Congratulations for choosing our solar photovoltaic system. We recommend you read this guide to familiarise yourself with your new system. It may also save you trouble later, should an issue arise.

This manual must remain in the possession of the customer.

Installation Date: ______________________

Electrician ________________  Phone: __ ___________

For further assistance or information contact our service desk
☎ 0800 769 377  info@solargroup.co.nz

Pages 1 to 8 are intended for the Owner / User
The remainder of this manual is for the Installer
IMPORTANT INFORMATION

This owner’s manual is intended for operation of grid-tied solar power generation systems. Battery-backup and off-grid systems require additional instructions.

System users and professional installers should read this manual carefully and strictly follow the instructions in the manual.

This guide provides a first-hand reference point for common questions, solar power information, shutdown, and maintenance information for owners and installers.

Please keep this manual in a safe place for reference.

This general manual provides important safety information relating to the installation, maintenance and handling of solar modules.

Failure to follow these instructions may result in death, injury or property damage.

The installation of solar modules requires specialized skills and should only be performed by licensed professionals.

LIMITATION OF LIABILITY

The information contained in this manual, and all other information or advice provided by Solar Group Ltd in connection with the purchase, installation, use, and service of Solar Power generation, is given in good faith. Solar Group Ltd will not be liable for any person for any inaccuracy or omission in the information arising through or any actions that are the fault of Solar Group Ltd, either directly or indirectly.

Solar Group and suppliers included shall not be held responsible for damages of any kind, including without limitation bodily harm, injury and property damage, relating to module handling, system installation, or compliance or non-compliance with the instructions set forth in this manual.

Being classified as High Risk Electrical Appliance, your PV system must be inspected by a Certified Inspector.
THANK YOU
For choosing a Solar Group Solar Power system.
Your solar photovoltaic system, or “PV” system, has been carefully installed to provide you with a long life, reliable and sustainable electricity generation investment for New Zealand conditions and is built and installed to New Zealand standards.

The Solar Power system consists of:
1. Solar PV Panels (also called modules)
2. Inverter
3. Framing Support Structure
4. Wiring

We hope you get the best out of your new solar generation system for years to come, and we appreciate your feedback.

Electrical Safety:

PV is a High Risk Electrical Appliance. PV will always be live, even in low light and cannot be switched off. PV panels are also current-limiting devices, so fuses are NOT likely to blow under short-circuit conditions and the following safety precautions must be made:

Live parts are either not accessible or cannot be touched.

All electrical work, including connection or disconnection of PV panel plugs & switches must only be conducted by a qualified electrical installer.

All PV Systems must be inspected and signed off by a qualified Solar PV inspector.
SOLAR POWER TYPE OF SYSTEM

STRING INVERTER SYSTEM

A string inverter system is where the solar panels are connected together, either in single or dual strings, and then connected to an inverter in your house. Information regarding the power production can be found both on your inverter or by using your login online at the website you are given (see page 4). This is less efficient because if one panel in the string is shaded or dirty the whole string is limited to the weakest link.

SOLAR EDGE / TIGO / SMART MODULES

Smart Modules are connected underneath each solar panel. Each Module is connected to the Inverter in the house. Information regarding the power production can be found both on your inverter or by using your login online at the website you are given (see page 4). This is highly efficient as it allows each panel to produce its maximum output, even if other panels are shaded or dirty.

MICRO-INVERTER SYSTEM

Micro-Inverters are connected underneath each solar panel. Each inverter connects wirelessly to the Communications Gateway which relays the information to the Software. This means there is no inverter in the house and information regarding the power production can be found using your login online at the website you are given (see page 4). This is highly efficient as it allows each panel to produce its maximum output, even if other panels are shaded or dirty.
SOLAR POWER TIPS

Owner Tip 1:
Make sure that you keep careful accounts of your smart meter. It will give you a good idea of how your system is performing & provide necessary data if you need to invoice your electrical retailer for exported power.

Note that the smart meter does NOT record the total solar power you have generated; your smart meter will only record what is left over from your usage.

Keep a separate record of your solar generation by using the data logging tools provided with the solar inverter. This record will also be useful to check the performance of your system.

Owner Tip 2:
Some Power retailers require you to invoice them periodically.
Take the opportunity of reading your export meter at the same time as you read your inverter output.
If you are GST registered, you can add GST to your claim.

Owner Tip 3:
Your solar PV system produces most of the power during the middle of the day.

It is advisable using 24-hour timers to shift usage to the middle of the day, ideally between 10am and 3pm.

Owner Tip 4:
Once installed, your solar power system can be monitored and data downloaded either via a USB connection to download built in data logging, or remotely via Wifi, if this built in for your system.

Consult the inverter manual for instructions on setting up data logging.

Owner Tip 5:
You can login online track your power.

Website: ________________________    Username: ________________________
Password: ________________________

Other Tip / Notes:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
COMMON ISSUES AND QUESTIONS

**My inverter is displaying ‘PV Earth Fault’ with a red LED light, or an audible alarm is heard.**

**THIS MUST BE URGENTLY RESOLVED AS SOON AS POSSIBLE BY A PV ACCREDITED ELECTRICIAN.**

While the inverter may continue to operate safely for a time, there is now a risk that any subsequent fault may cause an unsafe situation to occur. Immediately contact an electrician or Solar Group technical support to schedule maintenance as soon as possible.

**My inverter is displaying an error code on its LCD screen.**

Check the troubleshooting section of your inverter Operations Manual, and contact your installer or Solar Group technical support for any further advice you may require.

**My inverter seems to have stopped working entirely, and has not turned on again.**

Take careful note of the digital display on your solar inverter, and contact your solar installer or Solar Group for detailed trouble shooting advice.

**We have just had a power cut, what happens to my Grid-tied inverter?**

When the grid goes down or grid signal is lost, a grid-tied inverter is designed to safely shut down to protect people who may be working on the power lines. When the grid power returns, the grid-tie inverter will recognize the grid signal, and after 60 seconds, the inverter will resume normal operation automatically.

**Why is the inverter power output lower during the morning or evening than in the middle of the day?**

You solar production will change over the day because production is affected by the sun position relative to your panel orientation. For a Northward orientated system, you can expect most of the daily generation to occur between 10am and 3pm. For a westward facing system, you can expect a greater proportion of your power between midday and late afternoon.
My inverter is stopping and starting irregularly, even during sunny periods
If this occurs frequently, contact the installer or Solar Group technical support. This most often occurs if you are in a remote rural area, or at the end of a power line, or have an island grid, since your power quality may vary outside the normal permissible range of the inverter. In these cases, your inverter is designed to cut out to protect itself and the grid. Contact your network provider to help diagnose and solve the problem.

My inverter generated well most of today, but for some of the time, the output was low. It is sunny outside and it looks back to normal again now... what is happening?
You solar production will change over the day and on dark or cloudy days, your solar output may be reduced when clouds are overhead. When we calculated your expected system output, we took the average yearly sun-hours into account for your site, and this takes account of clouds during cloudy days, so your total generation for the month should still balance out.

It has been sunny all day for the last few days and the output still seems lower than normal for this month of the year.
Your solar production will be affected by leaves or shading. Visually check if there is any new obstruction shading the PV Panels. This may be dust, pollen, or blown leaves for example. If you cannot see any obvious obstructions, contact your installer or Solar Group technical support for further assistance.

I want to do alteration or maintenance to my building, which requires that I remove DC cables or the inverter.

YOUR SOLAR ARRAY IS CAPABLE OF PRODUCING DEADLY DC VOLTAGE,

EVEN IF: LIGHT IS VERY LOW, DUE TO CLOUDS OR TWILIGHT

EVEN IF: ALL ISOLATOR SWITCHES ARE TURNED OFF

Plan ahead for all work only use an electrician who is certified and experienced in Solar PV Systems to shutdown down the system and then decommission the system by unplugging all individual modules of the array so that voltage is reduced to extra low voltage. The Solar array will then be safe to dismantle and remove while work is done in that area. You will need to re-install and re-commission the solar PV system using all relevant electrical safety practices, consult your technical specialist for solar re-installation requirements.

It is very sunny outside and my inverter is producing surplus power. Should I run more appliances such as the washing machine now to take advantage of my free electricity?
Yes, absolutely! If you plan your energy usage to match the middle of the day during maximum generation hours, you will be able to benefit most from your solar generation system. Make sure that you shop around for the best offer from electricity retailers to buy your energy from you.
START UP, SHUT DOWN AND INVERTER STATUS

System Shutdown Procedure
Turn the “PV System” switch off in the switch board.
Turn the AC isolator (marked AC ISOLATATOR) OFF
Turn the DC Isolator (marked DC ISOLATATOR) OFF
The PV System is now shut down.

System Startup Procedure
Turn the DC isolator (marked DC ISOLATATOR) ON
Turn the AC Isolator (marked AC ISOLATATOR) ON
Turn the “PV System” switch on in the switch board.
The PV System is now activated.

Check Status of your inverter
Knock lightly with your knuckle on the inverter beside the LCD screen to cycle through menus. You can see inverter operating status, IP Address and generation history on-screen.

Inverter Serial Number Reference
The inverter Serial number is a 10 digit number labeled typically on the side of the box.

MAINTENANCE

Once a year or as needed by owner:
• Ensure that the solar panels are not covered by leaves, pollen or dust.
  If water will not suffice, use a light detergent that will not damage aluminium
• Check that the solar modules have good airflow underneath
• Check and record power output on the display regularly to confirm consistent operation
• Visual Check of all components
• Visual check for loose cables including under the panels
• Clean PV Array as required with low pressure hose or detergent

5 year service by approved electrician:
Repeat the Solar Group Commissioning Procedure as per page 35-41
RESIDENTIAL WARRANTY

Registration of Warranty:
A warranty confirmation will be emailed back to you. If the confirmation email is not received, contact Solar Group Ltd. 0800 769 377 or warranty@solargroup.co.nz

Registration of your inverter warranty must be carried out within 30 days of installation to validate the warranty.
Enasolar inverters can be registered online at [http://enasolar.net/warranty](http://enasolar.net/warranty)
Canadian inverters are registered by the installer, and you will be supplied with a warranty card which you can complete in the unlikely event that you need to make a warranty claim.

Coverage
- Solar Panels: 10-year mechanical warranty subject to 5-year service
- Solar Panels: 25-year linear -0.8% per year performance warranty subject to 5-year service
- String Inverter: 5-year (unless extended plan was purchased)
- Micro Inverter: 10-year subject to 5-year service
- Solar Edge: 25-year subject to 5-year service
- Parts & labour: 12 months

Faults or Claims
Faults or claims should be reported directly to the installer or to Solar Group Ltd

Changes of Owner
The warranty extends beyond the original purchaser to subsequent owners of the system during the original warranty period.

Consumers Statutory Rights
All benefits offered by this warranty are in addition to all other statutory rights

Ancillary Parts
This warranty only applies to inverter units supplied by Solar Group, and original or genuine company components replacement parts. NOT covered, are any electrical parts supplied by the installer, e.g. electrical conduit, cable, earthling.

Exclusions
The product is misused, neglected, abused or operated outside of original design parameters, or exposed to any chemical not recommended by Solar Group Ltd.
- Damage or loss of function to the solar system, and any other direct and indirect damage, as a result of debris accumulated either under or on top of the solar panel.
- Damage caused by force majeure, fire, lightning, flood, earthquake, landslide, storm, hail, wind, or severe adverse weather conditions.
- Equipment supplied by Solar Group as part of the installation kit has not been installed.
- Equipment or parts not supplied by Solar Group to this installation which may affect its operation/performance must first be authorized in writing by Solar Group Ltd.
- Solar Group Ltd shall **not be liable for any consequential damages**; damage to ceiling, floors, or any incidental expenses or inconvenience resulting from any defects of its products.
- For details on all other situations (commercial farming or industrial) contact Solar Group Ltd.
- Failures resulting from not meeting conditions of installation or regular maintenance as specified by Solar Group

![Added Value From Warranty](image)

**Backed By Our New 10/25 Linear Power Warranty Plus our added 25 year insurance coverage**

10 year product warranty on materials and workmanship
25 year linear power output warranty

Solar Group Grid-Tied Photovoltaic System Installation
Manual 01/2016
INSTALLATION SECTION

SAFETY PRECAUTIONS

**Warning:** All instructions should be read and understood before attempting to install, wire, operate and/or maintain the PV panel. Panel interconnects pass direct current (DC), even when exposed to low levels of sunlight. Contact with electrically active parts of the panel, such as terminals, can result in injury or death, whether the panel is connected or disconnected.

All installations must be performed in compliance with all applicable regional and local codes or other national or international electrical standards.

**Wear** suitable protection gear to prevent direct contact with Low Voltage DC systems of up to 600 Volts (non-slip gloves, clothes, etc.) Protect your hands from sharp edges during the installation.

Use safety gear to **prevent falling** when working on the roof.

Use electrical **insulated** tools to reduce the risk of electric shock.

**Remove** all metallic jewelry prior to installation to reduce the chance of accidental exposure to live circuits.

**Cover** the front of the panels in the PV array with an opaque material to halt production of electricity when installing or working with a panel or wiring.

Do not install or handle the panels when they are **wet** or during periods of **high wind**.

Do not use or install **broken** panels.

If the front **glass is broken**, or the back **sheet is torn**, contact with any panel surface or the frame can cause electric shock.

**Do not attempt to repair** any part of the photovoltaic panel.
For assistance on collection and recycling of PV panels, please call Solar Group.

Ensure that **stickers and labels** remain visible, and in good condition at all times.
INSTALLER RESPONSIBILITIES

• Complying with all applicable local or national building codes, including any that may supersede this manual.
• Ensuring that the selected frame is appropriate for the particular installation and the installation environment.
• Ensuring correct and appropriate design parameters are used in determining the design loading used for design of the specific installation. Parameters, such as snow loading, wind speed, exposure and topographic factor should be confirmed with the local building official or a licensed professional engineer.
• Ensuring that the roof, its rafters, connections, and other structural support members can support the array by issuing a PS 1 producer statement, either generic or site-specific as appropriate.
• Only use framing parts supplied by Solar Group.
• Maintaining the waterproof integrity of the roof, including selection of appropriate flashing.
• Ensuring safe installation of all electrical and mechanical aspects of the PV array
• Confirm with homeowner the location of the panels and inverter
• Display all the warning stickers in accordance with AS/NZS 5033
• Coordinate and carry out the electrical testing and inspection of the system to ensure that it functions as intended.
• Coordinating with the line company and the power retailer before and after the installation.
• Commissioning the system and hand-over to the client
• Show the client how to use the system and leaving this manual on site
ELECTRICIAN RESPONSIBILITIES

Grid connected PV system is deemed **high risk** and so following the chart requires

Prior to starting PEW, Collect any CD’s, MI’s and SDoC’s

Do PEW in an installation or part installation

Have PEW Tested

Test Results ok?

Yes

No

Is PEW Low Risk?

Yes

No

Is PEW High Risk?

Yes

No

Attach supporting Documents; CD’s, MI’s, SDoC’s

Have CoC Issued

Inspect, Test, Any other actions

Is PEW Compliant?

Yes

No

Issue RoI

Pre-Connection Checks

Is PEW Compliant?

Yes

Connect

Issue ESC

No

PEW = Prescribed Electrical Work
CD = Certified Design
MI = Manufacturers Instructions
SDoC = Supplier Declaration of Conformity
1. Cell: electrical device made of silicon that converts the energy of light directly into electricity by the photovoltaic effect. This electricity is Direct Current (DC).

2. Module: The PV Cells are assembled into framed solar Modules, known also as Solar Panels.

3. String: Several modules connected together in series with DC wiring along your roof.

4. PV array: All of the Solar PV Strings connected to a particular inverter.

5. The Solar Photovoltaic Array produces Direct Current, which is converted to 230V Alternating Current (AC) by an inverter. The inverter is connected either directly to your main switch board, or via a distribution board. When you use power during the day, AC current will be drawn from the inverter to your loads. When you are producing more power than you use, the balance of current will flow back out to the grid (export).
SEQUENCE OF WORK
1. Get pre-approval from Line Company
2. Get pre-approval from Power Retailer to install smart meter
3. Obtain a site-specific PS1 for the mechanical fixing of the panels
4. Review the PV Layout design schematic and the Electrical PV design
5. Install the fixing rails to the roof structure as per site design
6. Mount the grounding clips to the panels or the grounding weeb to the rails
7. Install the panels on the rails
8. Locate the position of the inverter as per site design
9. Mount the inverter
10. Connect inverter to switch board via a dedicated switch. Rating, distance & cables must be as per electrical design
11. Run the DC and the earth cables. Conduit, distance & cables per electrical design
12. String the panels leaving the 1st and the last string open
13. Display all the warning stickers in accordance with 5033
14. Commission the system
15. Lock the AC and the DC switches
16. Organise the PV inspection
17. Organise the Smart meter installation
18. Organise the Grid connection by Line company
19. Unlock the switches and hand over to the client

ELECTRICIAN SEQUENCE OF WORK / DOCUMENTS
1. Before starting the installation of prescribed electrical work, identify who is going to provide the following:
   - CD Certified Design by a designer for electrical design
   - MI Manufacturer’s assembly and installation instructions from manufacturer
   - SDOC Suppliers Declaration of Conformity for components used
   These are to be noted on or attached to the COC information.
2. Complete design, supply, installation and testing to AS/NZS 5033:2005 and to AS/NZS 4777
3. Issue COC, attach supporting documents, commission sheet - keep as record for 7 years
4. Contract an inspector to inspect the high risk category grid tied PV system
   Inspector will complete their own testing, view the COC and attached documents, whether all tests, components, design and installation comply with the current AS/NZS 5033 and 4777 and complete a Record of Inspection. The inspector must keep a copy of the COC and ROI for 7 years and register the high risk job onto the online database.
5. Complete connection, commission works and issue an ESC (Electrical Safety Certificate)
6. Supply the system owner with a copy of the COC, any attachments or records of the attachments, a copy of the ROI, a copy of the ESC and this system instruction manual
CHOOSING THE OPTIMAL PV ARRAY POSITION

**Angle and orientation:**
Solar PV may be installed on any roof ranging from due east, to north, to due west. Roofs sloping gently southward can also be installed upon using North-facing pitched up frames.

The angle of the solar panels relative to horizontal must be greater than 10°. Pitched up frame can be used to increase the angle when the roof slope is flat, or less than 10°.

**Shading:**
Solar PV systems are extremely sensitive to shading, and so shading must be carefully avoided for the whole year when designing the PV array location. Even a small amount of shading on one PV panel will create a bottle-neck that will reduce the performance of the entire string*. Long-term, localized shading spots on the PV panel can cause damage known as burn-in which will reduce the operability of the system over time.

*See page 12: for definition of a string

If it is not possible to find a large area of the roof that is mostly clear of shading, consult with a Solar Group representative about a micro-inverter solution. In a micro-inverter system, shaded panels will not affect to overall performance of the array because each panel generates independently of other panels.

**Near shading –Highly important**
Do not place the array where there will be shadowing by nearby shading objects such as chimneys, vents, aerials, roof geometry, or trees

**Far Shading**
Take note of larger shadings objects such as adjacent buildings and tall trees, and consider how the shadows will be created throughout the season and the affect on performance. Consider splitting a larger array using an inverter with multiple MPPT trackers, so that shading on one of the sub-arrays does not affect the entire system.

**Horizon**
Note any major horizon features such as mountains or hills, and place the PV array with the widest north-facing view of the sky.

*If in doubt about optimal location, contact Solar Group for a site specific analysis.*
CHOOSING INVERTER LOCATION

Warranty may be compromised if the inverter is not installed in accordance with the following:

**Switch Board Proximity:**
- Should be close to (within 3m) and within sight of the Main switchboard

**Free Ventilation / Free air flow:**
- The inverter can be installed indoors or outdoors. It should be installed in a location somewhere with a free flow of air, where the ambient temperature is between -25°C and +50°C.
- Should be shaded from direct sunlight during the hottest part of the day.
- Do not mount the inverter in a cupboard or an enclosed space with no air flow as this may cause the inverter to overheat and potentially cause damage.

**Designated Clearance:**
- Allow at least the clearance required by inverter manufacturer. The minimum requirements for airflow around the heat sink are a major factor contributing to efficient cooling of the inverter and as a result the inverter should never be installed where these minimum space requirements are not met.

**Other heat sources and debris:**
- Do not mount inverters above each other or another source of heat.
- Do not install the inverter anywhere that it is likely to accumulate debris such as tree leaves or large amounts of dust.

**Mechanical Considerations:**
- The inverter must be mounted at an angle no greater than 45 degrees forwards or backwards with the AC and DC isolating switches at the bottom on a wall or other flat surface.
- The Wall Mount must be attached to a flat surface such as plaster board, wood siding, masonry, or a pole assembly.
- Make sure the mounting surface can support the weight of the inverter before you begin. If you are installing on plaster board, use supporting material such as plywood or secure the fasteners to supporting wall studs.
- The Wall Mount must not be installed directly on galvanized steel. Eliminate the chance of dissimilar metal corrosion by using the supplied mounting hardware.

**Wifi Considerations:**
- For inverter models with Wi-Fi connection, the customer’s wireless router must provide a minimum of 30% signal strength at the inverter location. Any metal structures near or around the inverter can affect the Wi-Fi signal.
PV LAYOUT DESIGN

Once the desired location of the PV panels and the inverter are determined, it is highly recommended to issue a PV Layout design.

The layout design makes it the scope of the work clear to all parties involved. It also provides the home owner with site-specific energy calculation of system output.
HANDLING AND CHECKING THE GEAR

**CORRECT UNPACKING AND STORAGE OF PV PANELS**

- Do not place panels on top of each other.
- Do not place excessive loads on the panel or twist the panel frame.
- Do not stand, step, walk and/or jump on the panel.
- Do not drop or place objects on the panels (such as tools.)
- Do not mark the panels with sharp instrument.
- Particular attention should be taken to avoid panel back sheet to come in contact with sharp objects, as scratches may directly affect product safety.
- Do not leave a panel unsupported or unsecured.
- Do not change the wiring of bypass diodes.
- Keep all electrical contacts clean and dry.
- Store panels in a dry and ventilated room.
- Do not allow children and unauthorized persons near the installation site or storage area of panels.
- Do not transport panels in an upright position.
- Unpacking panel pallet with care & follow the unpacking steps marked on the pallet.
- Be careful when unpacking, transporting and storing the panels.
- Do not carry a panel by its wires or junction box.
- Carry a panel by its frame with two or more people.

**PV PANELS ID**

- Each panel is fitted with two identical barcodes (one on the laminate under the glass, the second on the panel frame) for its unique identification. Each panel has a unique serial number with 13 digits.
- A nameplate is also affixed on the rear side of each panel. This nameplate defines the model type, as well as the main electrical and safety characteristics of the panel.
- Record the serial numbers on the Commissioning Sheet

**CORRECT UNPACKING AND STORAGE OF INVERTER**

Some inverters may weight 20kg or more and therefore must be handled with care while lifting and installing so as to avoid personal injury. Use safe and proper handling techniques.

Always check the inverter mounting point is strong enough to take the 20kg load of the inverter when installed, and that the inverter mounting rack is fixed securely.
FRAMING COMPONENTS CHECK AND MATCH

Identify type:
Each row of framing: Metal Fixing, Ceramic Tile Fixing, Direct Fixing, or Pitched Up Fixing

Measure the frame length to use
Every row can be made up of a combination of 2.1m, 3.1m, 4.1m, 5.1m and 6.1m sections.
The sum total of rail lengths you choose in meters must be greater than the number of panels in a row (1m per panel) – and multiply by 2 because every row uses a pair of rails.
For example,
If you have 6 PV modules, you can use: 3 x 2.1m frame, or 2 x 3.1 m frame, or 1 x 6.1 frame.

Always prefer the longer length frame to minimise the splice kits (rail interconnector) installed.

Clamps and Splice kits per row:
Number of End clamps = 4
Number of mid clamps = 2 x ( (number of panels in the row) – 1 )
Number of splices = 2 x ( (number of rails) -1 )

Roof Fixings:
Fixings must be spaced NO GREATER than the maximum allowable spacing for the wind zone on the PS1 approval form. You may allow up to 300mm overhang, or half the fixings separate of either end of the row before the first and last fixings.

Fixing to purlins:
Fixings must align with the ridges, but will nominally be around the maximum allowable length as per the PS1.

Fixing to rafters:
Fixings are dictated by the rafter spacing.
For example, if you are allowed 1300mm spacing, and if your rafters are spaced at 600mm, your spacing will be 1200mm, fixing to every second rafter.
But if rafters are at 800mm, your spacing will be 800mm to match the rafters.
To ensure that the penetration is done on the crown of the profile, consider adding timber block parallel to the rafter, and fix to the block.

Metal Roof Fixings include one Fixing plate and hanger bolt per Fixing

Tile Roof Fixings include one Tile bracket and two fixing screws per Tile Bracket fixing

Rail Splices
Every rail splice is pre-assembled with 2 grub screws. Check the grub screws are screwed in place when receiving the pack.
SMALL ELECTRICAL CHECK AND MATCH

For single string installations:
One spare M4C connector with each inverter
One Panel Grounding Lug with each PV panel
One standard PV sticker kit with every inverter - see page 34

For dual string inverters such as Canadian Solar CSI 3600TL or CSI4600 or ENASOLAR 4.0kW or ENASOLAR 5.0kW
MC4 connector is required for every row, plus one is also supplied with the inverter:
- Male Plug
- Female Plug
- Male plug metal crimp
- Female plug metal crimp

The following extra stickers:
- A yellow ‘WARNING: Multiple DC sources’ sticker
- 2 extra ‘SOLAR DC’ stickers
- Extra ‘DC isolator’ stickers

RECOMMENDED SPARE PARTS
Include one extra pair of mid clamps and end clamps, as sometime they can be lost or damaged on site. A spare parts bag is a good idea to include - only unseal it if you need a spare part, check the contents of the parts bag, and return the sealed bag to the warehouse after install.

Recommended parts list:
- 2x spare fixing screws,
- pair of rail splices,
- grounding lug
- Spare MC4:
  - Male Plug
  - Female Plug
  - Male plug metal crimp
  - Female plug metal crimp
INSTALLATION VIDEOS:

Before the installation, familiarize yourself with the following videos via YouTube:

“How to Install an EnaSolar Grid Tied Solar Inverter”

“How to Install an EnaSolar Grid Tied Solar Inverter”

“Radiant PV Rooftop Rack - Solar racking system - Solar mounting system”
INSTALLATION TOOLS AND EQUIPMENT

**Paper**
- Site Plan and building layout
- Electrical Diagram
- Structure Producer statement
- Safety sheet and hazard identification
- Solar Group Commissioning Check sheet
- Inverter test certificate, manual & warranty card

**Electrical**
- Multi-meter
- Mega (MΩ meter)
- MC4-connector crimping tool
- DC current meter
- Notebook (for commissioning)

**Tools**
- Power drill
- 5.4mm Pilot drill (Or 5.0mm or 6.0mm as substitute)
- Philips screwdriver
- HEX socket female drive attachment, 8mm across corners
- Spanner 14mm between faces
- Allen keyset
- Ratchet and socket set
- Wire cutters, and cable splitters
- Spool of string for laying out
- Measuring tape and marking out string

**Consumables**
- Silicone Sealant

**Safety equipment**
- Hard hat
- Non-slip boots
- Eye protection
- High visibility clothing
- Fall restraint system
- Harness
- Scaffolding
MOUNTING PV PANEL ON VARIOUS FRAMES - OVERVIEW

Roof Type:
Solar Group PV panels may be installed on both concrete tile and corrugated metal roofs provided the roof slope is between 10° and 60°.

Fixing points location and spacing on roof:
Strictly follow the instructions of the Producer Statement

Rails possible configurations:

Pitched Up Frames and Ground Mounted Frames:
There are a large variety of frames – follow the producer statement and frame instruction

Direct fixing of panels:
Panel can be fixed with the clamps directly to a structurally sound frame

“A" is determined by PS1
“B” shall be 820mm – 1160mm for portrait or 500mm – 600mm for landscape
PLAN, MEASURE AND MARK

Fixings the panels are most commonly done to purlins. In some cases the fixing may be required to rafters. Always review the Producer Statement and the roof plan.

**Plan:**
When mounting more than a single row of panels, careful consideration must be taken to the fixing points. You may need to skip a purlin row to accommodate the minimum / maximum spacing of the rails and therefore run out of roof space or get into the high-pressure zone of the roof.

**Measure & Mark:**
For most corrugated roofs and tile roofs, the location of the underlying purlins is fairly clear. Use string or a measuring tape to align your fasteners for all other types of roofs.

It can be difficult to locate the rafters from the top of a metal tile roof. One method is to mark a point at the top of the roof using a new penetration such as a screw, and measuring from the screw to the rafter on the underside of the roof.

Measure and mark down from the top of the roof to the base

Measure and mark along the fixing points

**Where hanger bolt system is used:**
Pilot drill hanger bolt holes with a 5.4mm nominal hole. This may be substituted with a 5.0mm, 5.5mm, or 6.0mm drill as available.
FIXING INSTALLATION FOR METAL OR METAL-TILE ROOF

Mounting to metal and metal tile roofs, is done by using the hanger bolt system. Mount the fixing screws into underlying purlin as per PS1 document, and allow a spacing of **820mm – 1160mm (or 500-600mm)** between the rails.

Make sure that all penetrations are fully sealed so as to prevent any water ingress into the roof. Apply a generous bead of silicon sealant to the end of the hanger bolt, and run silicon sealant along the length of the fixing screw, and around the base of the rubber sealing washer.

**Tip:** Check for sharp metal shavings created during drilling, and remove and smooth the penetration with a file before completing the fixing. Use gloves and correct eye protection while drilling. Remove all swarf or debris from the roof when finished.

Install hanger bolts using a drill. Penetrate down through the metal tile into the underlying timber.

Apply additional silicon sealant around the base of the penetration to seal; or wipe access silicon.

Only penetrate the roof on ridges or high points of the roof profile.

Fix down and wipe clean
CONCRETE OR CERAMIC TILE ROOF FIXINGS

To mount to ceramic or concrete tile roofs, use the roof-hook system shown.

Mount the fixing screws into underlying rafter or trusses. (you may need a wood spacer)

Allow a spacing of 820mm – 1160mm (or 500-600mm) between pairs of fixing rows

Determine the positions of the roof hooks according to your plans.

Remove the roof tiles at the marked positions or, if possible, simply push them upward slightly.

Fix the roof hooks to the rafter using 6 x 80 mm timber screws.

The roof hook must not press against the roof tile.

Use the adjustment bolt to adjust the hook so that it fits above the tile without straining and keeps the rail straight.

If necessary, use an angle grinder or hammer to cut a recess in the tile that covers the roof hook at the point where the roof hook comes through so that the tile lies flat on the surface.

If grooved tiles are used, it will also be necessary to cut a recess in the lower tile.

Caution! Do not use fitted roof hooks as a ladder, as this extreme point load could damage the tile below
MECHANICAL ASSEMBLY – RAIL & SPLICE KIT

Attach the fixing plate and clamp facing up the slope of the roof.

Repeat fixing procedure on the remainder of the frame sections. Carefully insert frame rails.

Adjust the Hanger bolts so that the rails are evenly supported at 60mm or so above the roof surface. This will ensure adequate ventilation under the panels. Loosely attach the clips using the spring.

Fix adjacent rails ends together using a splice kit.
Tip: If your installation uses splices, attach the rails together before mounting the rails to the footings.

Although structural, the joint is not as strong as the rail itself. A rail should always be supported by two or more footings on both sides of the splice.

To connect rails together, put the splices under the rails halfway, put other rail on the halfway. Fasten the first M10*12 Allen bolt firmly using the Allen key. Fasten the other side M10*12 Allen bolt firmly using the Allen key. Tighten the second M10*12 Allen bolt using the Allen key. Fasten the other side M10*12 Allen bolt firmly using the Allen key. The connection is finished.
MECHANICAL ASSEMBLY – CLAMPS

Clip in the end clamps and mid clamps along the rail, ready to install the PV panels. These may be clipped into the PV frame readily at any location by applying moderate pressure. Be careful that the clips fit snugly, and are not loose. If the clip feels loose, inspect that it is not bent. Bent clips may be manually straightened or replaced with a spare clip during the site installation.

Tip: Always carry a few spare end and mid clamps in case they are dropped or damaged on site.

Inset the panel end clamp in the base rail.

Clip the mid or end clamp securely into the rail, apply even downward pressure so as not to bend the spring fastenings.
MOUNTING PV PANELS

WARNING: NEVER PLUG PV PANELS TOGETHER DURING INSTALLATION. ONLY A CERTIFIED ELECTRICIAN MAY CONNECT PV PANELS TOGETHER DURING TESTING OR COMMISSIONING OF THE SYSTEM.

Mounting the panels should be done by a team of two to minimise the possibility of panels slipping down the roof.
Avoid windy weather conditions for this part of the installation.

For panels mounted in portrait on horizontal frames:
Clip panel clamps into the rails, place it firmly against the panel and fasten to one side of the panel until it holds.
Now inset the next set of claps on the other side of the panel.
Place the next panel against the previously installed panel and tighten the inter-panel clamp using the Allen key until it holds. Repeat until all panels are installed.

Align all panels in straight line, and tightly clamps against the panel and fasten tightly using the Allen bolt (recommended torque is 15 Nm).
Put rail cap into the base rail.
SOLAR WIRING – ELECTRICAL PV DESIGN

The example below is showing the specification of the various electrical components: AC Cables, DC Cables, Grounding Cables, Conduit Size, maximum lengths, and switch rating.

The Electrical PV Design must be followed by the installer for safety, efficiency, and correct functioning of the PV system.
SOLAR WIRING - GROUNDING OF PV RAILS PANELS

Grounding is an important part of PV installation. There are two common grounding methods:
- Grounding individual panels using earth clamp system; or
- Grounding the rails using WEEB system (the mounting rail serves as ground conductor)

Grounding panels using earth clamp system:
Pre-assemble your earth clamps on the ground before mounting panels to the roof.

To preassemble earth clamps, drill a 6.0mm hole in the top of the PV panel near the middle. This way, the earth will be out of sight from the ground and easy to inspect from the roof level.

Assemble the lug to the frame with the serrated biting washer between the frame and the face of the lug. Tighten hard so that the washer bites into the frame and the lug.

Expose the grounding wire by snipping off a portion of the insulation. Insert the cable into the slot of the grounding clip and screw down with a Philips screwdriver to clamp the grounding clip shut. Check that the cable is securely fastened.

Grounding using rail WEEB system:
WEEB = washer electrical equipment bonding

Schematic is providing an overview of a rail WEEB system.

Individual WEEB assembly instructions are included with the system and must be strictly followed by the installer.
SOLAR WIRING - DC WIRING ON ROOF

All wiring must be carried out in accordance with standards AS/NZS 3000 and AS/NZS 5033, as per supplied drawings, and by suitably qualified technicians.

Follow wire size and maximum wire length as per the Electrical PV Design schematics. Undersized wiring can lead to significant power losses and a reduction in system efficiency. Use outdoor rated wiring when inverter is installed outside.

Normally: A 4.0mm² DC Solar wire is provided with Solar Group systems. For larger systems outside of the Solar Group standard residential systems range, or for systems with longer cable runs, a larger cable size may be specified by the PV design engineer.

All DC cables should be installed to provide as short run as possible.

Positive and negative cables of the same string or main DC supply should be bundled together, avoiding the creation of lighting induction loops in the system.

This requirement for short runs and bundling includes any associated earth or bonding conductors.

Clearly mark the positive and the negative at the end of each string to ensure correct polarity. Wrong polarity could destroy the inverter during commissioning.

It is a good idea to use a twin-core DC cable marked blue & red

The DC wires shall be secured and not come in contact with the roof surface. Using Acme Cable Clips is advisable.

Using plastic cable tie is not permitted.
SOLAR WIRING - CONDUIT

Conduit and conduit fixings are supplied to by the installer according to the wiring requirements for the site.

Conduits sizing and maximum length is determined by the Electrical PV Design and should be followed by the installer.

Use only approved high temp rated DC Conduits – available at your electrical merchant.

Some line companies require internal cable runs longer than 300mm to be installed in earthed metal conduit. The metal conduit must be earthed at the inverter, and insulated at the array. Long cables (e.g. PV main DC cables over 50m) may also be required to be installed in earthed metal conduit or trunking.

External conduit must be heavy duty, suitable for outdoors, and UV rated.

All conduits should be labeled “SOLAR DC” at the conduit terminations.

Be aware of the need to allow any water or condensation that may accumulate in the conduit or trucking to escape through properly designed and installed vents.

SOLAR WIRING – AC CABLES & AC SWITCHES

The inverter AC isolator switch should be positioned within 3 meters of, and within line-of-sight of, the AC circuit board.

If this is not the case, then a second lock-off load-breaking AC isolator switch must be installed within the switchboard with a label directing the inverter’s location.

Refer to Electrical PV Design for the power rating of the switch.

Refer to Electrical PV Design for the grade and maximum length of the AC cables.
INVERTER MOUNTING

INSTALLING THE WALL MOUNT- ENASOLAR

The Wall Mount comes with six pre-drilled 8mm holes for attaching it to the wall, as well as eight conduit holes for electrical wires.

Mark and drill at least four mounting holes, using the Wall Mounting Template provided and fit the Wall Mount with the supplied Mounting Hardware, ensuring it is attached securely.

Inspect the installation for any potential water leaks. Seal using an appropriate silicone sealant if required.

It is advisable to watch the video (refer to page 20)

*Note: If the inverter is incorrectly mounted this will invalidate the inverter warranty.*

CANADIAN SOLAR INVERTER MOUNTING

Use the wall-mounted bracket as a template and drill 7 holes

Fix the wall mounting bracket on the wall with the expansion bolts in accessory bag.

Carry the inverter by holding the groove on the heat sink.

Place the inverter on the wall.

Insert lock plate into two holes in the heat sink.

D.C. ISOLATOR SWITCHES

For Inverters that do not have built in Double-pole D.C. Isolators, these must be readily accessible and numbered according to the schematic shown. Make sure that no wiring is exposed after installation. Outdoor isolators must have suitable IP rating of 6.5 or higher

A.C. ISOLATOR SWITCHES

For Inverters that do not have built in A.C. Isolators, an A.C. switch, capable of being locked off, must be installed within 3 meters of and within line of sight of the inverter.
SOLAR SIGNAGE LABELS

FIRE AND EMERGENCY SIGNS:
Sign in white lettering on green reflector circle as shown should read: PV
This sign must be 70mm wide or larger.
2 Copies of this sign are required:
- 1 sign on the meter box
- 1 sign on the switchboard

SOLAR ARRAY ON ROOF NOTIFICATION:
Sign must indicate that there is a solar array on the roof, the open circuit voltage of the array, and the short circuit current of the array. For larger more complex system, a diagram or map of array locations is required.
2 Copies of this sign are required:
- 1 sign on the meter box
- 1 sign on the switchboard

DISCONNECTION DEVICES
All disconnection devices except plug and socket connectors shall be supplied with a number corresponding to the Electrical PV Design diagram.
Label must be supplied adjacent to every DC isolator and every DC switch disconnector, as shown.

MULTI-STRING ARRAYS (More than one DC input to the inverter)
This sign must be positioned beside the inverter.

SYSTEMS OVER 600 V
This sign is to be positioned on the door or access gate.
Systems over 600V must also have restricted access to all electrical equipment.

FUSE HOLDERS
This sign is to be located on or within the fuse holder.

MAIN SWITCHES

Solar Supply Main Switch & Normal Supply Main Switch signs shall be located at the main switch board beside the relevant switches.
### SOLAR GROUP COMMISSIONING SHEET FOR RESIDENTIAL SYSTEMS

**Installation Company**

**Electrical Licence**

**Client Contact Information:**

- **Name:**
- **Address:**
- **Email:**
- **Mobile:**

**Installer Contact Information:**

- **Name:**
- **Address:**
- **Email:**
- **Mobile:**

#### Notes:

<table>
<thead>
<tr>
<th>Light meter reading</th>
<th>Time of measurement</th>
<th>AC Power measurement</th>
<th>Operation</th>
<th>Operation</th>
<th>Inverter Rating</th>
<th>Operation</th>
<th>Operation</th>
<th>Short Circuit</th>
<th>Open Circuit</th>
<th>Polarity Check</th>
<th>Voltage</th>
<th>Continuity Check</th>
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<th>≤ 5 to earth resistance</th>
<th>Bonding to earth</th>
<th>Isolator Disconnection</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**String 1:**

**String 2:**

**DC Isolators:**

**Inverter 1:**

**Inverter 2:**

**Checklist:**

- PV modules are physically installed per module layout
- PV module number matches PV schematic
- Inverter model number matches PV schematic
- Module connectors tight, secured & per PV schematic (no lasso)
- Wire and conduit sizes installed per PV schematic
- Array installation is neat, fixed and spaced as per PS1
- Trees and plants will not grow tall enough to shade array
- Roof penetrations are secure and weather tight
- All equipment and parts are labelled as required
- Inverter is easily accessible
- Inverter installed with free room above and below for airflow
- AC Circuit breaker selected as per electrical specification
- Any Internal DC Conduit is clearly marked or identifiable
- Dissimilar metals are isolated to avoid galvanic corrosion
- Aluminium is not placed in direct contact with concrete
- "PV" sign visible from distance on SB, Meter box
- Internal Conduit Carrying Solar DC POWER is clearly identifiable
- Monitoring (Wi-Fi) Set up
- Inverter auto shuts down if AC is switched OFF
- AC isolator switch locked OFF with cable tie prior to inspection

**Circle Phases on property:**

- R
- W
- B

**Circle Phases PV supplies:**

- R
- W
- B

**Earth fault loop impedance:**

- mΩ

**Prospective Short Circuit Current:**

- kA

**Ambient temp at time of test:**

- °C

**Inverter indicative efficiency:**

- %

**Inverter Model number:**

**Inverter Serial Number:**

**PV Module Model Number:**

**PV Module Serial Numbers**

---

This Solar PV System has been installed and commissioned

_________ Installer signature ____________/__/___ Commissioned on

---

☐ To do prior to system being live

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**Solar Group Grid-Tied Photovoltaic System Installation Manual 01/2016**

Page 35
SYSTEM COMMISSIONING - GENERAL
The following instructions are designed to assist the installer going through the Solar Group Commissioning Sheet.

SOLAR GROUP COMMISSIONING SHEET FOR RESIDENTIAL SYSTEM

When to Commission?
The following commissioning tests shall be carried out after the installation of a PV array and before inspection.

Paperwork:
Record everything on the sheet systematically. The entire visual test is marked with (v).
In addition, you need to issue an Electrical Safety Certificate, Certificate of Compliance, and the Certificate of Conformity of the Inverter.
All four should be scanned and sent to technical@solargroup.co.nz and kept for 7 years.

Weather conditions for commissioning:
Conduct commissioning on sunny days with minimal cloud cover.
For accurate measurements, use radiation meter at the same angle and orientation as the PV module. Also use an ambient temperature thermometer.
Note on the commissioning sheet the available W/m²; time of day, and date of the reading.

Timing:
The readings of the PV input should be at the same time as the Inverter power recorded.

SPECIAL NOTE: The polarity and continuity checks are extremely important. They are recommended as a visual test. However, if the polarity or continuity cannot be verified visually; conduct an alternative check (such as electrical continuity) to be 100% sure that the polarity is correct.
SYSTEM COMMISSIONING - START UP PROCEDURE

The procedures as recommended by the inverter manufacturer must be followed. The below steps are generic and may to be used in absence of other instructions.

Prior to start up:
Go through the Commission Sheet and inspect and record all the fields that do not require the system to be live. (Light grey fields)
It will give you an opportunity to tidy up any loose ends at that final stage

Start-up:
Make sure that you are using the necessary safety gear.

Step 1:
Check that the DC isolators are open
Plug in the remaining DC connections (typically stringing on the last module)

Step 2:
Conduct the Resistance Procedure – see below

Step 3:
Conduct the Short Circuit Procedure on each string – see below

Step 4:
Follow the inverter start-up procedure. In absence of other instructions:
Turn ON the main AC switch at the switch board.
Turn ON DC isolators and turn ON the AC isolator of the inverter’s switch box.
Check that the system connects to grid with an approximately 60 seconds delay.

As you star-up the system, record the relevant data from inverter display to the Commissioning sheet
- Voltage at DC input of inverter per string
  This shall be approx. 30 x number of modules (±15%)
- Current at DC input of inverter per string
  This shall be approx. 6.0-8.0A per string
- Output power of the inverter

Step 5:
Turn AC main switch OFF - system must immediately be disconnected from the grid
If not – STOP and report

Remember to turn system OFF after testing is completed and safely LOCK the AC and DC power OFF when commissioning is completed.
SYSTEM COMMISSIONING - (-v) & (+v) RESISTANCE PROCEDURE

**WARNING:** PV ARRAY D.C. CIRCUITS ARE LIVE DURING DAYLIGHT AND UNLIKE A CONVENTIONAL A.C. CIRCUITS, CANNOT BE ISOLATED BEFORE PERFORMING THIS TEST.

This test is carried out when all cables are at their final position with all strings connected.

In large systems consideration should be given to carrying out an insulation measurement on sections of the array first, then on the complete array after sub-array switches are closed.

**It is advisable to secure test leads before carrying out the insulation resistance test.**

Connect the insulation test device between earth and the PV array positive connection.

Record in the commissioning test sheet the positive connection insulation resistance - the **resistance MUST be greater than 1 Mega Ohm**.

Connect the test device between earth and PV array negative connection.

Record in the commissioning test sheet negative connection insulation resistance - **the resistance MUST be greater than 1 Mega Ohm**.

Measure the open circuit voltage between the positive and the negative ends of the DC and record in the Commissioning Sheet. Also record it on the relevant stickers.

**Ensure the system is de-energized before removing test cables or touching any conductive parts.**
SYSTEM COMMISSIONING - SHORT CIRCUIT PROCEDURE

WARNING: THE FOLLOWING PROCEDURES DESCRIBE HOW TO MEASURE SHORT CIRCUIT CURRENTS. VOLTAGES CAN BE VERY HIGH AND IF THE PROCEDURES ARE NOT FOLLOWED THEN ARCING AND DAMAGE TO COMPONENTS COULD OCCUR.

NOTE: Some projects require that short circuit currents are recorded as part of the contractual commissioning as a means to establish performance drop over time. Otherwise, a record of the actual operating current of each string is sufficient. This could be done by using the meter on the inverter or by using a clamp meter when the system is operational.

Before commencing the test:

Limit access to non-authorized personnel; keep all staff away from contact with metallic parts of the array or any surface of any PV module; isolate the PV array from the inverter at the array DC isolator.

The following steps shall be undertaken to measure the short circuit current safely as shown in figure below.

(a) Ensure PV array DC isolator at the inverter is in the off position.
(b) For larger systems, ensure that the fuses or circuit breaker of the strings that are currently not being tested are turned off.
(c) Leave solar array cable connected to the PV DC isolator.
(d) Remove the cable connecting the PV array DC isolator to the inverter.
(e) With the PV array DC isolator ‘off’ connect the test DC isolator assembly. (Refer to Figure D1.)
(f) Turn on PV array DC isolator. Using a DC clamp meter measure the DC short circuit current for String 1. Turn off test DC isolator. Record the current on the Commissioning Sheet. Also record it on the relevant sticker.
(g) Repeat Step (f) for each string.
(h) After each string has been individually measured ensure test DC isolator is off.

Restore Inverter wiring and check all terminals are tight and all fuses are back in place.
SYSTEM COMMISSIONING - CALCULATING INDICATIVE EFFICIENCY

Indicative efficiency of the Inverter is the ratio between the power generated on the DC side and the power output on the AC side.

The indicative efficiency shall be above 95%

The reason for this calculation is a reassurance that the inverter is working well.

DC Power:
Record on the Commissioning Sheet the DC voltage for each string as per the inverter Display Screen.

Some inverters provide the DC current:
Record it. Multiply the Current by the Voltage and record the DC Power of the inverter.

Others inverters provide the DC Power on the display screen. Record it directly to the commission sheet.

Example:
Voltage is 400V and current is 5.5A
DC power 400 x 5.5 = 2,200W record 2.2kW

AC Power:
Read from the inverter the current AC Power generated (for example 2,250W) and record on the commissioning sheet

Indicative efficiency:
Divide the DC power by the AC power
Example: 2,200 ÷ 2,250 = 98% ✓

SYSTEM COMMISSIONING - VOLTAGE & FREQUENCY ADJUSTMENT

Inverter Voltage and frequency limits (passive anti-islanding protection) should be adjusted to meet the requirements of the local lines company, or otherwise checked against AS/NZS 4777.2 5.2 requirements and adjusted accordingly.

Example: Vector Passive anti-islanding protection requirements:

<table>
<thead>
<tr>
<th></th>
<th>Acceptable Trip Time in seconds</th>
<th>Minimum Acceptable Setting</th>
<th>Maximum Acceptable Setting</th>
</tr>
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<tbody>
<tr>
<td>Over-voltage (&gt;230V)</td>
<td>&lt; 0.5s (less than 0.5s)</td>
<td>230V</td>
<td>253V</td>
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<td>Under-voltage (&lt;230V)</td>
<td>&lt; 2s (less than 2s)</td>
<td>200V</td>
<td>230V</td>
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<tr>
<td>Over-Frequency (&gt;50Hz)</td>
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<td>&lt; 2s (less than 2s)</td>
<td>45Hz</td>
<td>47.3Hz</td>
</tr>
</tbody>
</table>

OR: If not mandated by a Network:
(a) V min shall be 180 V
(b) V max shall be 265 V
(c) f min shall be 47 Hz
(d) f max shall be 52 Hz

Download the software of the inverter manufacturer to your notebook.
Connect the inverter to your notebook and activate the software.
The adjustment is done via the software.
For Enasolar Inverters use the code 0006001001-A48D
Record the adjusted frequency and voltage protection settings on the Certificate of Conformity of the Inverter, and sign the changes.
SYSTEM COMMISSIONING - FINAL CHECKLIST
Go through the checklist at the bottom-left of the commissioning sheet

For large PV systems
Where PV array comprises multiple strings, string protection has been provided in AS/NZS 5033.
Wiring is protected from UV and mechanical damage. Weatherproof isolator (where required by local electricity distributor) is mounted immediately adjacent to the PV array.

For inverters that do not have a built-in isolator switches
The switch box shall be in close proximity to the inverter (less than 3 meter and within line-of-sight).
All wires between the inverter and the switch box shall be in conduit or trunks.

AC Circuit Breaker
AC circuit breaker mounted within the main switchboard to act as the main switch.
Ensure that the rating matches the PV Schematic.

Signage:
- Is permanently fixed on the main switchboard
- Is permanently fixed at the main solar switch
If the solar system is connected to a distribution board then the further signs shall be located on main switchboard and all intermediate distribution boards.
Where the inverter is not adjacent to the main switchboard, location information is provided.
Shutdown procedure is permanently fixed at inverter and/or on main switchboard.

Wi-Fi Setup (if applicable)
This should be done at the very end when the system is up and running.
There are two ways to complete the setup:
1. From the Wi-Fi network to the inverter (least recommended)
2. From the inverter, identify the network and connect
   Record the IP Address of the Wi-Fi

Go to the customer’s browser and enter the IP address – the screen will display the relevant data.