours or members of the public;
- The permissible snow and wind load zones appropriate for the UK shall be provided for the product and the specified mounting types;
- The respectively permissible installation heights above ground based on the wind effects for the loaded area according to BS EN 1991-1-4:2005+A1:2010 shall be provided for the product and the specified mounting types;
- The product shall not be modified or installed in a manner not specified by the manufacturer;
- Users are responsible for obtaining any necessary permissions from the property owner, landlord, freeholder, managing agent or relevant authority prior to installation including agreeing how any costs associated with installation will be apportioned;
- Users are responsible for obtaining any necessary planning permission and Listed Building Consents;
- Instructions for notifying network operator of installation and decommission;
- The device shall not be connected to damaged, degraded or non-compliant socket outlets. Users shall be advised to seek inspection and assessment by a qualified electrician if there are any doubt regarding the condition or suitability of the installation;
- Users are responsible for checking, before installation, whether the product may affect any relevant insurance arrangements, including their own insurance and, where applicable, insurance covering the property or building;
-

For the PV module, data sheet information shall be provided according to BS EN IEC 61730-1:2018 / IEC 61730-1:2023.

For the inverter, data sheet information shall be provided according to BS EN 50524:2021 and the applicable unit certificates according to Engineering Recommendation G98 Issue 2 Amendment 1.

Compliance shall be verified by inspection.

8.3.2 Information for assembly and commissioning

Assembly instructions shall be sufficiently detailed to enable safe and correct assembly and commissioning of the product to specifications set forth in the BS EN IEC 61730-1:2018 (IEC 61730-1:2023) and the BS EN IEC 62109 standard series.

The documentation shall include assembly instructions and, where applicable, product-specific instructions for commissioning, information to prevent foreseeable misuse and warnings relating to hazards that can occur during assembly or commissioning of the product.

The following information shall be provided:

- General safety instructions: Any necessary testing and modifications of the building's electrical system ("installation") shall only be performed by professional electricians in accordance with low voltage connection regulations such as the distribution code, Engineering Recommendation G98 Issue 2 Amendment 1 and the IET Wiring Regulations BS 7671;
- Where connection of the product requires modifications to the final circuit of the domestic installation, this shall be clearly stated and identified as work that can only be performed by a qualified electrician, e.g. replacement of the overcurrent protection device of the concerned electric circuit in accordance with BS 7671 Section 551.7.2 for the connection of a plug-in solar device;
- Users shall be advised to check that the electrical installation is equipped with modern residual current protection (RCBO and RCD) and is in good condition[10]. If the electrical installation is using older fuse protection and does not incorporate RCBOs, the installation shall be checked and, where necessary, upgraded by a professional electrician;
- Clearly state that only one plug-in solar device shall be installed per household[11];

[10] NOTE: Installations in which circuits are protected by miniature circuit breakers (MCBs) with residual current protection (RCD) provided upstream may also be acceptable, subject to verification through further testing now being undertaken by DESNZ.
[11] NOTE: This may be changed to circuit depending on outcome of consultation

- Information and instructions on how to identify which socket-outlets are supplied by the same circuit before installation. Where users are unsure how to identify circuits safely, they shall be advised to consult a professional electrician;
- Clearly state that the use of extension cables, multi-way adaptors and travel adaptors are not permitted;
- Information regarding connection procedure and cable management;
- Information that the DC connectors shall not be disconnected under load and that the AC supply shall be turned off before disconnecting DC connections;
- Information regarding permissible mounting types (e.g. attachment on a balcony railing, on the roof, overhead and/or on the facade);
- Requirements for assembly and mounting depending on the location. Any attachment method shall be reversible and non-permanent, and shall not compromise the structural integrity, fire performance, or weatherproofing of the building;
- The manufacturer's specified mounting procedure for PV module(s) and inverters;
- A detailed list of the individual components for the specified mounting system;
- Information regarding fastening or ballasting depending on the expected wind and snow load;
- Ventilation requirements for safe operation;
- Information regarding minimum spacing and positioning requirements for PV modules;
- Limitations on mounting conditions (e.g. fastening material, cooling);
- Information that in the case of buildings with a lightning protection system, the necessary separation distance from the discharges of the lightning protection system according to BS EN IEC 52305-3:2024 shall be observed;
- Instructions on safe installation of cables to reduce the risk of accident (e.g. pull relief, bending radii, no installation in the ground or wet areas);
- Information that plug-in solar devices shall not be connected to multiple sockets or multi-way adaptors;
- Information that only connection cables specified or approved by the manufacturer may be used;
- Information that users are responsible to keep escape and rescue paths clear;
- Information that users are responsible for ensuring that PV modules are installed in a way that does not increase the risk of fire spreading along external walls or balconies to neighbouring properties;
- Information that users are responsible for ensuring that PV modules are not installed on or fixed to walls or other parts of the building that form a property boundary between dwellings;

- Clear information on current registration and deregistration obligations with the Distribution Network Operator (DNO), including provision of a QR code directing consumers to the relevant guidance and registration process;
- Instructions to affix the label provided to the consumer unit in a clearly visible location. Instructions shall also be provided that, where the consumer unit is replaced or relocated, a new label shall be produced and affixed accordingly.
- Instructions for the operation and adjustment of controls;
- Instructions for connection to accessories and other components, including identification of suitable compatible equipment;
- Explanation of indications of operating status;
- Procedure to follow in the event of faults or defects;
- A statement that operation other than that as specified by the manufacturer may impair safety;
- Recommended intervals and procedures for inspection and maintenance, including visual checks of fixings, cables and connectors;
- Instructions for safe cleaning where applicable.

8.3.3 Information to be provided for identifying circuits

Recommended minimum consumer guidance to identify protective devices in the consumer unit/fuse box:

Modern electrical installations typically have configurations with RCBOs per circuit, or miniature circuit breaker (MCB) per circuit with shared residual current protection upstream. These devices are operated with individual switches that can be turned on and off. Modern protective devices allow individual circuits to be identified and are required to support safe installation of plug-in solar devices.

Older installations use wired fuses that may not provide individual protection for each circuit. They don't have individual switches that cannot be turned on and off.

Where the consumer unit does not use modern protective devices, is not clearly labelled, or is of unknown condition, users shall be advised to seek inspection and assessment by a qualified electrician before installing the product.

Recommended minimum consumer guidance to identify circuits[12]:

An electrical circuit typically supplies multiple sockets and is protected by a single circuit breaker in the consumer unit/fuse box. Sockets that are supplied by the same breaker are part of the same circuit. Users can identify which sockets are on the same circuit by observing

[12] NOTE: This section will be provided if consultation agrees to allow one plug-in solar PV device per circuit

which sockets lose power then the circuit breaker in the consumer unit/fuse box is switched off. Sockets that turn off together are on the same circuit.

Plug-in solar device shall only be connected to socket circuits and not to circuits supplying lighting or other fixed equipment. Examples:

- A plug-in solar device connected to a socket in the bedroom and another device connected to a socket in the kitchen is acceptable if these sockets are on different circuits (i.e., they do not switch off together);
- Two plug-in solar devices connected to sockets in the same room or area is not permitted if those sockets are on the same circuit (i.e. they switch off together);
- A plug-in solar device connected to a spur circuit supplying fixed equipment such as an electric cooker or boiler is not permitted;
- A plug-in solar device connected to a circuit used for lighting is not permitted.

Care should be taken when operating the consumer unit/fuse box. Switching off a circuit breaker may interrupt the supply to appliances and equipment. Where users are unsure how to identify a circuit breaker and circuit, or where the configuration of the consumer unit/fuse box is unclear, they shall seek advice from a professional electrician.

NOTE: Illustrations may be provided to assist users in identifying consumer unit types and electrical circuits.

8.3.4 Information regarding decommissioning and disposal

The documentation shall contain information regarding the procedure to follow for decommissioning and disposal.

The information shall be compliant with the Waste Electrical and Electronic Equipment Regulations[13] (WEEE).

Compliance is checked by inspection.

[13] Regulations: Waste Electrical and Electronic Equipment (WEEE) - GOV.UK

9 Device tests

9.1 General

Plug-in solar devices shall be subject to type testing and routine testing to demonstrate compliance with this specification.

Type tests shall:

- be performed on a representative device;
- demonstrate compliance with all applicable clauses of this specification;
- be documented in a test report retained by the manufacturer.

Manufacturers shall produce and retain a technical file demonstrating compliance, including:

- test reports;
- calculations (e.g. structural loading);
- conformity with referenced standards.

Records shall be retained for a minimum period of 10 years after the last manufacture of the device type.

9.2 Type tests

Type testing shall be carried out in accordance with applicable British or international standards and shall include, as a minimum, the tests listed in Table 1.

Table 1: Overview of type tests

Ref	Topic	Type of test	Value or criteria
4.1	Maximum apparent power (S_{max})	Check of compliance with the permissible maximum apparent power.	≤ 800 VA
4.1	Limitation of mains current in the case of reduced mains voltage	Measurement using the test procedure according to BS EN 50438 and G98 Engineering Recommendations	≤ 3.5 A at reduced voltage (≈0.85 Un)

4.1	Maximum power of the PV module	Visual inspection of the type plates regarding the maximum power of the PV module	≤ 2000 W
5.3	EMC - immunity	Check of verification - BS EN IEC 61000-6-1, BS EN 62920	Performance criteria A/B;
5.3	EMC – emissions	Check of verification BS EN IEC 61000-6-3, BS EN 62920	Compliance at maximum power across the declared DC input voltage
5.4	IP degree of protection	Verification against BS EN 60529 and inspection	≥ IP55 for assembly (excluding plug), consistent across interfaces
5.5.1	Protection against mechanical hazards	Test in accordance with BS EN IEC 61730-2 (MST 06)	Compliance with the acceptance criteria of the applicable in BS EN IEC 61730-2 test method
5.5.1.1	Verification of stability for the mounting system, if present, by means of structural calculation	Check of the verification	Structural calculation provided demonstrating stability for the declared mounting types and loading conditions, including applicable wind and snow loads
5.5.2	Corrosion – corrosive environment	Visual inspection	Where the product is not suitable for corrosive environments, this shall be clearly stated in the manufacturer’s documentation

5.5.2.2	Corrosion – suitability for corrosive environment	Test for verification of “Salt mist corrosion” - test according to BS EN 61701 and ammonia test according to BS EN 62716	Compliance demonstrated by the relevant corrosion and ammonia tests
5.6.1.1	Protection against direct contact – no opening without tool	Test/visual inspection	Live parts shall not accessible without the use of a tool
5.6.1.2	Detachable parts	Visual inspection	Detachable parts secured against loss or displacement
5.7	Compatibility with RCD	Suitability test according to BS EN 62109-1, Clause 7.3.8	Device working without impairing the protective function of the RCD
6.1	DC-cable suitability	Suitability test according to BS EN 50618 for outdoor cable	DC cables suitable for the declared environmental condition
6.1	AC-cable suitability	Suitability test according to BS EN 50618 for outdoor cable	DC cables suitable for the declared environmental condition
6.2.1	Ingress protection of free plug openings	Visual inspection	Compliance with BS EN 60529
6.2.2	Suitability of DC-plug connectors	Test/visual inspection on product	Connectors compatible with the mating parts specified by the manufacturer
6.2.3.2	Suitability/permissibility of the plug device on the installation side	Suitability test according to BS 1363 and BS 1362 and visual inspection of the pin assignment	Non-rewireable moulded plug fitted with a BS 1362 fuse not exceeding 5A; half-insulated pins

6.2.3.2	Suitability/permissibility of the installation side AC-plug device – contact protection mechanical solution	Visual inspection/check for standard compliance	Verification against BS EN IEC 61140 and 62109-1:2010
6.2.3.3.3	Suitability/permissibility of the installation side AC-plug device – contact protection electro-mechanical solution	Suitability test according to BS EN IEC 62368-1:2024	Automatic disconnection from the mains supply within 100 ms; voltage of accessible plug pins decreases to below 34V within 100ms following disconnection; capacitors greater than 100 ηF discharge to ≤34 V within 1s following disconnection
6.3	PV module suitability	Check for standard compliance	Certification of conformity
6.3	PV module – protection class if applicable	Visual inspection of checking the verification according to BS EN IEC 61730-1	Declared protection class verified by the manufacturer's documentation
6.4.1	Inverter suitability	Test for standard compliance	Compliance with BS EN 62109-1
6.4.1	Compliance with "outdoor" environmental category	Check for standard compliance	Compliance with BS EN 62109-1:2011-04, Table 4
6.4.4	Application of protection class III	Test for standard compliance	Safe isolation according to BS EN 62109-1:2011-04, 7.3.4 and 7.3.5
7	Network-technical requirements	Verification of compliance against	Registered on ENA Connect Direct

		G98 Engineering Recommendation	
8.1	Language	Visual inspection	Instructions and safety provided in English
8.2	Marking	According to DIN EN 62109-1:2011-04, visual inspection Note: Only for components that are not modules or inverters, as these were already tested	Markings are clearly visible, legible and durable
8.2.2	Warning markings	According to DIN EN 62109-1:2011-04; visual inspection	Warnings are clearly visible, legible and durable
8.2.3	Identification and warning markings	Visual inspection	Safety warning and markings are complete and consistent with the documentation
8.3	Documentation	Visual inspection	Contain all information necessary for safe assembly, operation, maintenance and decommission

9.3 Reporting

Upon completion of testing, a type test report shall be produced containing:

- identification of the tested device;
- test methods used;
- measured values;
- confirmation of compliance or non-compliance.

Evidence of type testing shall be submitted for registration on the ENA register (ENA Connect Direct Platform) to support verification that the product is compliant.

9.4 Routine tests

Routine tests shall be carried out on production units to verify:

- correct assembly and packaging;
- correct marking and documentation;
- correct operation of:
    - disconnection function,
    - capacitor discharge.

This publication is available from: https://www.gov.uk/government/consultations/plug-in-solar

If you need a version of this document in a more accessible format, please email alt.formats@energysecurity.gov.uk. Please tell us what format you need. It will help us if you say what assistive technology you use.