Eclipse 5000-II Solar Inverter

Installation and Operation Manual

AUSTRALIAN MADE AND OWNED

MIL-Solar

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ABOUT THIS MANUAL

This manual provides information on how to install, commission and operate the MIL-Solar Eclipse Inverter.

Updates to this manual

MIL-Solar reserves the right to revise this document and to make changes to the content from time to time without obligation to give prior notification of any such changes.
Please check with your Installation Company or the MIL-Solar website for the latest information.

Revision Table

Revision	Release Date	Changes	Applicable Serial No.'s
2	July 2019	Includes updated PV connectors, merging bulletin no. 150719, 150720, 170305, 140701 and User Manual into a single document.	140100 - onwards
3	Jan 2020	Data-connector pins updated following SER5120-009.	140100 - onwards
4	Feb 2020	Terms and Power Meter installation updated. Full review for consistency	140100 - onwards
5	May 2020	Warranty details updated. LED indicator table updated to support additional states for firmware PNo 5887 v3.78, more information added to LED state description.	140100 - onwards
6	Aug 2020	Updated WiFi information regarding channel and frequency selection	140100 - onwards
6.1	Nov 2020	LED indicator table updated. Warranty details updated.	140100 - onwards

Applicable Models

This manual covers MIL-Solar Eclipse Inverters with the serial number range of 140100 onwards with MCU firmware v3.78 or higher.

Definitions

Inverter	For the purposes of this manual, Inverter specifically means MIL-Solar Eclipse Inverter. The Inverter is a device used to convert DC power from photovoltaic solar cells to AC power for injection into a power grid.
AC Mains or Grid	The public AC Mains network of electricity lines or Grid to which all categories of consumers are connected and as operated by a supply or distribution company. When solar Inverters are installed on a domestic or commercial site, they are connected to this AC Mains Grid for the purpose of supplying electrical energy back into the Grid.

Symbols

Special symbols used throughout this manual.

	**NOTICE** Attention - notes and helpful hints on improving performance.
	**CAUTION** Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury and/or damage or failure of the Inverter.
	**DANGER** Indicates a hazardous situation which, if not avoided, could result in death or serious injury or potential fire risk.
	**HOT SURFACES** The top plate and upper surfaces of the Inverter can become hot when operating at full power on days of high ambient temperature.

FEATURES

Inverter Ratings

Topology	Transformerless. Not galvanically isolated.
Protective class	Class I
Overvoltage category	AC Output - Cat III, Solar PV inputs - Cat II
Operating temperature range	-25°C to 50°C
Maximum humidity	100% non condensing.
Altitude (maximum operating)	2000 m
Environmental category	Outdoor. To be sheltered from direct rain.
Pollution degree	PD3
Degree of protection	IP44 Splashing water only, no direct rain
Weight	23 kg

See Inverter Specifications on page 51 for full Inverter specifications.

Solar PV DC Inputs

Solar photovoltaic inputs only.
The Solar PV inputs are considered Overvoltage Category II.

	PV 1	PV 2
$V_{max\ PV}$	750 V DC	750 V DC
V_{MPPT}	90-600 V DC	90-600 V DC
$I_{SC\ PV}$	15 A DC	15 A DC
$I_{max\ continuous}$	12 A DC	12 A DC

Solar PV inputs are internally protected for over current. No external protective device is required for current limiting or short circuit protection.

AC Output – Grid Connection

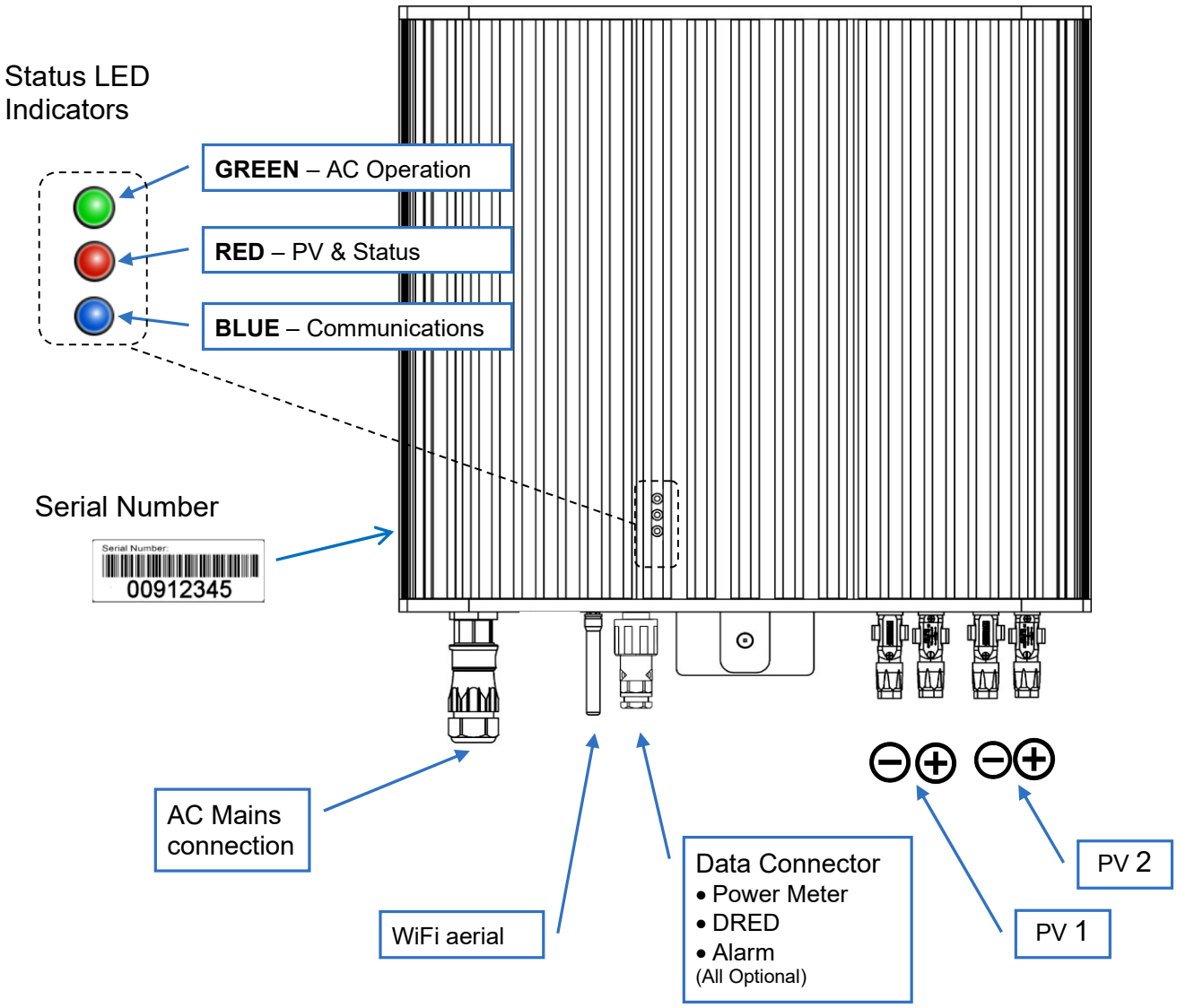
Single phase AC only.
The AC Mains connection is considered Overvoltage Category III.

For nominal specifications and maximum ratings refer to Inverter Specifications on page 51.

Solar PV arrays

⚠	**CAUTION** When photovoltaic arrays are exposed to light, a DC voltage is supplied to the PV inputs.
⚠	**CAUTION** Solar PV arrays connected to Eclipse Inverters must be FLOATING – not grounded.

Front view and Connections



Status LED Indicators

The MIL-Solar Eclipse Inverter has three LED indicators for displaying information about the current state of operation. These indicators have different colours associated with their function.

For further details see Inverter Operation on page 25 for standard operation, communications, alerts and alarms details.

Serial Number

Every Eclipse Inverter has a unique serial number displayed on its serial label located on the lower left hand side of the Inverter. This serial number is required for registering your equipment for electrical installation and for any warranty or service claims.

INSTALLING THE ECLIPSE INVERTER

Safety Considerations

	**DANGER** • Danger to life and property. • Breach of Government legislation. • Voiding of Warranty. All electrical installation and commissioning work undertaken on the Inverter, and the related connections to isolators, photovoltaic panels, optional accessories and house wiring systems must only be carried out by suitably qualified and licensed personnel.
	**CAUTION** Failure to install or operate the Inverter in the manner as specified by these Installation instructions may impair, or render inoperable, the protection systems provided by the equipment.

Selecting the Mounting Location

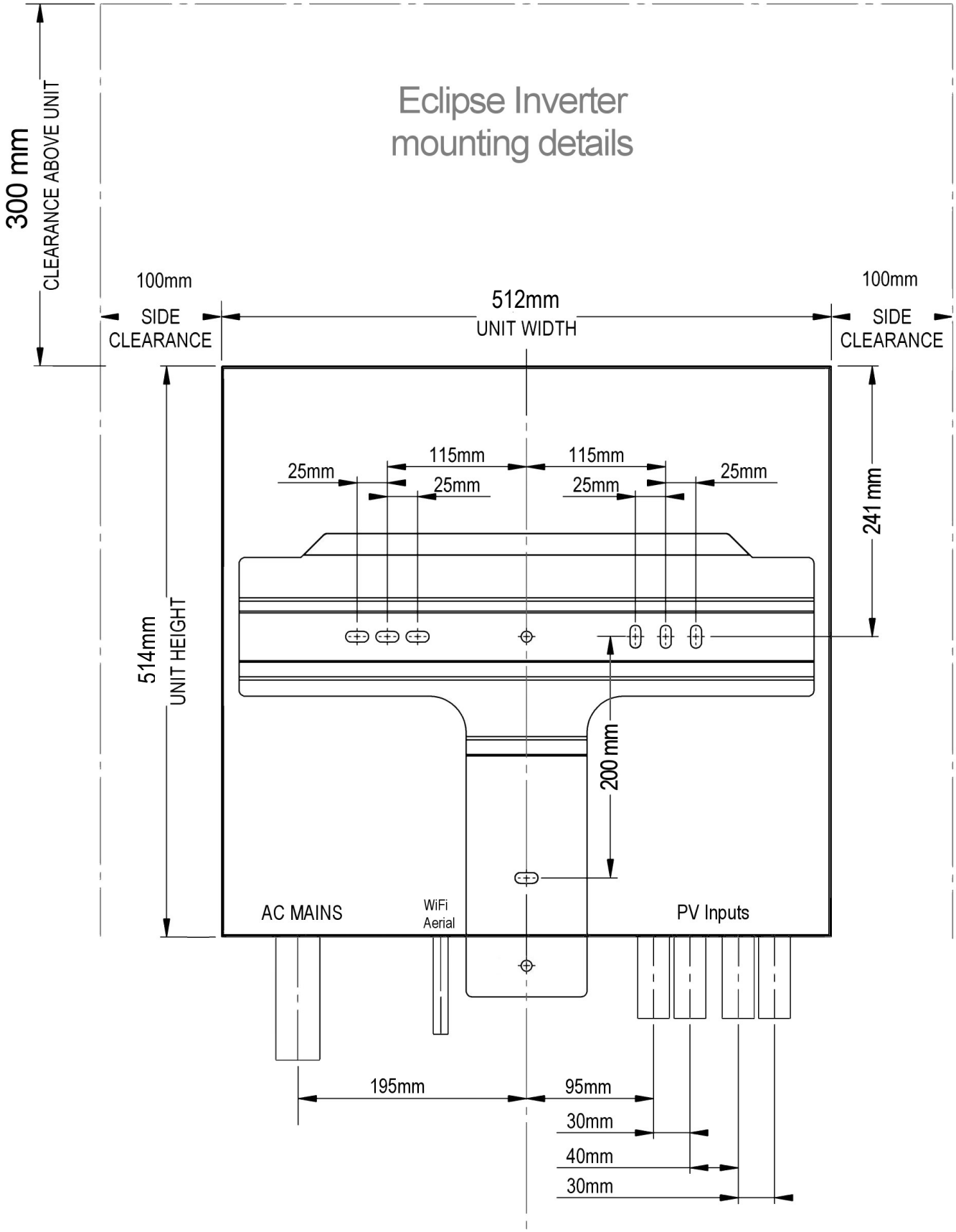
When selecting installation location of your Eclipse Inverter, you must consider and address all of the following points:

☞ **Air circulation**	The Inverter generates some heat when operating. It must only be installed in an area with adequate natural free flowing ventilation.
☞ **Vertical orientation**	The Inverter must be mounted in a vertical orientation to ensure proper cooling. The end of the housing with the connection points must always point downwards. Do not mount tilted at an angle to the vertical. Do not mount horizontally.
☞ **Direct sunlight**	To avoid power reduction due to excessive heating do not expose the Inverter to direct sunlight. Optimal operating performance is achieved when the ambient temperature is below 40° C.
☞ **Shielded location**	The Inverter can be located on a building in an outdoor location but must be mounted in a position that is sheltered from direct rain.
☞ **Wall mounting requirements**	The mounting method and location must be suitable for the Inverter's weight and dimensions and it must be mounted on a solid surface. (Refer to section Mounting on page 10 for mounting instructions)
☞ **Access**	Access to the Inverter, and especially any associated isolating switches, must be in accordance with the specific requirements of the relevant AUS/NZ standards. The mounting location must at all times be clear and have safe access without the use of additional aids such as ladders or lifting platforms.
☞ **User visibility**	Mount the Inverter at a height, and in such a position that visibility cannot be blocked to allow the operating status LEDs to be seen at all times.
☞ **Noise**	The Inverter can make noises when in use, which may be perceived as a nuisance in a living or sleeping area. Do not mount the unit on plasterboard walls or similar to avoid audible vibrations.
☞ **Location regards other equipment**	The minimum horizontal clearance distances to walls and other objects to ensure sufficient air circulation for cooling is **100** mm. Special consideration must be given where multiple Inverters are installed in the same area. As a minimum, all clearance distances are additive. DO NOT mount Inverters above each other or other heat generating equipment.

	**HOT SURFACES** Parts of the enclosure can become hot in normal operation. In high ambient temperatures the body and upper surface of the enclosure may become hot to touch.
	**CAUTION - Electromagnetic Radiation** Do not install the Inverter in a location where people may be closer than 20 cm distance for any length of time.

Mounting Location Dimension

When selecting where to install your Eclipse Inverter, ensure the Inverter meets minimum clearances with respect to the selected load bearing mounting points.



WiFi Access

If the Eclipse Inverter's WiFi connection is to be used continually by the customer, then consideration must be given to any metal structures near or around the Inverter which can affect the WiFi signal.

Mounting

The Eclipse Inverter must be attached to a flat surface such as timber, masonry or a dedicated pole assembly. The mounting bracket contains eight pre-drilled 8mm holes for attaching it to the wall.
Mark and drill at least four mounting holes, using the bracket as a template and attach the mounting bracket securely to the wall.

All cables must have sufficient length and bend radius before entry into conduit so that strain is not placed on the plugs or sockets where they connect to the inverter.

Weight Bearing

The wall structure on which the Inverter is to be mounted must adequately support its weight of 23 kg.

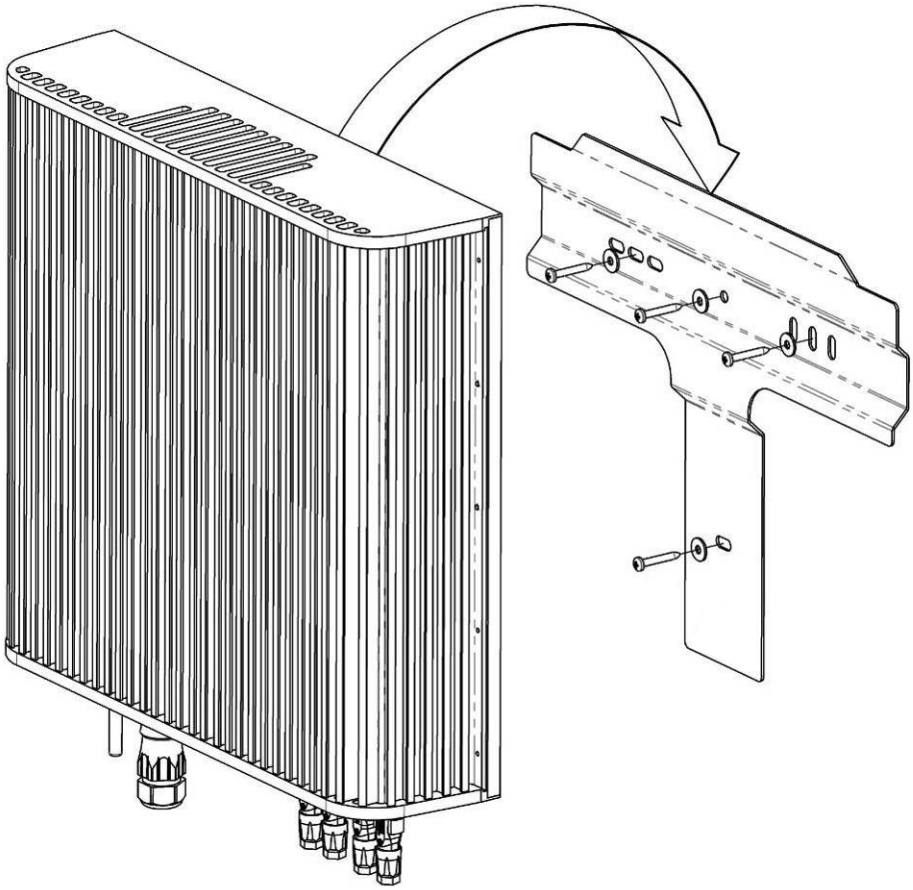
A minimum of four M6 fasteners must be used to securely install the mounting bracket onto the supporting structure. Always use correct fasteners for the structure being fixed to.

⚠	**CAUTION – Wall mounting strength** DO NOT mount on plasterboard, thin sheet cladding or sheetmetal unless you can absolutely ensure that all mounting points are fixed into suitably supporting structural members such as timber or metal studs.
⚠	**CAUTION – Dissimilar metals** DO NOT mount directly onto galvanised steel.
☞	**WARRANTY** Installing the Inverter incorrectly will invalidate the warranty. Please see Eclipse Inverter Australian Warranty on page **Error! Bookmark not defined.** for terms and conditions.

Install Inverter on mounting bracket

⚠	**CAUTION – Manual Handling** The Inverter weighs over 23 kg Care must be taken when lifting and placing the Inverter on mounting bracket.

Lift and place the top of the Eclipse Inverter over the mounting bracket and lower it until the Inverter weight is borne by the bracket.
Slide slightly from side to side to ensure that it has dropped into its fully seated position.



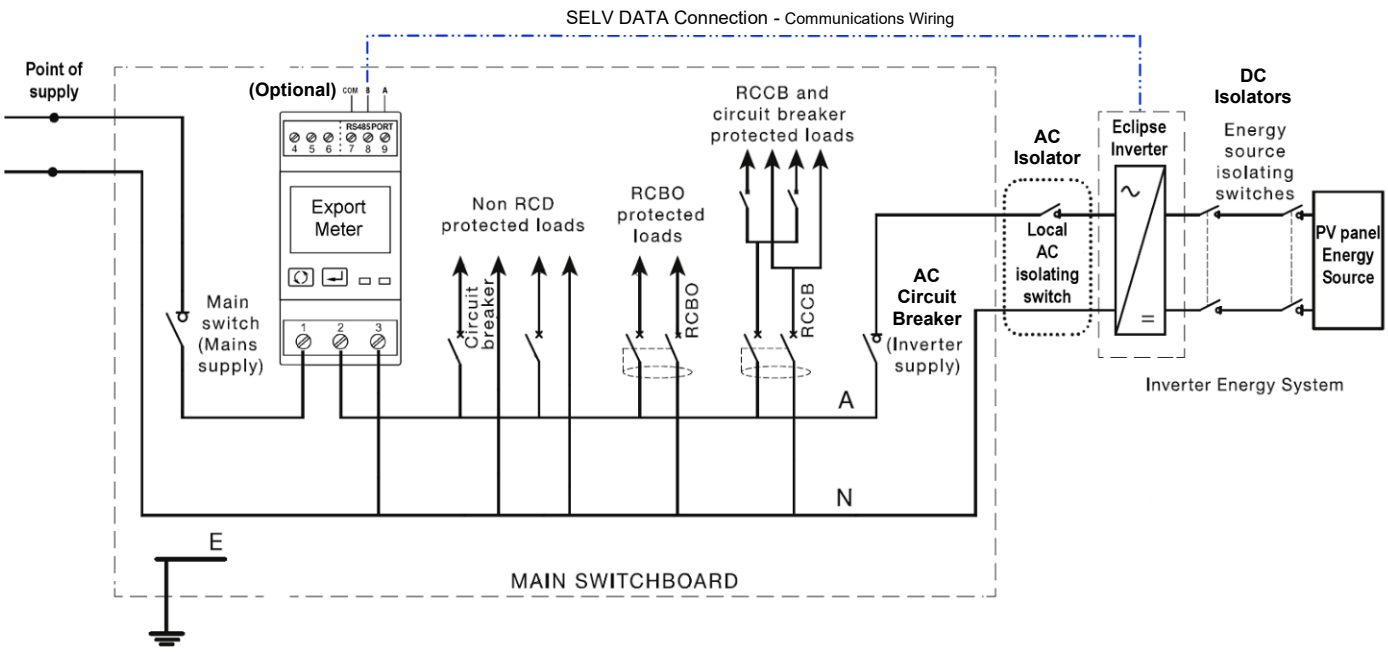
☞	**Secure the Inverter to the bracket** Before undertaking any wiring or connections, the Inverter must be secured to the mounting bracket using the M5 fastener provided.

WIRING

	DANGER **ELECTRICAL SAFETY STANDARDS - QUALIFIED PERSONNEL ONLY** All wiring must be in strict accordance with AS/NZS 4777.1, AS/NZS 3000 and AS/NZS 5033. All wiring and electrical works must be carried out by suitably qualified and licensed persons.
	CAUTION Using undersized wiring can result in a serious safety and fire risk to equipment and property.

Overall System Wiring Diagram

This diagram shows the full wiring diagram of an Eclipse Inverter including the optional power meter. The Export Limit and MyPower features of the Inverter require the installation of the power meter in the overall supply to the installation. As shown below, this power meter must be installed such that it measures the total site power at the point of connection to the Grid supply.



Mains Connection

	**DANGER** **ELECTRICAL SAFETY STANDARDS - QUALIFIED PERSONNEL ONLY** All wiring must be in strict accordance with AS/NZS 4777.1, AS/NZS 3000 and AS/NZS 5033. All wiring and electrical works must be carried out by suitably qualified and licensed persons.

Recommended AC circuit breaker

The breaker must be rated for bidirectional power flow at 32A. Sizing of all AC wiring for the Inverter must comply with AS/NZS electrical standards in accordance with the AC breaker and isolator employed.

	**Wire Size** Wire size is important, larger wires will reduce voltage rises, power losses and increase system efficiency. AS4777.1 has requirements for wire size to limit voltage rise.

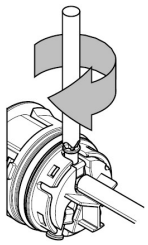
AC Isolator

The AC connection must comply with Section 4 of AS/NZS 4777.1. The AC wiring scheme to the Inverter must include an isolating device in compliance with this standard and be capable of safely disconnecting under conditions of the maximum ratings as specified above.

AC Mains connection to the Inverter

The AC Mains connection to the Eclipse Inverter is by way of an external connector. Ensure there is sufficient cable length and bend radius so that the connector is secured to the inverter AC socket in a straight line and not under strain when installed. The connector body must not press against any conduit or support the inverter when mounted on the supplied bracket.

Description	Female, 3-pole circular Weiland RST25i3 or equivalent connector approved for permanent installation according to IEC 61535
Voltage rating	250 V
Current rating	25 A with 4 mm² wiring, 32 A with 6 mm² wiring
IP rating	IP66/68

Screw terminal tightening torque: 0.8 – 1 Nm	

Protective Earthing

The protective earth connection provided by the Inverter AC Mains connector is for protective earthing of the Inverter only. Do not use the Inverter protective earth for earthing other parts of the system.

Protective earthing of exposed metal Solar PV module frames and Solar PV Array mounting frames must be in accordance with AS/NZS 5033.

Protective earthing conductor - minimum cross-sectional area
The protective earthing conductor cross-sectional area must be in accordance with AS/NZS 3000.

Solar PV Input

	DANGER **ELECTRICAL SAFETY STANDARDS - QUALIFIED PERSONNEL ONLY** All wiring must be in strict accordance with AS/NZS 4777.1, AS/NZS 3000 and AS/NZS 5033. All wiring and electrical works must be carried out by suitably qualified and licensed persons.
	Panel Ratings All PV panels and modules used with an Eclipse Inverter must have an IEC 61730 Class A rating as required by IEC 62109.

Solar PV Input - Maximum Ratings

	PV 1	PV 2
Maximum Input Voltage	**Maximum Operating Input Current**	
750 V	12 A	12 A

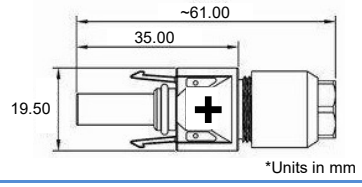
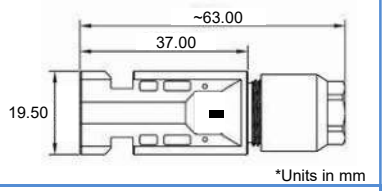
Solar PV Isolator

All PV connections must comply with Section 4 of AS/NZS 4777.1. All PV array wiring connected to the Inverter must include isolating devices in compliance with AS/NZS 5033 capable of safely disconnecting under conditions of the maximum input ratings as specified above.

If two different PV circuits are to be used for the dual, independent Inverter PV inputs, then two appropriately rated isolators are required or a combined isolator capable of breaking both circuits independently.

	CAUTION Solar PV arrays input PV1 and PV2 connected to the Eclipse Inverter must be isolated from earth.

Solar PV Array – Cable Connectors

	POSITIVE ⊕	NEGATIVE ⊖
Physical		
Description	Cable Plug MC4 (+)	Cable receptacle MC4 (-)

Terminations of the PV system wiring to the connectors must be carried out in strict accordance with the connector manufacturer's instructions and using the specified tools as applicable. Ensure there is sufficient cable length and bend radius so that the cable connector is secured to the inverter PV inputs in a straight line and not under strain when installed.

	CAUTION – Do not substitute alternate connectors! Only use the MC4 connectors provided with the Inverter.

Data Connector

The Data Connector is used to connect the follow optional features to the Eclipse Inverter.

- External Fault Alarm
- Demand Response Enabling Device (DRED)
- Power Meter Communication

Detailed instructions for wiring each of these features are described in the following sections.
If installing multiple of these features plan ahead when wiring the Data Connector.

Spare Part No. 6800

	DANGER All data connection wiring must only be carried out by a suitably qualified and licensed person. Failure to install the data connector wiring as specified could result in an electrical shock hazard leading to death or serious injury or potential fire risk.

Data Connector Wiring

All wiring connected to the terminals of the Eclipse Inverter Data Connector must:

- Only be connected to SELV or PELV circuits as per AS/NZS 3000 that do not exceed 25 Vac or 60 V ripple free DC under both normal and single fault conditions.
- Prevent a single fault such as a loose wire or cut insulation resulting in an unsafe condition.
- Use Clipsal 5005C305B C-BUS Cat 5E or equivalent with an outer insulation rated for switchboard installations.
- Ensure there is sufficient cable length and bend radius so that the cable connector is secured to the inverter data socket in a straight line and not under strain when installed.

Fault Tests and Alarm

Since July, 2015, all Inverters sold and installed in Australia must be certified as compliant to the electrical safety standard IEC 62109 parts 1 and 2.
A feature of this safety standard is the requirement for automatic testing and detection of system wiring and fault conditions by the Inverter.
Where the Inverter determines a fault an indication is provided to the User by the LED Status Indicators.

These fault tests include:

- Solar PV array insulation – Alarm
- RCD Earth Leakage – Alarm
- Grid disconnect relay – Alarm
- Self tests of the fault detection circuits
- AC mis-wiring

	Alarm - LED and User Display (WiFi) All faults are displayed on the Inverter LED's as detailed on page 27. The Alarm faults are displayed on the User Display by WiFi
	Alarm - Email The Inverter will automatically send an Alarm by email to MIL-Solar or the Installer as the primary form of Alarm alert (via WiFi network connection). Alarm messages identify the Inverter as well as the type of fault detected.

External Alarm Output (optional)

	DANGER All external alarm output wiring must only be carried out by a suitably qualified and licensed person. Failure to install the external alarm output wiring as specified could result in an electrical shock hazard leading to death or serious injury or potential fire risk.

The Eclipse Inverter provides for the connection of an optional local Alarm indicator. The Alarm output connection is a voltage free, normally open relay contact which closes on Alarm. The external alarm wiring and voltage supply must be SELV or PELV maximum 25 Vac or 30 Vdc

Contact Ratings:

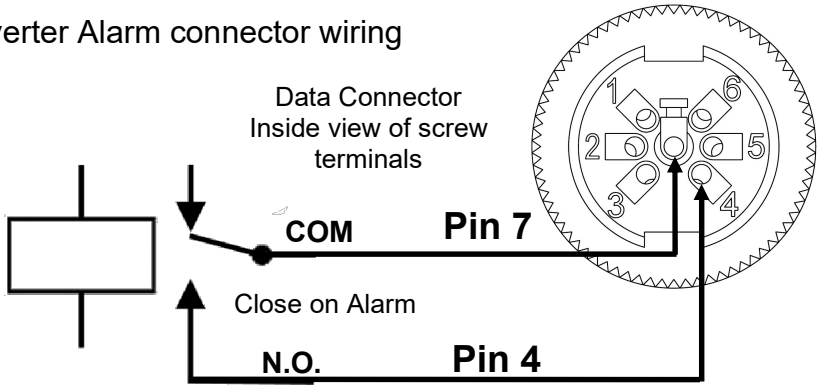
Maximum Voltage:	**30V DC**
Maximum Current:	**1A – resistive only**

External Alarm Installation (optional)

The Eclipse Inverter is supplied with a screw terminal Data Connector for the data connections and the optional Alarm. It comprises of two parts – terminal insert and outer housing. To access the pin screw terminals, unscrew the outer housing from the terminal insert.

Spare Part No. 6800

Inverter Alarm connector wiring



☞	**Multiple Data Circuits** The Alarm output uses only two of the seven pins in the Data Connector. Ensure to wire all of the required data cables before closing the connector.

External Alarm Output Wiring

All External Alarm Output Wiring must:

- Only be connected to SELV or PELV circuits as per AS/NZS 3000 that do not exceed 25 Vac or 60 V ripple free DC under both normal and single fault conditions.
- Prevent a single fault such as a loose wire or cut insulation resulting in an unsafe condition.
- Use Clipsal 5005C305B. C-BUS Cat 5E or equivalent with an outer insulation rated for switchboard installations.

DRED (optional)

AS/NZS AS4777.2-2015 requires the capability for an Inverter to be connected to a Demand Response Enabling Device (DRED). The DRED device can control various power output modes of the Inverter including demanding disconnection from the Grid.

Most installations of inverters of 5kW output or less do not have DRED devices.

Demand Response Mode - DRM 0

☞	**No DRED required** If the installation does not have a DRED device, then no action is required. The DRM 0 connection pins should be left open circuit – no connections.

Before getting started

Plan and review:

- Location of the DRED device provided by the utility, likely in the site switchboard
- Connection and termination details at the DRED device
- Route for data cabling from the DRED device to the Eclipse Inverter

Installing DRED connection

	DANGER All DRED wiring must only be carried out by a suitably qualified and licensed person. Failure to install the DRED Wiring as specified could result in an electrical shock hazard leading to death or serious injury or potential fire risk.

DRED Wiring

All DRED wiring must:

- Only be connected to SELV or PELV circuits as per AS/NZS 3000 that do not exceed 25 Vac or 60 V ripple free DC under both normal and single fault conditions.
- Prevent a single fault such as a loose wire or cut insulation resulting in an unsafe condition.
- Use Clipsal 5005C305B. C-BUS Cat 5E or equivalent with an outer insulation rated for switchboard installations.

Data Connector

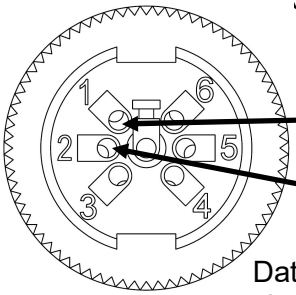
The Eclipse Inverters is supplied with a screw terminal Data Connector for the data connections to the Inverter. This connector is also used for the DRM 0 connection.

Spare Part No. 6800

DRM 0 connection

DRM 0 mode is enabled via connections *RefGen* and *Com Load/DRM0* (Refer AS4777.2_2015)

DRM 0	Data Connector
COM LOAD/0	1
REF GEN/0	2



Data Connector
Inside view of
screw terminals

	Multiple Data Circuits The DRED connection uses only two of the seven pins in the connector. Ensure to wire all of the required cables before closing the connector.
	CAUTION All data connections to the Inverter are SELV or PELV. Suitable insulated cable and/or protection must be provided where the cable is routed through the switchboard for connection to the DRED device.

DRED Data Cable Specification

AS4777.2 specifies the following rating for the DRED connection:

TABLE 6

RJ45 SOCKET AND TERMINAL BLOCK SPECIFICATIONS

Property	Value	Symbol
Current rating	≥ 1.5	A
Voltage rating (V r.m.s.)	≥ 125	V
Dielectric strength (V r.m.s. 50 Hz, 1 min)	≥ 1000	V
Insulation resistance (MΩ min 500 V)	≥ 500	M Ω

Power Meter Installation (optional)

	**DANGER** Installation and wiring of the Power Meter in the switchboard MUST ONLY be carried out by a suitably qualified and licensed person. Failure to install the power meter correctly could result in an electrical shock hazard leading to death or serious injury and potential fire risk.

The MIL-Solar Eclipse Inverter has an optional feature that enables the Inverter to monitor the power usage of the installation. This feature shows power usage and power export/import in real time through the Inverter's User Interface, enabling the user to better manage their power. See My Power on page 37 for further details.

For the MyPower feature, a MIL-Solar Power Meter must be installed in the main switchboard which is connected to the AC Mains Grid.

The Power Meter can be either single phase or 3 phase depending on the installation's Grid supply.

The Power Meter also enables the use of the Export Limit feature, limiting the amount of power exported to the grid, which may be a requirement of the power distribution company. See Export Limit Operation on page 40 for further details.

Before getting started

Plan and review:

- Single phase or 3 phase meter being used.
- Possible locations for the Power Meter in the site switchboard.
- Access to the incoming AC Mains supply for connection through the Power Meter.
- Route for data cabling from the Power Meter to the Eclipse Inverter.

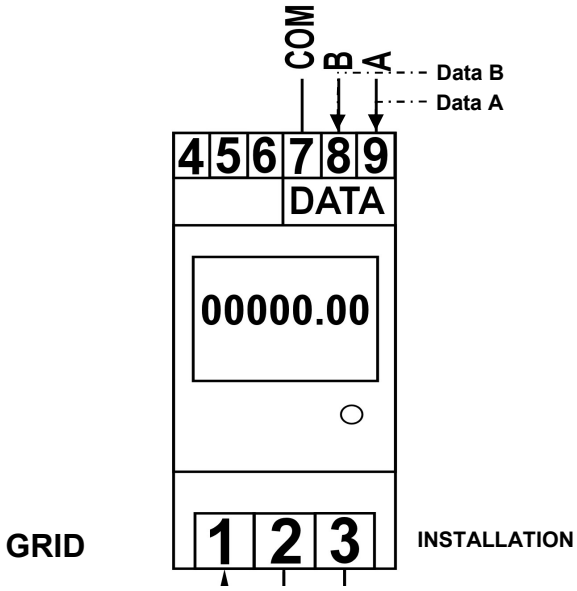
Ensure that you have the Data Connector supplied for the data cable connection to the Eclipse Inverter and sufficient length of suitable data cable.

	**NOTICE** The Power Meters are pre-configured, altering the Power Meter's internal settings will prevent the use of the Eclipse Inverter MyPower features.

Power Meter Wiring

The Power Meter must be wired into the main switchboard feed immediately after the main isolator, but before the connection point for the Eclipse Inverter. Use the appropriate Power Meter to match the number of phases at the site. The Power Meter has a maximum rating of 100 A.

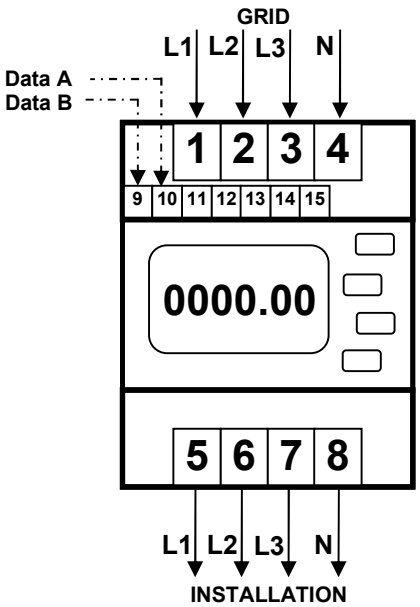
Single Phase Power Meter Wiring



Single Phase

Term	Description
1	Incoming Grid L-IN Active
2	L-OUT Active Outgoing to installation switchboard
3	Neutral
8	Data B
9	Data A
4-7	Unused

3 Phase Power Meter Wiring



3 Phase

Term	Description
1	Incoming Grid L1 (Red)
2	Incoming Grid L2 (White)
3	Incoming Grid L3 (Blue)
4	Incoming N (Black)
5	Outgoing L1 (Red)
6	Outgoing L2 (White)
7	Outgoing L3 (Blue)
8	Outgoing N (Black)
9	Data B
10	Data A
11-15	Un-used

Inverter Phase

The Inverter can be connected on any of the 3 phases. Ensure to note down the phase and update it in the Inverter User Interface, see Configuring the Inverter for MyPower on page 39 for details.

Power Meter Data Wiring

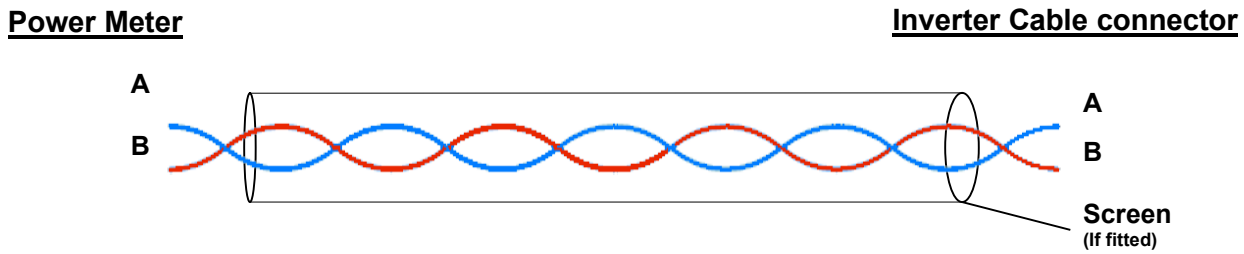
A data connection must be made between the Power Meter and the Eclipse Inverter.

	**DANGER** All data connection wiring must only be carried out by a suitably qualified and licensed person. Failure to install the data connection wiring as specified could result in an electrical shock hazard leading to death or serious injury or potential fire risk.

Power Meter Data Wiring

All Power Meter data wiring must:

- Only be connected to SELV or PELV circuits as per AS/NZS 3000 that do not exceed 25 V AC or 60 V ripple free DC under both normal and single fault conditions.
- Prevent a single fault such as a loose wire or cut insulation resulting in an unsafe condition.
- Use Clipsal 5005C305B. C-BUS Cat 5E or equivalent with an outer insulation rated for switchboard installations.
- Twisted pair. AWG 22 – 26.
- The Data 'A' and Data 'B' connections must use one twisted pair.



Inverter Data Connector

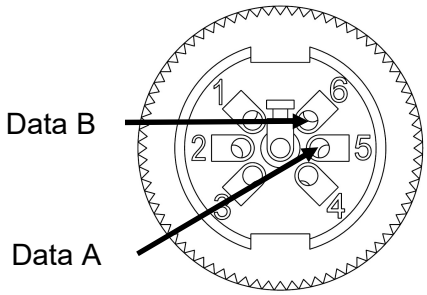
The Eclipse Inverter is supplied with a screw terminal Data Connector for terminating the Power Meter data cable at the Inverter. It is comprises of two parts – a terminal insert and an outer housing.

Spare Part No. 6800

Power Meter Data Connection Wiring

Wire the data cable between the Power Meter and Inverter using the following table.

	Terminal		
	Connector (Inverter end)	**1 Phase Power Meter**	**3 Phase Power Meter**
Data A	5	9	10
Data B	6	8	9



Data Connector
Inside view of
screw terminals

	**Multiple Data Circuits** The Power Meter connection uses only two of the seven pins in the connector. Ensure to wire all of the required cables before closing the connector.

Single Phase Power Meter - Data Cable Termination

Restrain the data cable to the Power Meter housing using a cable tie supplied with the MyPower meter as shown below.

Three Phase Power Meter - Data Cable Insulation and Termination

The data cable at the 3 phase meter must be insulated from the active and neutral terminals using the MIL-Solar insulator PNo 6958 provided with the Power Meter.

- Fit all AC L and N conductors to the Power Meter.
- Fit the MIL-Solar Insulator PNo 6958 so it covers the AC L and N terminals.
- Fit the data wiring to the Power Meter.
- Close the cover and secure in place with the cable ties supplied. This restrains the data cable and the insulator.

Insulator PNo 6958

	**DANGER** All data connection wiring must only be carried out by a suitably qualified and licensed person. Failure to install Insulator connection wiring as specified could result in an electrical shock hazard leading to death or serious injury or potential fire risk.

COMMISSIONING

Pre commissioning checks

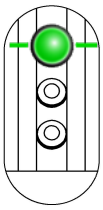
Check the following requirements before commissioning:

- The Inverter is correctly installed, mounted and secured to mounting bracket at bottom.
- Correct installation of AC wiring at switchboard.
- The AC circuit breaker is connected and operating correctly.
- Correct wiring of AC Isolator and connection of the AC cable to the Inverter.
- Correct connection of protective earth.
- Complete connection of all Solar PV DC cables.
- Correct polarity of all DC connections.

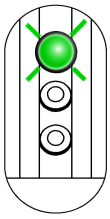
Power and Grid Connect

To turn OFF or turn ON the inverter use the following sequence of switches.

Power ON Sequence



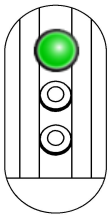
1. Switch ON the AC circuit breaker and the AC Isolator.
   Hear one click of the AC relay inside the Inverter.
   See the green LED **slow** flash ready for PV Solar DC power.



2. Switch ON the DC Isolators for the PV Solar panels.
   See the red LED **slow** flash, green LED **fast** flash then change to red LED **off**, green **fast** flash

3. **Grid connecting.**
   When the Inverter determines that there is sufficient PV Solar power input, it will initiate the one minute grid connect countdown delay.

   See the green LED **medium** flash. After one minute the Inverter will connect to the Grid, hear one click of the AC relay inside the Inverter.

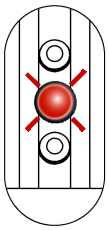


4. **Grid connected - Generating.**
   The Inverter will begin to output increasing AC power

   See the green LED **constant** ON.

If you encounter any problems, refer to Eclipse LED Status Indicator Tables on page 27 and to Troubleshooting on page 44 for assistance in diagnosing any exception events.

Power OFF Sequence



1. Switch OFF AC Isolator.

   See the green LED will turn OFF and the red LED will **medium** flash.

2. Switch OFF DC Isolators, the red LED will turn OFF.

☞	**Commissioning – status display** Refer to Inverter Operation section on page 25 for the corresponding Status messages shown on the Inverter display accessed by a web browser.

LED Legend

See Eclipse LED Status Indicator Tables on page 27 for all LED configurations

	OFF		**Slow Rate** 1 Flash per 4 Seconds		**Medium Rate** 1 Flash per Second		**Fast Rate** 4 Flashes per Second		**ON** Constant

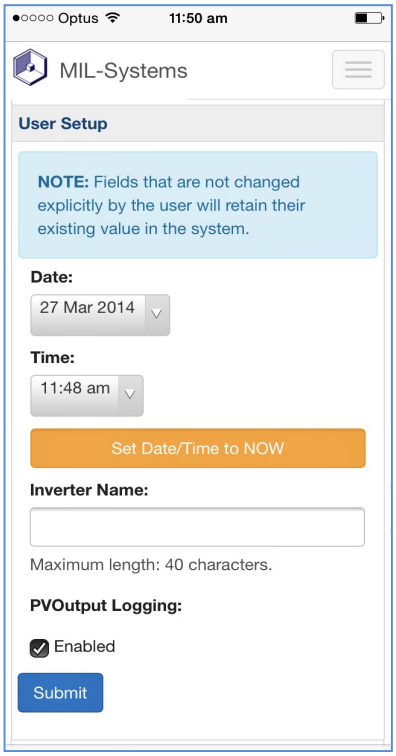
Inverter Settings

Configure the Inverter settings via the User Interface after connecting the Inverter WiFi. See on page 28 for connection details.

Date – Time

The Eclipse Inverter Date and Time is set to AES time when it is made. The inverter will remember the Date and Time for a month without it being turned on. The Inverter must have the correct Date and Time for correct displays, data records and email alerts.

The Date and Time can be verified and/or set from the User Interface by accessing the **[User Setup]** tab under the **Status** menu.



NOW
Can be selected to fill the Date and Time field as per the current values in your device.

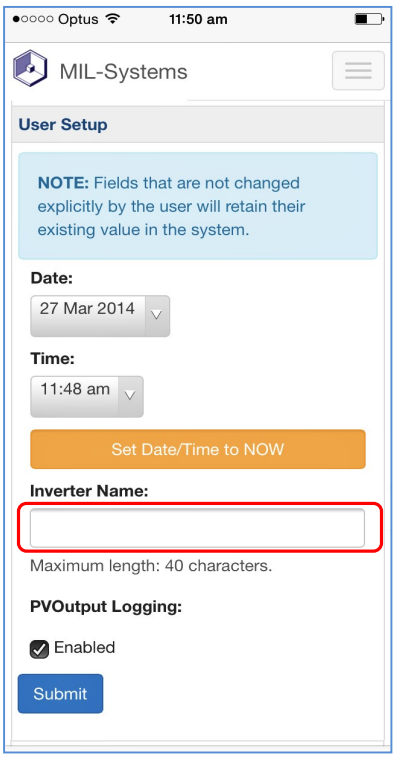
Submit
Any changes made to values on this page must be submitted before taking effect in the Inverter.

☞	**Retained Settings** Inverter settings such as Date and Time can be set in advance prior to installation on site. Settings will be retained for a month without power.

Inverter Name

The Eclipse Inverter can be given a unique name as determined by the User. This personalised naming can be particularly useful where:

- The user or the Installation Company wishes to regularly access data from the Inverter over the internet using a local network connection. Choosing your own name can make it easy to identify.
- PVOutput is a free online service allowing your Inverter to automatic upload its solar power generation data to be accessed from anywhere. To use this feature create a PVOutput account at pvoutput.org and enter details into the Inverters 'User Setup' tab.



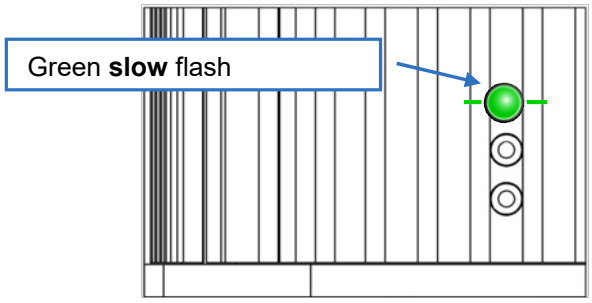
INVERTER OPERATION

Turn ON and Grid Connection

The Inverter is turned ON by switching ON the AC Isolator switch near the Inverter and the AC circuit breaker in the switch board.

AC ON

When AC Mains is turned ON at the AC Isolator (No PV Solar DC at this time) the green LED status indicator will **slow** flash. At this time, the Inverter is awaiting DC power from the PV panels.

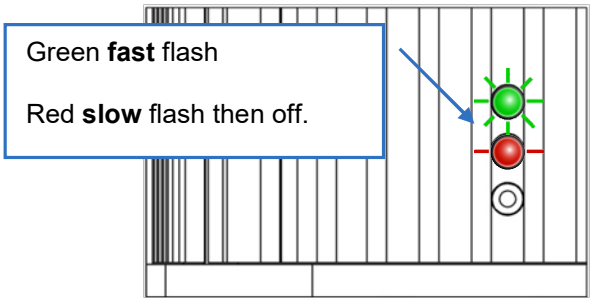


Status	
Time Exporting	00:00
Inverter	**AC ON**
PV Panel	Low Solar
WiFi network	Local 0012456

AC ON, PV DC turned ON

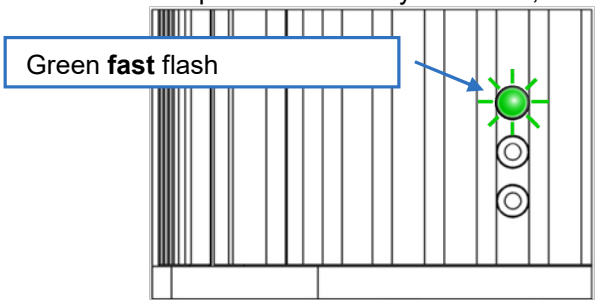
When PV Solar DC power is available, the Inverter will go through two initialisation stages:

1. Internal checks.



Status	
Time Exporting	00:00
Inverter	**Initialising**
PV Panel	Solar Available
WiFi network	Local 0012456

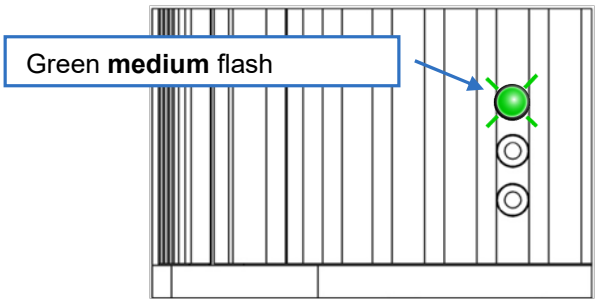
2. Start Up Tests. PV array insulation, RCD, AC relay, Mis-wire



Status	
Time Exporting	00:00
Inverter	**Running Start Up Tests**
PV Panel	Solar Available
WiFi network	Local 0012456

Grid Connecting

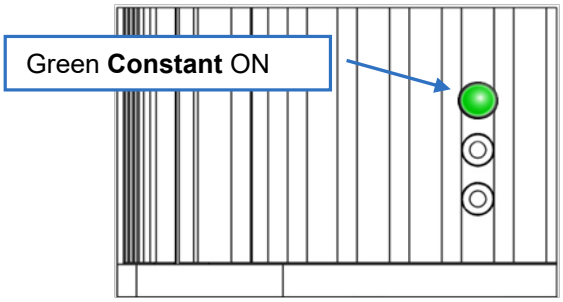
When there is sufficient PV Solar power available for the Inverter to begin generation, the Inverter will perform a 60 second count down sequence before connecting, or reconnecting, to the grid.



Status	
Time Exporting	00:00
Inverter	**Connecting in 58 secs**
PV Panel	Solar Available
WiFi network	Local 0012456

Grid Connected - Day Generation

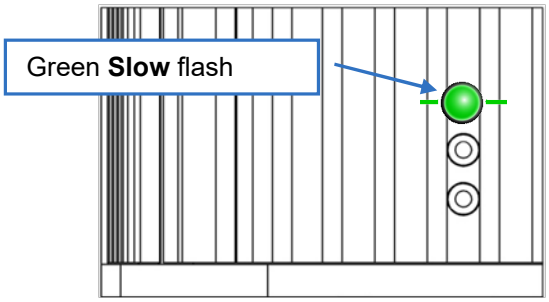
Once connected to the grid, the green LED is **constant** ON and the Inverter is generating AC power.



Status	
Time Exporting	00:00
Inverter	**Grid Connected**
PV Panel	Solar available
WiFi network	Local 0012456

Low or no PV solar power input

☞	**Low Solar Input** If there is little or no PV Solar power input, the Inverter will not connect to the grid.



Status	
Time Exporting	00:00
Inverter	**AC ON**
PV Panel	**Low Solar**
WiFi network	Local 0012456

AC Mains Grid Abnormal Conditions

The AC Mains Grid has abnormal AC voltage and frequency from time to time. The AC voltage can be too high particularly when an area has many solar PV systems exporting power to the Grid. When these abnormal conditions occur the Australian Standard AS/NZS4777.2 mandates that solar PV inverters respond by reducing or pausing power output or disconnecting from the Grid. The Eclipse Inverter LEDs indicate the abnormal condition and its response.

When the Grid is bad (eg AC voltage too high) the LEDs are green constant ON and red medium flash. The Inverter operation is paused and the Grid is disconnected.

When the Grid returns to normal the Inverter will re-connect to the Grid and start generating power increasing to full power over 5 minutes.

The Grid abnormal conditions are recorded in the Inverter event log which can be accessed by the Installer or MIL-Solar and analysed for information about the Grid conditions. This information can be provided to the Grid power distribution company and they may choose to mitigate unreasonable Grid abnormal conditions.

☞	**You do not need to do anything when Grid abnormal events are shown.** The Eclipse Inverter will automatically return to normal operation when the Grid is normal.

LED Legend

	OFF		**Slow Rate** 1 Flash per 4 Seconds		**Medium Rate** 1 Flash per Second		**Fast Rate** 4 Flashes per Second		**ON** Constant

Eclipse LED Status Indicator Tables

Inverter Operation

	OFF No AC available No PV Solar available	**Night** AC ON No PV Solar available	**Grid Connecting** 60 sec countdown	**Start Up Tests** AC ON PV Solar available	**Day Generating** PV Solar available Grid connected
		Grid Disconnected by DRED DRM 0 Operation PAUSED		**Initialising** PV Solar available	**Power Output Reduced** Priority 6, Note 3 Generation limited due to high temperature Grid connected
	AC OFF PV Solar available	**Operating Error** Priority 4, Note 3 Operation INTERUPTED (Self retry or next day retry, Note 2)	**Waiting for Grid OK** Priority 5, Note 3 Operation PAUSED Grid Voltage too high Grid Frequency bad (Self retry)	**Start Up Tests Delayed** Operation PAUSED AC ON PV Solar available (Self retry)	**Grid Bad** Priority 5, Note 3 Operation PAUSED Grid disconnected Grid Voltage too high Grid Frequency bad (Self retry)
	Installation Fault Priority 1, Note 3 Operation STOPPED AC or PV Mis-wired (Restart from AC OFF and DC OFF)	**Start Up Test Fault** Priority 3, Note 3 Operation INTERUPTED **ALARM** asserted, Note 1 • PV Array Insulation Fault (Self retry) • RCD or AC Relay Self Test Fault (next day retry, Note 2)		**RCD Earth Leakage Trip** Priority 2, Note 3 Operation INTERUPTED **ALARM** asserted, Note 1 (Next day retry, Note 2)	
	Start Up Error Operation INTERUPTED (Next day retry, Note 2)				

Note 1: The **ALARM** will clear the next day when the Inverter has completed **Start Up Tests** without fault.
Note 2: The next day retry can be done manually by turning DC OFF then ON while PV Solar is available.
Note 3: Priority X is the priority assigned to various fault conditions with 1 being the highest priority. Where more than one fault condition is present at the same time, the fault with the highest priority will be the one indicated by the LEDs. Faults with the same priority cannot be present at the same time.
Note 4: This LED Table is applicable to Eclipse inverters with software revision "MCU base PNo 5887 v3.78" on 9/6/20 or later. Refer to manual revision 4 or earlier available for download from https://www.mil-solar.com.au/general-information/ for LED status indicator table applicable to MCU firmware version 3.77 or earlier.

LED Legend

	OFF		**Slow Rate** 1 Flash per 4 Seconds		**Medium Rate** 1 Flash per Second		**Fast Rate** 4 Flashes per Second		**ON** Constant

WiFi Communications

☞	When the inverter WiFi is sending or receiving data the blue LED will flicker irregularly.

	Status	Details
	OFF	There is no AC or PV Solar available to the Inverter.
	Standalone Mode	When starting from AC OFF and DC OFF the Inverter always starts in Standalone Mode. This allows devices such as smart phones and tablets to search and find the Inverter's standalone WiFi and connect to it. This mode is for installation configuration and set-up, and for changing WiFi network set-up & password in the future. This mode is for users to view and monitor the inverter without a home WiFi network. If the inverter WiFi had previously been connected to the home WiFi network it will start in Standalone Mode then after 5 minutes it will automatically reconnect to the home WiFi network it has saved. To change a saved home WiFi network it must be cleared by the inverter set-up while in Standalone Mode, refer to page 29 for instructions. The Inverter will only enter Standalone Mode when starting from AC OFF and DC OFF.
	Home Network Mode Connected	The Inverter has successfully connected to the home WiFi network and communications are operating normally.
	Failed to Connect to Network	Network connection failed. The Inverter has been configured to a home WiFi network but was unable to reconnect, or has lost communications. The inverter will keep trying to reconnect to a saved home WiFi network. To re-establish WiFi connection, restart the inverter by turning AC OFF and DC OFF, then ON again, then wait for 5 minutes for automatic reconnection. If the inverter is still unable to connect to the home WiFi network, re-configure the WiFi network from Standalone mode. Refer to page 29 for instructions. This may be required if the network WAP/router has been reset or the home WiFi network name or passphrase has changed.

Note 1: This LED Table is applicable to Eclipse inverters with software revision "MCU base PNo 5887 v3.78" on 9/6/20 or later. Refer to manual revision 4 or earlier available for download from https://www.mil-solar.com.au/general-information/ for LED status indicator table applicable to MCU firmware version 3.77 or earlier.

LED Legend

	OFF		**Slow Rate** 1 Flash per 4 Seconds		**Medium Rate** 1 Flash per Second		**Fast Rate** 4 Flashes per Second		**ON** Constant

WiFi User Interface

The MIL-Solar Eclipse Inverter comes standard with WiFi capability enabling a wireless connection with a wide range of devices and home/office networks. This networking capability provides a comprehensive User Interface including the ability to graphically display the Inverter performance as well as providing the means to recall and display historic performance details.

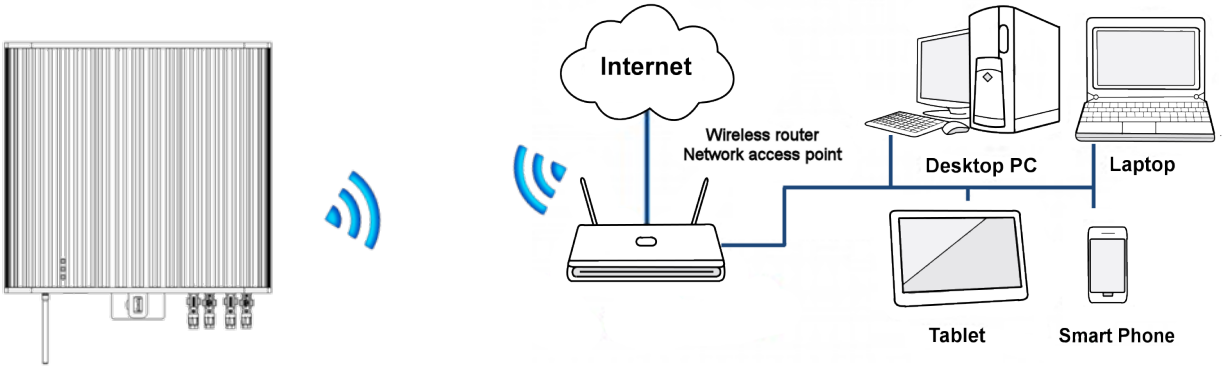
The WiFi connection to the Inverter can be made in two ways:

Standalone Mode

Connection to a nearby smart phone, tablet or other device. Used for User Interface without home WiFi network

Home WiFi Network Mode

Connection to the home WiFi network and the internet
Used for convenient User Interface anywhere in the home on many devices.
Required for continual monitoring and logging over Internet.



Accessing the Inverter User Interface

Connecting the Inverter to a nearby smart phone or device.

When starting from AC OFF and PV Solar DC OFF the Inverter always starts in Standalone Mode for 5 minutes. This allows nearby smart phones and other devices with WiFi to find and connect to the Inverter's standalone WiFi. Once WiFi connected the device can browse to the Inverter User Interface for installation configuration, home network setup and ongoing monitoring of the Inverter operation and generating performance.

If the inverter WiFi had previously been connected to the home WiFi network it will start in Standalone Mode then after 5 minutes it will automatically change to Network Mode and reconnect to the home WiFi network it has saved.

Start or Re-start the Inverter to be in Standalone Mode

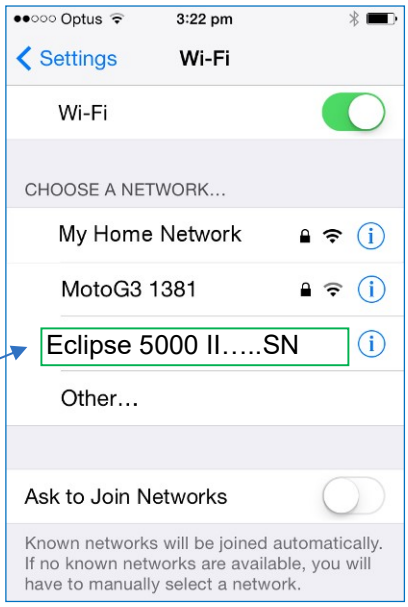
Stop the Inverter by turning OFF the AC isolator first, then turning OFF the DC isolators, wait until all the LEDs are OFF. Start the Inverter by turning the AC isolator ON. When the AC is turned ON the Inverter will start in Standalone Mode for 5 minutes with the blue LED ON. The DC isolators can be OFF or ON. If no Network Mode name and passphrase has been configured the Inverter will remain in Standalone Mode.

Connecting to Inverter in Standalone Mode

On your **phone/tablet**, go into **Settings**
Turn **ON WiFi** and search for available Networks.

The Eclipse Inverter will be identified by the name “Eclipse” followed by the model and serial number for the Inverter.
Eg: Eclipse 5000 II p SN140022

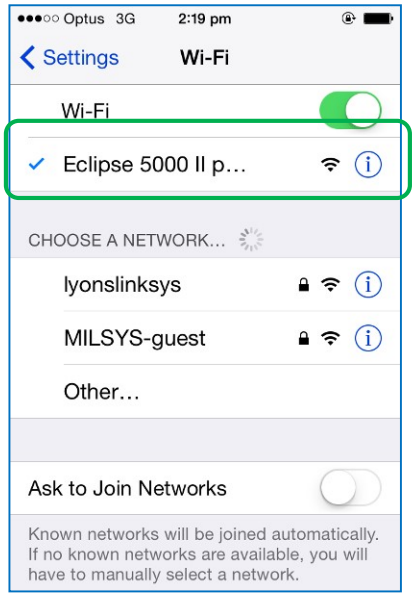
Check that the serial number is the one for this Inverter (and not that of another nearby Eclipse)



Join to this Eclipse network by tapping on the selection.

Confirm that the Eclipse Inverter has connected to your phone or tablet.

Depending on your mobile Device, this may be shown as a tick ☑, or by the phrase “CONNECTED” or similar.



Display on a Browser

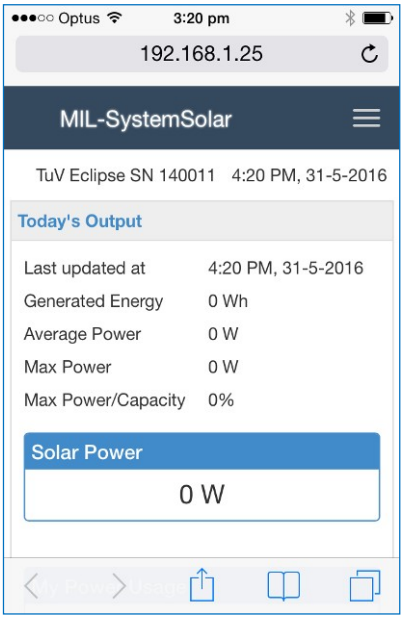
Having confirmed connection to the Inverter on the mobile device, open a **Browser** on the mobile device.

E.g. Chrome, Safari, Internet Explorer

In the address bar window at the top of the Browser type in the IP address

192.168.1.25

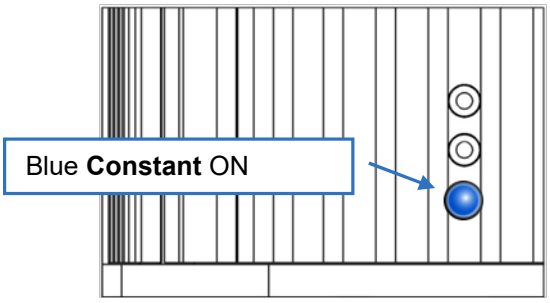
The Inverter **Status** page should then be displayed.



☞	**Inverter Web User Interface** Having connected your mobile device to the Inverter, your Browser can then be used to navigate the Inverter User Interface menus and functions. This includes monitoring Inverter operation and accessing setup and configuration pages.

LED Status when in Standalone Mode

The blue LED on the Eclipse Inverter will be **constant** (ON) when the Inverter WiFi is in Standalone Mode. When the inverter WiFi is sending or receiving data the blue LED will flicker irregularly.



Status	
Time Exporting	00:00
Inverter	Solar Generating
PV Panel	Solar available
WiFi network	**Eclipse Inverter**

The Inverter will remain in Standalone Mode if it has not been set up for a home network connection.

The Inverter will remain in Standalone Mode even when a connected mobile device goes out of range of the Inverter. A mobile device returning to the Inverter WiFi connection range will reconnect.

If the Inverter has been previously configured for a home WiFi network it will automatically reconnect after 5 minutes in Standalone Mode.

Connecting to a Home WiFi Network

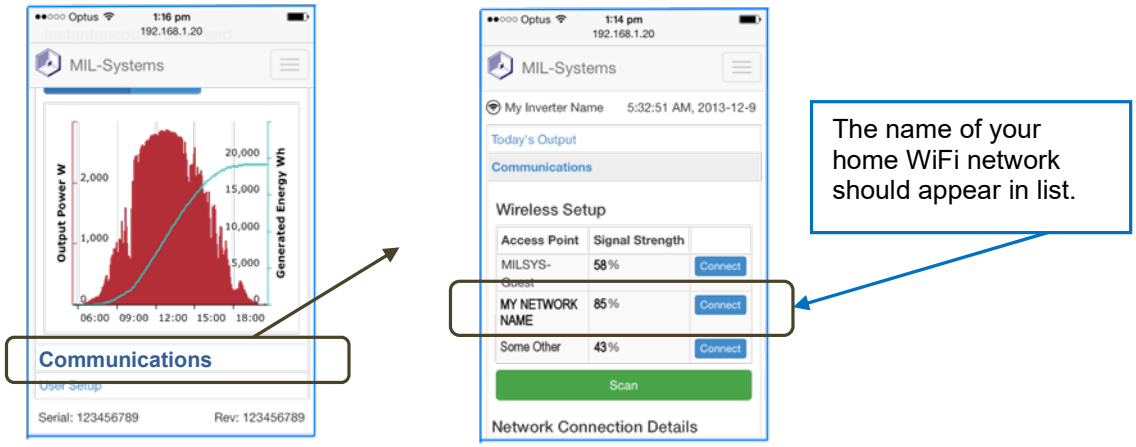
This section explains how to connect the Inverter with a home WiFi network via a wireless access point (WAP).

Start the Inverter from AC OFF and Solar PV DC OFF, turn AC ON so that the Inverter starts in Standalone Mode for 5 minutes. The DC isolators can be OFF or ON.

Every time the Inverter starts in Standalone Mode it scans once for nearby WiFi networks.

Connect a smart phone or other device to the Inverter's Standalone WiFi. Once the WiFi is connected the device can browse to the Inverter User Interface and go to the **Status** page.

On the **Status** page, locate and select the "**Communications**" tab (at the bottom).
On the **Communications** page, select SCAN to view the results of the scan of nearby WiFi networks that the Inverter did when it turned on in Standalone Mode. Selecting SCAN again will not cause the inverter to scan again for nearby networks.



☞	**WiFi frequency & Channel selection** The Eclipse will only scan and connect to a WiFi network on the 2.4 GHz frequency, channels 1 to 11. If you are unable to see your home WiFi name in the scan results, refer to your home WiFi user manual for guidance on checking and altering the configuration so it transmits on 2.4 GHz and on channel 1 to 11.

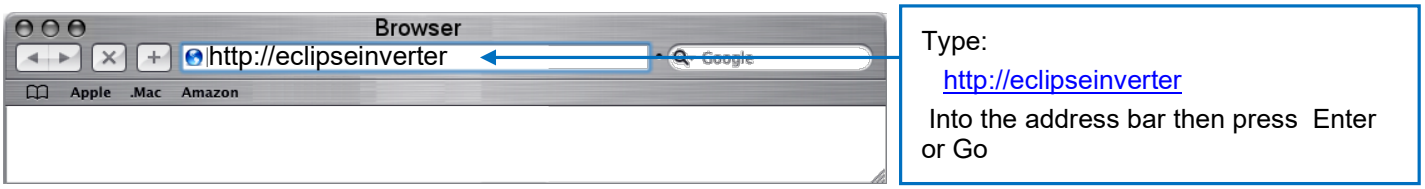
Select **Connect** beside your WiFi network name. If the network is passphrase protected you will be required to enter in the network passphrase.

Follow the instructions displayed on your device for completing the home WiFi network connection.

Accessing the Inverter via your Network

Use any browser such as Internet Explorer, Safari or Chrome on a PC or laptop connected to your network to access the home page of the Inverter.

The Eclipse Inverter home Status page should now be displayed in your browser.



Finding the Inverter on your Network with Fing

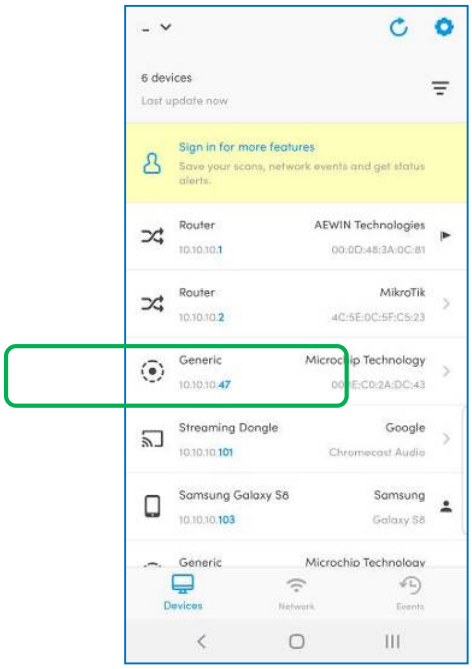
If the address **eclipseinverter** does not work, then you may have to enter the specific IP address for the Inverter into the browser. Eg: http:\192.xxx.x.xxx. The IP address for the Inverter is assigned by your home network router. To find this address download 'Fing' onto your smart phone or mobile device (available on android and apple) using the QR code.

Download Fing

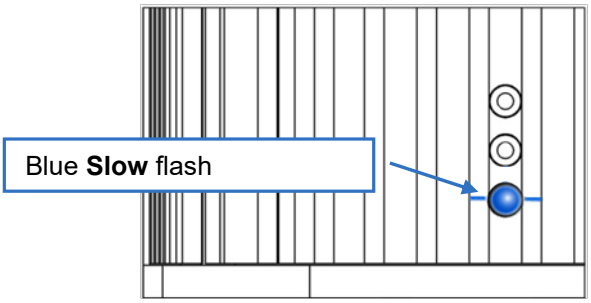
Use Fing to find your Inverter on the home network

Open the Fing app with your smart phone connected to the same network that the Inverter is connected to. Fing will automatically scan the network and identify all devices connected to it and their IP addresses. The Eclipse Inverter will be listed as 'Generic Microchip'. Enter the IP address next to this item into your web browser, this will redirect you to the Inverter's User Interface. Record this address for future reference.

The Inverter IP address may change if the home network router is re-started after an AC power failure.



LED Status when Network is connected



Status	
Time Exporting	00:00
Inverter	Grid Connected
PV Panel	Solar available
WiFi network	***My Network Name***

When the inverter WiFi is sending or receiving data the blue LED will flicker irregularly.

Changes to your Network or WiFi router

If your network wireless access point router is reset or changes the network name or passphrase, then the network connection may have to be set up again in the Inverter. This must be done with the Inverter in Standalone Mode. Refer to Connecting to a Home WiFi Network on page 32 for instructions and repeat the process for the changed network.

The Inverter will continuously attempt to reconnect with the configured home WiFi network after a disconnection.

Updating Inverter Firmware

In the event of improvements and new features the Inverter firmware can be updated wirelessly or **over the air**.
Access to this feature is limited to Installers only.

Over the Air

The User Interface software can be upgraded over the WiFi connection.
Do not disassemble or open the Inverter. Any attempt to do so will void all warranty and represent a serious safety risk.

Preparation

Update Device

The device to be used to update the Inverter must have WiFi and an operating system where it is possible to download a file and store it in a directory location.

E.G. Laptops, network connected PC's, some tablets.
Most mobile phones are NOT suitable.

Save UI onto upload device

Save the new version of the User Interface software onto the update device.
The UI is a single file of the form:

M16_fw_update_v1-32.ota

It will be recognisable by a **.OTA** extension at the end of the file name.

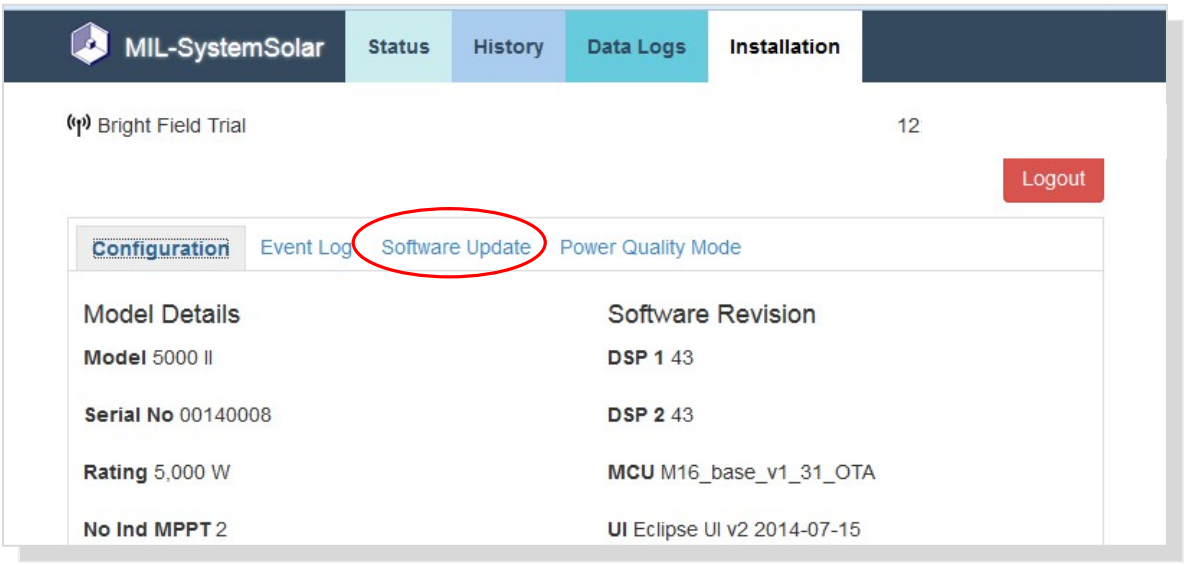
Update Method

⚠	**CAUTION – Turn OFF and isolate the PV inputs before starting** Stop the Inverter by turning OFF the AC isolator first, then turn OFF the DC isolators. Wait until the LED's are OFF then turn ON the AC isolator. Only the AC should be ON during this process.

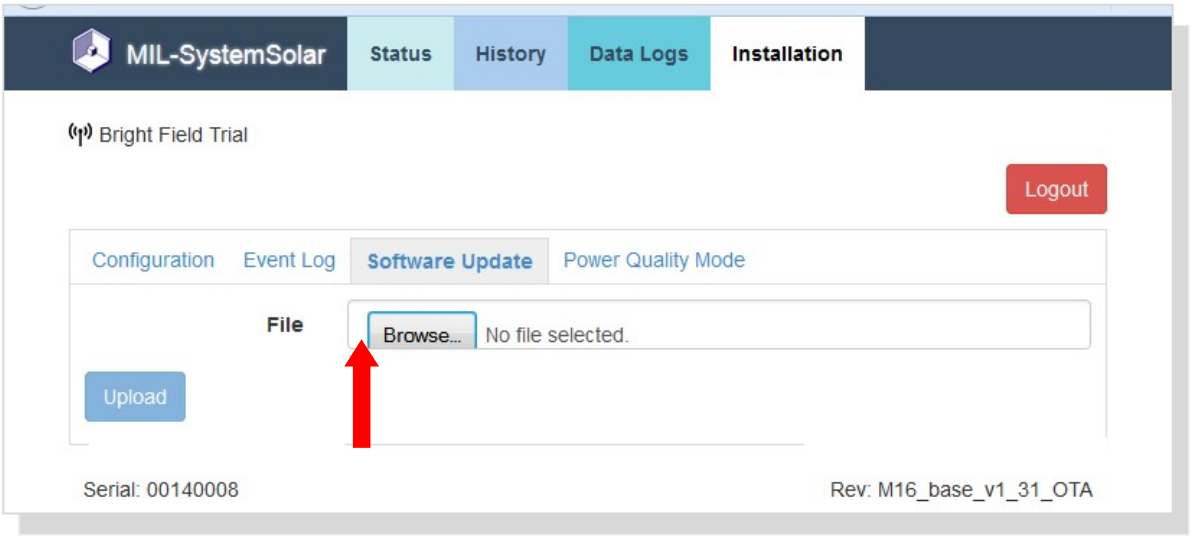
Connect the update device to the Inverter WiFi in Standalone Mode.

Using the update device browser access the Inverter **Installation** page using your Installation user name and password.

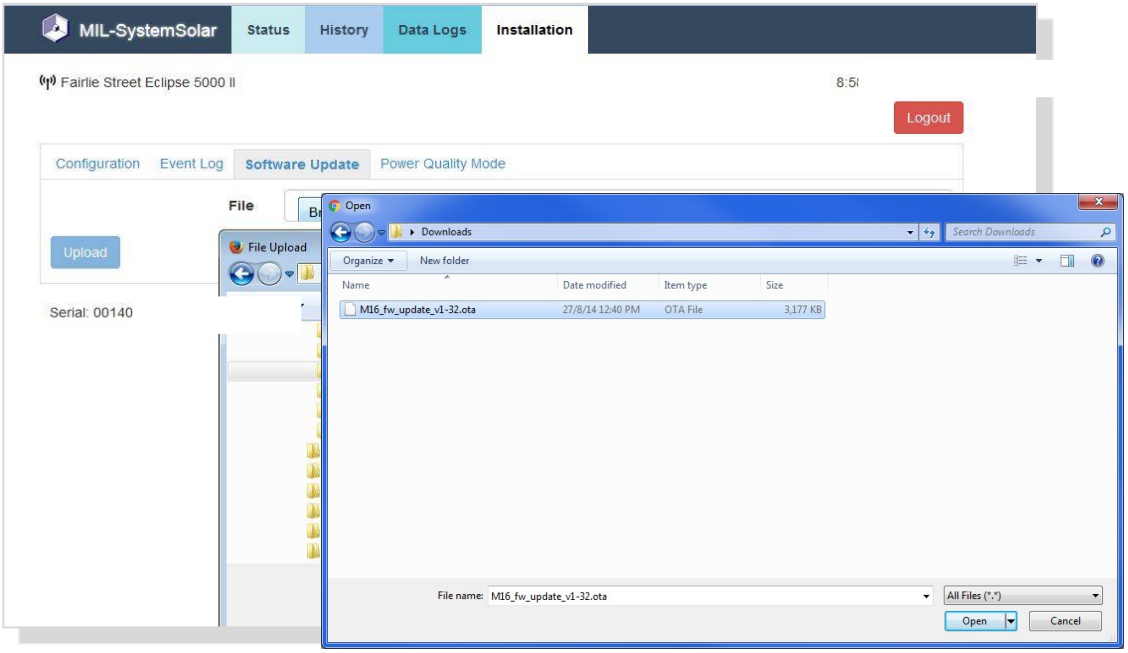
Select the **Software Update** tab.



Select the **Browse** button.
This will allow you to navigate on your update device to where the software update file is saved.

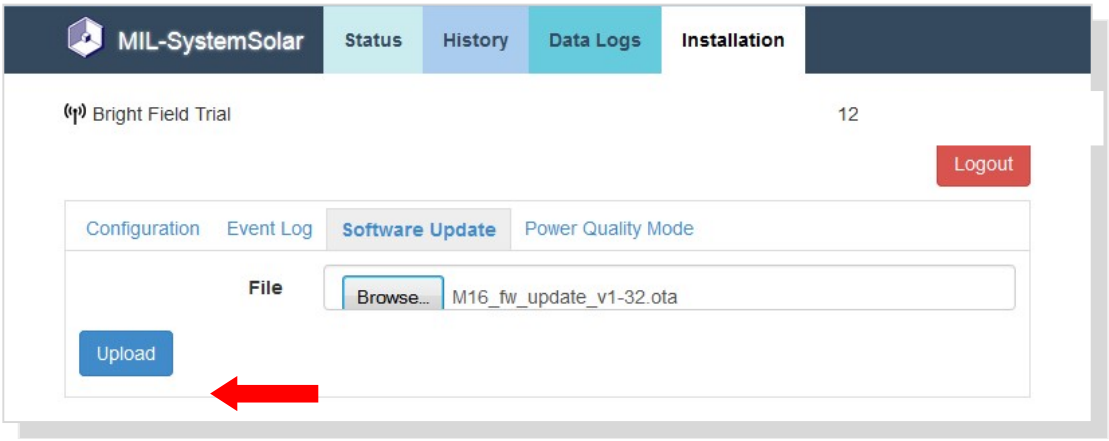


Find the new User Interface software OTA File and select it. [Open]

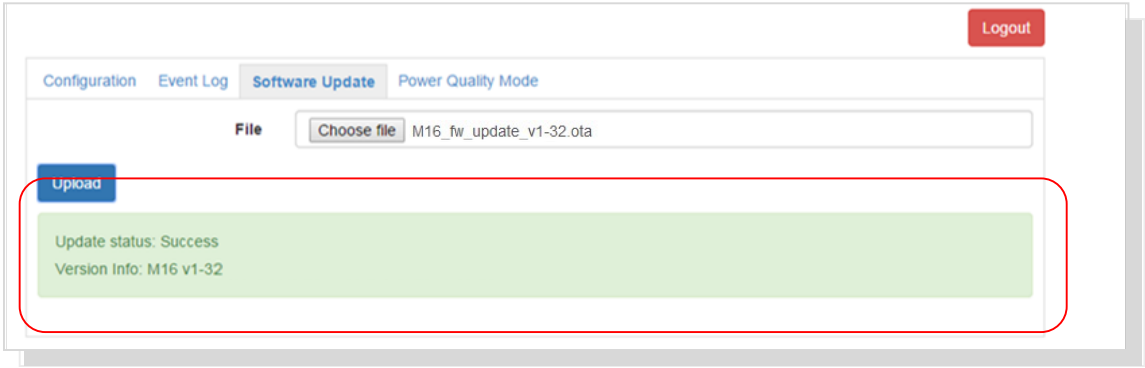


Select the OTA file, the Inverter will display the name in the **File** window.

Select the **Upload** button to initiate the software update.



The User Interface will be updated when the transfer to the Inverter is complete. This takes about 60 seconds.



When the update statue is **Success** the Inverter will automatically restart and finish the software update. This will take about 40-80 seconds; do **not** turn off power to the Inverter during this time as that may corrupt the software. Wait for the Inverter to return to Standalone Mode and for its WiFi to return. The Inverter will automatically change to network mode after 5 minutes and connect to the home WiFi network.

Having successfully restarted, the Inverter will go through the AC ON initialising sequence.
When the green LED **slow** flashes the DC isolators can be turned back ON and the Inverter will continue its start sequence.

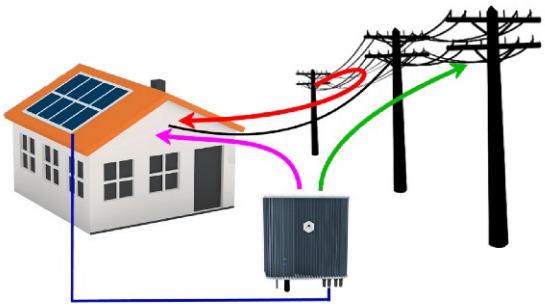
MY POWER

The MIL-Solar Eclipse Inverter has an optional feature that enables the Inverter to monitor the power usage of the installation. This feature shows power usage and power export/import in real time through the Inverter's User Interface, enabling the user to better manage their power.

For the MyPower feature, the MIL-Solar Power Meter must be installed in the main switchboard which is connected to the AC Mains Grid.

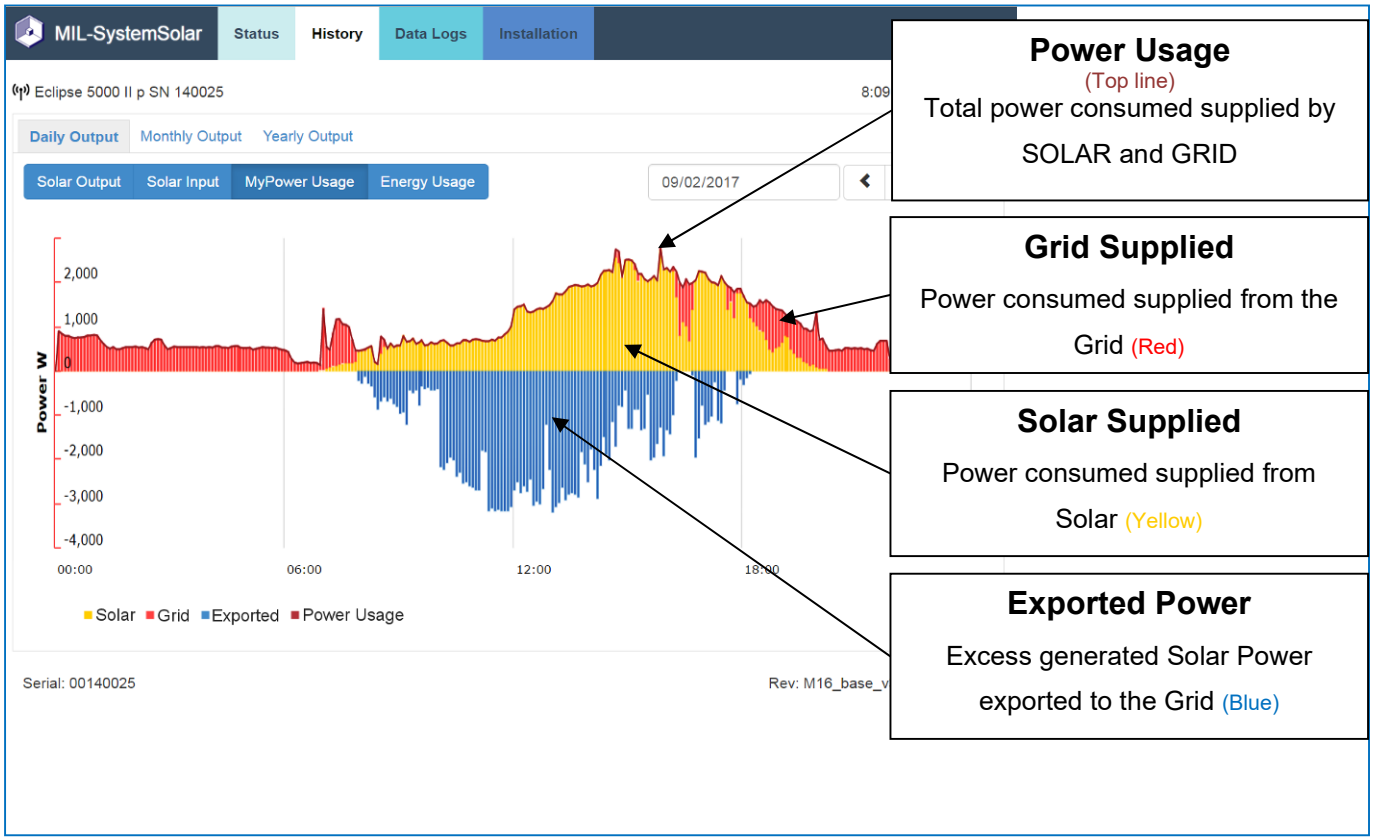
The Power Meter can be either single phase or 3 phase depending on the installation's Grid supply.

Only Installers or MIL-Solar are authorised to enable and configure the MyPower feature.



MyPower Display

The User Interface displays the MyPower features showing the user the generated, exported and imported power in a simple and easy to understand chart.

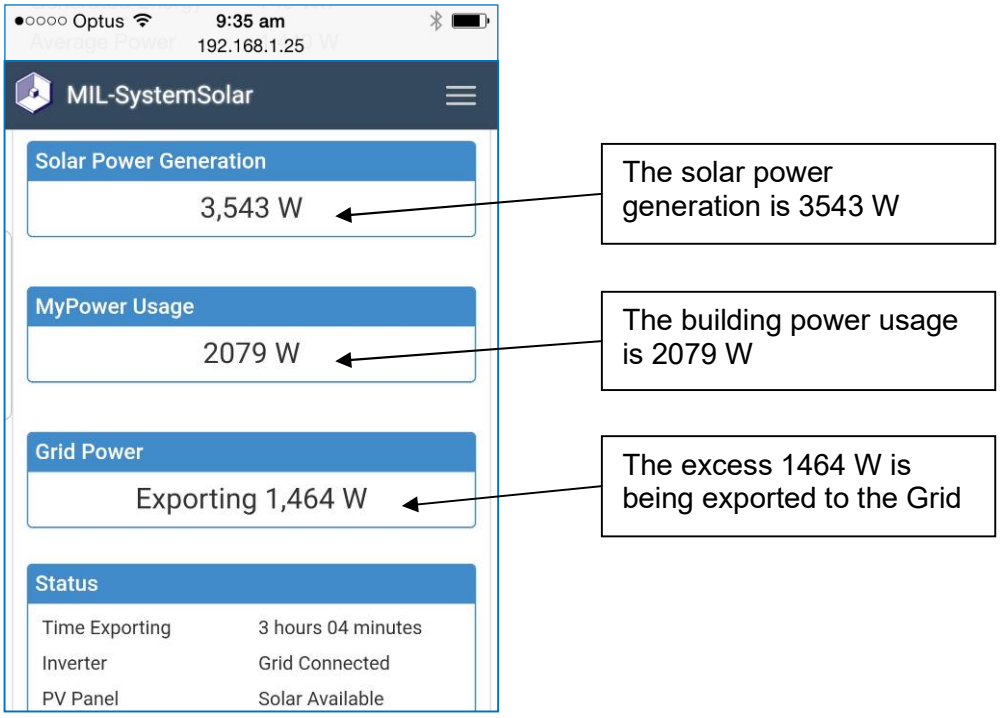


Typical daily usage chart showing Solar and Grid supplied power and the total power consumed by the home.

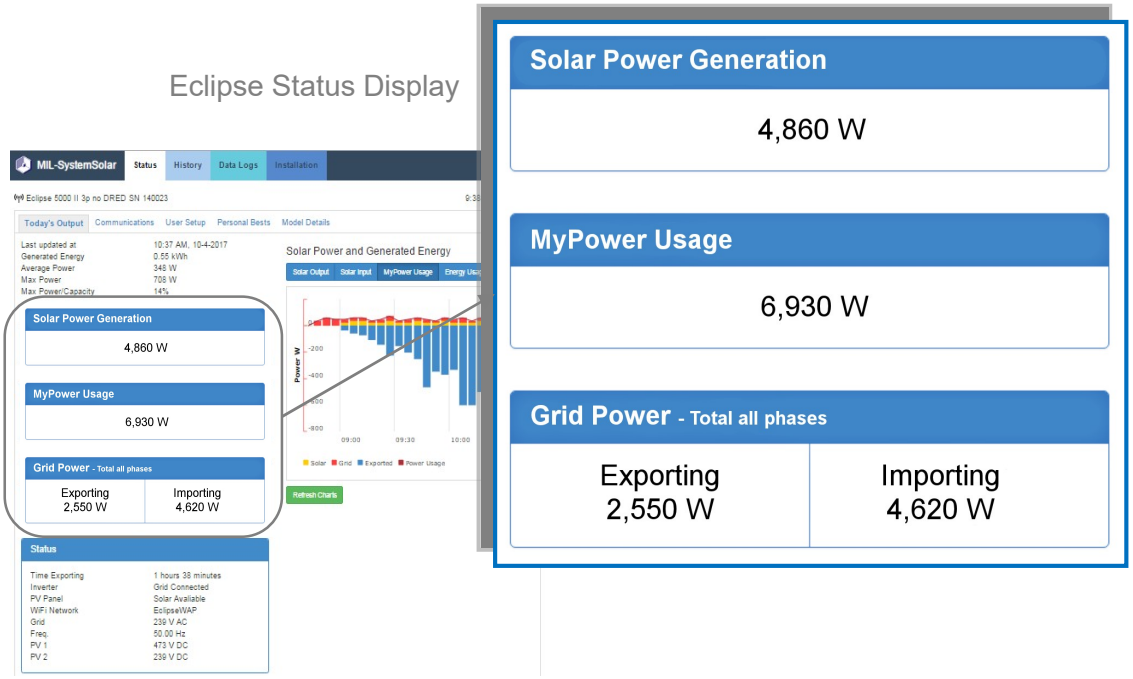
Updated Status Page

Eclipse Inverters with MyPower feature have an additional area on the Status display page that shows the net power in/out of the grid for the home installation.

Single Phase Status Page Example



3 Phase Status Page Example



☞	**My Power Usage** My Power Usage shows the instantaneous net power being drawn from (Importing), or fed into the Grid (Exporting).

Configuring the Inverter for MyPower

☞	**Note** Eclipse Inverters ordered with the MyPower option are factory configured and no programming should be required.

These setup steps are only required if adding the functionality to an existing system or to check the current installation settings. Permission to change these settings is limited to Installers and MIL-Solar.

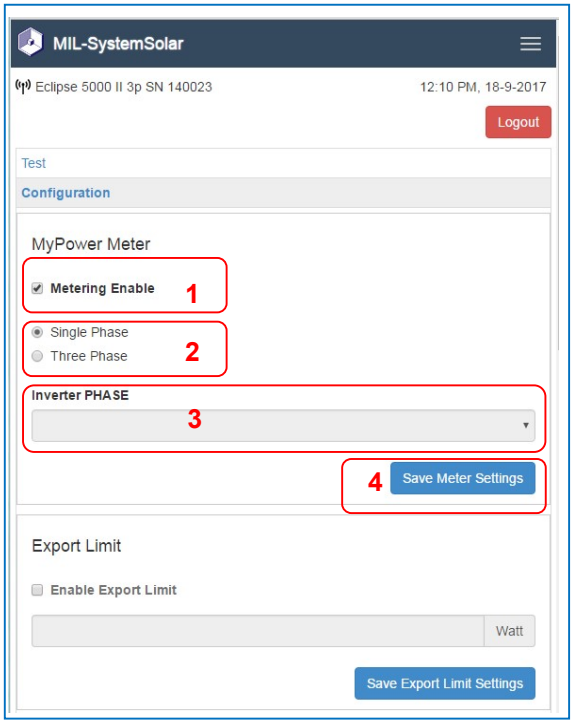
Connect to the Inverter

Connect your browser device to the Inverter User Interface.

Access the **Installation** page using your Installer Name & Password.

Select the **[Configuration]** tab.

Verify/Enable the MyPower option



1. **Metering Enable**

   Ensure this option is Ticked

2. **Meter Type**

   Select the matching number of phases for your installation

3. **Phase** (3 phase meters **only**)

   If using a 3 phase meter select the phase that the Inverter is connected to. See Power Meter Wiring on page 20 for assistance with identifying which phase the Inverter is installed on.

Phase	Line	Cable Colour
1	L1	Red
2	L2	White
3	L3	Blue

*As per AS/NZS 3000:2000

4. **Save the Settings**

   Make sure that you save the new selections

☞	**Phone Keypad Interference** The pop up keypad on devices like iPhones may need to be minimised/closed to view and access to this button.

5. **Re-start the Inverter**

   Re-start the Inverter by turning OFF the AC isolator first, and then turn OFF the DC isolators. When the status LEDs are OFF, then turn ON the AC and DC isolators.

   If the Inverter is not re-started the MyPower display will show incorrect values.

Verify

Having successfully configured and re-started the Inverter, the Status Page will now include an additional page showing the current MyPower information.

Export Limit Operation

The Export Limit feature limits the amount of generated solar power fed into the Grid from the home, as may be required by the power distribution company. This does not put a limit on the power generation of the Inverter. The Inverter will prioritise providing power to the site, with any excess power exported to the grid capped at the export limit amount. In some instances, it is a condition of the installation approval given by the Network Distribution Company that the Inverter is capable of limiting power exported to the Grid to a defined maximum.

☞	**MyPower Required for Export Limit Operation** The MyPower meter **must** be installed for use of the Export Limit feature.

Configuring for Export Limited operation

This setup is only required in the special case where the site installation approval requires the Inverter to have Export Limited constraints.

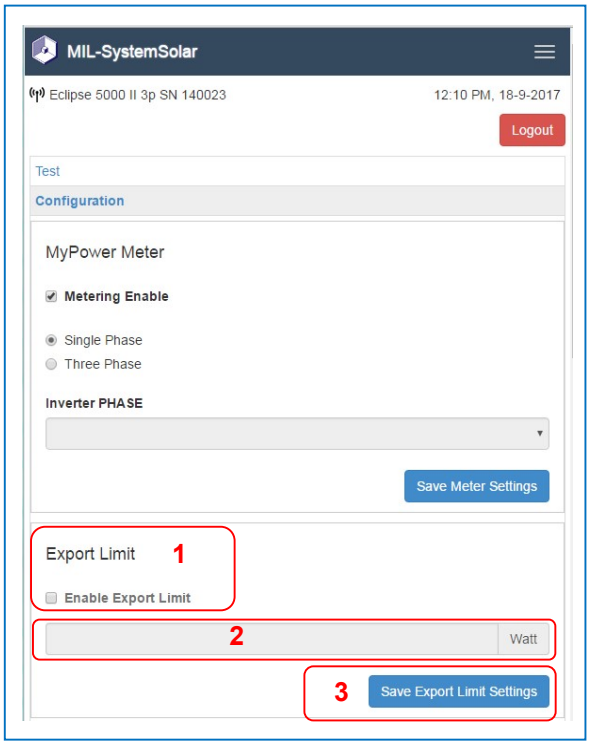
Only Installers or MIL-Solar are authorised to enable and configure the Export Limit feature.

Connect to the Inverter

Connect your browser device to the Inverter User Interface.

Access the **Installation** page using your Installer Name & Password.

Select the **[Configuration]** tab.



Configure the Export Limit parameters

1. **Enable Export Limit**

   Ensure this option is Ticked

2. **Set Export Limit**

   Enter the Export Power Limit required for the installation approval. The unit is Watt.

3. **Save the Settings**

   Make sure that you save the new data limits and settings entered.

.

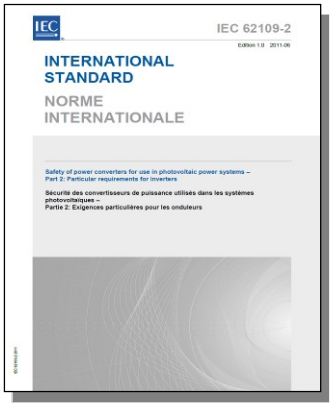
☞	**Phone Keypad Interference** The pop up keypad on devices like iPhones may need to be minimised/closed to view and access to this button.
☞	**Inverter restart** The Inverter will automatically restart for the new Export Limit settings to take effect.

FAULT ALARM

From the 10th July, 2015, all Inverters sold and installed in Australia must be certified as compliant to the electrical safety standard IEC 62109 parts 1 and 2.

A feature of this new Safety Standard is the requirement for the User to be alerted by an Alarm activated under certain wiring and fault conditions as detected by the Inverter.

This manual details how faults are indicated on the Eclipse Inverter and how to connect to an optional external Alarm.


IEC 62109-2

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Safety of power converters for use in photovoltaic power systems – Part 2: Particular requirements for inverters

Sécurité des convertisseurs de puissance utilisés dans les systèmes photovoltaïques – Partie 2: Exigences particulières pour les onduleurs

IEC 62109 Alarm Requirement

Extract from the standard

13.9 Fault indication

Where *this Standard* requires the inverter to indicate a fault, both of the following shall be provided:

a) a visible or audible indication, integral to the inverter, and detectable from outside the inverter, and

b) an electrical or electronic indication that can be remotely accessed and used.

The installation instructions shall include information regarding how to properly make connections (where applicable) and use the electrical or electronic means in b) above, in accordance with 5.3.2.10.

NOTE The requirement in b) is intended to allow a variety of techniques such as provision of a signal using relay contacts, an open-collector output, a message sent on a network communication system (for example wired or wireless Ethernet), etc. The intent is that the fault indication will be received by the person responsible for the system, when that person is located in a different location than the PV system.

Eclipse Fault Indication

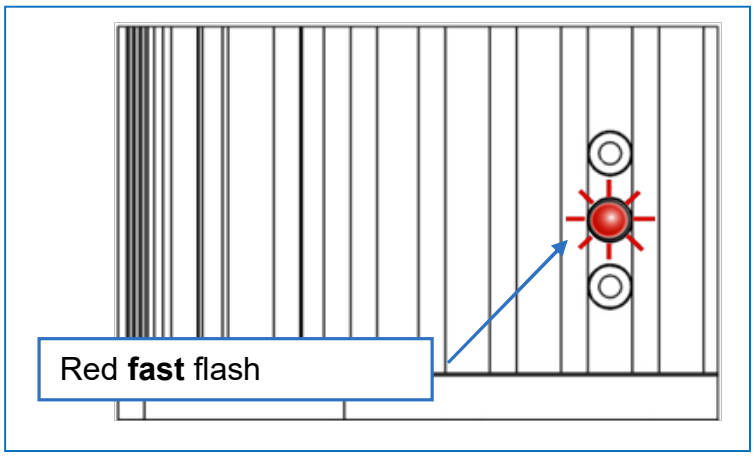
Eclipse Inverters provide four forms of fault indication:

1. Visible at the Inverter. **Fast** flashing red LED fault indicator.
2. Red flashing Alarm warning message on the User Interface on the display device connected to the Inverter WiFi network.
3. Alarm email message to MIL-Solar or Installer
4. Alarm relay contact output for connection of external alarm indicator (optional).

Visible Fault indication at Inverter

All faults required to be indicated as per the standard are displayed at the Inverter by the red LED **fast** flash.

For details on the types of faults indicated and how they are cleared, refer to the section **Alarm Conditions Asserted by the Eclipse Inverter** on page 43.



Visible Fault Indication Display

All faults required to be indicated as per the standard are displayed on all network connected display devices as shown.

Email Alarm Message

All faults required to be indicated as per the standard are displayed by an Alarm email message to MIL-Solar or Installer containing the Inverters unique serial number.

External Alarm

All faults required to be indicated as per the standard can be displayed by use of the Inverter external alarm relay contact output. This is an optional Alarm only, See section External Alarm Installation on page 17 for installation details. The external alarm contacts can be used to turn on:

- Audible Alarms
- Visible Alarms

Alarm Conditions Asserted by the Eclipse Inverter

The following table details the types of Alarms as required by IEC 62109, and under what conditions the Alarm is asserted. The table also details the conditions under which the Alarm will be cleared.

Inverter Condition	Alarm Tested and Asserted	Cleared
Disconnection device. The isolation provided by the automatic disconnection relay shall be automatically checked before the Inverter starts operation.	Tested every time the Inverter attempts to connect to the Grid. Alarm asserted if fault, Inverter operation interrupted until next day.	Cleared before starting next day.
DC insulation resistance from the Inverter PV inputs to earth.	Tested by the Inverter before starting operation. Alarm asserted if fault, Inverter operation interrupted until re-test is passed or until next day.	The PV array insulation is re-tested every few minutes and the Alarm is cleared if the insulation test passes. Otherwise cleared before starting next day.
Residual current monitoring which operates whenever the Inverter is connected to the Grid with the automatic disconnection means closed.	a) Continuous residual current test. The Inverter shall disconnect within 0.3 s and assert the Alarm if the continuous residual current exceeds limits as defined in IEC62109. b) Sudden change in residual current test. The Inverter shall disconnect and assert the Alarm in accordance with the timing and limits as defined in IEC62109. If fault Inverter operation interrupted until next day.	Cleared before starting next day.
Residual Current monitoring Device (RCD) self-test failure.	A self test of the RCD is done prior to the Inverter attempting to connect to the Grid. If fault Inverter operation interrupted until next day.	Cleared before starting next day.

Next Day

These Alarms remain asserted even after solar generation ceases at night.

Next day when the Inverter has sufficient solar energy available to begin the start sequence the fault conditions are rechecked, and the Alarm is cleared if they pass.

Alarms can be cleared by turning the AC isolator OFF, then turning the DC isolator OFF, when all LEDs are OFF turn on the AC isolator ON, then turn DC isolator ON. Refer to section Power ON Sequence and Power OFF Sequence on page 23.

TROUBLESHOOTING

ELECTRICAL HAZARD

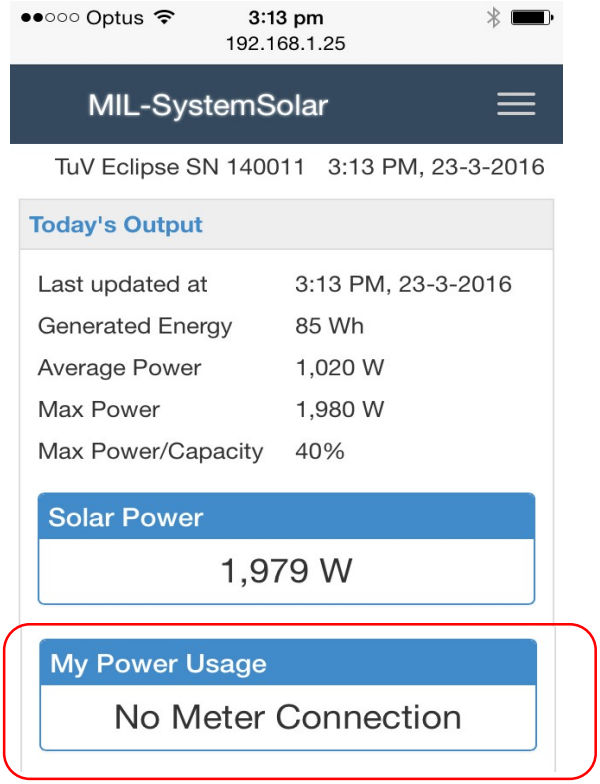
Do not attempt to open or access internal Inverter components this will automatically void the warranty.

Installation

Power Meter - “No Meter Connection”

The Eclipse Inverter continually monitors the communications to the Power Meter.

If it is unable to establish proper communications with the Power Meter then the Inverter will display an error message No Meter Connection as shown to the right.



Possible Causes

The Meter must have AC L and N power supplied to it for communications to be established. See section Power Meter Wiring on page 20.

- Ensure communications wiring to the power meter is properly connected to terminals.
- Ensure communications wiring is properly connected to terminals on the Inverter Data Connector.
- Ensure that the Data Connector is fully engaged with the Inverter connector.
- Ensure that the wiring connections follow the correct pin – pin assignment.

Re-start the Inverter after taking corrective actions, refer to section Power ON Sequence and Power OFF Sequence on page 23.

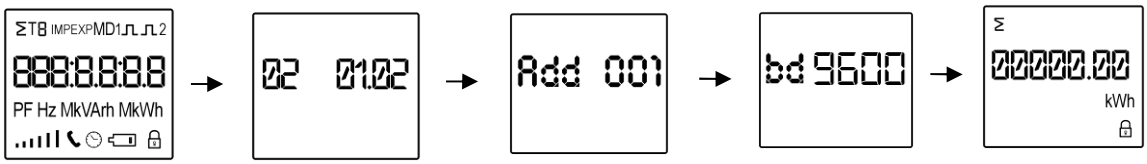
Inverter power limited

When the Inverter is operating and displaying this error message, the maximum power generated by the Inverter is capped at the Export Limit value set.

For some installations, this may be configured as zero.

Meter Communications Self Test

Whenever the meter is powered on, it runs through a self test and sequentially displays 5 parameter setup pages.



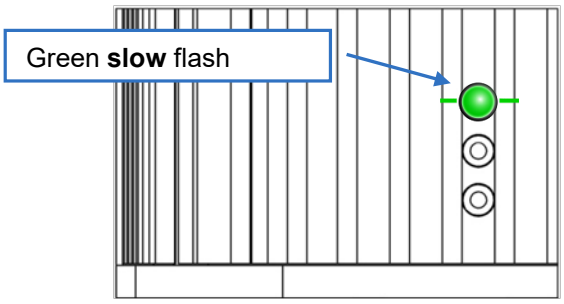
Ensure that Add = 001 and bd = 9600

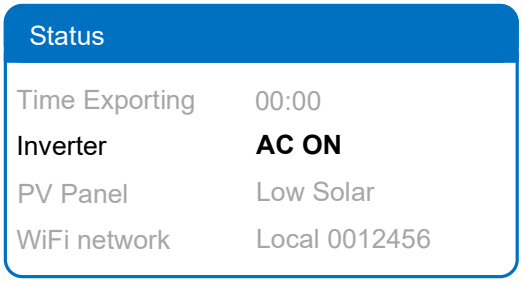
LED Status Indicator Alerts

Low or no PV Solar Input - NIGHT

The Eclipse Inverter continually monitors the solar input from the PV panels.
This status is displayed whenever there is insufficient solar energy for the Inverter to operate.

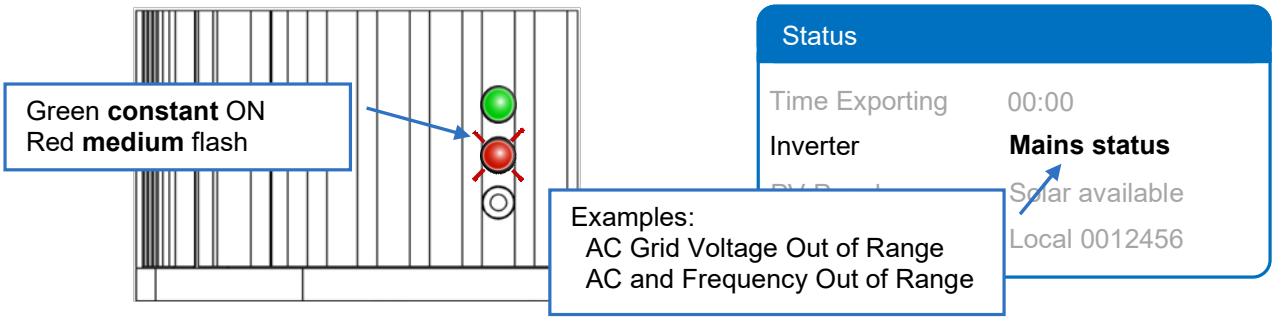
☞	**This is the normal status if there is no sun or low solar input.** This status will also be displayed if the solar panel DC isolators are turned OFF. Check the DC isolators and ensure they are all turned “ON”.





Grid Abnormal

The Eclipse Inverter continually monitors the AC Mains supply while it is operating.
If the AC Mains voltage is abnormally high or low or frequency out of range then the Inverter will pause operation, disconnect from the Grid and display this status.

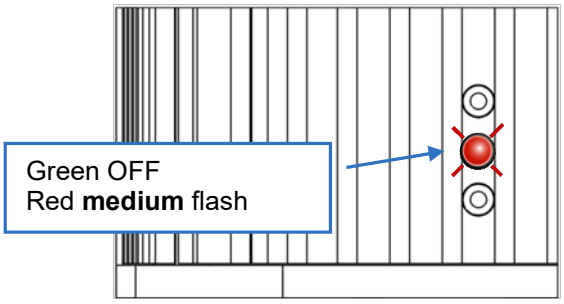


If you find this event is occurring regularly, contact your solar system supplier and have them monitor and review your mains conditions.

☞	**You do not need to do anything when Grid abnormal events are shown.** The Eclipse Inverter will automatically return to normal operation when the Grid is normal.

No AC Mains - Solar Power available

The Inverter is being powered by the PV panels. It has detected that there is no AC mains.



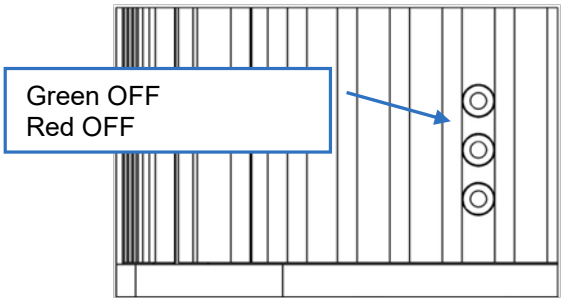
Status	
Time Exporting	00:00
Inverter	**AC OFF**
PV Panel	**Solar Available**
WiFi network	Local 0012456

☞	**AC mains OFF** Check AC isolator is ON and the Inverter circuit breaker is ON in the Switchboard.

No AC Mains and No Solar Panel Power

The Inverter will operate and display status when either AC Mains power is available **OR** there is Solar PV power available.

If there is no LED display, then there must be no power available from either the AC Mains or Solar PV DC.



Status
Time Exporting
Inverter
PV Panel
WiFi network

Status Display

The browser Status Display can not be updated by the Inverter when there is no power.

It will not show current information.

☞	**No Power supply** Check AC and DC isolators and the Inverter circuit breaker is ON in the Switchboard.

LED Legend

See Eclipse LED Status Indicator Tables on page 27 for all LED configurations

	OFF		**Slow Rate** 1 Flash per 4 Seconds		**Medium Rate** 1 Flash per Second		**Fast Rate** 4 Flashes per Second		**ON** Constant

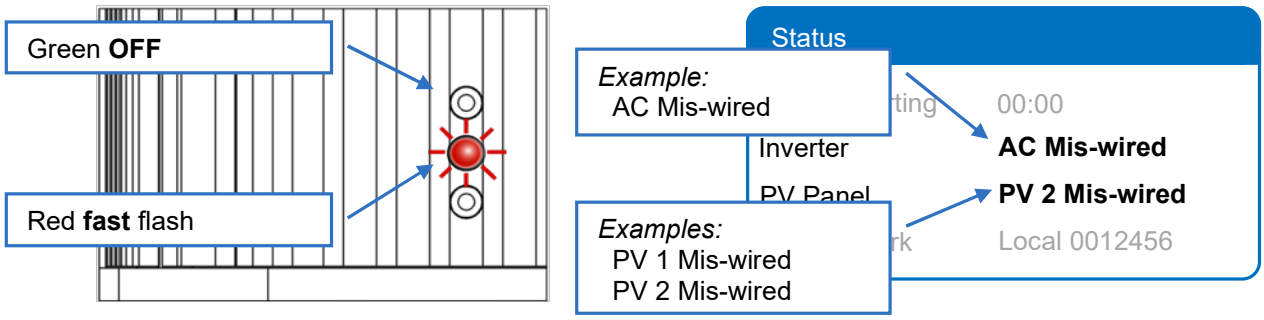
Alarms

AC or DC Wiring Fault

The Eclipse Inverter has determined that there is a fault in the AC or DC connections to the Inverter. Such faults will be reported when:

- The PV Solar Array DC connection to the Inverter is incorrectly wired.
- The AC Mains or Earthing is incorrectly wired.

This is an installation wiring fault.
The Eclipse Inverter will not attempt to start under such a fault condition.



DO NOT OPERATE THE INVERTER
The Installer or other qualified electrical service person must correct the wiring before the inverter will operate.

A mis-wired fault cannot be corrected by the user.

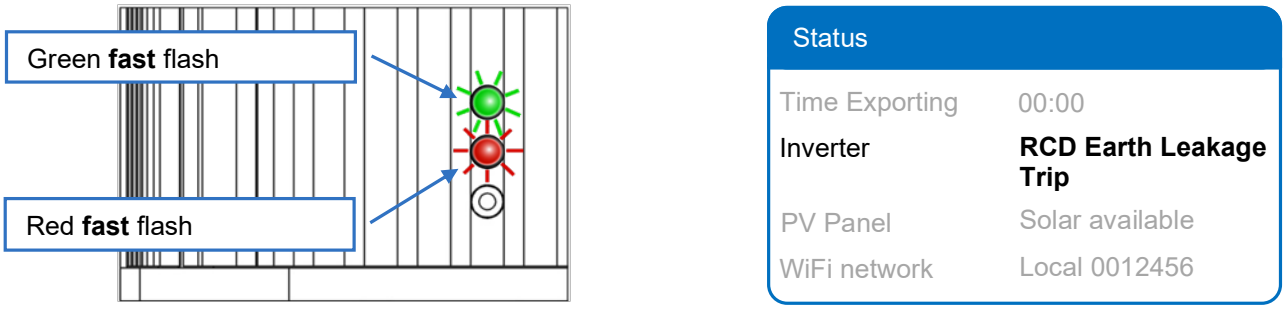
RCD Earth Leakage Trip

The Eclipse Inverter does RCD earth leakage tests to detect potentially serious earth faults. Such faults may occur in:

- The photovoltaic panels or their wiring and isolators.
- The AC and earth wiring to the Inverter.

If the Inverter detects an earth fault the operation is interrupted and the **ALARM** is asserted.

The Inverter power generation remains off until the start of next day when the RCD test is done again.



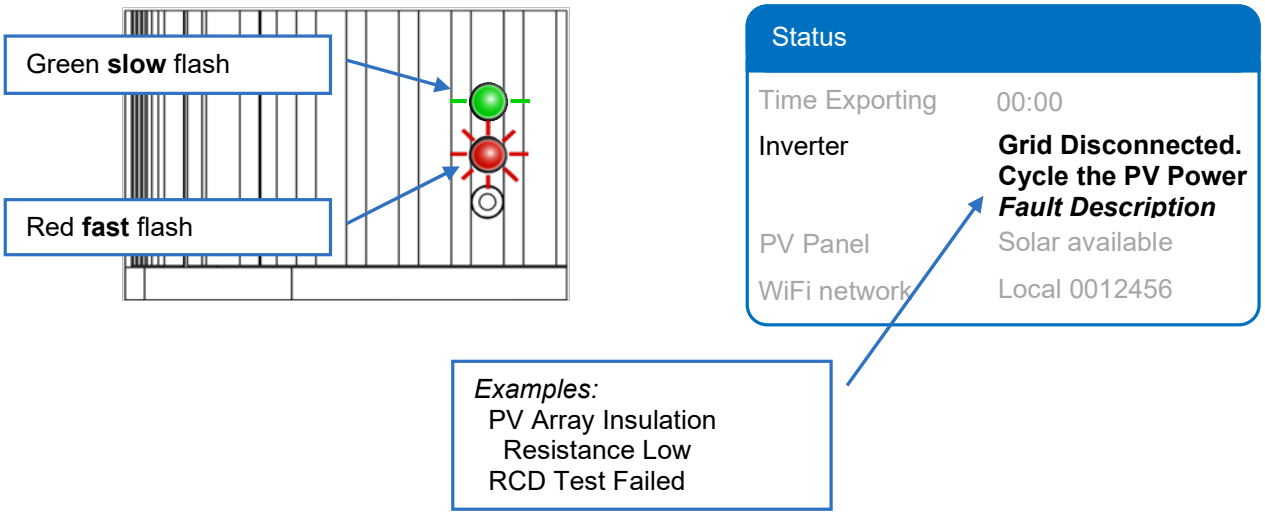
Next day re-test
The Inverter will retest the earth leakage when Solar PV Power is available the next day.

Fault does not clear
If such a fault indication persists, including when the inverter is started from AC OFF and DC OFF, then there may be an issue with your solar system installation or the Inverter itself.
Contact your installation company for an electrician to investigate the solar system.

Inverter Self Tests and Solar PV System Insulation Test

At the start of each day the Eclipse Inverter performs self tests and tests the Solar PV system insulation resistance to earth.
If the Inverter fails a self test or detects that the Solar PV Array insulation resistance is too low it will not connect to the Grid.

The **ALARM** indication will be asserted.



If the Eclipse Inverter regularly fails these tests then contact your solar system supplier and have them monitor and review your Solar PV panels and wiring.

☞	**Automatic Reconnection** The Inverter will normally continue to monitor the conditions and automatically reconnect when it returns to normal. **This may not occur until the next day in some circumstances.**

⚠	**Fault does not clear** If such a fault indication persists, including when the inverter is started from AC OFF and DC OFF, then there may be an issue with your solar system installation or the Inverter itself. Contact your installation company for a service technician to inspect.

LED Legend

See Eclipse LED Status Indicator Tables on page 27 for all LED configurations

	OFF		**Slow Rate** 1 Flash per 4 Seconds		**Medium Rate** 1 Flash per Second		**Fast Rate** 4 Flashes per Second		**ON** Constant

MAINTENANCE

General routine

The MIL-Solar Eclipse Inverter is designed to require very little maintenance.

It is recommended to routinely:

1. Check that nothing has been placed on the top or front surface of the Inverter, this could reduce the cooling ventilation.

2. Check that nothing has changed in the installation surrounds that could potentially impact ventilation to the Inverter.

3. Check there is no build up in the cooling fins that could reduce the convection air flow. This will cause the Inverter to run at elevated temperatures and reduce its generation performance.

Build up from nesting insects and vegetation

The Eclipse Inverter has been designed with forward facing cooling fins so that any build up in the fins that may occur from nesting insects such as mud wasps, spiders or birds can be easily removed.

1. Ensure that adequate personal protection is used to prevent any risks from the insects and/or their bites or stings.

2. Turn off the Inverter by turning OFF the AC isolator first and then the DC isolators.

3. Scrape out any build up from the cooling fins using a thin, stiff non metallic tool such as an old toothbrush.

   Give special attention and care to not damaging or scratching the three LED status indicators. If in doubt, do not clean in this channel.

4. Vacuum out dislodged debris wherever possible.

5. Remove all tools.

6. Start the Inverter by turning ON the AC isolator followed by turning ON the DC isolators.

⚠	**Chemical cleaners** Do not use chemical cleaners or solvents on the Eclipse Inverter or the related solar system wiring or any Isolator switches.
⚠	**Pressure Spray** Do not water pressure spray or water hose the inverter or surrounding wiring and isolators.

REPLACEMENT PARTS

Spare Part No.	Name	Description
1637	Mounting Screw	M5 x 16 Stainless steel screw
5390	Mounting Bracket	5120 wall mounting bracket
6049	WiFi Antenna	WiFi antenna to enable to use of the WiFi interface
6330	Single Phase Power Meter	Single phase MyPower enabled 100 A power meter
6358	3 Phase Power Meter	3 phase MyPower enabled 100 A power meter
6797	PV Connectors (Pair)	Male and Female pair of MC4 PV connectors
6800	Data Connector	7 Pin data connector. Connects data connections of DRED, Alarm and Power Meter to the Inverter
6850	AC Connector	AC connector, Weiland RST25i3S or equivalent approved according to IEC 61535 for use with 4.0 to 6.0 mm2 cable with circular external sheath, 14 to 18 mm OD.

INVERTER SPECIFICATIONS

Input (DC)	
Maximum input voltage	750 V
MPPT operating range	90 V ... 600 V
Number of independent MPPT channels	2
Maximum operating input current	12 A / 12 A
Isc PV - Maximum input short circuit current.	15 A / 15 A
Output (AC)	
Rated power (Maximum at Unity power factor)	5000 W
Rated power conditions	230 V, 50 Hz
Maximum AC VA (250V AC)	5000 VA
Nominal AC voltage	230 V
Maximum AC withstand voltage	300 V
Nominal AC frequency / range	50 Hz ± 5 Hz
Max. output current	21.7 A
Power factor at rated power	1
Reactive Power Control	YES
Variable Power factor - leading/lagging	±0.8
AC mains connection phases	1 Φ
Efficiency	
Maximum efficiency / European efficiency	97 % / 96.3 %
Protection systems	
PV panel fault – Array isolation	YES
Ground fault monitoring	YES
DC reverse polarity – PV panel miswired	YES
AC short-circuit current protection	YES
AC miswired	YES
'Safety switch' – Residual current monitoring	YES
Protection class (IEC 62103)	I
Overvoltage category (IEC 60664-1)	AC Output – III, Solar PV inputs - II
Environment	
Dimensions (H / W / D)	514 / 512 / 150 mm
Weight	24 kg
Operating temperature range	-25°C to +50°C
Relative humidity	4 % to 100 % (condensing)
Noise emission (typical)	25 dB(A)
Standby consumption (overnight)	1 W
Topology	Transformerless. Non galvanically isolated.
Cooling method	Convection
Degree of protection (AS/IEC 60529)	IP44
Altitude (maximum operating)	2000 m
Maximum relative humidity (non-condensing)	100 %
Installation location	Outdoor. Sheltered from direct sun and rain.
Standard DC connections	MC4
Standard AC connections	Weiland RST25i3S or equivalent IEC 61535
Features	
Display - Status / Information	LED / Browser
WiFi Ethernet interface	YES
Export Limit functionality (inc Power Meter)	Optional
Alarm output relay	YES
DRED control	DRM 0
Warranty	Standard 5 + 5 Year
Warranty - extended	Optional : 10 / 15 / 20 years
Standards and approvals	AS 4777.2(2015), ASNZS 3100, AS/NZS60950, IEC 62109.1 & .2, AS/NZS 61000.6.3, AS/IEC 60529
Legend	
YES	Included as standard feature on Eclipse model
Optional	Refer sales representative for configuration options

ECLIPSE INVERTER AUSTRALIAN WARRANTY

OVERVIEW

MIL-Solar offers two warranty levels for Your Eclipse Inverter. The purchase of an Eclipse Inverter includes the **Eclipse Standard 5 Year Warranty**. Alternatively, the **Eclipse Premium 10 Year Warranty** is available to buy at $450.00 (excluding GST) on the Date of Purchase.

The particular warranty provided with Your Eclipse Inverter is specified on Your Warranty Certificate issued on the Date of Purchase. The warranty is registered to Your Eclipse Inverter Serial Number.

Warranty is provided for Your Eclipse Inverter at its first Installation Site within Australia only. Warranty does not apply to Eclipse Inverters that have been removed and re-installed at a different location.

ECLIPSE STANDARD 5 YEAR WARRANTY

The Eclipse Standard 5 Year Warranty provides the following to the Customer at no cost:

(a) the repair at Our Factory in Melbourne, of an Eclipse Inverter that develops a Substantiated Fault within the Standard 5 Year Warranty Period. Warranty includes parts and labour to do the repairs;
(b) a replacement Eclipse Inverter, or equivalent inverter, if MIL-Solar elects to replace rather than repair an Eclipse Inverter that develops a Substantiated Fault within the Standard 5 Year Warranty Period. The replacement Eclipse Inverter may be an updated model or other inverter with equivalent power rating or payment of the market price for an equivalent inverter;
(c) the associated freight costs of repairing or replacing an Eclipse Inverter that develops a Substantiated Fault within the Standard 5 Year Warranty Period, using MIL-Solar's nominated freight company (up to a maximum of $200.00 per warranty claim);
(d) on site removal and re-installation labour by an approved Service Agent (up to a maximum of 3 hours per warranty claim); and
(e) any approved travel costs of the Service Agent (up to a maximum of 4 hours per warranty claim).

ECLIPSE PREMIUM 10 YEAR WARRANTY

The Eclipse Premium 10 Year Warranty is available to buy at $450.00 (excluding GST) on the Date of Purchase.

The Eclipse Premium 10 Year Warranty provides the following comprehensive cover to the Customer:

(a) the repair at Our Factory in Melbourne, of an Eclipse Inverter that develops a Substantiated Fault within the Premium 10 Year Warranty Period. Warranty includes parts and labour to do the repairs;
(b) a replacement Eclipse Inverter, or equivalent inverter, if MIL-Solar elects to replace rather than repair an Eclipse Inverter that develops a Substantiated Fault within the Premium 10 Year Warranty Period. The replacement Eclipse Inverter may be an updated model or other inverter with equivalent power rating or payment of the market price for an equivalent inverter;
(c) the associated freight costs of repairing or replacing an Eclipse Inverter that develops a Substantiated Fault within the Premium 10 Year Warranty Period, using MIL-Solar's nominated freight company (up to a maximum of $200.00 per warranty claim);
(d) on site removal and re-installation labour by an approved Service Agent (up to a maximum of 3 hours per warranty claim); and
(e) any approved travel costs of the Service Agent (up to a maximum of 4 hours per warranty claim).

Additional details about the MIL-Solar warranty and claims process are available at www.mil-solar.com.au .

CONTACT DETAILS FOR WARRANTY SUPPORT

Website: www.mil-solar.com.au
Phone: (03) 9325 3455
Email: info@mil-solar.com.au

Documentation

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