Plug-In Solar Installation Instructions

Slate/Tile Roof Mount Kit – New Build/Self Build

Plug-In Solar – Power Your Future
www.pluginsolar.co.uk

These installation instructions contain important information on safety matters and the installation of the Plug-In Solar kit. Please read this guide carefully to ensure safe installation and operation.

*Installations are undertaken at the customer's own risk. This Installation manual is to be used as a guide only, and your discretion must be used when installing the Plug-In Solar kit. You MUST follow ALL local regulations and consult a professional in the appropriate field if you are in any doubt with any aspect of the installation. Plug-In Solar Ltd takes no responsibility for incorrect installation of our kits.

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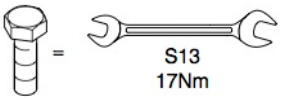
TOOL REQUIREMENTS

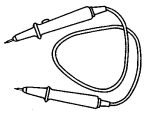
Please note, this is just a guide, and you may require additional tools than listed here.

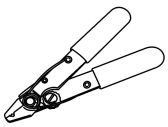
8mm Socket Tool 

6mm Hex (Allen) Key 

9,10,13,17,19mm Spanners 

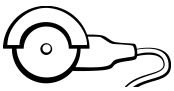
Drill with Torx30 (AW30 Bit) 

Voltage Tester 

Wire Strippers 

Flathead Screwdriver 

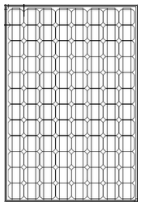
Phillips Screwdriver 

Angle Grinder (with Stone Disk) 

COMPONENT GUIDE

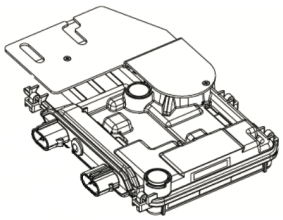
The number of components you receive will depend on the type of kit you have purchased. Please unpack all your items, and check you have all the correct components based on your Delivery Note.

Solar Panel

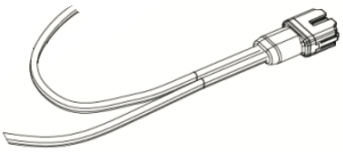


Slate/Tile Roof Mount System
Including all fixings (see Appendix 7 for more information)

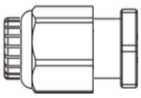
Enphase Micro-Inverter(s)



Enphase Q Cable(s)

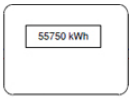


Enphase Branch Terminator(s)



AC Isolator

MCS Certified Generation Meter



SAFETY INSTRUCTIONS

Before installing or using a Plug-In Solar kit, please read all instructions and cautionary markings in this document and on the Micro-Inverters and Solar Panels.

The installation of a Plug-In Solar kit shall be carried out by a competent person with sufficient skills and training to apply safe methods of work, in compliance with G98 Engineering Recommendations.

The installation of a Plug-In Solar kit will be carried out to no lower a standard than that required in the Manufacturer's installation instructions, as provided here.

No parameter relating to the electrical connection and subject to type verification certification will be modified unless previously agreed in writing between the DNO (Distribution Network Operator) and the Customer.

All electrical installations shall be performed in accordance with local electrical codes.

All appropriate health and safety regulations must be observed and required safety precautions taken.

Be aware that installation of this equipment includes the risk of electric shock.

Be aware that the body of the Micro-Inverter is the heat sink and can reach a temperature of 80°C. To reduce risk of burns, do not touch the body of the Micro-Inverter.

DO NOT disconnect the PV module from the Micro-Inverter without first disconnecting the AC power. In no circumstances, connect a DC input when an AC connector is unplugged.

DO NOT attempt to repair a Micro-Inverter. If it fails, contact Hoymiles Customer Support to obtain an RMA number and start the replacement process. Damaging or opening a Micro-Inverter will void the warranty.

CAUTION! The external protective earthing conductor is connected to the micro-inverter protective earthing terminal via an AC connector. When connecting; connect the AC connectors first to ensure the micro-inverter earthing then undertake the DC connections. When disconnecting; disconnect the AC by opening the branch circuit breaker. Whilst maintaining the protective earthing conductor in the branch circuit breaker, connect to the micro-inverter, then disconnect the DC inputs.

You MUST follow the IET Wiring Regulations at all times and consult a professional electrician if you are in any doubt.

IMPORTANT INFORMATION

1] It is a requirement that you abide by the Health and Safety at Work Act 1974, when undertaking the installation of a Plug-In Solar Kit.

https://www.hse.gov.uk/legislation/hswa.htm

2] All electrical work must comply with The IET Code of Practice for Grid Connected Solar Photovoltaic Systems, and the 18th Edition of the IET Wiring Regulations.

https://shop.theiet.org/code-of-practice-for-grid-connected-solar-photovoltaic-systems

https://shop.theiet.org/bs-7671-2018-requirements-for-electrical-installations-iet-wiring-regulations-18th-edition-blue

3] Installers must ensure that the property's electricity supply is suitable for the connection of the additional demand and generation of the system being installed.

4] All work on your property must comply with the latest Building Regulations in the UK. The ability of the existing roof to carry the load (weight) of the solar panels will need to be checked and proven. Some strengthening work may be needed. It is your responsibility to check this and undertake/organise appropriate works as necessary.

https://www.planningportal.co.uk/info/200128/building_control

5] You may require planning permission for your Solar installation. It is your responsibility to check. If you are in any doubt, contact your local planning department or visit the Online Planning Portal for further advice.

https://www.planningportal.co.uk/info/200130/common_projects/51/solar_panels

6] Under G98 regulations, you must Commission your Plug In Solar Installation with your Distribution Network Operator (DNO) with 28 days of completion of the installation.

We provide ALL the G98 documentation required to commission your installation with your DNO, as well as step by step instructions on the process. You can find out who your DNO is, and their contact details here:

https://www.ssen.co.uk/whoismynetworkoperator/

7] Installations are undertaken at the customer's own risk. The Installation manuals provided are to be used as a guide only, and your discretion must be used when installing a Plug In Solar Kit. Plug In Solar Ltd take no responsibility for the incorrect installation of our product. You MUST follow ALL local regulations and abide by ALL necessary health and safety codes. You MUST consult a professional in the appropriate field if you are in doubt about any aspect of the installation.

WARNINGS

Never disconnect the DC wire connectors under load. Ensure that no current is flowing in the DC wires prior to disconnecting. An opaque covering may be used to cover the module prior to disconnecting the module.

Do not touch any live parts in the system, including the Solar array, when the system has been connected to the electrical grid.

Prior to installing any of the Micro-Inverters, verify that the utility voltage at the point of common connection matches the voltage rating on Micro-Inverter label.

Do not mount the Micro-Inverter in a location that allows exposure to direct sunlight. Allow a minimum of 3/4''(1.5cm.) between the roof and the bottom of the Micro-Inverter to allow proper airflow.

Always disconnect AC power before disconnecting the PV module wires from the Micro-Inverter. The AC connector of the first Micro-Inverter in a branch circuit is suitable, as a disconnecting means, once the AC branch circuit breaker in the load center has been opened.

The Micro-Inverter is powered by PV module DC power.

SOLAR PANEL INSTALLATION

When installing the solar panels included in your Plug-In Solar Kit, you must abide by a number of safety requirements:

Do not operate solar panels near highly flammable gas and vapors (e.g. gas tanks, gas stations).

Do not install solar panels in enclosed space.

Do not install solar panels in locations where they may be submerged in water.

Do not use solar panels as a substitute for normal roofing (solar panels are not watertight).

Do not install solar panels in close proximity to air conditioning systems.

Do not install solar panels above 4000 m (13120 ft) altitude above sea level.

Do not allow any chemical substance (e.g. oil, solvent etc.) to come into contact with any part of the solar panels.

The solar panel operating temperature must be between –40 °C to +85 °C (–40 °F to +185 °F).

Prevent solar panel shadowing. Optimal solar irradiation leads to maximum energy output. Install the solar panels so that they face the sun.

Avoid shadowing (due to objects such as buildings, chimneys or trees).

Avoid partial shading (for example through overhead lines, dirt, snow).

Ensure you conform to the necessary structural requirements where you are installing the solar panels.

Ensure the solar panels are properly fastened to the ground, the roof, or the facade, using the mounts provided.

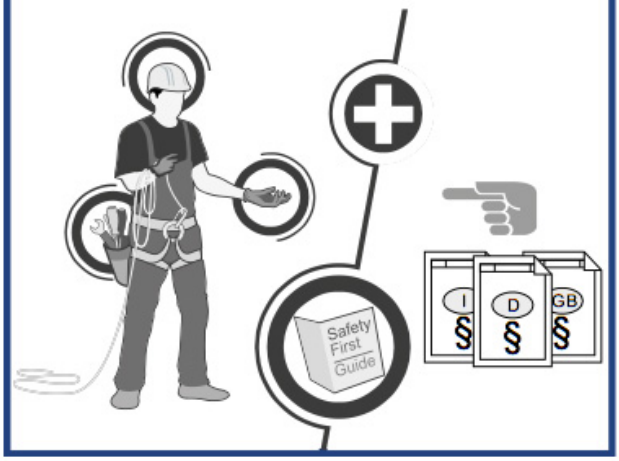
Ensure sufficient rear ventilation of the module.

Follow grounding procedures set out in the roof mount installation manual.

Please see the following instructions for further information on how to handle and install your solar panels.

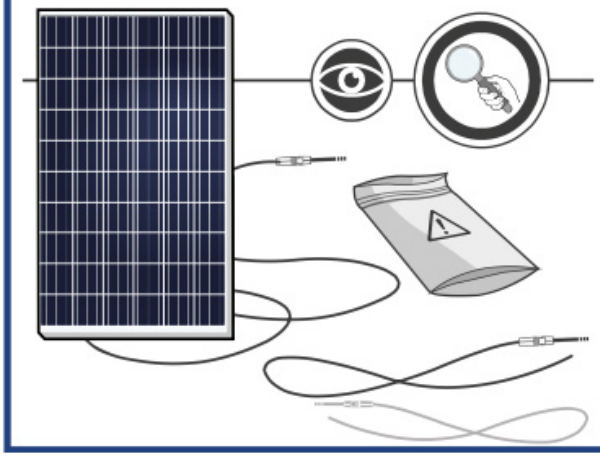
Refer to the Micro-Inverter installation section of this installation manual for information on how to wire your solar panels to the Micro-Inverters.

- Ensure that all personnel are aware of and adhere to accident-prevention and safety regulations.
- While working wear clean gloves.

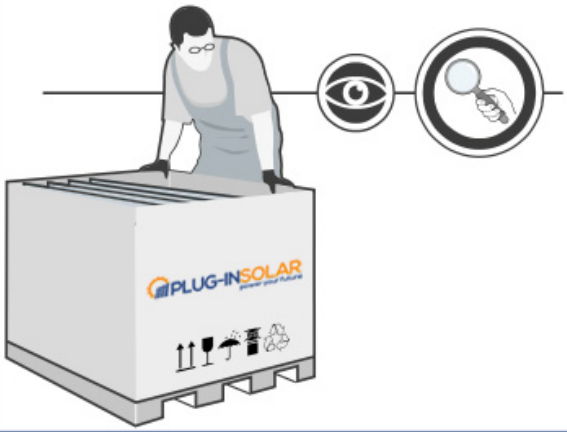


DANGER! Risk of fatal injury due to electric shock!

- Do not install damaged modules.

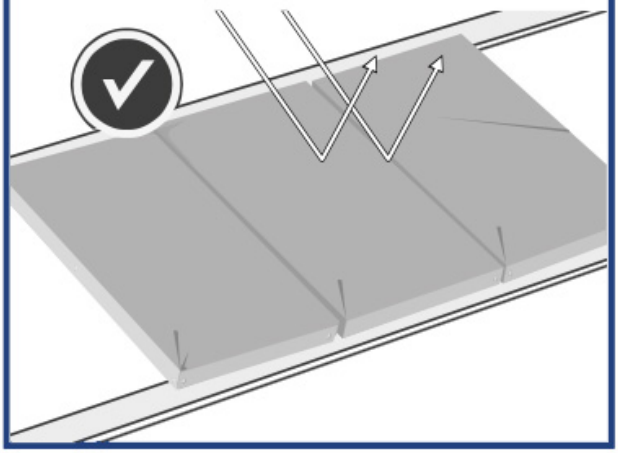


- Inspect the packaging for damages.
- Contact the transport company regarding any damage to the packaging and follow their instructions.
- Follow any instructions on the packaging.

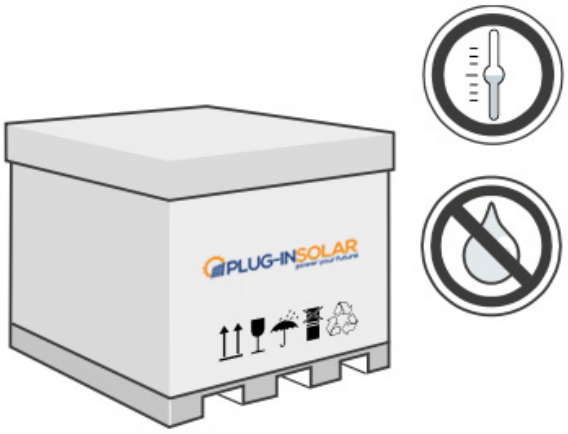


DANGER! Risk of fatal injury due to electric shock!

- Cover the modules with an opaque material during installation.

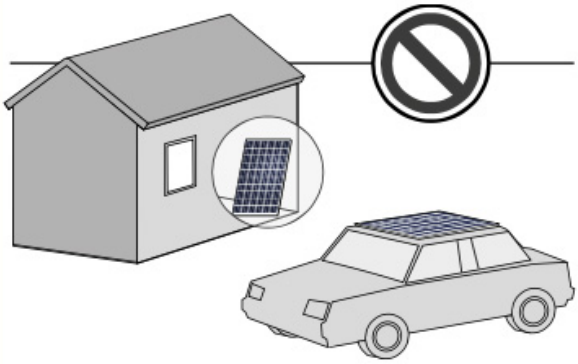


- Leave modules in their original packaging until installation.
- Store the modules securely in cool and dry rooms. The packaging is not weatherproof.



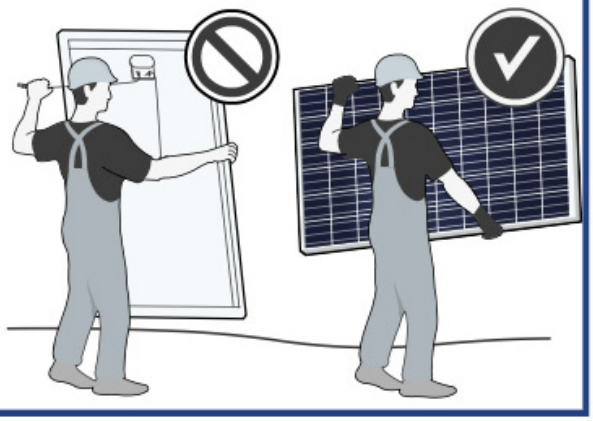
WARNING! Fire Risk!

- Do not install modules indoors.
- Do not install modules on moving objects.



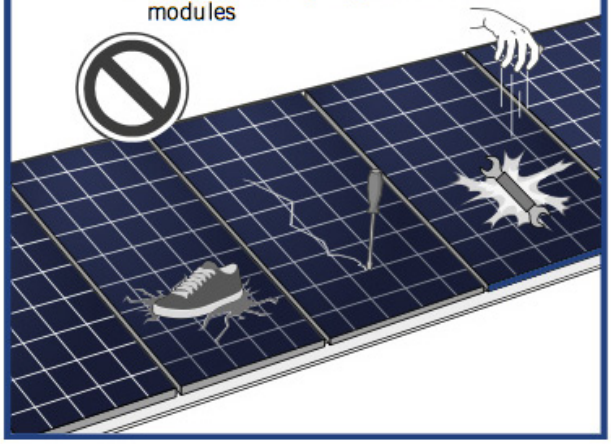
NOTE! Module damage may occur!

- Never lift or move the module with the connection cables or junction box.
- Carry modules upright and horizontally as shown.



NOTE! Module damage may occur!

- Never step on modules.
- Do not subject modules to any mechanical stress.
- Do not allow any objects to fall onto modules

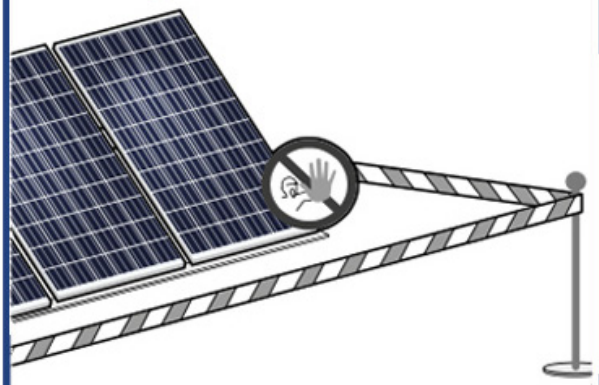


NOTE! Module damage may occur!

- Do not drop modules.

DANGER! Risk of fatal injury due to electric shock!

- Block off the installation zone.
- Keep children and unauthorized individuals away from the solar power system.



NOTE! Module damage may occur!

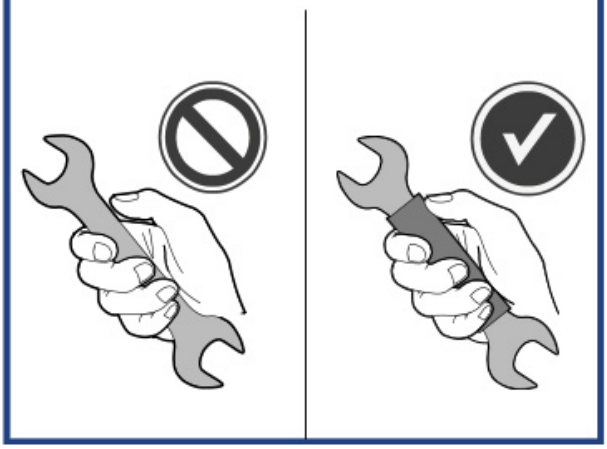
- Do not stack modules.

NOTE! Module damage may occur!

- Do not install modules near flammable gas/vapors.
- Do not install modules in close proximity to air conditioning systems.

DANGER! Risk of fatal injury due to electric shock!

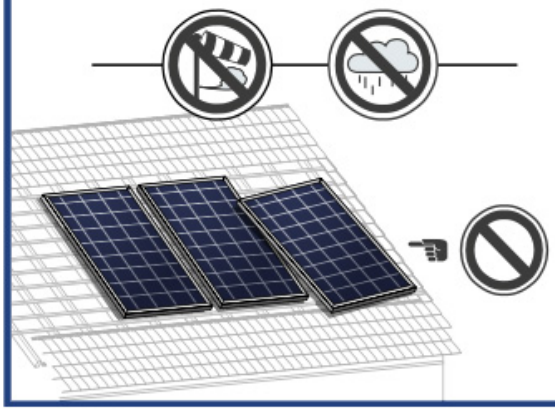
➔ Only use dry, insulated tools.



WARNING! Risk of injury due to falling modules!

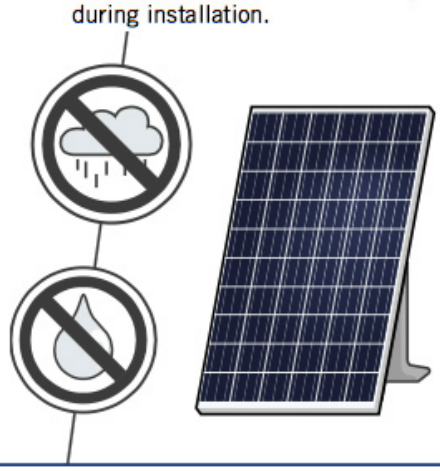
➔ Secure modules during installation.

➔ Do not install modules in windy or wet weather.

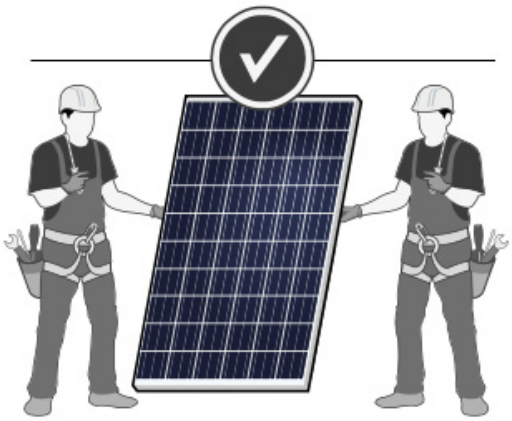


DANGER! Risk of fatal injury due to electric shock!

➔ Ensure that modules and tools are not subject to moisture or rain at any time during installation.

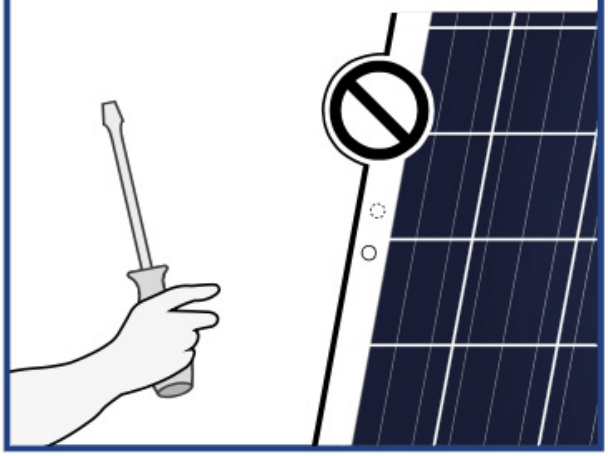


➔ Do not carry out the installation alone.



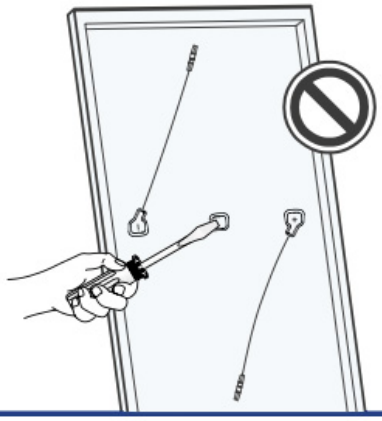
- Only install undamaged modules and components.

➔ Do not modify the module (e.g. do not drill any additional holes).



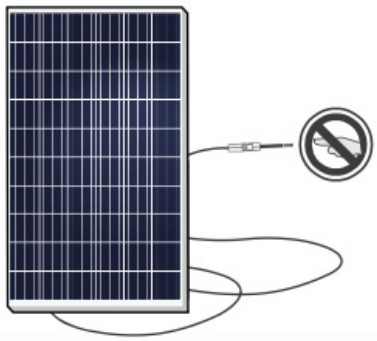
DANGER! Risk of fatal injury due to electric shock!

- Never open the junction box.
- Do not remove bypass diodes.



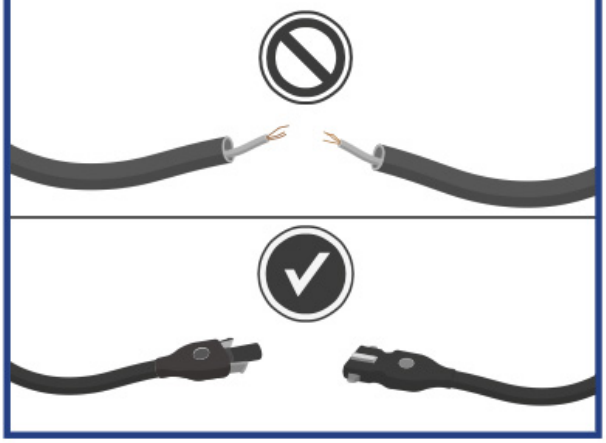
DANGER! Risk of fatal injury due to electric shock!

- Never touch live contacts with bare hands.
- Cover connectors by suitable protective caps until installation.



DANGER! Risk of fatal injury due to electric shock!

- Insulate any exposed cable ends.
- Only connect cables with plugs.



SLATE/TILE ROOF MOUNT SYSTEM INSTALLATION

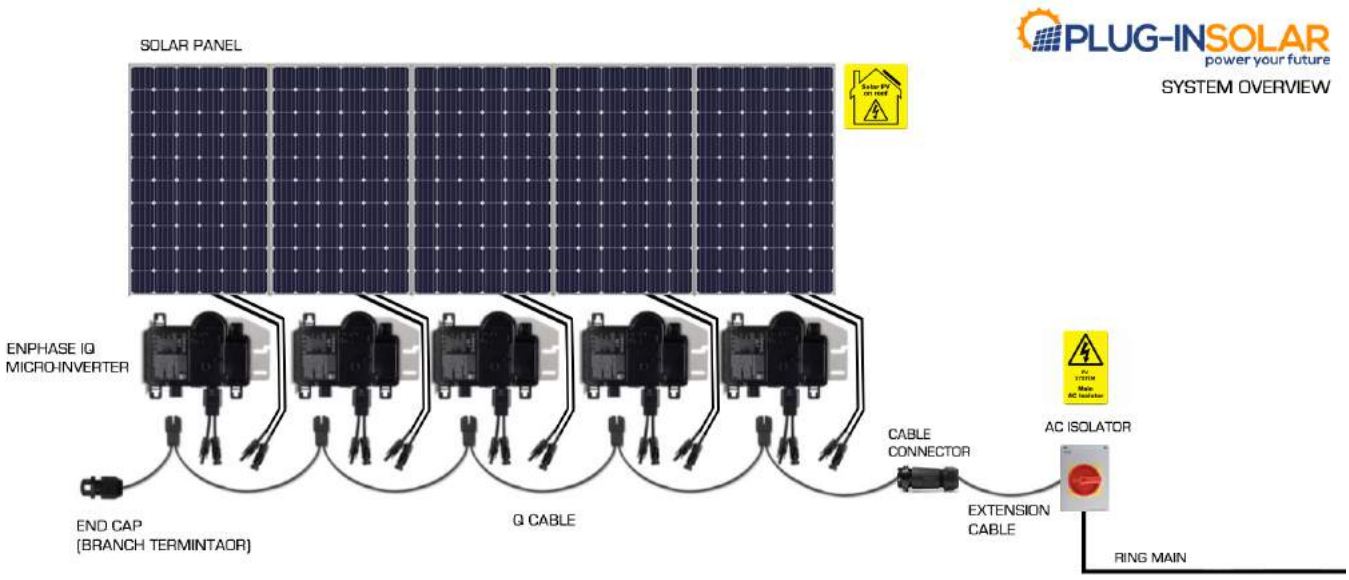
For installation instructions for a Slate/Tile Roof, please refer to the Roof Mount Manual provided in Appendix 7.

Plug-In Solar takes no responsibility for the method by which you choose to install your mounting system. This is a guide only. Please consult a roofing expert if you are in any doubt on how to safely and correctly install your system. It is your responsibility to ensure the roof is watertight.

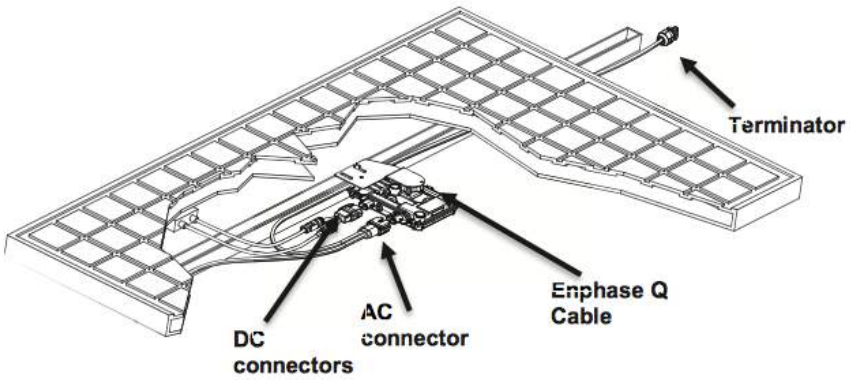
Once you have completed the installation on your roof, please return to the Micro-Inverter installation section of this manual for information on how to wire your solar panels to the Micro-Inverters.

ENPHASE MICRO-INVERTER INSTALLATION

1. System Wiring Diagram



2. Once you have completed installing the Renusol Console+ Mount system, attach the Micro-Inverters to the panels using the Enphase Frame Mounts (please see installation sheet on Page 24) Ensure the bolts are tightened securely. The Micro-Inverter must be under the module, out of long-term exposure to direct sunlight or rain.



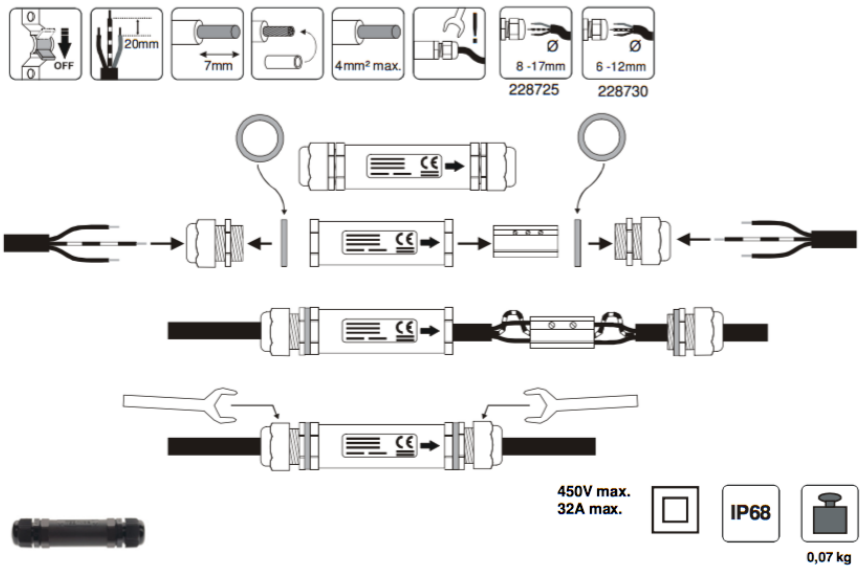
3. For installation instructions for the Enphase Micro-Inverter, please refer to the Enphase Manual provided in Appendix 1.

4. Each Micro-Inverter has serial number labels affixed. Once the micro-inverters are installed, please peel one label off each micro-inverter and stick them to the warranty card (please refer to the Enphase Manual in Appendix 1 of this installation manual for more information).

5. If you need to extend the length of AC Bus Trunk Cable, we can supply extra lengths on request. If you provide your own cable please be sure to use the correct cable wire size (AWG) depending on distance of the last Micro-Inverter to the connection point and the number of Micro-Inverters in the branch, as shown in the table below. Please be aware, the longer the cable run, the greater the power loss.

	Number of Micro-Inverters in branch							
	2	3	4	5	6	7	8	9
External Wire size(AWG)	*Maximum External cable length (ft)*							
12	*370.7*	*237.1*	*167.9*	*124.3*	*93.6*	*70.2*	*51.4*	*35.7*
10	*593.1*	*379.4*	*268.6*	*198.9*	*149.7*	*112.3*	*82.3*	*57.1*
8	*926.8*	*592.9*	*419.6*	*310.7*	*233.9*	*175.5*	*128.6*	*89.3*
6	*1482.8*	*948.6*	*671.4*	*497.1*	*374.3*	*280.8*	*205.7*	*142.9*

Follow the instructions outlined below to connect the AC Bus Trunk Cable to your extension cable, using a connection box, or similar (supplied upon request).



WIRING THE SOLAR TO AC ISOLATOR AND GENERATION METER

IMPORTANT SAFETY INFORMATION – FOR YOUR PROTECTION

For details of how to install the AC Isolator and Generation Meter, including wiring diagrams, please refer to Appendices 11 and 12 of this installation manual.

Before installation please read these instructions carefully and use the AC Isolator and Generation Meter in accordance with these safety wiring instructions.

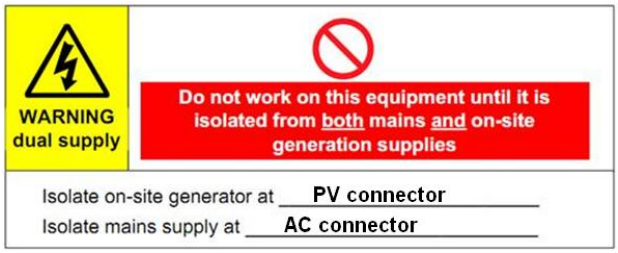
- The AC Isolator and Generation Meter in must be installed by a qualified electrician in accordance with the current UK legislation, guidance and codes of practice. In the UK these are the 17th Edition Wiring regulations BS7671-2008 and subsequent amendments.
- Once the packaging has been removed and prior to installation, carry out a visual check to make sure there are no signs of obvious damage.
- The mains supply should be between 230 and 253V.
- Ensure ALL electrical supplies are isolated prior to any work taking place.
- The AC Isolator and Generation Meter must be installed in a clean, dust free, dry and internal location.
- The AC Isolator and Generation Meter are designed to be installed between the Micro- inverter and the mains supply feed.
- Before commissioning the installer must check ALL terminal screws to ensure no connections have worked loose during transit.
- When installing the AC Isolator and Generation Meter ensure that the correct cable is used for both distance and current carrying capacity (In both normal operation and fault conditions). Refer to BS7671 17th edition wiring regulations if in any doubt.

After installation, wiring insulation tests should be completed to avoid misleading instrument readings and possible internal damage to the unit. Check your work thoroughly before restoring power to the circuit.

Once power has been restored, your Plug-In Solar kit will be feeding FREE electricity into your mains circuit.

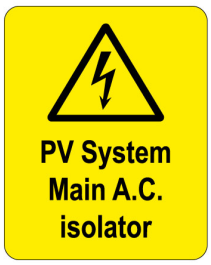
PLACING WARNING LABELS

When installing a Plug-In Solar kit you must place labelling at the **Existing Consumer Unit** and at all points of isolation between the **Existing Consumer Unit** and the **Solar Panels** within your premises. This is to indicate the presence of a Small Scale Embedded Generation installation (SSEG). The labelling should fixed in place to ensure that it remains legible and secure for the lifetime of the installation. The following labels must be used and have been provided with your Plug-In Solar kit.

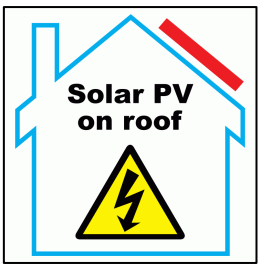


Dual supply labelling should be placed at the Plug-In Solar Connection Unit between the PV system and Existing Consumer Unit to indicate the presence of on-site generation and indicating the position of the main A.C switch disconnector.

A Micro-Inverter should be labelled stating "Inverter - isolate A.C. and D.C. before carrying out work". The Micro-Inverters also have this warning label as standard.



An AC isolator Label should be placed next to the Plug-In Solar Connection Unit and all other AC switches/disconnects (if applicable). ON and OFF positions should be clearly labelled.



To ensure the Fire and Rescue Service are aware that Solar is installed on the roof the following sign shall also be fitted next to the existing consumer unit in the building. You do not need this label for Ground Mount systems.

In addition to this safety labelling, you must also display an electrical schematic diagram next to the existing consumer unit in the property. You will have been provided with an electrical schematic diagram relevant to your kit, but can see an example in Appendix 1. Please note the diagram in Appendix 1 is non-prescriptive and is for illustrative purposes only.

INSPECTING AND TESTING YOUR PLUG-IN SOLAR INSTALLATION

As part of the G98 on-site commissioning tests you shall carry out a functional check of the loss of mains protection, for example by removing the supply to the Plug-In Solar kit during operation and checking that the AC Isolator operates to disconnect the Plug-In Solar Kit from the DNO's Distribution System.

Installation of a Plug-In Solar kit must be designed, installed, inspected, tested and certificated in accordance with BS 7671:2018 IET Wiring Regulations.

COMMISSIONING YOUR PLUG-IN SOLAR INSTALLATION

Once you have installed, inspected and tested your Plug-In Solar kit, it is a requirement that you complete and return a G98 Engineering Recommendation Form to your Distribution Network Operator (DNO) within 28 days.

Distribution Network Operators (DNOs) own and operate the distribution network of towers and cables that bring electricity from the national transmission network to homes and businesses. They don't sell electricity to consumers, this is done by the electricity suppliers. Informing the DNO of your installation allows them to manage the grid more effectively.

There are 9 different DNO's across the UK, so you must make sure you submit your form to the correct DNO in your area. You can find your DNO by entering your postcode using this website: https://www.ssepd.co.uk/Whoismynetworkoperator/

Once you have identified your DNO you must download a G98 Engineering Recommendation Form from their website (or request that they e-mail one to you).

Completing G98 Engineering Recommendation Form

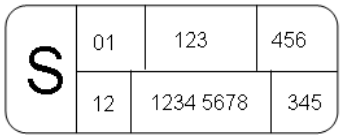
An example G98 Engineering Recommendation Form can be found in Appendix 4 of this Installation Manual. Please note G98 forms differ between DNO's, this is an example only.

The G98 Engineering Recommendation Form is relatively self-explanatory, however there are a number of sections that you must complete correctly:

Installation Address Details Section

Installation details	
Address	1 The Road One Place Sussex
Post Code	AB12 3CD
MPAN(s)	17 123456789000

Found on your electricity bill



A Meter Point Administration Number, also (MPAN), is a 21-digit reference used in the UK to uniquely identify electricity supply points. You must correctly fill in your own MPAN in this section of the form.

Your MPAN can be found on your electricity bill and often looks like the image on the left.

SSEG Micro-Generator Details Section

Summary details of Micro-generators - where multiple **Micro-generators** will exist within one premises.

Manufacturer	Date of Installation	Technology Type	Manufacturer's Ref No (this number should be registered on the ENA **Type Test Verification Report** Register as Product ID)	**Micro-generator Registered Capacity** in kW				
				3-Phase Units	Single Phase Units			Power Factor
					PH1	PH2	PH3	
Hoymiles Converter Technology Co., Ltd	01/01/2021	Solar PV	MI-600		1kW			>0.99

Input kW Size of your Plug-In Solar Kit

Within the SSEG Details section of the form, fill in the details of your installation. The capacity will be the size of the Plug-In Solar kit you purchased, i.e. 1kW. The Primary Energy Source must always be filled as 'Solar PV'. If you have any existing SSEG's (e.g. wind/solar) you must also declare these here.

SSEG Installer Details Section

Installer Details:	
Installer	Mr No. Body
Accreditation / Qualification	N/A (Self-Installed)
Address	1 The Road One Place Sussex
Post Code	AB12 3CD
Contact person	Mr No. Body
Telephone Number	01234 567891
E-mail address	nobody@pmail.com
Installer signature	.....

Input "N/A (Self-Installed)" here

As Plug-In Solar kits are DIY, self installed solar systems you should complete this section as the installer. In the Accreditation/Qualification section you should fill this in as 'N/A (Self-Installed)', unless you have an appropriate accreditation. This section of the form also needs to be signed.

Along with the completed G98 Engineering Recommendation Form, you must also supply the DNO with the following:

1. An electrical schematic diagram for your installation (A relevant electrical schematic diagram will be provided with your Plug-In Solar Kit). An example can be seen in Appendix 3.
2. A copy of the G98 Type Verification Test Report Certificate for the Micro-Inverters (This can be found in Appendix 7)
3. A photograph of your existing electricity meter (be sure to include the make and model of the meter)

Email/Fax/Post the information above to your DNO using the contact supplied on the Commissioning Form. Do not send it to Plug-In Solar, we cannot apply to the DNO on your behalf.

When the DNO has received your form and it has been processed, you will get a confirmation email/letter to say it has been accepted.

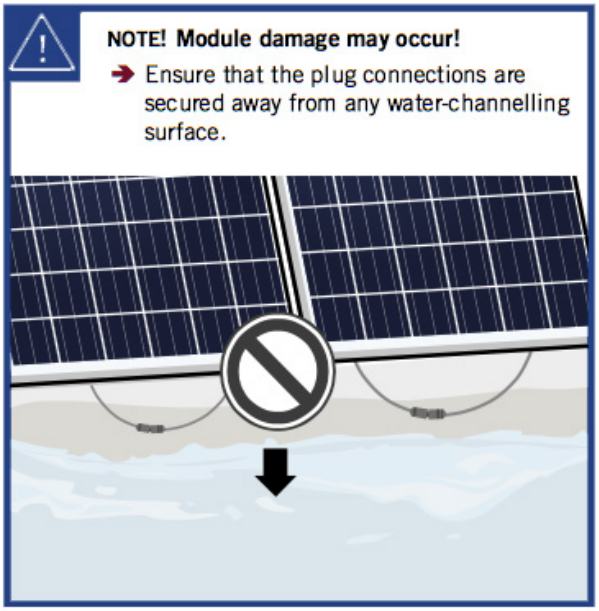
Notifying the DNO of changes to a Plug-In Solar kit

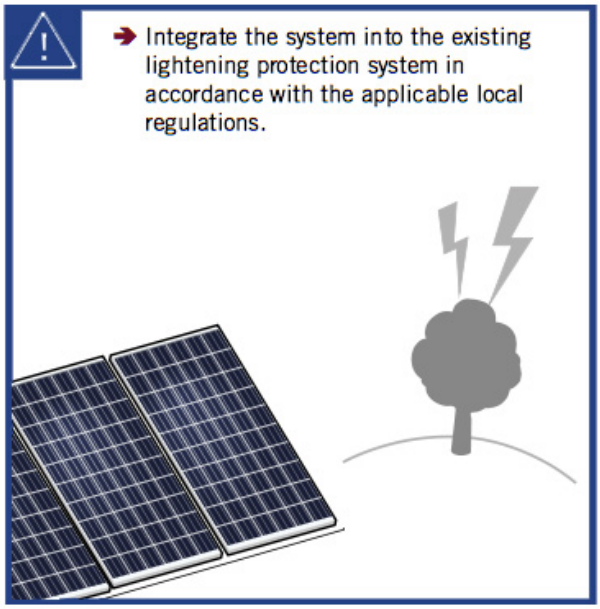
If during the lifetime of the Plug-In Solar kit it is necessary to replace a major component of the Plug-In Solar kit, it is only necessary to notify the DNO if the operating characteristics of the Plug-In Solar kit or the Plug-In Solar Connection Unit have been altered when compared against the unit that was originally commissioned.

Notifying the DNO of the decommissioning of a Plug-In Solar kit

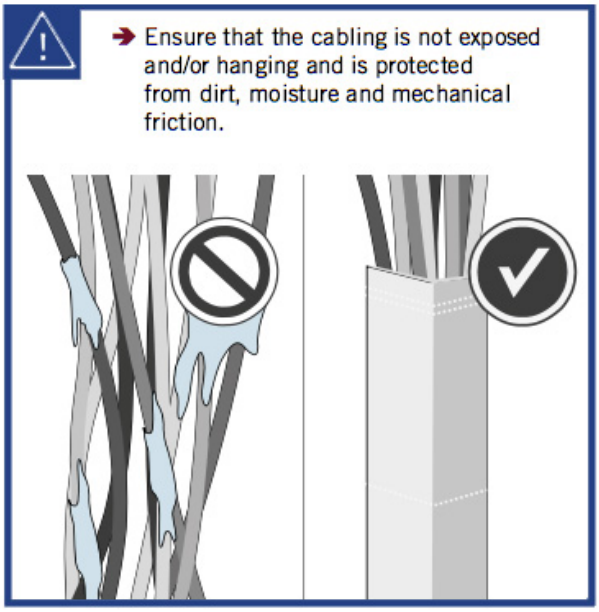
In the event that a Plug-In Solar kit is to be decommissioned and will no longer operate as a source of electrical energy in parallel with the DNO's Distribution System, you must notify the DNO by completing a G98 Decommissioning Confirmation Form. Please contact your DNO for a copy of this form.


Ensure that all necessary safety and functional tests have been carried out according to applicable standards.


NOTE! Module damage may occur!
Ensure that the plug connections are secured away from any water-channelling surface.

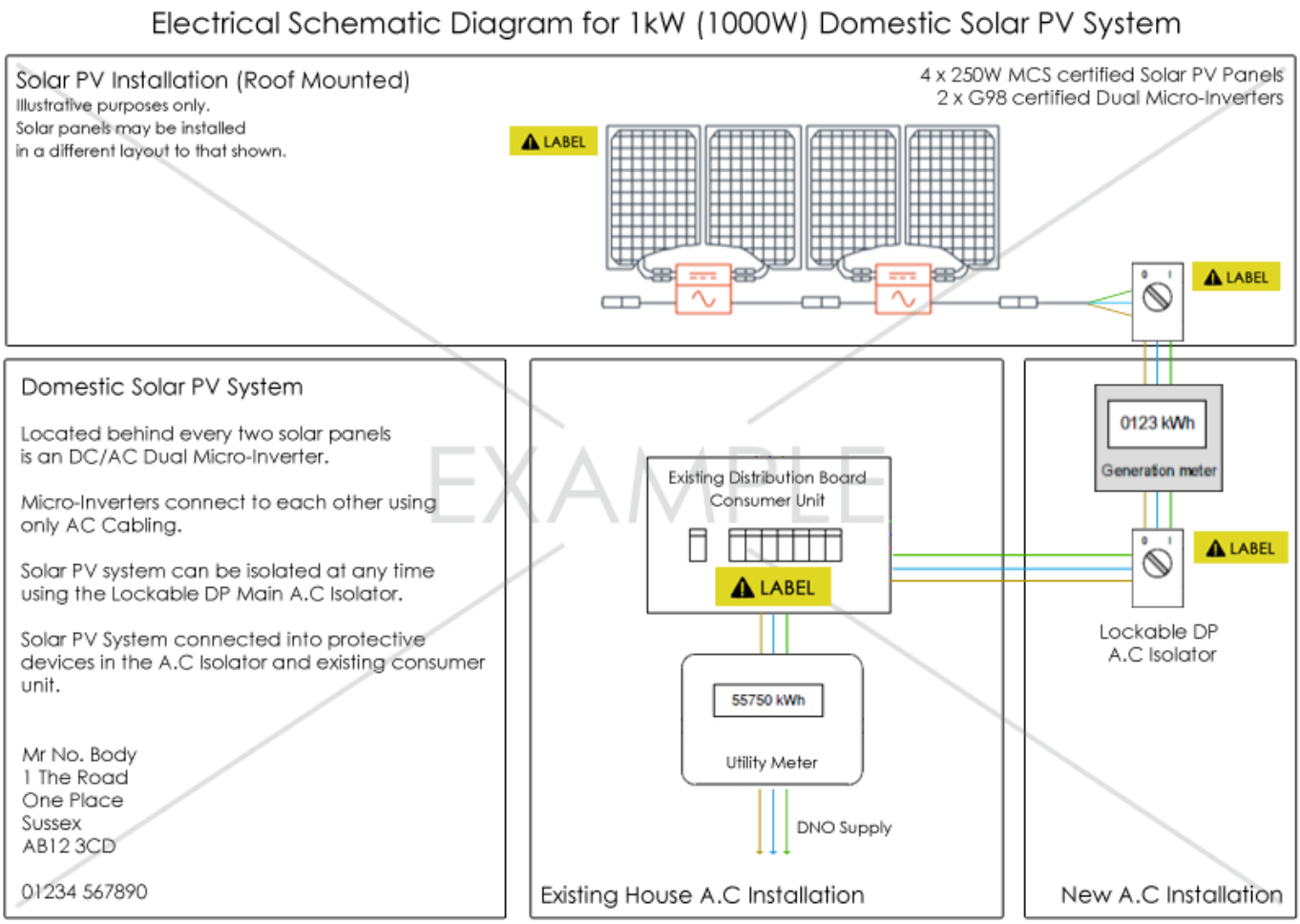

Integrate the system into the existing lightening protection system in accordance with the applicable local regulations.


WARNING! Fire Risk!
Do not use light concentrators (e.g. mirrors or lenses).


Ensure that the cabling is not exposed and/or hanging and is protected from dirt, moisture and mechanical friction.

APPENDIX 1. EXAMPLE ELECTRICAL SCHEMATIC DIAGRAM

This is non-prescriptive and is for illustrative purposes only.



Form B: Installation Document for connection under G98

Please complete and provide this document for each premises, once **Micro-generator** installation is complete.

To ABC electricity distribution **DNO**

99 West St, Imaginary Town, ZZ99 9AA abced@wxyz.com

Customer Details:	
Customer (name)	Mr No. Body
Address	1 The Road One Place Sussex
Post Code	AB12 3CD
Contact person (if different from **Customer**)	
Telephone number	01234 567891
E-mail address	nobody@pmail.com
Customer signature	.....
Installer Details:	
Installer	Mr No. Body
Accreditation / Qualification	N/A (Self-Installed)
Address	1 The Road One Place Sussex
Post Code	AB12 3CD
Contact person	Mr No. Body
Telephone Number	01234 567891
E-mail address	nobody@pmail.com
Installer signature	.....

Installation details			
Address			1 The Road One Place Sussex Found on your electricity bill
Post Code			AB12 3CD
MPAN(s)			17 123456789000
Location within **Customer's Installation**			Garage
Location of Lockable Isolation Switch			Utility Room
Details of Micro-generator			
Manufacturer / Reference			Hoymiles Converter Technology Co., Ltd
Date of Installation			01/01/2021
Primary Energy source			Solar PV
Power Factor			>0.99
Manufacturer's reference number			MI-600
Emerging technology classification (if applicable)			Input kW Size of your Plug-In Solar Kit
Micro-generator Registered Capacity in kW	3-Phase Units		
	Single Phase Units	PH1	1kW
		PH2	
		PH3	

Declaration – to be completed by Installer for Micro-generators Tested to EREC G98	
I declare that the relevant **Micro-generators** and the installation which together form a **Micro-generating Plant** within the scope of EREC G98 at the above address, conform to the requirements of EREC G98. This declaration of compliance is confined to **Micro-generating Plant** tested to EREC G98 or EREC G83 as applicable at the time of commissioning.	
Signature:	Date: 01/01/2021

Summary details of Micro-generators - where multiple **Micro-generators** will exist within one premises.								
Manufacturer	Date of Installation	Technology Type	**Manufacturer's** Ref No (this number should be registered on the ENA **Type Test Verification Report** Register as Product ID)	**Micro-generator Registered Capacity** in kW				
				3-Phase Units	Single Phase Units			Power Factor
					PH1	PH2	PH3	
Hoymiles Converter Technology Co., Ltd	01/01/2021	Solar PV	MI-600		1kW			>0.99
Input kW Size of your Plug-In Solar Kit								

Use a separate line for new and existing installations and for different Primary Energy sources above. Use PH 1 column for single phase supply.

QUICK **INSTALL** GUIDE

ENPHASE.

Installing **Enphase IQ 7, IQ 7+** and **IQ 7X** Microinverters

To install Enphase IQ Series Microinverters, read and follow all warnings and instructions in this guide and in the *Enphase IQ 7 and IQ 7+ Microinverter Installation and Operation Manual* at: enphase.com/support. Safety warnings are listed on the back of this guide.

The Enphase Microinverter models listed in this guide do not require grounding electrode conductors (GEC) or equipment grounding conductors (EGC). The microinverter has a Class II double-insulated rating, which includes ground fault protection (GFP). To support GFP, use only PV modules equipped with DC cables labeled ***PV Wire*** or ***PV Cable***.

IMPORTANT: Enphase IQ Series Microinverters require the Q Cable and are not compatible with previous Enphase cabling. An Envoy-S is required to monitor performance of the IQ Microinverters. The Q Accessories work only with Enphase IQ Series Microinverters.

PREPARATION

A) Download the Enphase Installer Toolkit mobile app and open it to log in to your Enlighten account. With this app, you can scan microinverter serial numbers and connect to the Enphase Envoy-S to track system installation progress. To download, go to enphase.com/toolkit or scan the QR code at right.

B) Refer to the following table and check PV module compatibility at: enphase.com/en-us/support/module-compatibility.

Model	DC connector	PV module cell count
IQ7-60-2-INT	MC-4 locking type	Pair only with 60-cell modules.
IQ7PLUS-72-2-INT	MC-4 locking type	Pair with 60- or 72-cell modules.
IQ7X-96-2-INT	MC-4 locking type	Pair only with 96-cell modules.

C) In addition to the Enphase Microinverters, PV modules and racking, you will need these **Enphase items**:

- An Enphase Envoy-S (model ENV-S-WM-230 or ENV-S-WB-230-F/G/I) communications gateway is required to monitor solar production and may be required to propagate a grid profile to the microinverters.
  NOTE: Depending on your region, IQ Series Microinverters may not produce until an Envoy-S is installed and configured with the appropriate grid profile. See the Envoy-S Quick Install Guide for details.
- Enphase Q Relay, single phase (Q-RELAY-1P-INT) or Enphase Q Relay, multiphase (Q-RELAY-3P-INT).
- Tie wraps or cable clips (ET-CLIP-100) - works with both multiphase and single-phase cable
- Enphase Sealing Caps (Q-SEAL-10): for any unused connectors on the Enphase Q Cable
- Enphase Terminator (Q-TERM-R-10 for single phase or Q-TERM-3P-10 for multiphase): one for each AC cable segment end.
- Enphase Disconnect Tool (Q-DISC-10)
- Enphase Q Cable for single-phase or multiphase:

Cable model	Connector spacing*	PV module orientation	Connectors per box
Single-phase			
Q-25-10-240	1.3m	Portrait (all)	240
Q-25-17-240	2.0m	Landscape (60- and 96-cell)	240
Q-25-20-200	2.3m	Landscape (72-cell)	200
Multiphase			
Q-25-10-3P-200	1.3m	Portrait (all)	200
Q-25-17-3P-160	2.0m	Landscape (60- and 96-cell)	160
Q-25-20-3P-160	2.3m	Landscape (72-cell)	160

*Allows for 30 cm of cable slack.

D) Check that you have these other items:

- An AC junction box.
- Tools: screwdrivers, wire cutter, voltmeter, torque wrench, sockets, and wrenches for mounting hardware
- Field Wireable Connectors (Q-CONN-R-10M and Q-CONN-R-10F for single phase Q Cable or Q-CONN-3P-10M and Q-CONN-3P-10F for multiphase Q Cable): optional male and female connectors.

E) Protect your system with lightning and/or surge suppression devices. It is also important to have insurance that protects against lightning and electrical surges.

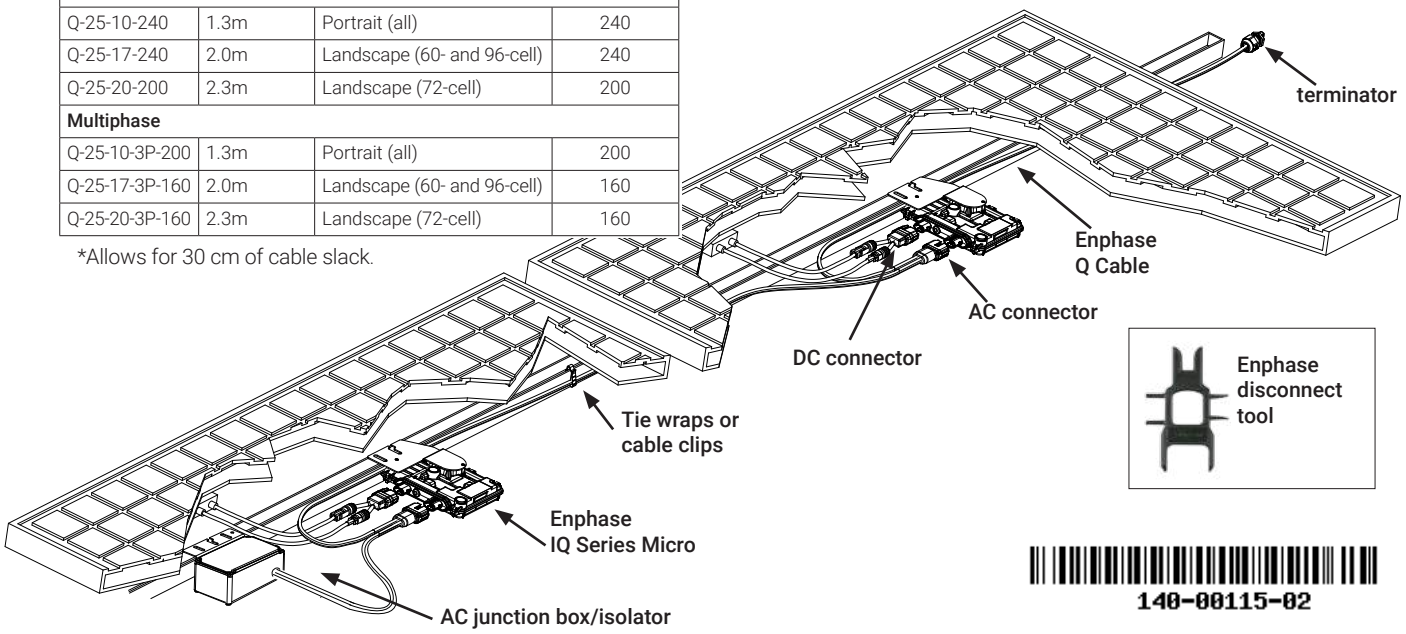
F) Plan your AC branch circuits to meet the following limits for maximum number of microinverters per branch when protected with a 20-amp over-current protection device (OCPD). For multiphase installations, use a 3-pole 20A OCPD.

Maximum* IQ Micros per AC branch circuit			
	IQ 7 Micros	IQ 7+ Micros	IQ 7X Micros
Single-phase	16	13	12
Multiphase	48	39	36

* Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

G) Size the AC wire gauge to account for voltage rise. Select the correct wire size based on the distance from the beginning of the Enphase Q Cable to the breaker in the load center. Refer to the Voltage Rise Technical Brief at enphase.com/support for more information.

Best practice: Center-feed the branch circuit to minimize voltage rise in a fully-populated branch.



140-00115-02

INSTALLATION

1 Position the Enphase Q Cable

A) Plan each cable segment to allow connectors on the Enphase Q Cable to align with each PV module. Allow extra length for slack, cable turns, and any obstructions.

B) Mark the approximate centers of each PV module on the PV racking.

C) Lay out the cabling along the installed racking for the AC branch circuit.

D) Cut each segment of cable to meet your planned needs.

WARNING: When transitioning between rows, secure the cable to the rail to prevent cable or connector damage. Do not count on the connector to withstand tension.

2 Position the Junction Box

A) Verify that AC voltage at the site is within range:

Single-Phase Service		Three-Phase Service	
L1 to N	207 to 253 VAC	L1 to L2 to L3	360 to 440 VAC
		L1, L2, L3 to N	207 to 253 VAC

B) Install a junction box at a suitable location on the racking.

C) Provide an AC connection from the junction box back to the electricity network connection using equipment and practices as required by local jurisdictions.

3 Mount the Microinverters

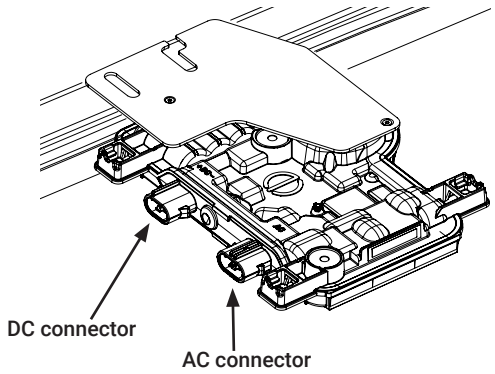
A) If the Enphase DC bulkhead connectors are not already attached to the microinverters, attach them now. Make sure they are fully seated.

B) **Mount the microinverter bracket side up (as shown) and under the PV module, away from rain and sun.** Allow a minimum of 1.9 cm between the roof and the microinverter. Also allow 1.3 cm between the back of the PV module and the top of the microinverter.

WARNING: Install the microinverter under the PV module to avoid direct exposure to rain, UV, and other harmful weather events. Do not mount the microinverter upside down.

C) Torque the mounting fasteners as follows. Do not over torque.

- 6 mm mounting hardware: 5 N m
- 8 mm mounting hardware: 9 N m
- When using mounting hardware, use the manufacturer's recommended torque value



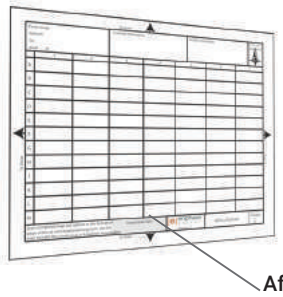
4 Create an Installation Map

Create a paper installation map to record microinverter serial numbers and position in the array.

A) Peel the removable serial number label from each microinverter and affix it to the respective location on the paper installation map.

B) Peel the label from the Envoy-S and affix it to the installation map.

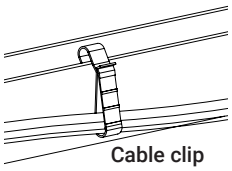
C) Always keep a copy of the installation map for your records.



5 Manage the Cabling

A) Use cable clips or tie wraps to attach the cable to the racking. The cable must be supported at least every 1.8 m.

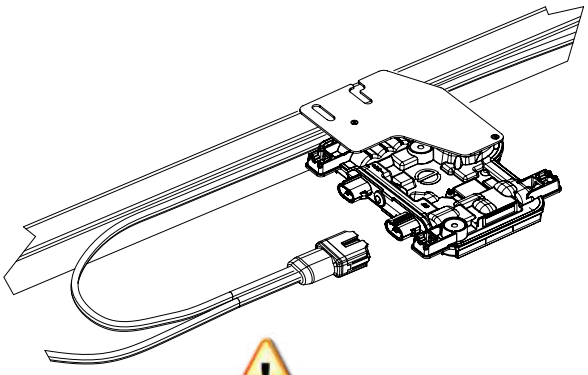
B) Dress any excess cabling in loops so that it does not contact the roof. Do not form loops smaller than 12 cm in diameter.



6 Connect the Microinverters

A) Connect the microinverter. Listen for a click as the connectors engage.

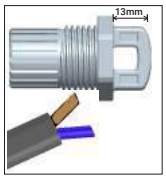
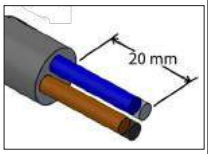
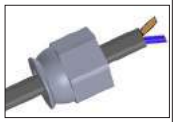
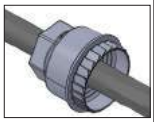
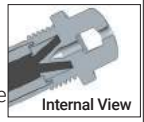
B) Cover any unused connectors on the AC cable with Enphase Sealing Caps. Listen for a click as the sealing caps engage.



WARNING: Install sealing caps on all unused AC connectors as these connectors become live when the system is energized. Sealing caps are required for protection against moisture ingress.

To remove a sealing cap or AC connector, you must use an Enphase disconnect tool.

7 Terminate the Unused End of the Q Cable

Single-phase Q Cable : Q-TERM-R-10	Three-phase Q Cable : Q-TERM-3P-10
A) Remove 13 mm of the cable sheath from the conductors. Use the terminator body loop to measure. 	**A)** Remove 20 mm of the cable sheath from the conductors. 
B) Slide the hex nut onto the cable. The grommet inside the terminator body must remain in place. 	**B)** Slide the hex nut onto the cable. The grommet inside the terminator body must remain in place. 
C) Insert the cable into the terminator body so that the two wires land on opposite sides of the internal separator. 	**C)** Insert the cable into the terminator body so that the four wires land on separate sides of the internal separator. 
D) Insert a screwdriver into the slot on the top of the terminator to hold it in place. Hold the terminator body stationary with the screwdriver and turn only the hex nut to prevent the conductors from twisting out of the separator. Torque the nut to 7.0 Nm. 	**D)** Bend the wires down into the recesses of the terminator body and trim as needed. Place the cap over the terminator body. Insert a screwdriver into the slot on the terminator cap to hold it in place. Rotate the hex nut with your hand or a wrench until the latching mechanism meets the base. Do not over torque. 
E) Attach the terminated cable end to the PV racking with a cable clip or tie wrap so that the cable and terminator do not touch the roof.	**E)** Attach the terminated cable end to the PV racking with a cable clip or tie wrap so that the cable and terminator do not touch the roof.

WARNING: The terminator can not be re-used. If you unscrew the nut, you must discard the terminator.

8 Complete Installation of the Junction Box

A) Connect the Enphase Q Cable into the junction box.

B) Note that the Q Cable uses the following wiring color code:

Single-Phase	Three-Phase
Brown – L1 Blue - N	Brown – L1 Black – L2 Grey – L3 Blue - N

NOTE: The Q Cable internally rotates L1, L2, and L3 to provide balanced 400 VAC (three-phase), thus alternating phases between microinverters.

NOTE: Minimise the number of unused Q Cable connectors with three-phase systems. When cable connectors are left unused on a three-phase system, it creates a phase imbalance on the branch circuit. If multiple cable connectors are skipped over multiple branch circuits, the imbalance can multiply.

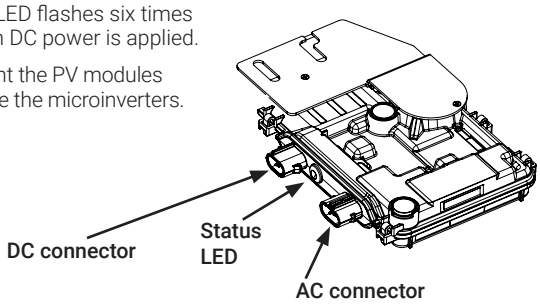
9 Connect the PV Modules

DANGER! Electric shock hazard. The DC conductors of this PV system are ungrounded and may be energized.

A) Connect the DC leads of each PV module to the DC input connectors of the corresponding microinverter.

B) Check the LED on the connector side of the microinverter. The LED flashes six times when DC power is applied.

C) Mount the PV modules above the microinverters.



10 Energize the System

A) Turn ON the AC disconnect or circuit breaker for the branch circuit.

B) Turn ON the main utility-grid AC circuit breaker. Your system will start producing power **after a five-minute wait time.**

C) Check the LED on the connector side of the microinverter:

LED	Indicates
Flashing green	Normal operation. AC grid function is normal and there is communication with the Envoy-S.
Flashing orange	The AC grid is normal but there is no communication with the Envoy-S.
Flashing red	The AC grid is either not present or not within specification.
Solid red	There is an active "DC Resistance Low, Power Off" condition. To reset, refer to the *Enphase Envoy-S Installation and Operation Manual* at: http://www.enphase.com/support.

ACTIVATE MONITORING AND SELECT GRID PROFILE

After you have installed the microinverters, follow the procedures in the *Enphase Envoy-S Quick Install Guide* to activate system monitoring, set up grid management functions, and complete the installation.

- Connect the Envoy-S
- Detect devices and select grid profile
- Connect to Enlighten
- Register the system
- Build the virtual array

SAFETY

IMPORTANT SAFETY INSTRUCTIONS SAVE THIS INFORMATION.

This guide contains important instructions to follow during installation of the Enphase IQ 7, IQ 7+, and IQ7X Microinverters.

	**WARNING**: Hot surface.
	**WARNING**: Refer to safety instructions.
	**DANGER**: Risk of electric shock.
	**Refer to manual**
	**Double-Insulated**

Safety Symbols	
⚠	**DANGER**: Indicates a hazardous situation, which if not avoided, will result in death or serious injury.
⚠	**WARNING**: Indicates a situation where failure to follow instructions may be a safety hazard or cause equipment malfunction. Use extreme caution and follow instructions carefully.
⚠	**WARNING**: Indicates a situation where failure to follow instructions may result in burn injury.
✓	**NOTE**: Indicates information particularly important for optimal system operation.

General Safety	
⚠	**DANGER**: Risk of electric shock. Do not use Enphase equipment in a manner not specified by the manufacturer. Doing so may cause death or injury to persons, or damage to equipment.
⚠	**DANGER**: Risk of electric shock. Be aware that installation of this equipment includes risk of electric shock.
⚠	**DANGER**: Risk of electric shock. The DC conductors of this photovoltaic system are ungrounded and may be energized.
⚠	**DANGER**: Risk of electric shock. Always de-energize the AC branch circuit before servicing. Never disconnect the DC connectors under load.
⚠	**DANGER**: Risk of electric shock. Risk of fire. Only use electrical system components approved for wet locations.
⚠	**DANGER**: Risk of electric shock. Risk of fire. Only qualified personnel should troubleshoot, install, or replace Enphase Microinverters or the Enphase Q Cable and Accessories.
⚠	**DANGER**: Risk of electric shock. Risk of fire. Ensure that all AC and DC wiring is correct and that none of the AC or DC wires are pinched or damaged. Ensure that all AC junction boxes are properly closed.
⚠	**DANGER**: Risk of electric shock. Risk of fire. Do not exceed the maximum number of microinverters in an AC branch circuit as listed in this guide. You must protect each microinverter AC branch circuit with a 20A maximum breaker or fuse, as appropriate.
⚠	**DANGER**: Risk of electric shock. Risk of fire. Only qualified personnel may connect the Enphase Microinverter to the utility grid.
⚠	**WARNING**: Risk of equipment damage. Enphase male and female connectors must only be mated with the matching male/female connector.
⚠	**WARNING**: Before installing or using the Enphase Microinverter, read all instructions and cautionary markings in the technical description, on the Enphase Microinverter System, and on the photovoltaic (PV) equipment.
⚠	**WARNING**: Do not connect Enphase Microinverters to the grid or energize the AC circuit(s) until you have completed all of the installation procedures and have received prior approval from the electrical utility company.

General Safety, continued	
⚠	**WARNING**: When the PV array is exposed to light, DC voltage is supplied to the PCE.
✓	**NOTE**: To ensure optimal reliability and to meet warranty requirements, install the Enphase Microinverters and Enphase Q Cable according to the instructions in this guide.
✓	**NOTE**: Provide support for the Enphase Q Cable at least every 1.8 m.
✓	**NOTE**: Perform all electrical installations in accordance with all applicable local electrical codes.
✓	**NOTE**: The AC and DC connectors on the cabling are rated as a disconnect only when used with an Enphase Microinverter.
✓	**NOTE**: Protection against lightning and resulting voltage surge must be in accordance with local standards.

Microinverter Safety	
⚠	**DANGER**: Risk of electric shock. Risk of fire. Do not attempt to repair the Enphase Microinverter; it contains no user-serviceable parts. If it fails, contact Enphase customer service to obtain an RMA (return merchandise authorization) number and start the replacement process. Tampering with or opening the Enphase Microinverter will void the warranty.
⚠	**DANGER**: Risk of fire. The DC conductors of the PV module must be labeled "PV Wire" or "PV Cable" when paired with the Enphase Microinverter.
⚠	**WARNING**: You must match the DC operating voltage range of the PV module with the allowable input voltage range of the Enphase Microinverter.
⚠	**WARNING**: The maximum open circuit voltage of the PV module must not exceed the specified maximum input DC voltage of the Enphase Microinverter.
⚠	**WARNING**: Risk of equipment damage. Install the microinverter under the PV module to avoid direct exposure to rain, UV, and other harmful weather events. Always install the microinverter bracket side up. Do not mount the microinverter upside down. Do not expose the AC or DC connectors (on the Enphase Q Cable connection, PV module, or the microinverter) to rain or condensation before mating the connectors.
⚠	**WARNING**: Risk of equipment damage. The Enphase Microinverter is not protected from damage due to moisture trapped in cabling systems. Never mate microinverters to cables that have been left disconnected and exposed to wet conditions. This voids the Enphase warranty.
⚠	**WARNING**: Risk of equipment damage. The Enphase Microinverter functions only with a standard, compatible PV module with appropriate fill-factor, voltage, and current ratings. Unsupported devices include smart PV modules, fuel cells, wind or water turbines, DC generators, and non-Enphase batteries, etc. These devices do not behave like standard PV modules, so operation and compliance is not guaranteed. These devices may also damage the Enphase Microinverter by exceeding its electrical rating, making the system potentially unsafe.
⚠	**WARNING**: Risk of skin burn. The chassis of the Enphase Microinverter is the heat sink. Under normal operating conditions, the temperature could be 20°C above ambient, but under extreme conditions the microinverter can reach a temperature of 90°C. To reduce risk of burns, use caution when working with microinverters.
✓	**NOTE**: The Enphase Microinverter has field-adjustable voltage and frequency trip points that may need to be set, depending upon local requirements. Only an authorized installer with the permission and following requirements of the local electrical authorities should make adjustments.

Enphase Q Cable Safety	
⚠	**DANGER**: Risk of electric shock. Do not install the Enphase Q Cable terminator while power is connected.
⚠	**DANGER**: Risk of electric shock. Risk of fire. When stripping the sheath from the Enphase Q Cable, make sure the conductors are not damaged. If the exposed wires are damaged, the system may not function properly.
⚠	**DANGER**: Risk of electric shock. Risk of fire. Do not leave AC connectors on the Enphase Q Cable uncovered for an extended period. You must cover any unused connector with a sealing cap.
⚠	**DANGER**: Risk of electric shock. Risk of fire. Make sure protective sealing caps have been installed on all unused AC connectors. Unused AC connectors are live when the system is energized.
⚠	**WARNING**: Use the terminator only once. If you open the terminator following installation, the latching mechanism is destroyed. Do not reuse the terminator. If the latching mechanism is defective, do not use the terminator. Do not circumvent or manipulate the latching mechanism.
⚠	**WARNING**: When installing the Enphase Q Cable, secure any loose cable to minimize tripping hazard
✓	**NOTE**: When looping the Enphase Q Cable, do not form loops smaller than 12 cm in diameter.
✓	**NOTE**: If you need to remove a sealing cap, you must use the Enphase disconnect tool.
✓	**NOTE**: When installing the Enphase Q Cable and accessories, adhere to the following: • Do not expose the terminator or cable connections to directed, pressurized liquid (water jets, etc.). • Do not expose the terminator or cable connections to continuous immersion. • Do not expose the terminator or cable connections to continuous tension (e.g., tension due to pulling or bending the cable near the connection). • Use only the connectors and cables provided. • Do not allow contamination or debris in the connectors. • Use the terminator and cable connections only when all parts are present and intact. • Do not install or use in potentially explosive environments. • Do not allow the terminator to come into contact with open flame. • Fit the terminator using only the prescribed tools and in the prescribed manner. • Use the terminator to seal the conductor end of the Enphase Q Cable; no other method is allowed.

INSTALLATION MAP

To sheet / Vers la page / Al foglio / Zu Blatt / Naar pagina: _____

Panel Group / Groupe de modules / Gruppo di moduli / Modulgruppe / Modulegroep: Azimuth / Azimut: Tilt / Inclinaison / Inclinazione / Neigungswinkel / Helling: sheet / page / foglio / Blatt / pagina_____ / _____	Client / Cliente / Kunde / Cliënt:	Installer / Installateur / Installatore:	N S E W / N S E O N S O W / N Z O W

	1	2	3	4	5	6	7
A							
B							
C							
D							
E							
F							
G							
H							
J							
K							

To sheet / Vers la page / Al foglio / Zu Blatt / Naar pagina: _____

To sheet / Vers la page / Al foglio / Zu Blatt: _____

Envoy serial label /
étiquette de numéro de série /
etichette di serie Envoy /
Serien Nummer / Label serienummer:

ENPHASE

ENPHASE.COM

INSTALLATION MAP / PLAN D'INSTALLATION
MAPPA INSTALLAZIONE / INSTALLATIONSPLAN
INSTALLATIE KAART

To sheet / Vers la page / Al foglio / Zu Blatt / Naar pagina: _____

This Limited Warranty is a voluntary manufacturer's warranty provided by Enphase Energy, Inc. ("**Enphase**") in respect of the products set forth below:

- **IQ™7-series and IQ6-series microinverters, and microinverters with product SKU C250-72-2LN-S2** which, in each case, are connected to the internet through an Envoy™ product, listed below (each a "**Microinverter**");
- **IQ Envoy, IQ Combiner+, IQ Combiner, IQ Commercial Envoy, Envoy-S Standard, Envoy-S Metered, or AC Combiner Box** (each, an "**Envoy**"); and
- **Q Aggregator, Q Commercial Aggregator, Mobile Connect, or Consumption CT**;

each a "**Covered Product**".

This Limited Warranty applies in addition to statutory rights available to consumers under UK consumer laws, including under the Consumer Rights Act 2015.

If you are a consumer and your Covered Product is defective or does not conform with the contract of sale, you can choose to make a claim under UK consumer laws or under this Limited Warranty (whichever is applicable).

We have set out below a summary of UK consumer rights under the Consumer Rights Act 2015. This is not an exhaustive description of the rights available to consumers under UK consumer laws. For more information about UK consumer laws, contact your local consumer organisation (e.g. your local trading standards or citizens advice bureau).

UK Consumer Laws

The Consumer Rights Act 2015 automatically introduces certain terms into contracts for the sale of goods to consumers including, for example, that the goods (i) will match the description given of them, (ii) will be of satisfactory quality and (iii) will be reasonably fit for any particular purpose made known to the seller.

If goods are defective or do not conform with the contract of sale, a consumer may be entitled to (i) a repair or a replacement free of charge, (ii) a discount or (iii) a refund by the seller.

The primary responsibility to provide these remedies will sit with the seller from whom the consumer purchased the goods. So, if you purchased a Covered Product from a third party reseller and not directly from Enphase, you would need to contact that reseller in order to make a claim.

For goods purchased in England and Wales, these rights expire six years from delivery of the goods. For goods purchased in Scotland, these rights expire five years from delivery of the goods.

Limited Warranty

In addition to your rights under UK consumer laws, subject to the terms of this Limited Warranty (including the limitations and exclusions set out below), Enphase warrants to the Covered Owner (as defined below) that the Covered Product will be free from defects in workmanship and materials for the applicable warranty period set forth below (each a "**Warranty Period**"), provided that the Covered Product is (i) purchased from Enphase or an entity expressly authorized by Enphase to resell the Covered Product (the "**Authorised Reseller**"), (ii) the Covered Product remains at the original End User location (the "**Original Location**"), and (iii) the Original Location is within the United Kingdom.

Covered Product(s) and Limited Warranty Period(s)

Covered Product(s)	**Limited Warranty Period(s)**
IQ™7-series, IQ6-series microinverters connected to the internet through an Envoy product	25 years commencing on the earlier of (i) the date the Covered Product is shipped from Enphase, or (ii) the date the Covered Product is activated* in Enphase's Enlighten™ system (such applicable date is referred to as the "**Warranty Start Date**").
SKU C250-72-2LN-S2 microinverters connected to the Internet through an Envoy product	10 years from the Warranty Start Date.
IQ Envoy™, IQ Combiner 3, IQ Combiner+, IQ Combiner, IQ Commercial Envoy, Envoy-S Standard, Envoy-S Metered, or AC Combiner Box	5 years from the Warranty Start Date.
Q Aggregator, Q Commercial Aggregator, Mobile Connect or Consumption CT	5 years from the Warranty Start Date.

*A Covered Product is considered "activated" when the PV solar system has received "permission to operate" by authorities having jurisdiction.

If Enphase repairs or replaces a Covered Product, the Limited Warranty will continue on the repaired or replacement product until the later of (i) the end of the original Limited Warranty Period as set in the table above or (ii) 90 days from the date of receipt of the repaired or replacement product, as long as the repaired or replacement product is installed and (where the repaired or replacement product is a Microinverter) connected to the internet through an Envoy (as described in the Installation and Operation Manual found at www.enphase.com) within 45 consecutive days from the date on which you receive the repaired or replacement product.

This Limited Warranty is given only to the end user who acquired and put the Covered Product into use for the first time (the "**End User**") or to a subsequent end user (the "**Transferee**") (each of the End User or Transferee being a "**Covered Owner**") as long as (i) the Covered Product remains at the Original Location, and (ii) the Transferee submits to Enphase a "**Change of Ownership Form**" and pays the applicable fee (the "**Transfer Fee**") within 30 days from the date of transfer to the Transferee. This submission is a requirement for continued coverage under this Limited Warranty. The Transfer Fee is set out in the Change of Ownership Form and is subject to reasonable adjustment from time to time (as determined at Enphase's discretion). The Change of Ownership Form and payment instructions are available at http://www.enphase.com/warranty.

A claim under the Limited Warranty must be submitted by following the procedures set out in Paragraph 3 below (RMA Process).

1. Warranty Exclusions.

i. This Limited Warranty will not apply in the following circumstances:

a) if the Covered Product is not registered with Enphase and (where the Covered Product is a Microinverter) connected to the internet through an Envoy (as described in the Installation and Operation Manual found at www.enphase.com) within 45 consecutive days following the Warranty Start Date;

b) if the Covered Product is not installed, operated, handled, or used in accordance with the Quick Install Guide (provided with the Covered Product) or Installation and Operation Manual or under conditions for which the Covered Product was not designed;

c) if the defect arises after the expiration of the Warranty Period;

d) if the Covered Product has been altered, modified, or repaired (unless such alteration, modification or repair is made by Enphase or a third party acting on its behalf);

e) if the Covered Product has been misused, neglected, tampered with or otherwise damaged;

f) If the Covered Product has been used otherwise than in accordance with applicable laws;

g) if the Covered Product has been subjected to fire, water, generalized corrosion, biological infestations, acts of nature, or input voltage that creates operating conditions beyond the maximum or minimum limits listed in the Covered Product specifications set out in the Installation and Operation Manual, including high input voltage from generators or lightning strikes;

h) if the defect has been caused by another component of the attached solar system not manufactured by Enphase;

i) if the original identification markings (including trademark or serial number) of the Covered Product have been defaced, altered, or removed;

j) if the Grid Profile (utility approved operating parameters) of a Microinverter has been altered, and such alteration causes the product to malfunction, fail, or fail to perform; and/or

k) if the defect occurs during shipping or transportation after the Covered Product is sold by Enphase to an Authorised Reseller.

ii. In addition, this Limited Warranty does not cover:

a) the cost of labour for removal or installation of a Covered Product,

b) normal wear and tear or deterioration, or cosmetic, technical or design defects of a Covered Product which do not materially affect energy production or degrade form, fit, or function of the Covered Product;

c) theft or vandalism of the Covered Product;

d) the removal, installation or troubleshooting of the End User's or the Transferee's electrical systems; and/or

e) software programs installed in the Covered Product and/or the recovery and reinstallation of such software programs and data.

2. Remedies. If Enphase confirms the existence of a defect that is covered by this Limited Warranty, Enphase will, at its option, either (a) repair or replace the Covered Product free of charge, or (b) issue a prorated credit or refund for the Covered Product to the End User or Transferee in an amount equal to the current market value of the Covered Product at the time the End User or Transferee notifies Enphase of the defect, as determined in Enphase's sole discretion. If Enphase elects to repair or replace the Covered Product, Enphase will, at its option, use new or reconditioned parts or products of original, comparable, or improved design.

3. RMA Process. To make a claim under this Limited Warranty, the End User or Transferee must comply with the Return Merchandise Authorization ("**RMA**") Procedure available at http://www.enphase.com/warranty.

4. Assignment. Enphase expressly reserves the right to novate or assign its rights and obligations under this Limited Warranty to a third party with the demonstrated expertise and requisite resources needed to effectively discharge the obligations hereunder.

5. Limitation of Liability.

i. Enphase will not be responsible for any loss or damage which is not Enphase's fault or is not foreseeable. Loss or damage is foreseeable if either it is obvious that it will happen or if, at the time the contract of sale was made, both we and you knew it might happen.

ii. Enphase only provides the Covered Product for domestic and private use. If you use the Covered Product for any commercial or business purpose, Enphase will not be responsible for business losses including, for example, loss of profits, loss of business, business interruption or loss of business opportunity.

iii. Nothing in this Limited Warranty will limit or exclude Enphase's liability for (a) death or personal injury caused by its negligence, (b) fraud or fraudulent misrepresentation, (c) any breach of your legal rights in relation to the Covered Product (including as summarised above under "UK Consumer Laws") or (c) for any other liability which cannot be limited or excluded under applicable law.

6. Governing law. If you purchased the Covered Product in England, Wales or Northern Ireland, this Limited Warranty is governed by and construed under the laws of England and each party submits to the non-exclusive jurisdiction of the English courts. If you purchased the Covered Product in Scotland, this Limited Warranty is governed by and construed under the laws of Scotland and each party submits to the non-exclusive jurisdiction of the Scottish courts.

7. Severability. If any term of this Limited Warranty is held to be illegal or unenforceable, it will be excluded from this Limited Warranty and the legality or enforceability of the remaining terms will not be affected.

This Limited Warranty is offered by Enphase Energy, Inc.

Contact Details:

United Kingdom https://enphase.com/en-uk/support/

The grant of this Limited Warranty is expressly conditioned upon the acceptance and agreement by the End User and any permitted Transferee to the terms, conditions, and requirements herein.

Limited Warranty for Solar Modules

(High Efficiency Single Glass Series)

V09_20200316

This Limited Warranty is suitable for the following LONGI Modules model	
LR6-60PE-xxxM	LR6-72PE-xxxM
LR6-60PH-xxxM	LR6-72PH -xxxM
LR6-60PB-xxxM	LR6-72PB -xxxM
LR6-60HP-xxxM	LR6-72HP-xxxM
LR6-60HPH-xxxM	LR6-72HPH-xxxM
LR6-60HPB-xxxM	LR6-72HPB-xxxM
LR6-66HP-xxxM	LR6-78HP-xxxM
LR6-66HPH-xxxM	LR6-78HPH-xxxM
LR6-66HPB-xxxM	LR6-78HPB-xxxM
LR6-60HIH-xxxM	LR6-72HIH-xxxM
LR6-60HIB-xxxM	
LR4-60HPH-xxxM	LR4-72HPH-xxxM
LR4-60HIH-xxxM	LR4-72HIH-xxxM
LR4-60HPB-xxxM	LR4-60HIB-xxxM
LR6-60OP-xxxM	LR6-72OP-xxxM
LR6-60OPH-xxxM	LR6-72OPH-xxxM

Supplier is committed to the following quality performance warranty for solar modules (hereinafter referred to as “modules”). The Product Warranty Term starts as of the delivery date as per INCOTERMS 2010 or 6 months after the modules are shipped out of the production plant, which the earlier date shall be effective (hereinafter short as the “Warranty Effective Date”).

1. Limited Product Warranty-Repair or Replacement within 12 years

Supplier assures that under the conditions for regular application, installation, use and service, the integral module (including attached DC connectors, cables) can meet the demand of regular application, use and installation and have no defect caused by material and process within 144 months as of the Warranty Effective Date. If the modules get out of order or fail to operate due to material or process defects within 144 months as of the Warranty Effective Date, Supplier provides remedy, only repairing and replacing the failed modules after verification and confirmation by an independent testing institution agreed by Supplier and the customer in advance. The remedy of repair or replacement is the exclusive measure within this “Limited Product Warranty”, which does not involve assurance for the module power output. The power output assurance is to be specially elaborated in the Section 2 “Limited Warranty for Peak Power” below.

2. Limited Warranty for Peak Power - Limited Compensation

Supplier provides power output loss assurance within 25 years as of the Warranty Effective Date. Power output loss is calculated by comparing the minimum “module nominal power under standard testing conditions” (short as nominal power) marked on the nameplate with the actual power output under standard testing conditions.

The annual attenuation is less than 2% within the 1st year from the Warranty Effective Date and is less than 0.55% from the 2nd year to the 25th year within the peak power warranty period. The output power can reach 84.8% in the last year of the 25-year peak power warranty period.

Supplier assures that any qualified module sold out can meet the power guarantee value mentioned above within 25 years of power warranty period from the Warranty Effective Date. If any power loss exceeds the guaranteed value verified by Supplier, and Supplier attributes such power loss to its material or process defects, or such power loss is further (required by customers) verified by the third party testing institution (agreed by both the customer and Supplier), Supplier will make judgment at its discretion and

take either remedial measures as (1) provide extra modules to make up for power loss as above; or (2) repair or replace the defected modules and provide the shipment free of charge to the initial delivery location.

The above-mentioned compensations in “Limited Warranty for Peak Power” are the sole and exclusive remedy measures.

Note: If any customer finds that the defective modules need to be returned before the treatment, the freight shall be borne on the customer. If the third party testing institution confirms that it is the responsibility within the scope of Supplier quality warranty, the shipping cost can be compensated as per the freight or related invoice provided by the customer.

3. Exceptions and Restrictions

(a) All quality warranty claims shall be submitted to Supplier or Supplier authorized distributors in written form within but not beyond the warranty period in any cases.

(b) “Limited Product Warranty” and “ Limited Warranty for Peak Power” do not apply to modules in situations below:

- Improper use, misuse, negligence, intentional damage or accidents;
- Fabrication without permission, improper installation or application;
- The customers move the installed module or change the location of the module installed without any prior written consent or authorization by the supplier.
- Fail to follow the repair and recovery instructed by the producer;
- Fail to follow the Supplier maintenance instructions;
- Power failure, power surge, lightning, fire and flood, accidental damage or force majeure.

(c) “Limited Product Warranty” and “Limited Warranty for Peak Power” do not compensate costs as, any costs related to module installation, demounting and re-installation (except for those stated in the last part of Section 5) or custom clearance costs and other costs related to return and replacement of modules.

(d) Claims will be rejected if the module model and serial number labels are falsified, removed or blurred without written authorization by Supplier.

4. Quality Warranty Scope

Unless Supplier agrees on and signs and recognizes other obligations and liabilities in written form, the warranty clauses in this quality warranty will replace and exclude other explicit or implied assurances including but not limited to the merchantability assurance, or assurance for special purposes or applications, and other obligations and liabilities undertaken by Supplier. Supplier shall not be responsible for human injury or property losses nor for other losses or injuries caused by modules or module-related problems (including but not limited to any module defect or any defect caused by use and installation). Supplier shall not compensate any collateral damages, derived damages or special damages by any cause. Losses such as profit loss, production loss or revenue loss caused by product faults are excluded hereby. If Supplier makes compensation for customers, the accumulated compensation amount shall not exceed the invoicing price for a single module paid by the customer.

5. Quality Warranty Performance

If any customer proposes legitimate quality warranty requirements in accordance with the “Limited Product Warranty”, they shall send a written notice by registered letter to Supplier at the address below or send email to Supplier email address. The customer shall attach proof of quality warranty herewith, corresponding module serial number and purchasing date and provide the invoice marked with clear purchasing date, price, module model and Supplier seal or signature.

If modules need to be shipped to Supplier for testing, repair or replacement, Supplier shall provide the return merchandise authorization (RMA) to the customer. Supplier will not accept returned modules without RMA. With approval of the customer service department, the reasonable, normal and proved shipping cost (including return cost and re-shipping cost of repaired and replaced modules) of modules related to “Limited Product Warranty” and “Limited Warranty for Peak Power” will be compensated by Supplier to customers.

6. Transferability

The clauses of this “Quality Warranty” will cover end users and can be transferred to any successive owners if the module’s installation position is unchanged and the inheritance or transferring relations can be sufficiently proved.

7. Severability of Clauses

Should a part or a clause of the "Quality Warranty" is considered invalid or ineffective or not executable, or this part or clause to some people or some conditions is deemed invalid or ineffective or not executable, this situation shall not affect effectiveness of other parts or clauses of the "Quality Warranty". In this case, the other parts or clauses in this "Quality Warranty" or the applicability of this "Quality Warranty" are considered independently effective.

8. Dispute Resolution

If any dispute occurs with quality warranty claims, one of the domestic first-class testing institutions such as TÜV SUD, Intertek, UL, CQC and CGC shall be invited for verdict of the final claim. All the cost shall be borne by the losing party unless otherwise stipulated in the verdict. Supplier reserves the right for the final interpretation.

Further dispute resolutions shall be executed by the applicable legal jurisdiction agreed upon in the sales contract signed by both parties.

9. Alteration

The repair, replacement or the provision of extra modules does not mean that the warranty period is renewed and the original warranty period shall not extend. Any replaced modules are possessed by Supplier and shall be treated or disposed of at its own discretion. In case Supplier has stopped producing the same model as the defective modules which the claim is made against, Supplier shall keep the right to provide the modules of other models (different sizes, color, shape or power), either new brand or original brand.

10. Force Majeure

If Supplier fails to perform or postpone performing sales articles or this "Quality Warranty" in the event of fire, flood, storm, typhoon, lightning, natural disaster, change of public policies, terrorism, war, riot, strike, or unavailability of proper and sufficient labor and materials or due to any other reasons or situations out of control of Supplier, Supplier shall not take any responsibilities for customers or any third party. In this case, Supplier shall not take any responsibilities for end users or any third party in any form.

Note: "Peak power" is the maximum power of solar module under the standard testing conditions (STC). Standard testing conditions refer to as:

(a) Spectrum amplitude AM1.5

(b) 1000W/m^2 irradiance

(c) Irradiance at the correct angle and the cell temperature is 25℃.

Testing is done at the terminal of the junction box according to IEC61215 (equivalent to GB/T 9535). Supplier's calibration and testing standard are effective on the manufacturing date of the solar modules. Supplier's calibration standards are consistent with the approved standards by international institutions. During the period of 'Limited Warranty for Peak Power', measurement uncertainty shall be counted when determining module's output power, according to standard IEC 60904.

Block B, No.8989 Shangji Road, Xi'an Economic and Technological Development Zone, Xi'an, Shaanxi, China.

Tel: +86- 4009696199 Fax: +86-29-86686228

Postal code: 710018 Official website: en.longi-solar.com

UKAS PRODUCT CERTIFICATION
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TÜV SÜD BABT

Certificate of Factory Production Control

This certificate has been issued to

LONGi Green Energy Technology Co., Ltd.

of

No. 388, Middle Hangtian Road
Chang'an District
710100 Xi'an City
Shaanxi
People's Republic of China

whose production management system has been assessed and found to comply with the Factory Production Control Requirements of the MCS Product Certification Scheme in respect of:

Production of Photovoltaic Solar Panels

at the address(s) listed on the Annex of this certificate

and includes the ranges of

Photovoltaic Solar Panels
as detailed
on the attached annex to this certificate

Signed:

on behalf of TUV SUD BABT UNLIMITED

MCS CERTIFIED

Certificate Number: BABT 8771R06

Valid from: 07 September 2021 This Certificate expires on: 28 November 2022

The holder of this certificate is authorised to use the MCS Approved Product Mark. This certificate has been issued in accordance with the Testing and Certification Regulations of TÜV SÜD. Conditions of validity of this certificate, if any, are listed in the Annex.
This certificate constitutes page 1 of the combined Certificate and Annex.

For further details related to this certification please contact BABT@tuv-sud.co.uk

TÜV®

Annex to
Factory Production Control Requirement
Microgeneration Certification Scheme

1 Manufacturing Location

Facility 1	Facility 2	Facility 3
LONGi Solar Technology (Chuzhou) Co., Ltd. No.19 Huai'an Road, Nanqiao District, Chuzhou City, Anhui Province, P.R. China	LONGi Solar Technology (Xianyang) Co., Ltd. No.120 Wenxing West Road, Qindu District, 712000 Xianyang City, Shaanxi Province, P.R. China	LONGi Solar Technology (Jiangsu) Co., Ltd. No.288 Yaojia Road, Jiulong Town, Hailing District, Taizhou City, Jiangsu Province, P.R. China

2 Established Conformity

2.1 Product Certification Scheme Requirements

Microgeneration Certification Scheme	Revision	Applicability
MCS 005 – Solar Photovoltaic Modules	Issue 3.1	☒
MCS 010 – Factory Production Control Requirements	Issue 2.0	☒
MCS 012 – Pitched Roof Installation Kits	Issue N/A	☐
MCS 017 – Bespoke Building Integrated Photovoltaic Products	Issue N/A	☐

2.2 Assessment Report

Assessment Report Number	Issue Number	Issue Date
BABT 8771 R06	1	2021-09-06

3 Technical Documentation

3.1 User Guide

PV Module Installation Manual LGiLE-T-PRD-013-18 V11	Issued	2021-04-06

3.2 Test Reports

50155409 008	Issued	2019-07-11
50155409 012	Issued	2019-11-06
50155409 013	Issued	2019-11-20
50155409 024	Issued	2020-12-24
50212844 020	Issued	2020-12-31
704061700509-07	Issued	2019-07-09
704061700509-08	Issued	2019-10-22
704061700509-09	Issued	2019-11-25
704061700509-10	Issued	2020-03-09
704061700509-11	Issued	2020-04-15
704061700509-12	Issued	2020-07-01
704061700509-13	Issued	2020-07-22
704061700509-13A1	Issued	2020-07-22

704061700509-14	Issued	2020-09-09
704061700509-15	Issued	2020-10-12
704061700509-16	Issued	2020-11-04
704061700509-17	Issued	2021-01-25
704061700516-03	Issued	2019-06-27
704061700516-04	Issued	2019-10-17
704061700516-05	Issued	2019-11-09
704061700516-06	Issued	2019-11-28
704061700516-07	Issued	2020-03-09
704061700516-08	Issued	2020-04-13
704061700516-09	Issued	2020-06-25
704061700516-10	Issued	2020-07-24
704061700516-11	Issued	2020-08-19
704061700516-12	Issued	2020-10-30
704061700516-14	Issued	2021-01-24
704061700516-15	Issued	2021-05-07
704061802022-04	Issued	2019-07-10
704061802022-05	Issued	2019-11-25

4 Products Within Scope of Certification

4.1 MCS 005: Solar Photovoltaic Modules

Product Type	Product Name Note 1	Power Range (W) Note 2	Certification Number
Monocrystalline	LR6-60HPB-xxxM	300 - 320	BABT8771-01/00
Monocrystalline	LR4-60HPB-xxxM	335 - 365	BABT8771-02/01
Monocrystalline	LR6-72HPH-xxxM	365 - 395	BABT8771-03/00
Monocrystalline	LR6-60HPH-xxxM	300 - 325	BABT8771-04/00
Monocrystalline	LR4-72HPH-xxxM	420 - 455	BABT8771-05/02
Monocrystalline	LR4-60HPH-xxxM	350 - 375	BABT8771-06/01
Monocrystalline	LR6-72HBD-xxxM	360 - 395	BABT8771-07/01
Monocrystalline	LR6-60HBD-xxxM	300 - 325	BABT8771-08/01
Monocrystalline	LR4-72HBD-xxxM	415 - 455	BABT8771-09/02
Monocrystalline	LR4-60HBD-xxxM	345 - 375	BABT8771-10/02
Monocrystalline	LR6-60PB-xxxM	295 - 315	BABT8771-11/00
Monocrystalline	LR5-72HPH-xxxM	525 - 555	BABT8771-12/00
Monocrystalline	LR5-66HPH-xxxM	480 - 505	BABT8771-13/00
Monocrystalline	LR5-72HBD-xxxM	500 - 545	BABT8771-14/00
Monocrystalline	LR5-66HBD-xxxM	475 - 495	BABT8771-15/00
Monocrystalline	LR4-66HPH-xxxM	405 - 425	BABT8771-16/00
Monocrystalline	LR4-60HIB-xxxM	335 - 370	BABT8771-17/00
Monocrystalline	LR4-60HIH-xxxM	350 - 380	BABT8771-18/00
Monocrystalline	LR4-66HIH-xxxM	395 - 425	BABT8771-19/00
Monocrystalline	LR4-72HIH-xxxM	420 - 465	BABT8771-20/00
Monocrystalline	LR5-72HIH-xxxM	525 - 545	BABT8771-21/00
Monocrystalline	LR5-66HIH-xxxM	480 - 500	BABT8771-22/00

Annex to
Factory Production Control Requirement
Microgeneration Certification Scheme

Product Type	Product Name Note 1	Power Range (W) Note 2	Certification Number
Monocrystalline	LR4-60HIBD-xxxM	345 - 375	BABT8771-23/00
Monocrystalline	LR4-72HIBD-xxxM	415 - 450	BABT8771-24/00
Monocrystalline	LR5-72HIBD-xxxM	500 - 545	BABT8771-25/00
Monocrystalline	LR5-66HIBD-xxxM	475 - 500	BABT8771-26/00
Note 1: where xxx = output power rating in W Note 2: in steps of 5 W			

5 Additional Information

All products within the scope of this certification shall be listed on the MCS Installations Database for the duration of this certificates validity. The database shall contain an entry for each individual power rating for the certified product, where the power rating shall be suffixed to the certificate number as listed on this certificate.

6 Conditions of Validity

This certificate authorizes the manufacturer or their authorized representative to apply the MCS Approved Product Mark to the range of products listed within this certification in accordance with the MCS Manufacturers / Distributors agreement dated **17th January 2020.**

This certificate ceases to be valid if the manufacturer makes any changes or modifications to the approved equipment or the approved quality system, which have not been notified to, and agreed with TUV SUD BABT UNLIMITED or a person appointed by TUV SUD BABT UNLIMITED to perform that role.

The manufacturer must immediately cease affixing the MCS Approved Product Mark on any product subject to expiry, withdrawal or suspension of this certification.

Signature: _____ Date: 2021-09-07

(Stephen Milliken)

On behalf of TUV SUD BABT UNLIMITED

GS-ROOF

TILE ROOF, TIN ROOF AND
TILT ROOF SYSTEM

PUB16 JAN01

INSTALLATION GUIDE

GS-ROOF SYSTEM

Fastensol
Smart energy

Thank you for choosing the Fastensol solar panel roof mounting system. Made from custom-designed aluminium extrusions and components, Fastensol's streamlined design and improved frame strength greatly simplify solar panel installation.

Offering a high level of adjustability for module width and depth Fastensol's versatile design makes it suitable for a wide variety of building types and zones including residential, commercial and remote environments.

Fastensol is backed by a 10-year warranty and is compliant with the AS/NZS 1170.2:2011/ Amdt 2:2012 on wind actions, AS/NZS16641.1:1997 on aluminium structures, AS1720.1:2012 on timber structures, AS/NZS4600:2005 on cold-formed steel structures.

INSTALLATION OF THIS PRODUCT IS TO BE PERFORMED ONLY BY PROFESSIONALLY TRAINED INSTALLERS.

Any attempt by an unqualified person to install this product could result in death or serious injury.

Part I. SAFETY AND INSTALLER RESPONSIBILITIES

Handling and Installing Fastensol

It is critically important that safety practices are observed when installing

- ✓ Do not throw or roughly handle any Fastensol components.
- ✓ Do not bring Fasrensol system into contact with sharp or heavy objects.
- ✓ Do not modify Grace solar components in any way. The exchange of bolts, drilling of holes, bending or any other physical changes not described in standard installation procedure will void the warranty.
- ✓ It is the installer's responsibility to verify the integrity of the structure to which Fastensol components is fixed. Roofs or structures with rotten/rusted bearers, undersized bearers, excessively spaced bearers, or any other unsuitable substructure cannot be used with Fastensol components, and installation on such structures will void the warranty, and could result in death or serious injury.

Wind and Climate Design

A Fastensol frame installed in accordance with this installation manual is compliant with AS/NZS 1170.2:2011/Amdt 2:2012.

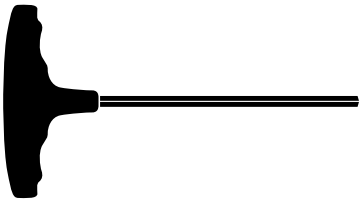
This manual (including the drawings) cannot cover all types of buildings and eventualities.

AS/NZS 1170.2:2011/Amdt 2:2012 provides guidance on determining the wind pressures applicable to your Fastensol install site, taking into account roof shape and geographic location. Sufficient guidance is given in this document, but you may wish to procure a copy of these standards if your company installs Australia/New Zealand wide.

- ✓ REMEMBER average wind speeds are higher for structures mounted closer to the roof perimeter zone (edge).
- ✓ Make sure your installation complies with local and national building codes. Take into account relevant design parameters (wind speed, exposure and topographic factor) when determining the loading for the installation.
- ✓ If alternative fasteners are used to fix the framing to the roof (assuming supplied fasteners are unsuitable for any reason), all screw fasteners must conform to corrosion resistance Class 4 Australian Standard AS3566 and be of equal or greater strength to those supplied with your Fastensol order.

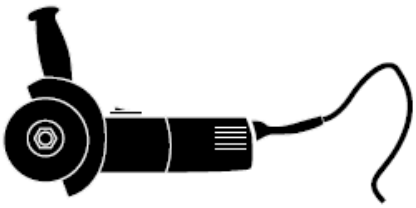
Part II. TOOLS REQUIRED FOR INSTALLATION

✓ **T-bar Allen Key or 6 mm hexagonal driver bit**
If using a 6 mm driver bit, make sure the cordless power tool used for driving has a hand-tight clutch setting and a fine (soft) impact drive to prevent damage to the fragile glass panels and threads on the SunLock framing.



✓ **Cordlessdrill**
Drill or impact driver for driving roof material fixings.

✓ **Angle grinder**
For terracotta tile roof installation, and angle grinder fitted with a continuous edge diamond tipped tile0cutting blade; gloves, hearing protection, a face protection mask, and a suitably rated breathing protection mask for all people in proximity of grinding



✓ **Gloves**
Protect the hazard of the sharp corners.

✓ **Cord or color pen**
Mark the installation position;

✓ **Spirit level**

✓ **Rule**

Step 2: Determine Roof Installation Roof Areas

Solar panels can be installed anywhere on the roof, as long as sufficient fixings are used. Higher wind speeds are encountered at the edges of roofs and therefore more fixings are required in these areas.

For a flush mounted array, a roof can be divided into two zones, the central zone and the end zone. The width of these zones can be determined based on the length of the building.

For a tilted array, a roof can be divided into three zones, the internal zone, intermediate zone and the edge zone. The width of these outer zones can be determined based on the length, width and average height of the building.

If fixings are located in the intermediate, edge or end zones, then the maximum spacing to the next fixing must be reduced, as per the table in the drawings.

Determining the width of the central and end zones, 'B/3'

The width of the central and end zones is determined by calculating the roof length and dividing this result by 3.

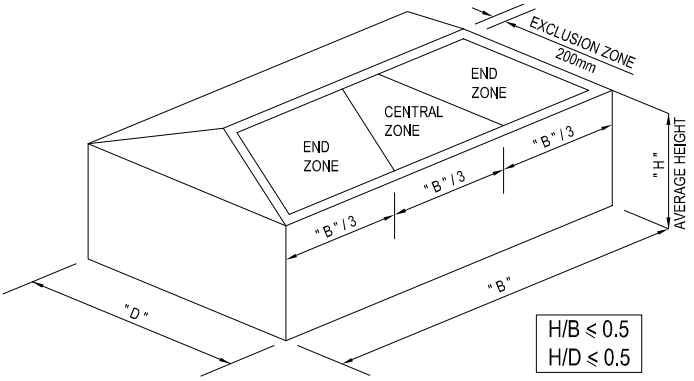
An exclusion zone of 200 mm must be made on the edges of the roof.

Determining the width of the edge and intermediate zones, 'A'

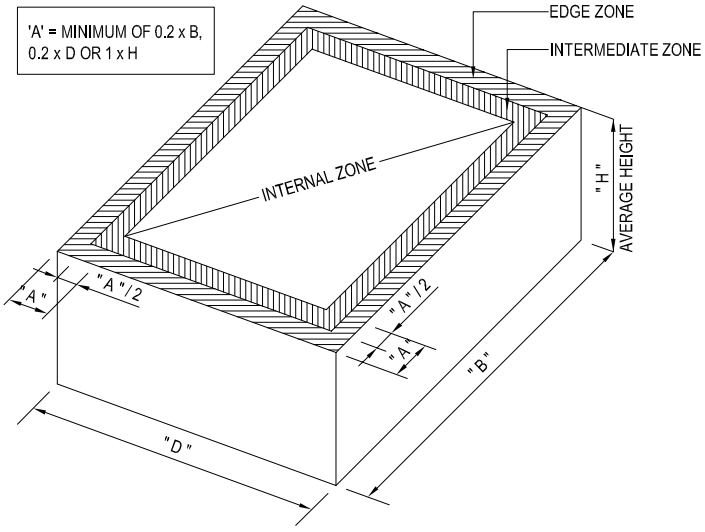
The width of the edge and and intermediate zones, 'A', is determined by calculating each of the following values, and then using the smallest:

- 0.2 x B
- 0.2 x D
- H

Flush mounted arrays:



Tilt mounted arrays:



Determine the height of the of your installation site:

- This document provides sufficient information for Fastensol system installation height less than 20meters. If your installation site is more than 20 meters in height, please contact Fastensol to obtain engineering data to support your installation.

Determine Roof slope:

- Fastensol's system can be used for roof slope up to 60 degrees. Please verify the Installation site roof slope should be between 0 degrees and 60 degrees.

Step 3: Determine the Maximum Rail Support Spacing

FASTEN SOLAR FR RAIL 2 FOR PITCHED ROOFS

Maximum Fixing Spacing Table
Tiled Roof With Roof Hook Fixed to Rafter with minimum of
2x12 gauge (5.5 mm minimum diameter, 10 tpi) screws with 50 mm minimum embedment into timber
Wind Region to AS Code 1170.2 - 2011

	Wind Region A		Wind Region B		Wind Region C		Wind Region D	
Height above Ground	Remote from Roof Edge	Adjacent to Roof Edge	Remote from Roof Edge	Adjacent to Roof Edge	Remote from Roof Edge	Adjacent to Roof Edge	Remote from Roof Edge	Adjacent to Roof Edge
5 metres	**2,250**	1,590	**1,480**	950	**885**	580	**540**	N/S
10 metres	**2,015**	1,300	**1,200**	780	**790**	520	**480**	N/S
15 metres	**1,820**	1,165	**1,080**	700	**690**	450	**420**	N/S
20 metres	**1,700**	1,100	**1,020**	660	**615**	400	**375**	N/S

Maximum Fixing Spacing Table
Pitched Metal Roof with "L" Bracket Fixed to Purlin with minimum of
1x12 gauge (5.5 mm minimum diameter, 14 tpi & 10 tpi) screws for fixing to steel & timber respectively
Wind Region to AS Code 1170.2 - 2011

	Wind Region A		Wind Region B		Wind Region C		Wind Region D	
Height above Ground	Remote from Roof Edge	Adjacent to Roof Edge	Remote from Roof Edge	Adjacent to Roof Edge	Remote from Roof Edge	Adjacent to Roof Edge	Remote from Roof Edge	Adjacent to Roof Edge
5 metres	**2,250**	1,530	**1,420**	915	**850**	555	**515**	N/S
10 metres	**1,950**	1,240	**1,155**	750	**760**	500	**460**	N/S
15 metres	**1,750**	1,120	**1,040**	675	**660**	430	**405**	N/S
20 metres	**1,640**	1,050	**980**	640	**590**	390	**360**	N/S

FASTEN SOLAR FR RAIL 2 FOR FLAT METAL ROOFS

Maximum Fixing Spacing Table
Fixing at between 10 to 15 degrees
Fixed to Flat Metal Roof with minimum of
2x12 gauge (5.5 mm minimum diameter, 14 tpi & 10 tpi) screws for fixing to steel & timber respectively
Screwed through to 1.2 mm minimum BMT steel or 50 mm minimum embedment into timber
Wind Region to AS Code 1170.2 - 2011

	Wind Region A	Wind Region B	Wind Region C	Wind Region D
5 metres	1,300	800	500	N/S
10 metres	1,100	650	450	N/S
15 metres	900	600	400	N/S
20 metres	800	550	350	N/S

Maximum Fixing Spacing Table
Fixing at between 10 to 15 degrees
Fixed to Flat Metal Roof with Klip-Loc Clamp
Wind Region to AS Code 1170.2 - 2011

	Wind Region A	Wind Region B	Wind Region C	Wind Region D
5 metres	1,300	800	500	N/S
10 metres	1,100	650	450	N/S
15 metres	900	600	400	N/S
20 metres	800	550	350	N/S

Maximum Fixing Spacing Table
Fixing at between 15 to 30 degrees
Fixed to Flat Metal Roof with minimum of
2x12 gauge (5.5 mm minimum diameter, 14 tpi & 10 tpi) screws for fixing to steel & timber respectively
Screwed through to 1.2 mm minimum BMT steel or 50 mm minimum embedment into timber
Wind Region to AS Code 1170.2 - 2011

	Wind Region A	Wind Region B	Wind Region C	Wind Region D
5 metres	650	400	250	N/S
10 metres	550	325	220	N/S
15 metres	500	300	200	N/S
20 metres	450	275	N/S	N/S

Maximum Fixing Spacing Table
Fixing at between 15 to 30 degrees
Fixed to Flat Metal Roof with Klip-Loc Clamp
Wind Region to AS Code 1170.2 - 2011

	Wind Region A	Wind Region B	Wind Region C	Wind Region D
5 metres	650	400	250	N/S
10 metres	550	325	220	N/S
15 metres	500	300	200	N/S
20 metres	450	275	N/S	N/S

Maximum Fixing Spacing Table
Fixing at between 30 to 60 degrees
Fixed to Flat Metal Roof with minimum of
2x12 gauge (5.5 mm minimum diameter, 14 tpi & 10 tpi) screws for fixing to steel & timber respectively
Screwed through to 1.2 mm minimum BMT steel or 50 mm minimum embedment into timber
Wind Region to AS Code 1170.2 - 2011

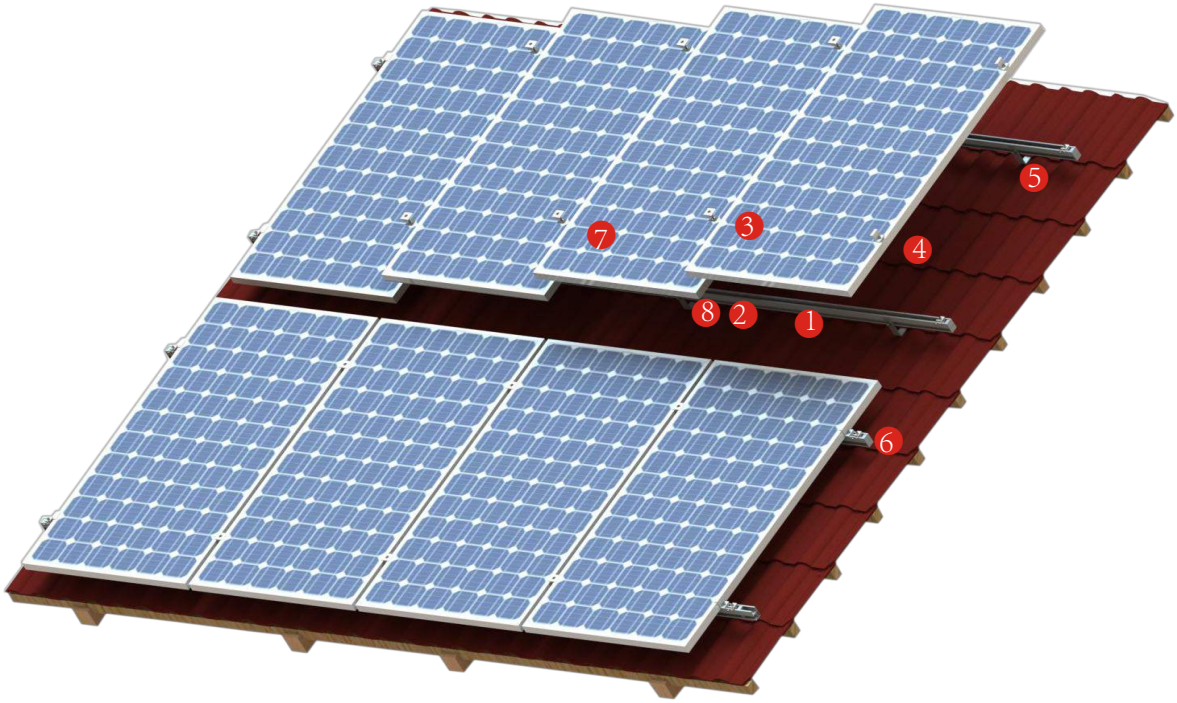
	Wind Region A	Wind Region B	Wind Region C	Wind Region D
5 metres	650	400	250	N/S
10 metres	550	325	220	N/S
15 metres	500	300	200	N/S
20 metres	450	275	N/S	N/S

Maximum Fixing Spacing Table
Fixing at between 30 to 60 degrees
Fixed to Flat Metal Roof with Klip-Loc Clamp
Wind Region to AS Code 1170.2 - 2011

	Wind Region A	Wind Region B	Wind Region C	Wind Region D
5 metres	650	400	250	N/S
10 metres	550	325	220	N/S
15 metres	500	300	200	N/S
20 metres	450	275	N/S	N/S

Part IV. System Overview and Components

[4.1.] Tile roof mounting system



1. **Standard Rail** – Supports PV modules. Use two per row of modules. Aluminum extrusion, anodized.

Standard Rail Length	
808~826mm wide panels	990~1020mm wide panels
2560mm	4200mm
3405mm	

2. **Rail splice** – Extend Fastensol Rails to any length as required by the quantity or width of the solar panels.
   Tapping screw for Rail splice - st6.3*25 ×4pcs.

3. **Mid Clamp Kit** – Standard pre-assembly for the usual panels with thickness 30, 35, 40, 46, 50, 57mm

4. **End Clamp Kit** – Standard pre-assembly for the usual panels with thickness 30, 35, 40, 46, 50, 57mm

5. **Stainless Steel Tile Hook** - Roof mounts secure the railing to tile roofs.
   Aluminum Tile Hook - Roof mounts secure the railing to tile roofs.
   Wood screw - st6.3*80 ×3pcs

6. **Grounding Lug -**To ensure the entire system grounded and safe.

7. **Bonding Jumper -**Electorically connect spliced rails .

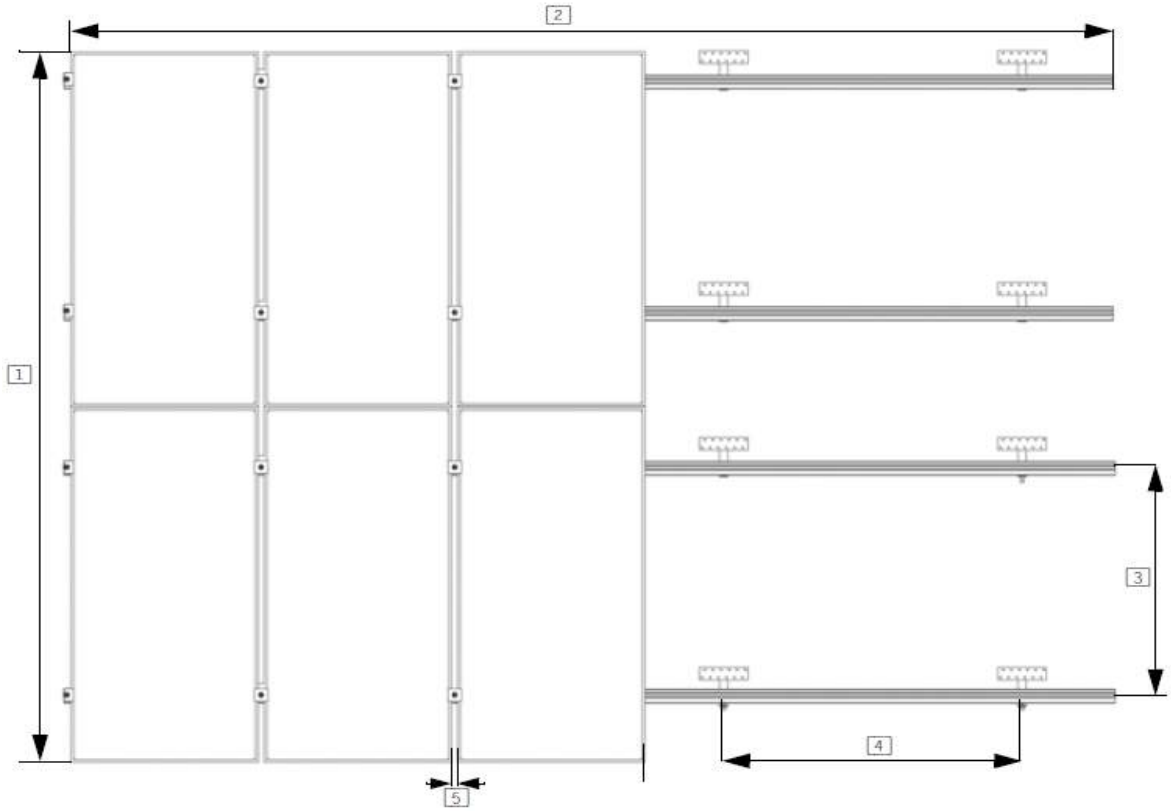
8. **Grounding Clip -**Cooperated with mid Clamp to install under the Rail

Part IV. Installation

[5.1.] Installing tile roof mounting system

Step 1: Designing the module field

According to the specification of modules, calculate the length of rails, distance and span between two hooks. Details and drawings is as below:



1. Height of the module field: module height x number of modules vertically
2. Width of the module field: number of modules horizontally x (width of the module + 18 mm)+32 mm
3. Distance between roof connections vertically (according to the clamping points pre-defined by the module producer): Quarter-points of the modules, about 1/2 of module height.
4. Distance between roof connections horizontally: Depending on the distance between rafters and on the static requirements (please see the ***Part III*** on page 6).
5. Distance between modules: 17 mm

When positioning the modules, please take into consideration

- That the values above are
- That dimensions of tiles or other roof covering and the position of the rafters define the precise actual horizontal distance between roof connections
- That the distance between roof laths defines the precise actual vertical distance between roof connections.

Part IV. Installation

[5.1.] Installing tile roof mounting system

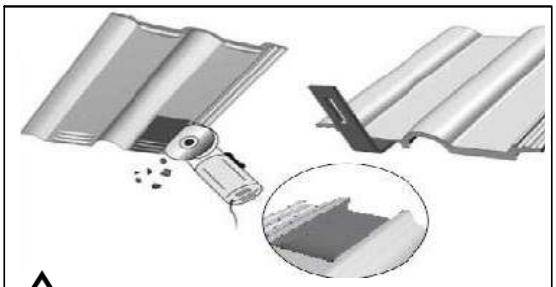
Step 2: Installing tile bracket

Remove the roof tiles at the marked positions or simply lift them up slightly. Input the roof hook to the wooden beam. Fix the roof hooks with 3pcs wood screws (st6.3x80).

Note: Minimum 2 pcs wooden screws

Cover the hooks by the removed tile

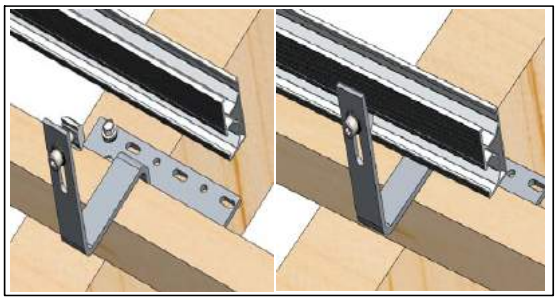
If necessary, use an angle grinder or hammer to cut a concavity in the tile that covers the roof hook at the point where the roof hook comes through.(Caution! Must not use fixed roof hook as a ladder, as this extreme point load could damage the tile below.



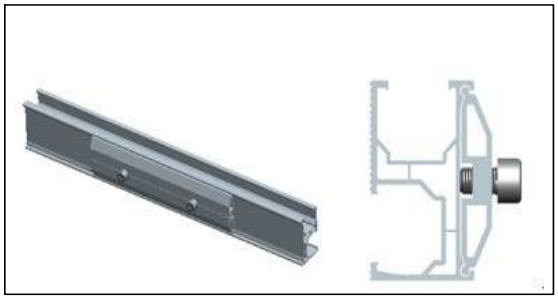
⚠ To minimize risk of injury, exercise caution when operating tile cutting tool, and follow tool manufacturer's safety instructions. Failure to follow appropriate safety procedures could result in severe lacerations of dismemberment.

Step 2: Installing the rail

Fix the rail to tile hook by inserting the Tbolt into the rail channel, and then fasten the flange nut. The rail can be adjusted vertically within the roof attachment slot when bolts are loosely fastened.

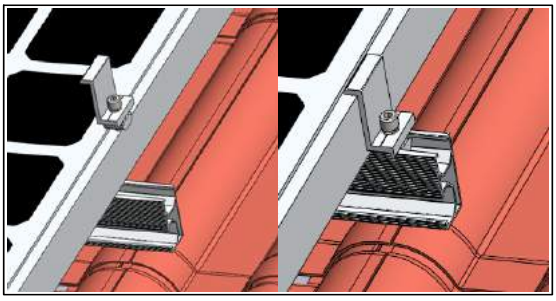


Installation of the splice to connect multiple rails together. Slide the splices on the rear side of the pre-assembled rails halfway to the side. Fasten the first M8 bolt firmly using the Allen key. Now slide the next rail segment into the splice. Tighten the second M8 bolt .The connection is finished.



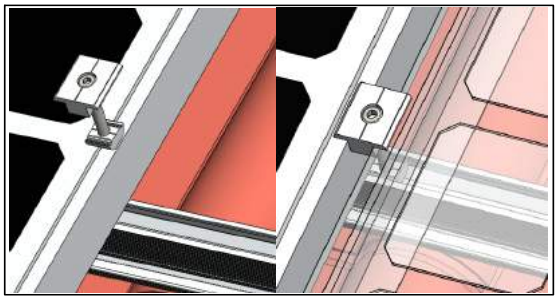
Step 3. Installing the End Clamp

Insert Tbolt of the end clamp into the rail channel. Using a 10 mm hex driver, secure the first solar panel to the railing starting as close to the end of the row as possible. A minimum of 50 mm between the end of the rail and edge of the first solar panel is required(recommended torque is 15-20Nm).



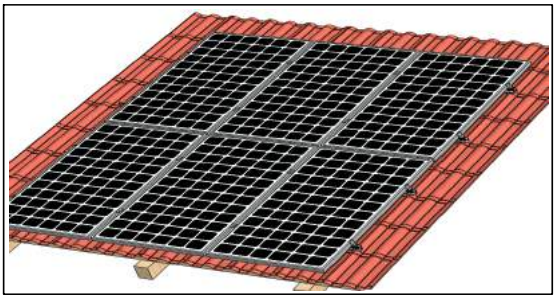
Step 4. Installing the Mid Clamp

Insert the T-clip of the mid clamp into the rail channel and position the clamp against the first panel frame. Hand-tighten the screw 2-3 turns to loosely hold the clamp in position. Ensure the EarthLock washer is placed between the rail and the frame of the panel ***(pls refer to the chapter [5.6.] if you have any questions about the grounding installation).***



Step 5. Finish installing all the panels

Repeat doing last step till finish installing all the panels. Check the whole system and re-fix all outer screws after finish installing the panels.

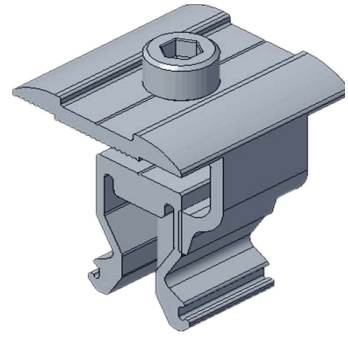


Universal-Clamp

GS Rail System with Click-in Technology

GS Universal Clamp

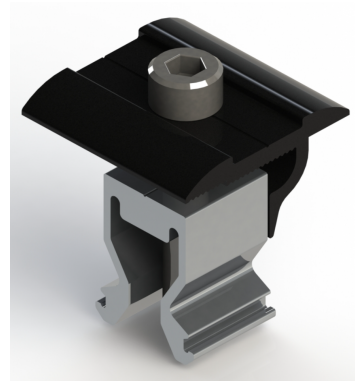
Article No.	UC-GS



Product properties

Material	AL6005-T5 and SUS304
Dimensions	40x40 mm
Weight	0.070 kg
Colour	Mill or Black
Pre-assembled	Yes

One Clamp For All



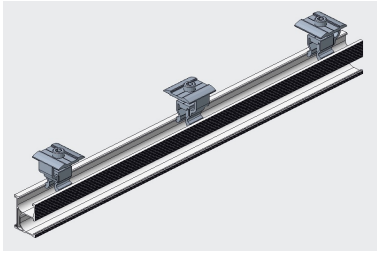
Application properties

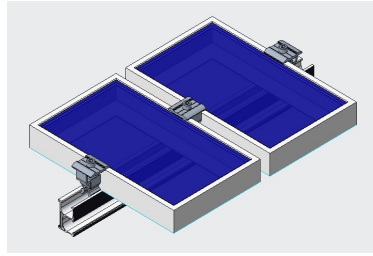
Function	Mid and End Clamp
Max. fastening torque	14.5 Nm
Clamping range	35 - 46 mm Panels
Type of modules	Framed Modules
Drive	Hexagon Socket M8
Can be used with Rail system	GS Rail

Package

Package Detail	320 pcs/ctn

Installation





Dealer information

WARRANTY

12 year limited Product Warranty, 5 year limited Finish Warranty

Fastensol co. Ltd warrants to the original purchaser ("Purchaser") of product(s) that it manufactures ("Product") at the original installation site that the Product shall be free from defects in material and workmanship for a period of ten (10) years, except for the anodised finish, which finish shall be free from visible peeling, or cracking or chalking under normal atmospheric conditions for a period of five (5) years, from the earlier of 1) the date the installation of the Product is completed, or 2) 30 days after the purchase of the Product by the original Purchaser ("Finish Warranty").

The Finish Warranty does not apply to any foreign residue deposited on the finish. All installations in corrosive atmospheric conditions are excluded. The Finish Warranty is VOID if the practices specified by AAMA 609 & 610-02 – "Cleaning and Maintenance for Architecturally Finished Aluminum" (www.aamanet.org) are not followed by Purchaser. This Warranty does not cover damage to the Product that occurs during its shipment, storage, or installation.

This Warranty shall be VOID if installation of the Product is not performed in accordance with Fastensol's written installation instructions, or if the Product has been modified, repaired, or reworked in a manner not previously authorized by Fastensol IN WRITING, or if the Product is installed in an environment for which it was not designed. Fastensol shall not be liable for consequential, contingent or incidental damages arising out of the use of the Product by Purchaser under any circumstances.

If within the specified Warranty periods the Product shall be reasonably proven to be defective, then Fastensol shall repair or replace the defective Product, or any part thereof, in Fastensol's sole discretion. Such repair or replacement shall completely satisfy and discharge all of Fastensol's liability with respect to this limited Warranty. Under no circumstances shall Fastensol be liable for special, indirect or consequential damages arising out of or related to use by Purchaser of the Product.

Manufacturers of related items, such as PV modules and flashings, may provide written warranties of their own. Fastensol's limited Warranty covers only its Product, and not any related items.

CONSUMER GUARANTEES

In addition to our Warranty against Defects, the Frame also comes with guarantees that cannot be excluded under the Australian Consumer Law (**Consumer Guarantees**).

In the event that the Frame fails to satisfy a Consumer Guarantee, you are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the Frame repaired or replaced if the Frame fails to be of acceptable quality and the failure does not amount to a major failure.

Please note that in addition to the rights and remedies set out in this document, you may also have other rights and remedies available to you under the law.

CONTACT DETAILS

Xiamen Fasten Solar Technology Co.,ltd

Address: *Room4B , No.16 Xiangxing 3 Road, Huli Bonded District, Huli District, Xiamen, China 361006*

Sales and Service: 00*86-592-5685378*

Fax: 00*86-592-5215070*

Email: *info@fastensolar.com*

MAINTENANCE AND CLEANING

6005-T5 aluminium is largely maintenance free. Only in highly polluted or marine conditions is rinsing with clean water required, during scheduled panel cleaning.

REFERENCES

AS/NZS 1170.2:2011/Amdt 2:2012 on wind actions

AS/NZS16641.1:1997 on aluminium structures

AS1720.1:2012 on timber structures AS/

NZS4600:2005 on cold-formed steel structures

AS3566-2011, self-drilling screws for the building

and construction industries.

Don Moore & Associates
Consulting Structural & Civil Engineers

20 April, 2016 Reference 2169.15

Xiamen Fasten Solar Technology Co., Ltd
31 Xiangxing 1st Road
Huli District 361006 Xiamen
China

Dear Sirs

FASTEN SOLAR T RAIL 2 FOR PITCHED ROOFS

As requested we have calculated the Maximum Fixing Spacing's for Fasten Solar Rail 2 as outlined in the attached Tables.

The tables have been calculated for Australian conditions based on the following criteria:-

- Wind Loads are in accordance with AS Code 1170.2:2011.
- Wind average recurrence interval of 500 years.
- Wind Terrain Category 2.
- Shielding and topographic multipliers, Ms and Mt taken as unity.
- Racks mounted on roofs of enclosed buildings of nominal rectangular shape.
- Roof slopes from 0 degrees up to 45 degrees from horizontal.
- Maximum solar panel length of 2.00 metres.
- Maximum solar panel width of 1.20 metres.
- Minimum of 2 rails per panel.
- Maximum panel weight of 15 kilograms per square metre.
- Roof structure to be checked and certified as suitable for applied rack loads prior to installation.
- Solar panels to be certified by Manufacturer as able to resist wind loads in accordance with AS Code 1170.2:2011.

I certify that that installations in accordance with these attached Tables will be structurally sufficient for Australian conditions provided the above conditions are adhered to.

Yours faithfully,

Don Moore FIE Aust. FIStructE. CPEng. NER.
Registered Building Practitioner No. EC-1106

11 Oak Street, Hawthorn Victoria 3122 Australia • **Telephone:** 03 9853 2323 • **Facsimile**: 03 9853 2324
• **Email:** dmoore@donmooreassociates.com.au • **Web:** www.donmooreassociates.com.au • **Mobile:** 0412 392 933
Charlett & Moore Pty Ltd ABN 27 004 859 956

Don Moore & Associates
Consulting Structural & Civil Engineers

30 May, 2016 Reference 2169.15

Xiamen Fasten Solar Technology Co., Ltd
31 Xiangxing 1st Road
Huli District 361006 Xiamen
China

Dear Sirs

FASTEN SOLAR T RAIL 2 FOR FLAT METAL ROOFS

As requested we have calculated the Maximum Fixing Spacing's for Fasten Solar Rail 2 as outlined in the attached Tables.

The tables have been calculated for Australian conditions based on the following criteria:-

- Wind Loads are in accordance with AS Code 1170.2:2011.
- Wind average recurrence interval of 500 years.
- Wind Terrain Category 2.
- Shielding and topographic multipliers, Ms and Mt taken as unity.
- Racks mounted on roofs of enclosed buildings of nominal rectangular shape.
- Roof slopes from 0 degrees up to 45 degrees from horizontal.
- Maximum solar panel length of 2.00 metres.
- Maximum solar panel width of 1.20 metres.
- Minimum of 2 rails per panel.
- Maximum panel weight of 15 kilograms per square metre.
- Roof structure to be checked and certified as suitable for applied rack loads prior to installation.
- Solar panels to be certified by Manufacturer as able to resist wind loads in accordance with AS Code 1170.2:2011.

I certify that that installations in accordance with these attached Tables will be structurally sufficient for Australian conditions provided the above conditions are adhered to.

Yours faithfully,

Don Moore FIE Aust. FIStructE. CPEng. NER.
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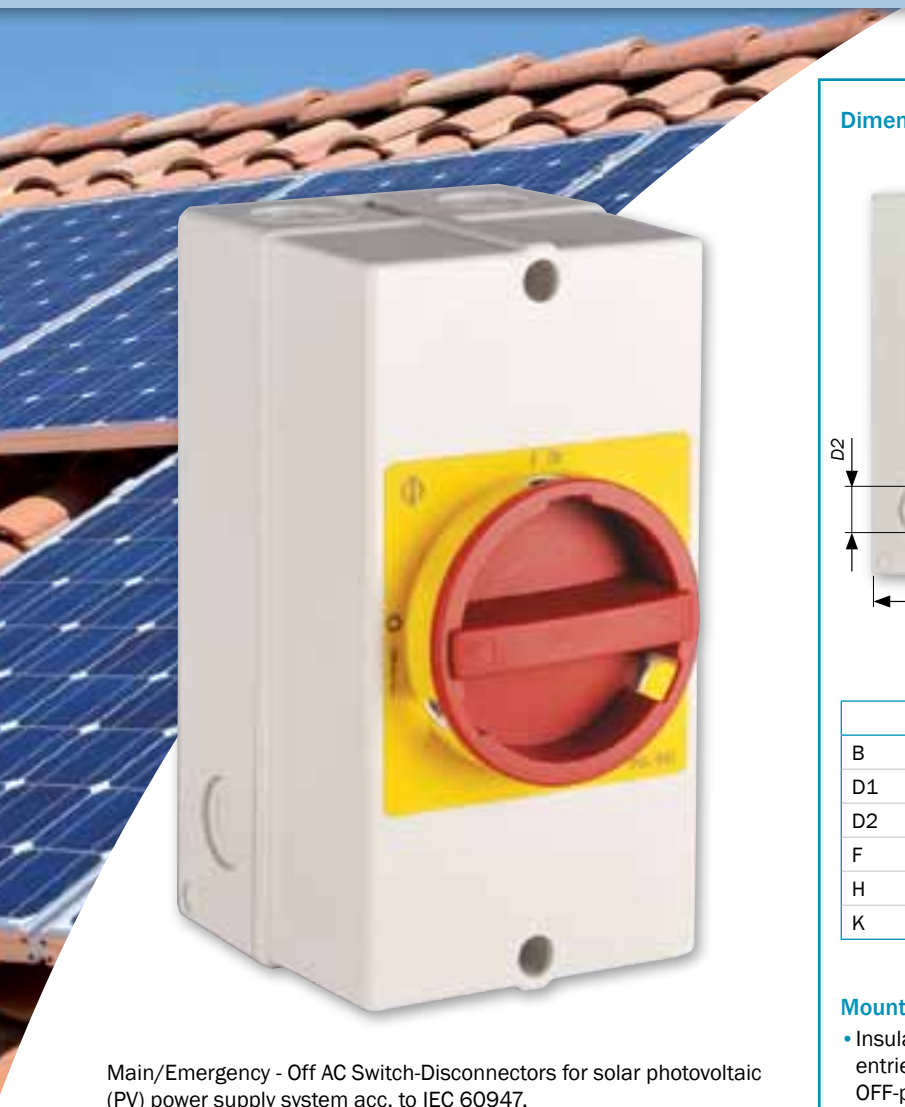


Main/Emergency - Off AC Switch-Disconnectors for solar photovoltaic (PV) power supply system acc. to IEC 60947.

General Data

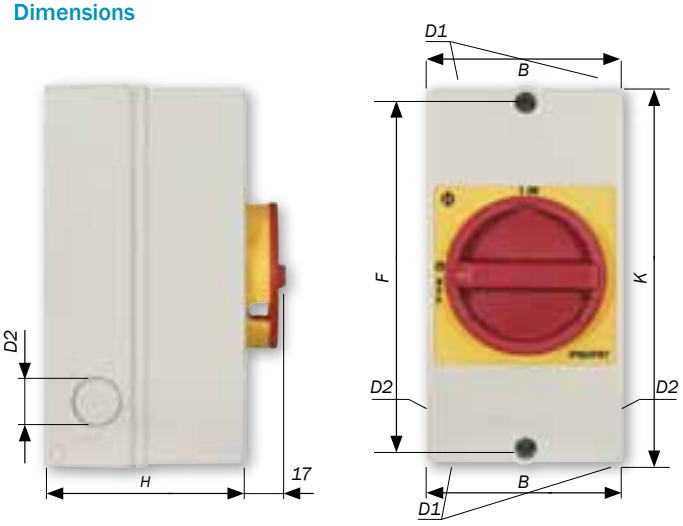
- Switch-Disconnectors according to EN 60947-3 respectively VDE 0660 part 107
- Ambient Temperature:
  35°C average during 24 hours with peaks up to 40°C
- Terminals:
  Finger-proof according to VDE 0660-514 and BGV A3, IP 20

Rated Value & Order Number

Operational current AC-21A	Insulation voltage Ui	Enclosed thermal rating I	Order number
25A	690V	25A	**KG20 T203/GBA270 *KS1V**
25A	690V	25A	**KG20 T203/GBA294 *KL**†
32A	690V	32A	**KG32 T203/GBA294 *KL**†
40A	690V	40A	**KG41 T203/GBA270 *KL1V**†

† Larger enclosure to match KG20/32 T104 DC enclosure

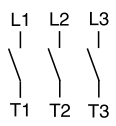
Dimensions



	KG20...KS	KG20/KG32...KL	KG41
B	85	85	100
D1	4 x Ø 20/25	4 x Ø 20	4 x Ø 25
D2	2 x Ø 20	2 x Ø 20	2 x Ø 25
F	110	150	178
H	90	82	93
K	120	160	190

Mounting

- Insulated enclosure, protection IP66/67, insulated, knock-out entries, red handle and contrasting yellow escutcheon plate, OFF-position lockable with padlocks, switch interlocked with lid to prevent opening in 'ON' position. Earth terminal included as standard. Optional Black/Grey handle available for use as Main Switch.

Connecting diagram	Tightening torque for terminal screws		Strip length
	KG20/ KG32	1,25Nm	KG20/ KG32 
	KG41	1,80Nm	KG41 

Maximum permissible wire gauge (use copper wire only)

Single core or stranded wire	KG20/KG32:6mm² KG41:16mm²
Flexible wire	KG20/KG32:4mm² KG41:10mm²

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Berkshire
RG14 2AH
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