AS/NZS 4777.2:2020 Technical Information

SI6.0H-13/SI8.0H-13

Version 1.2 | 29/08/2023

Contents

1 Disclaimer

Every attempt has been made to make this document complete, accurate and up-to-date. Readers are cautioned, however, that changes to local regulations or product improvements may cause SMA Australia to make changes to this document without advance notice. SMA Australia shall not be responsible for any damages, including indirect, incidental or consequential damages, caused by reliance on the material presented, including, but not limited to, omissions, typographical errors, arithmetical errors or listing errors in the content material.

It is therefore recommended that you always check for the latest version prior to following the instructions in this document.

2 Scope

This document is intended to cover the following SMA models to achieve the function for "Grid Connect Inverter – Battery Only".

Inverter model
SI6.0H-13
SI8.0H-13

Table 1: *In scope inverters*

As of December 18th, 2021 all inverters installed in Australia must comply with one of the pre-set region setting sets described in AS/NZS 4777.2:2020.

1. Australia A
2. Australia B
3. Australia C

All three regions contain the default Power Quality, Volt-Watt, Volt-Var, Frequency/Voltage Response and grid protection settings. Should you require advice or changes to protection settings please reach out to the SMA technical support for assistance.

2.1 Relevant Documents

The documents in Section 2.1.1 and Section 2.1.2 must be read in conjunction with this document. Where the requirements of SMA's documentations are in addition of local standards and regulations, the additional requirements must be followed.

NOTE: AC, DC and earthing cables must be sized according to AS/NZS 3000 or the product's instruction manual, whichever is the greatest.

2.1.1 Local Standards and Regulations

1. AS/NZS 3000
2. AS/NZS 5139
3. AS/NZS 4777
4. Applicable local Service and Installation Rules

2.1.2 SMA Documents

The documents below can be found in"Downloads" section of SMA Australia Sunny Island webpage.

1. Sunny Island Datasheet
2. Sunny Island Operating Manual
3. Sunny Island Quick Reference Guide
4. SMA FLEXIBLE STORAGE SYSTEM - Increased self-consumption with SUNNY ISLAND 4.4M / 6.0H / 8.0H and SUNNY HOME MANAGER
5. SMA FLEXIBLE STORAGE SYSTEM with Battery-Backup Function - Battery-Backup Systems including Increased Self-Consumption with SUNNY ISLAND 4.4M / 6.0H / 8.0H and SUNNY HOME MANAGER
6. SMA SMART HOME - The System Solution for Greater Independence
7. SMA Energy System Home with Battery-Backup Function
8. Technical Information - Batteries in Sunny Island Systems - List of Approved Batteries

3 Product Ratings

Selected electrical ratings are extracted from SMA documents to clarify ratings that are applicable for Sunny Island when operating in on-grid mode. Always refer to either product datasheet or operating manual for the complete ratings.

Technical Data	SI6.0H-13	SI8.0H-13
Port AC-2 (Utility Grid as External Source)		
Rated AC voltage range (V)	172.5 to 264.5	
Permitted frequency range (Hz)	40 to 70	
Maximum AC input current (A)	50	
Maximum AC input power (W)	11500	
Maximum AC output current for increased self consumption (A)	20	26.1
Maximum apparent AC output power for increased self consumption (VA)	4600	6000
Battery DC Input		
Rated input voltage (V) / DC voltage range (V)	48 / 41 to 63	
Max battery charging current (A) / rated DC charging current (A) / DC discharging current (A)	110 / 90 / 103	140 / 115 / 136
*Temperature sensor for lead-acid batteries is not included in the scope of delivery, please contact SMA to order this part. *Port AC-1 does not have functionality in on-grid mode and shall not be connected to any external source/load when operating in on-grid mode		

Table 2 *Electrical Characteristics*

4 Connecting to the inverter

4.1 Required equipment

a. Laptop with WiFi and/or Ethernet port with a Web Browser eg. Chrome, Firefox, Edge.
    i. Internet access onsite is not required if Firmware is downloaded prior to site visit.

4.2 Connection

a. Via WiFi connection – refer to **4.2.1**
b. Via Ethernet – refer to **4.2.2**

SMA recommends Ethernet as the preferred method of connection as it is more stable and less susceptible to external interference.

4.2.1 Connecting via Wi-Fi

a. Search for the WLAN of the inverter.
   The name will follow the format **SMA [serial number]**.

b. Use the device specific **WPA2-PSK password**. The WPA2-PSK password can be found on the type label on the side of the inverter.

Image 1: *Example of WPA password*

c. Open a web browser and enter in the IP address **192.168.12.3**.

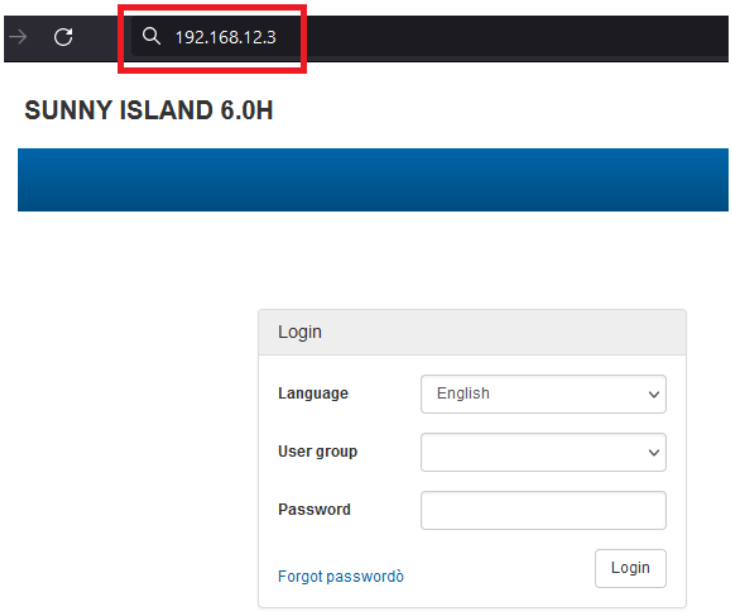

Image 2: *WiFi Login Menu*

4.2.2 Connecting via Ethernet

a. Connect your laptop to the inverters ethernet (COM ETH) port.

b. Open a web browser and enter in the IP address **169.254.12.3**.

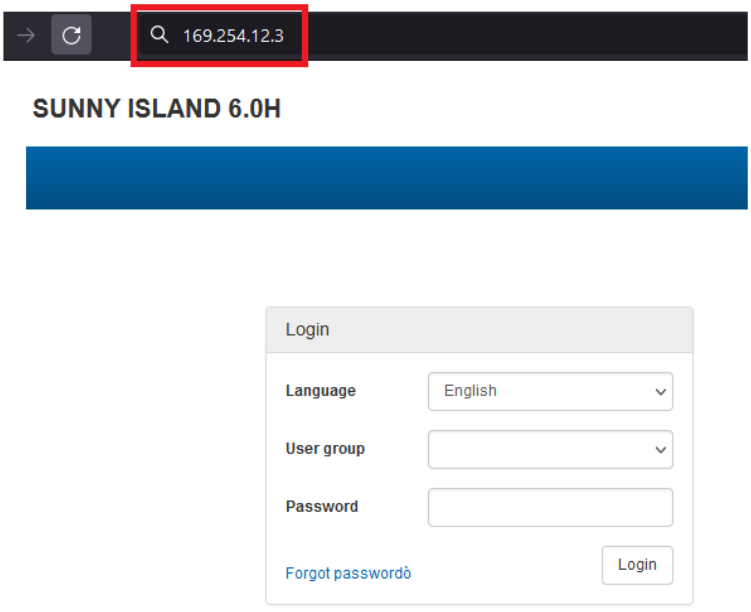

Image 3: *Direct Ethernet Login Menu*

5 Commissioning Inverter

Commissioning the inverter can be done by either:

a. Web browser on a laptop – Mac and Windows

DNSP	Country Standard
Ausgrid Ausnet Citipower Endeavour Energy Energex Ergon Essential Energy Evoenergy Jemena SA Power Networks Ausgrid PowerCor United Energy	[AU] AS/NZS 4777.2:2020 Generator Region A
Western Power	[AU] AS/NZS 4777.2:2020 Generator Region B
Horizon Power TasNetworks	[AU] AS/NZS 4777.2:2020 Generator Region C
New Zealand DNSPs	[AU] AS/NZS 4777.2:2020 Generator Region NZ

Table 3: *DNSP Country standard selection*

5.1 Via Web Browser

Please refer to section 4.2 for connection via Wi-Fi or Ethernet

1. Connect to the inverter and login as installer via the web browser.
2. Navigate to user settings icon as shown below and choose **start the installation assistant.**

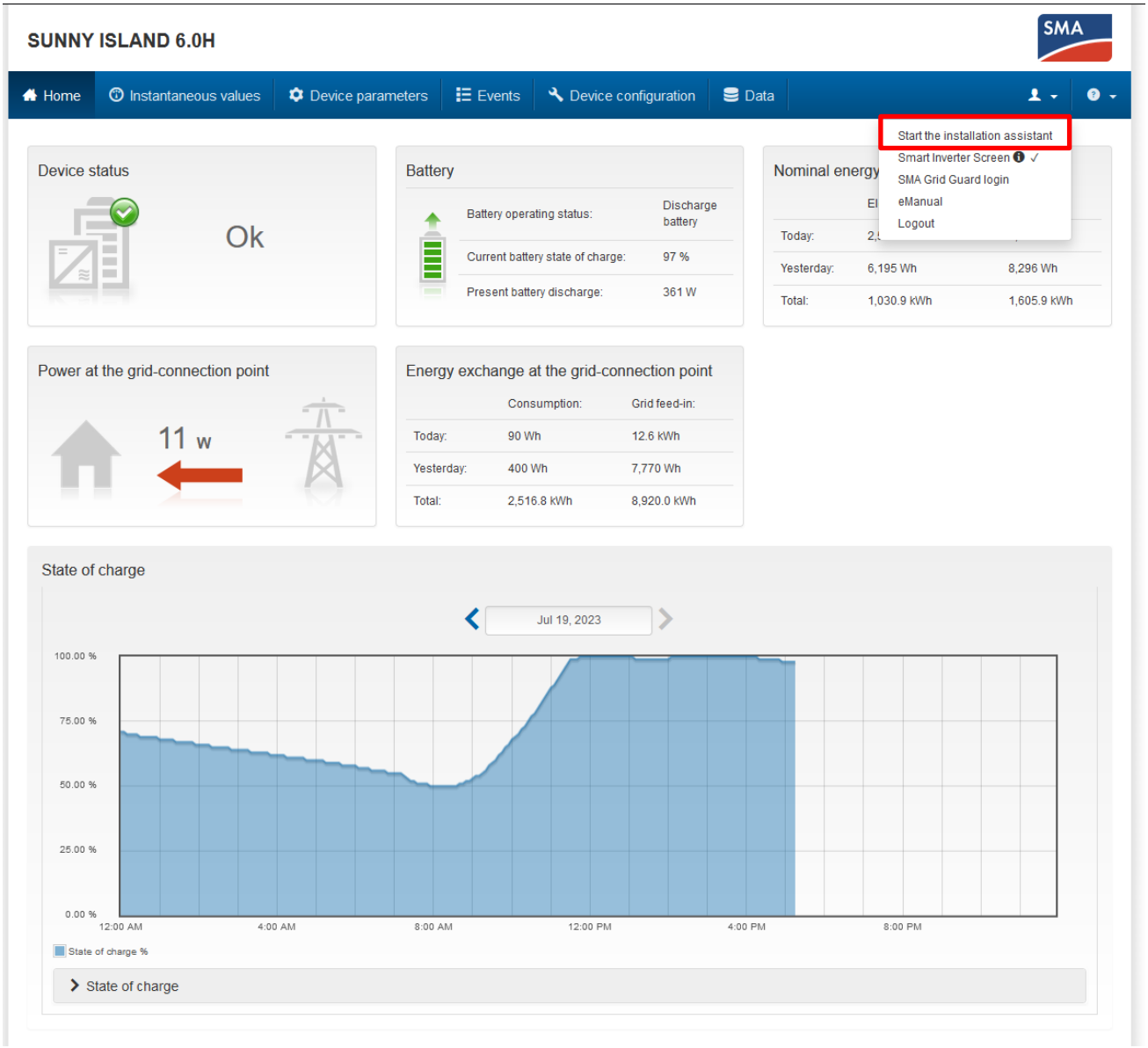

Image 4: *Installation Assistant*

3. Follow the steps below to commission the inverter:
    a. Complete **Step 1: Network** and **Step 2: Time Setting** then move onto **Country Standard.**

b. **Step 3:** Setup SI for **on-grid use** with desired **operation mode** and select the correct **country standard** for use (refer to table 3).

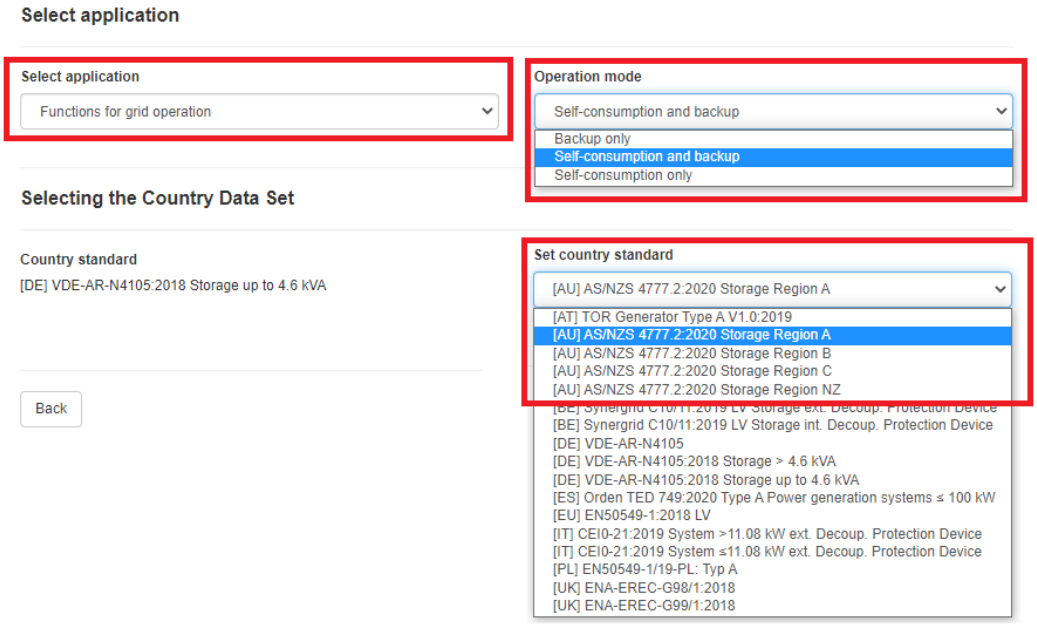

Image 5: *Select Application*

c. **Step 4:** This step is only for off-grid hence is skipped.

d. **Step 5:** Select the system configuration that applies.

NOTE: For on-grid Sunny Island in Australia there are only 2 options. 1 phase with 1x SI or 3 phase with 3x SI. Multicluster systems will not be supported, or CEC listed.

1 phase:

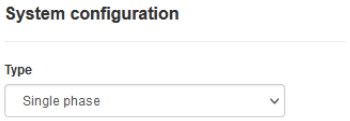

Image 6: *1 Phase System Configuration*

3 phase: Make sure to have the correct phase rotation for the slave inverters.

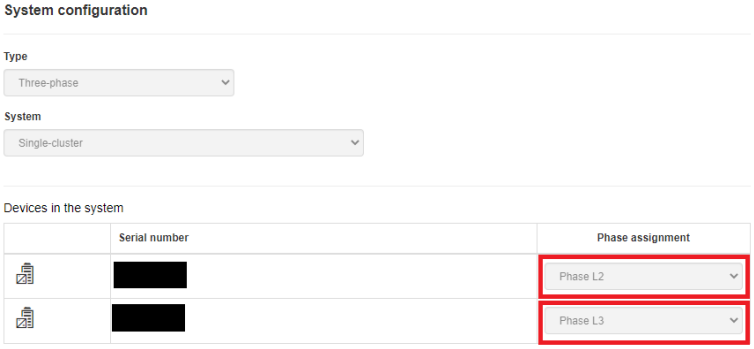

Image 7: *3 Phase System Configuration*

e. **Step 6:** Refers to grid management services, if you need to export limit the system a Home Manager 2.0 will be required, and export limit configuration can be found in a separate supporting document.

f. **Step 7:** Selection of battery.
Select battery type based on installed battery. If using lead acid or unmanaged lithium please consult with battery manufacturer for correct charging parameters.

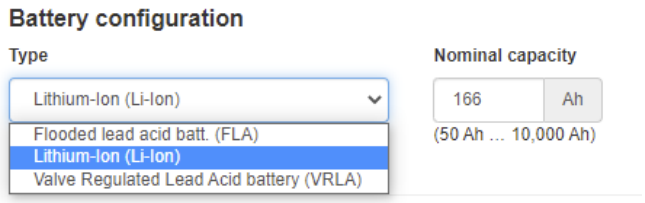

Image 8: *Battery Configuration*

g. Continue to the summary page and confirm the configuration has been setup correctly. Check that the Country Standard is also correct.

Image 9: *Summary*

5.2 Changing grid protection & power quality response modes

To change the settings associated with power quality and grid protection, please reach out to the service team on +61 2 9491 4200 between 8am to 6pm Monday to Friday AEDT. Alternatively, you can also reach the Service team online via the SMA Online Service Centre at https://my.sma-service.com/.

6 Updating Firmware

NOTE: The Sunny Island will only operate after it has been commissioned. Please update the firmware to the minimum shown in Table1 to unlock the new AS/NZS 4777.2:2020 country codes.

Please refer to **Table 4** for applicable devices and minimum firmware versions. We recommend using the latest firmware from the website if it is newer than the one listed below.

Inverter model	Minimum firmware
SI6.0H-13 SI8.0H-13	3.30.12.R

Table 4: *Minimum Firmware Requirements*

NOTE: For further clarification about how to make a firmware update refer to the instructions within the zip folder of the firmware update and also the document "User Manual - Executing a firmware update - SUNNY ISLAND 4.4M / 6.0H / 8.0H" on Sunny Island's download section.

6.1 Procedure

6.1.1 Required equipment

a. Laptop with WiFi and/or Ethernet port with a Web Browser eg. Chrome, Firefox, Edge.
    i. Internet access onsite is not required if Firmware is downloaded prior to site visit.

6.1.2 Connection

a. Via WiFi connection – refer to **4.2.1**
b. Via Ethernet – refer to **4.2.2**

SMA recommends Ethernet as the preferred method for firmware update as it is more stable and less susceptible to external interference.

6.1.3 Updating Firmware

a. Select **Installer** as the user group and enter your password.
   i. If this is the first-time logging into the inverter you will need to setup a User and Installer password.
   ii. Please set the **User** password to **Sma12345!**

b. Set the parameter under device parameters to automatic update.
   i. This ensures that the Sunny Island will perform the firmware update correctly when new file is uploaded.

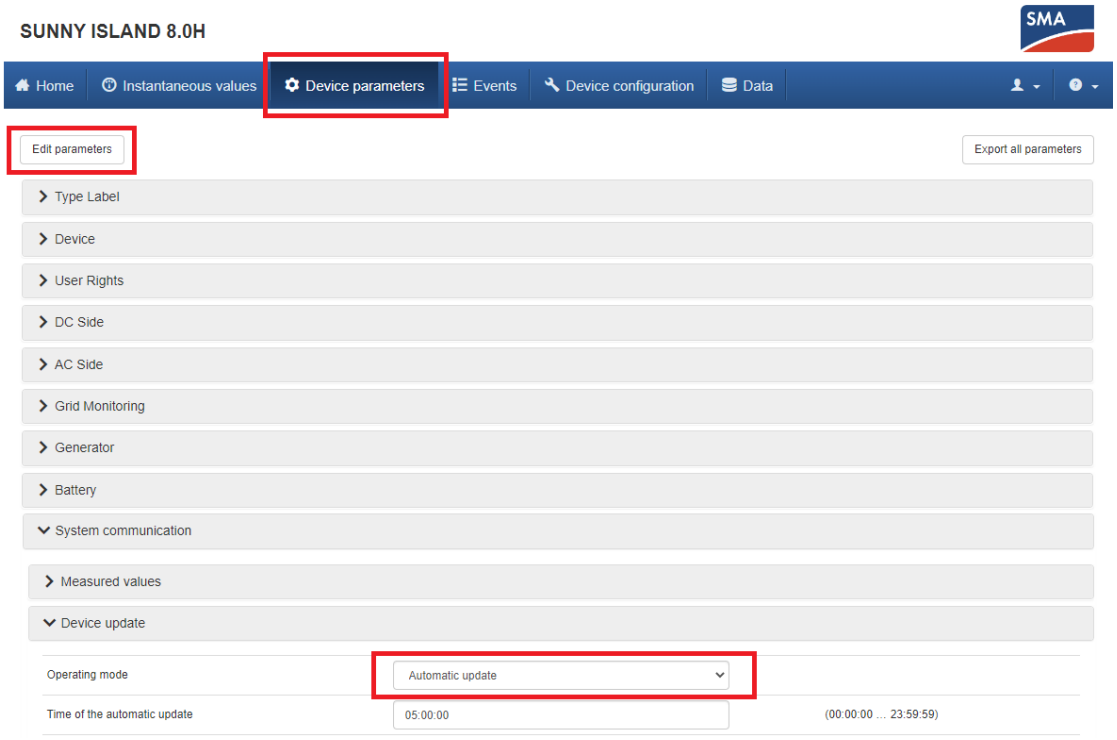

Image 10: *Setting automatic update*

NOTE: If "Automatic update" is set in "Operating Mode", firmware update starts immediately once the firmware file has been uploaded.

NOTE: If "Time-controlled" is set in "Operating Mode", Sunny Island will perform firmware update at the preset time, "Time of the automatic update" can be edited to change the preset time. "Time-controlled" should only be selected if there is authorised personnel close by during the selected time as Sunny Island may require additional input from him/her to continue/complete the update. If the update process is not completed, Sunny Island may remain in state of update and may not function as intended, this may cause unintended loss of functionality such as Sunny Island not charging the battery etc.

c. Once automatic update is selected navigate to the **Device Configuration** via the top menu.

   i. Once on the page, click on the setting wheel next to the Device.

   ii. Select **Update firmware.**

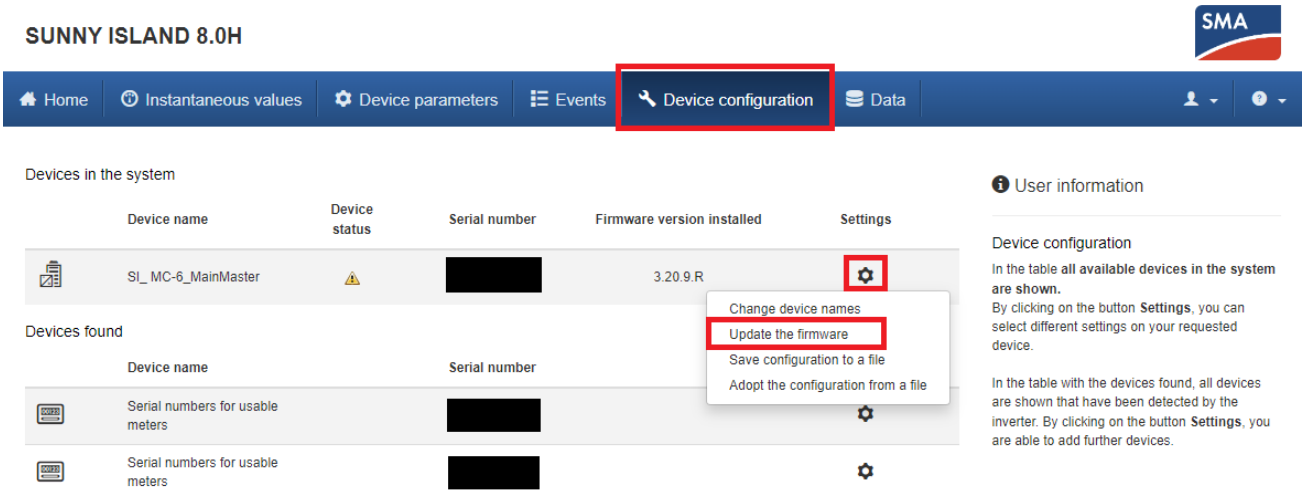

Image 11: *Update the Firmware*

d. Click on **Browse...** locate the appropriate firmware update on your smart device and click **Update firmware**.

Image 12: Firmware Update selection

While loading the firmware, there will be a blue bar showing the progress. Once the firmware has been uploaded successfully, a message "**Update transport successful**" will appear. If the inverter is set to automatic update from the steps before, firmware will start to be automatically updated at this point.

NOTE:
Depending on the firmware, the update process will take some time to complete. During this time, the file will be uploaded from your smart device to the inverter. Once this upload process reaches 100%, the inverter will install the new firmware. During which, you will lose connection between your smart device and the inverter. **Wait 15 minutes** after losing connection, before reconnecting to the inverter's WebUI. If performing a firmware update for a 3 phase cluster refer to the instructions in the update folder for the firmware.

When the update is complete, you will be able to verify this by navigating to **Events** and finding an entry **Update completed**.

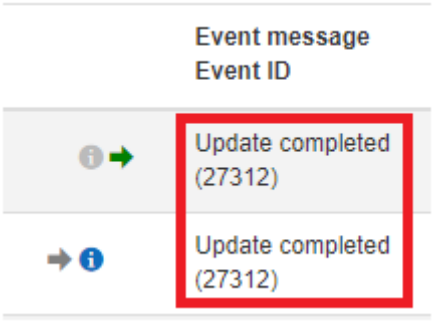

Image 5: *Update completed message*

Do not restart the Sunny Island, if you have any issues during the firmware update procedure please consult with SMA service team.

You can reach the service team on +61 2 9491 4200 between 8am to 6pm Monday to Friday AEST.

7 Checking of Parameters

To verify that the Firmware and Country Standard are correct, it can be done via the following method.

a. WebUI of the inverter
   i. Via Web Browser

7.1 Via WebUI

Screenshots shown below are using a mobile device, web interface will look slightly different on a laptop/computer screen.

Login to the inverter WebUI as a **User** Refer to section **4.2.2** for web browser connection options	**Checking the Country standard** Navigate to **Device Parameters > Grid Monitoring > Grid Monitoring > Country standard.**
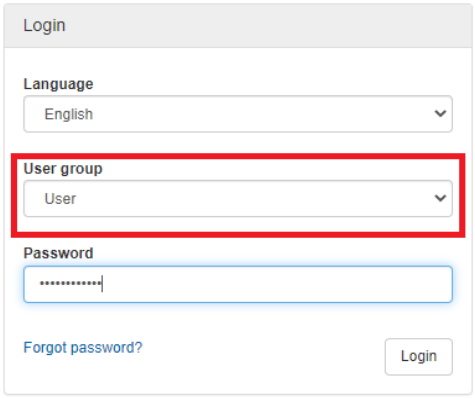	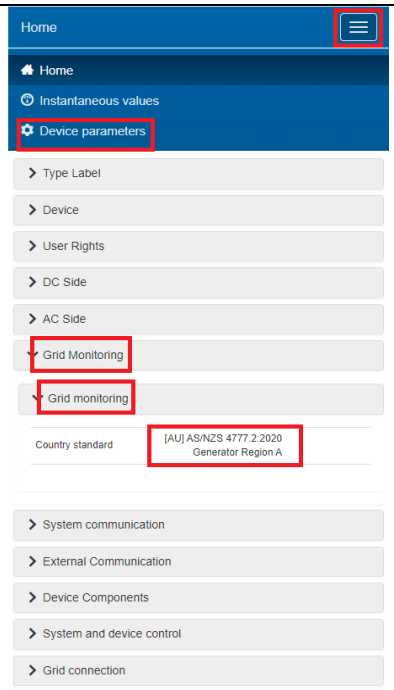
Image 14: *Login to inverter WebUI as a User*	***Image 15:*** *Checking Country Standard*

Checking the Firmware

On the **Home** page scroll to the bottom of the screen to find the current firmware.

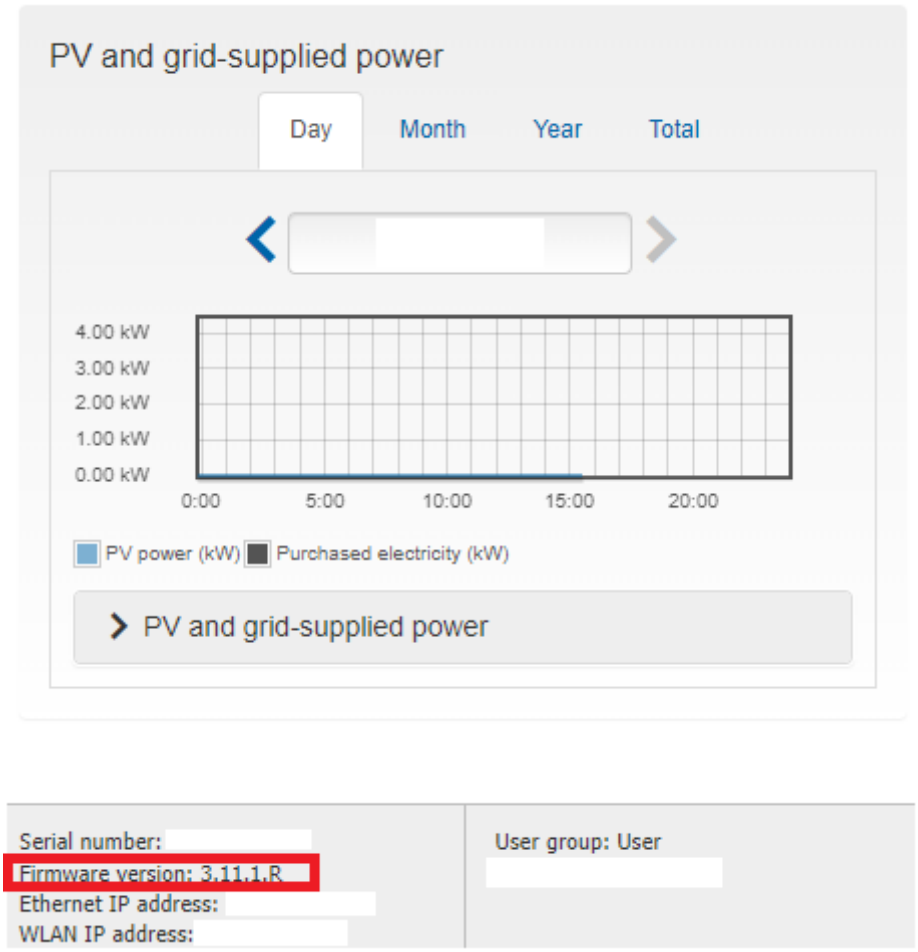

Image 16: *Checking Firmware*

Table 5: *Checking Parameters via WebUI*

7.2 Grid Protection and Power Quality Settings

7.2.1 Volt-Watt

To verify Volt-Watt settings search for **P(V)** and click on download as shown in image 17. The downloaded settings will be in a CSV format.

7.2.2 Volt-Var

To verify Volt-Var settings search for **Q(V)** and click on download as shown in image 17. The downloaded settings will be in a CSV format.

7.2.3 Frequency Protection

To verify Frequency Protection settings search for **Frequency Monitoring** and click on download as shown in image 17. The downloaded settings will be in a CSV format.

7.2.4 Voltage Protection

To verify Voltage Protection settings search for **Voltage Monitoring** and click on download as shown in image 17. The downloaded settings will be in a CSV format.

7.2.5 Over/Under Frequency

To verify Over/Under Frequency Protection settings search for **P(F)** and click on download as shown in image 17. The downloaded settings will be in a CSV format.

7.2.6 Fixed Power Factor

To verify Fixed Power Factor settings search for **Manual cos φ setting** and click on download as shown in image 17. The downloaded settings will be in a CSV format.

7.2.7 Fixed Reactive Power

To verify Fixed Reactive Power settings search for **Manual Reactive Power** and click on download as shown in image 17. The downloaded settings will be in a CSV format.

7.2.8 Ramp Rate

To verify Ramp Rate settings search for **WGra** and click on download as shown in image 17. The downloaded settings will be in a CSV format.

Image 17: *Grid quality settings download*

Group	Name	Value	Translated	Unit	Channel
System and device control	P(V), tripping delay	0	0	s	Parameter.Inverter.WModCfg.WCtlVolCfg.ActTms
System and device control	P(V), number of points used	2	2		Parameter.Inverter.WModCfg.WCtlVolCfg.Crv.NumPt
System and device control	P(V), max. number of support points	8	8		Parameter.Inverter.WModCfg.WCtlVolCfg.Crv.NumPtMax
System and device control	P(V), voltage value	1.1	1.1	p.u.	Parameter.Inverter.WModCfg.WCtlVolCfg.Crv.XVal[0]
System and device control	P(V), voltage value	1.13	1.13	p.u.	Parameter.Inverter.WModCfg.WCtlVolCfg.Crv.XVal[1]
System and device control	P(V), voltage value	2	2	p.u.	Parameter.Inverter.WModCfg.WCtlVolCfg.Crv.XVal[2]
System and device control	P(V), voltage value	2	2	p.u.	Parameter.Inverter.WModCfg.WCtlVolCfg.Crv.XVal[3]
System and device control	P(V), voltage value	2	2	p.u.	Parameter.Inverter.WModCfg.WCtlVolCfg.Crv.XVal[4]
System and device control	P(V), voltage value	2	2	p.u.	Parameter.Inverter.WModCfg.WCtlVolCfg.Crv.XVal[5]
System and device control	P(V), voltage value	2	2	p.u.	Parameter.Inverter.WModCfg.WCtlVolCfg.Crv.XVal[6]
System and device control	P(V), voltage value	2	2	p.u.	Parameter.Inverter.WModCfg.WCtlVolCfg.Crv.XVal[7]
System and device control	P(V), active power value	100	100	%	Parameter.Inverter.WModCfg.WCtlVolCfg.Crv.YVal[0]
System and device control	P(V), active power value	20	20	%	Parameter.Inverter.WModCfg.WCtlVolCfg.Crv.YVal[1]
System and device control	P(V), active power value	0	0	%	Parameter.Inverter.WModCfg.WCtlVolCfg.Crv.YVal[2]
System and device control	P(V), active power value	0	0	%	Parameter.Inverter.WModCfg.WCtlVolCfg.Crv.YVal[3]
System and device control	P(V), active power value	0	0	%	Parameter.Inverter.WModCfg.WCtlVolCfg.Crv.YVal[4]
System and device control	P(V), active power value	0	0	%	Parameter.Inverter.WModCfg.WCtlVolCfg.Crv.YVal[5]
System and device control	P(V), active power value	0	0	%	Parameter.Inverter.WModCfg.WCtlVolCfg.Crv.YVal[6]
System and device control	P(V), active power value	0	0	%	Parameter.Inverter.WModCfg.WCtlVolCfg.Crv.YVal[7]
System and device control	P(V), activation	308	On		Parameter.Inverter.WModCfg.WCtlVolCfg.Ena
System and device control	P(V), type of reference voltage	4520	Mean value of phase v		Parameter.Inverter.WModCfg.WCtlVolCfg.VRefMod
System and device control	P(V), limitation of change rate	303	Off		Parameter.Inverter.WModCfg.WCtlVolCfg.WGraEna
System and device control	P(V), decrease rate	20	20	%/s	Parameter.Inverter.WModCfg.WCtlVolCfg.WGraNeg
System and device control	P(V), increase rate	20	20	%/s	Parameter.Inverter.WModCfg.WCtlVolCfg.WGraPos
System and device control	P(V), type of reference active power	4405	Maximum active powe		Parameter.Inverter.WModCfg.WCtlVolCfg.WRefMod
System and device control	P(V), nominal value filter	308	On		Parameter.Inverter.WModCfg.WCtlVolCfg.WTmEna
System and device control	P(V), setting time, nominal value filter	3	3	s	Parameter.Inverter.WModCfg.WCtlVolCfg.WTms

Image 18: *P(V) settings CSV*

8 Monitoring

Sunny Island's operation, energy flows etc can be monitored with either of the methods below, please refer to their respective webpages for more information on how to set up monitoring.

8.1 Sunny Portal

This monitoring method can be accessed via web browser on laptops, desktops and mobile devices.

SUNNY PORTAL - Simple and Efficient PV System Monitoring | SMA Australia (sma-australia.com.au)

8.2 SMA Energy App

This monitoring method can be accessed via an app on mobile devices.

SMA Energy App | SMA Solar

9 Export Limiting

The Sunny Island is a battery only inverter, under all configurations the inverter will be a zero export device*. Therefore, no further settings are required.

Sunny Island is not currently tested for AS/NZS 4777.2:2020 Appendix L, this document will be updated when the tests are completed.

*When supporting devices (ie. Energy Meter) are installed correctly.

10 Circuitry Overview

Sunny Island is listed as "Grid Connect Inverter – Battery Only", the diagrams below are applicable for this function. For more information, please refer to "SMA FLEXIBLE STORAGE SYSTEM - Increased self-consumption with SUNNY ISLAND 4.4M / 6.0H / 8.0H and SUNNY HOME MANAGER".

NOTE: AC, DC and earthing cables must be sized according to AS/NZS 3000 or the product's instruction manual, whichever is the greatest.

10.1 System with One Sunny Island Inverter

PE port in AC-1 and AC-2 shares a common bus, connection of AC-1's PE port is not necessary.

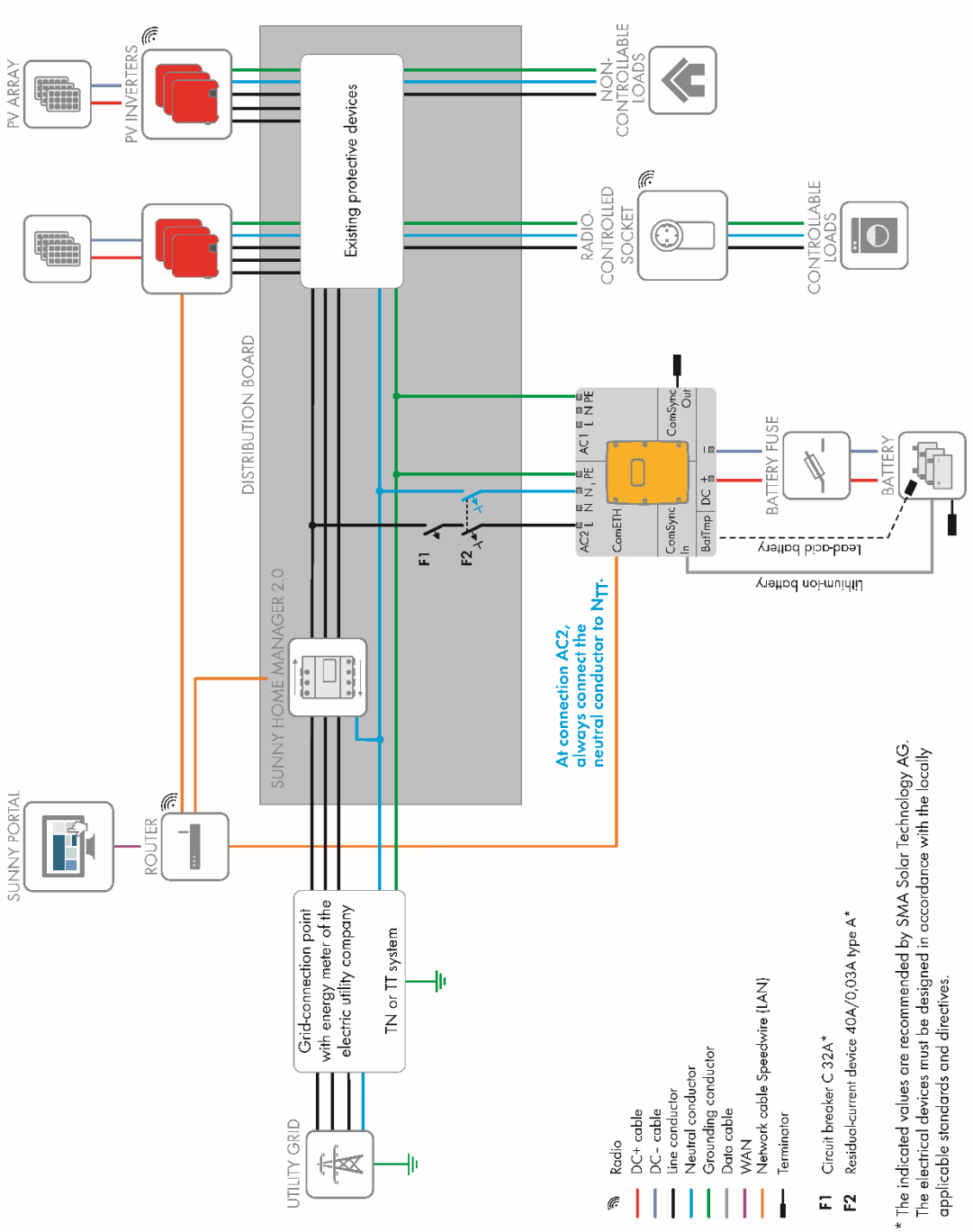

Image 19: *Circuitry Overview for system with one Sunny Island inverter*

10.2 System with Three Sunny Island Inverters

In a system with three Sunny Island inverters, the inverters must be of the same power class, installation of different power classes, e.g. 1 x SI6.0H and 2 x SI8.0H is not permissible.

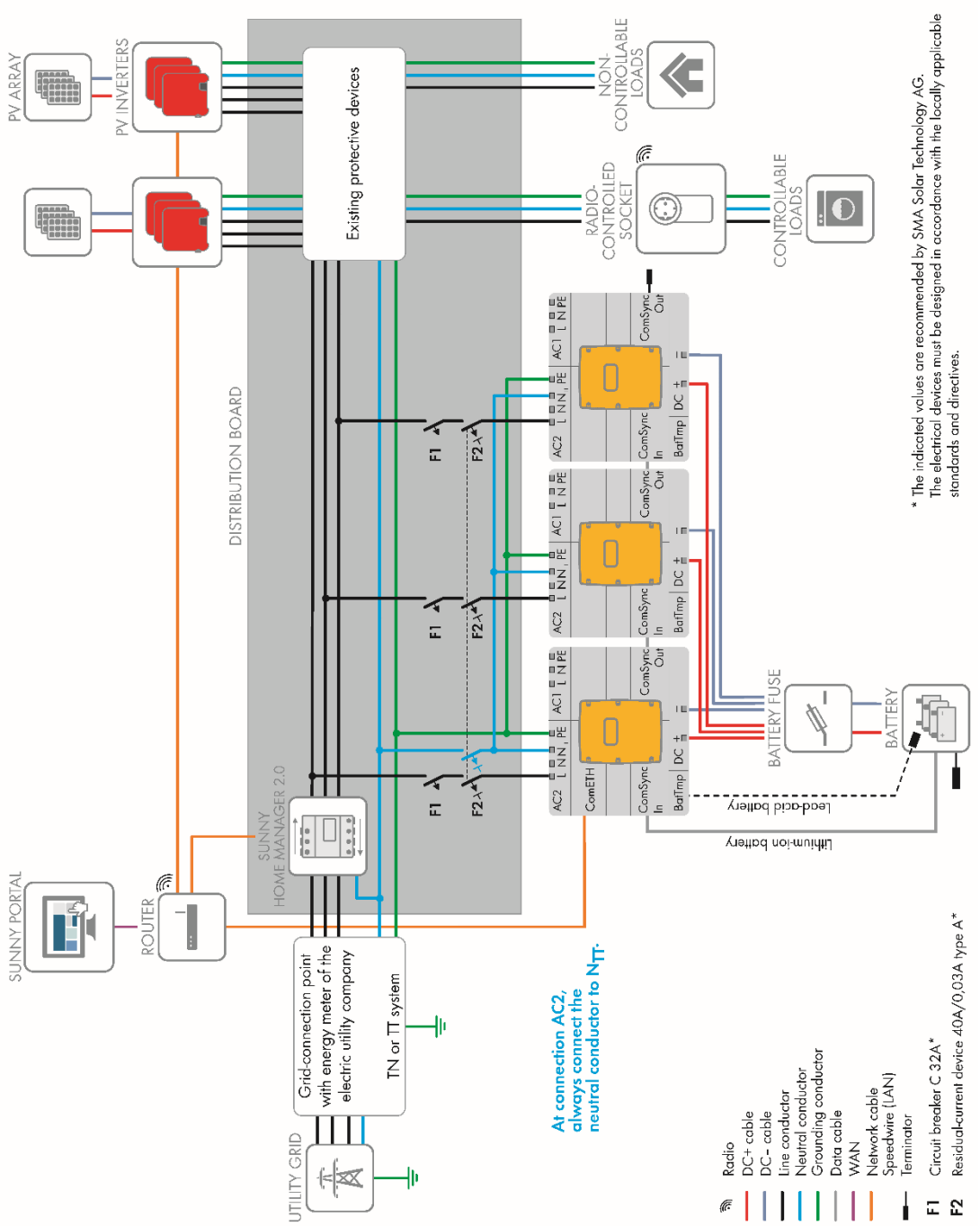

Image 20: *Circuitry Overview for system with three Sunny Island inverters*

11 Backup

The Sunny Island is listed as Grid Connected Inverter – Battery only, this means a separate transfer switch is required to achieve backup functionality.

The transfer switch can be built with off the shelf components, refer to sections below for 1 phase or 3 phase setups. Alternatively select distribution partners also sell a premade version.

11.1 SLD to create your own transfer switch

11.1.1 1 phase SI setup

To create your own single phase transfer switch, you need the following bill of materials.

Drawing reference	Component type	Sizing
X1 to X7	Terminal blocks	Refer to Table 5. Cable selection guide
F1	Fuse	250V 1A
F2	Circuit Breaker	Up to supply fuse
F3	Circuit Breaker	Up to supply fuse
F6	Circuit Breaker	Nominal rating of SI. SI6.0 – 20A SI8.0 – 26A
Q2	Contact	Up to supply fuse 1NO + 1NC
Meter	SMA Energy Meter 2.0 (EMETER20) or Home Manager 2.0 (HM-20)	
Enclosure	IP55 or greater enclosure	

Table 6: *Single Phase Transfer switch bill of materials*

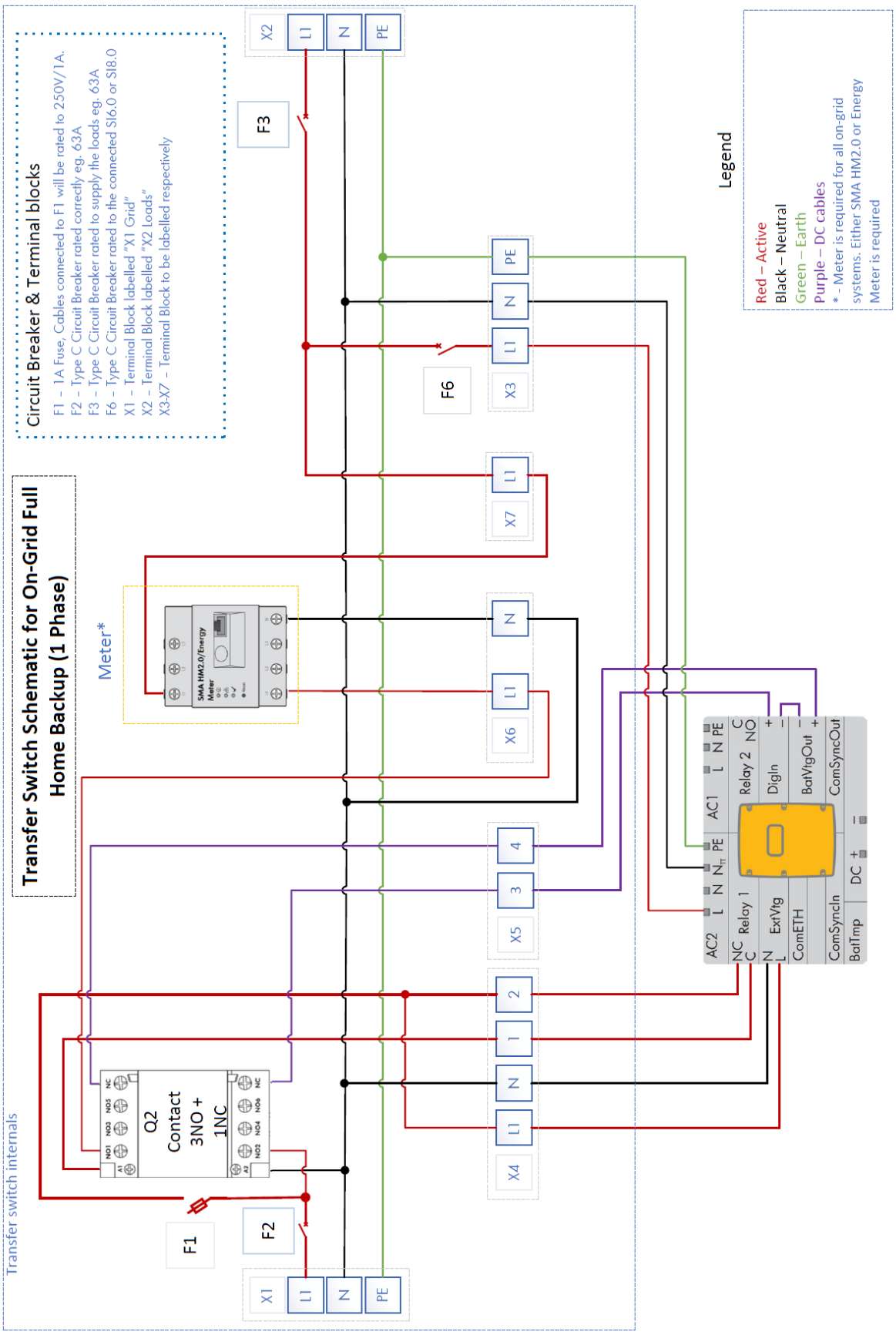

Image 21: *Single Phase Transfer Switch*

Cable Nominal Voltage & Currents	L1/L2/L3/N		1/2		3/4	
	Voltage	Current	Voltage	Current	Voltage	Current
X1	230Vac	63A				
X2	230Vac	63A				
X3	230Vac	20A/26A*				
X4	230Vac	1A	230Vac	1A		
X5					48Vdc	1A
X6	230Vac	63A				
X7	230Vac	63A				

*Current limit for SI6.0H/SI8.0H

Table 7: *Cable Selection Guide, with 63A supply*

11.1.2 3 phase SI setup

Drawing reference	Component type	Sizing
X1 to X7	Terminal blocks	Refer to Table 5. Cable selection guide
F1	Fuse	250V 1A
F2	Circuit Breaker	Up to supply fuse
F3	Circuit Breaker	Up to supply fuse
F6	Circuit Breaker	Nominal rating of SI. SI6.0 – 20A SI8.0 – 26A
Q2	Contact	Up to supply fuse 3NO + 1NC
Meter	SMA Energy Meter 2.0 (EMETER20) or Home Manager 2.0 (HM-20)	
Enclosure	IP55 or greater enclosure	

Table 8: *Three Phase Transfer switch bill of materials*

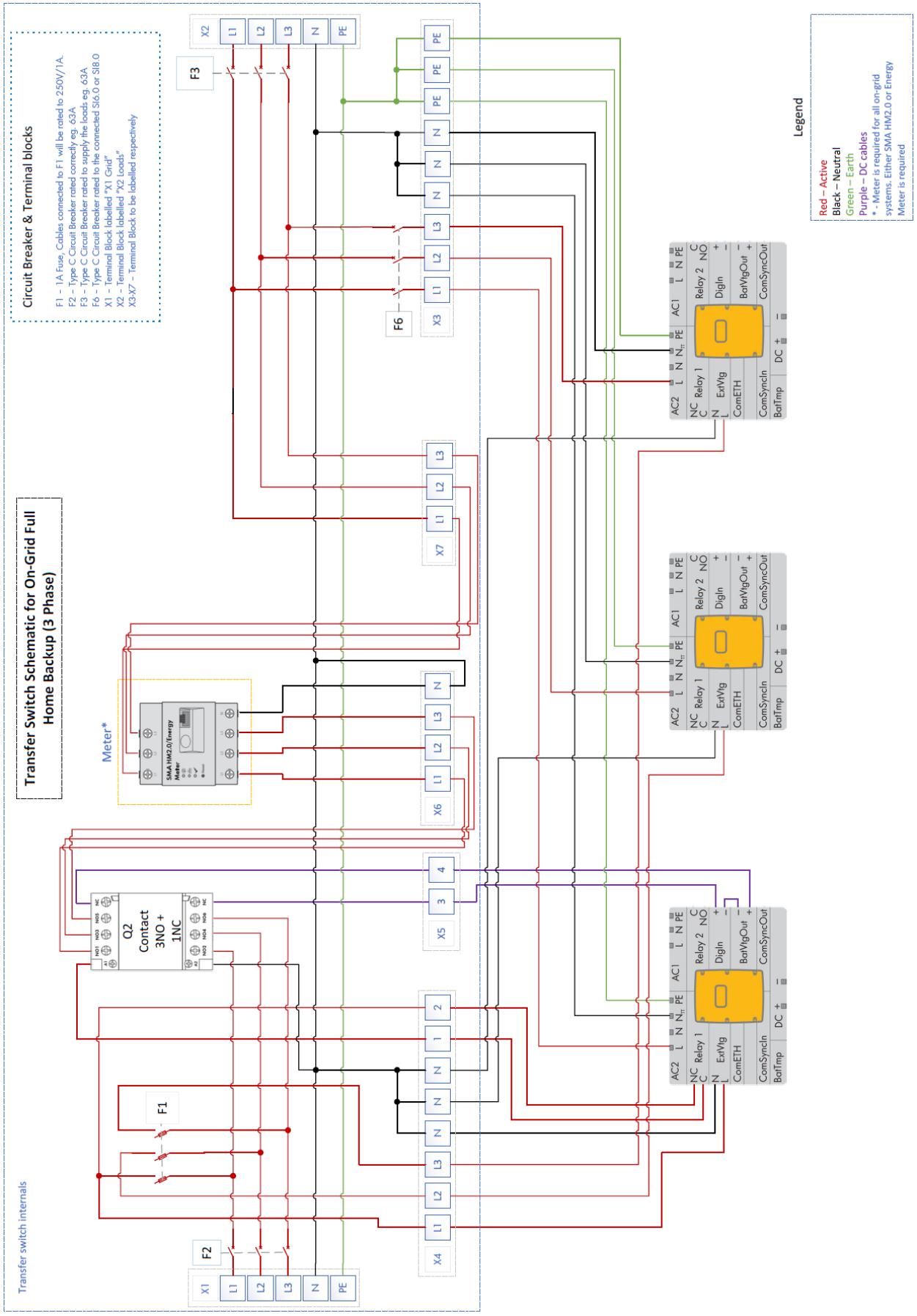

Image 22: *Three phase transfer switch*

11.2 Transfer Switch Distribution Partners

For pricing and availability of the transfer switches please reach out to the companies below.

Battery Works® – sales@battery.com.au

12 DRED / DRM

12.1 Connection to a DRED

Inverter connection to a demand response enable device (DRED) is possible with an approved Sunspec modbus Demand Response controller (DRC) such as provided by FuturePoint® or Olivance®:

Olivance Powerlink - Olivance

Ethernet cable from the DRM must be connected to Sunny Island's Ethernet Port marked "X" as below.

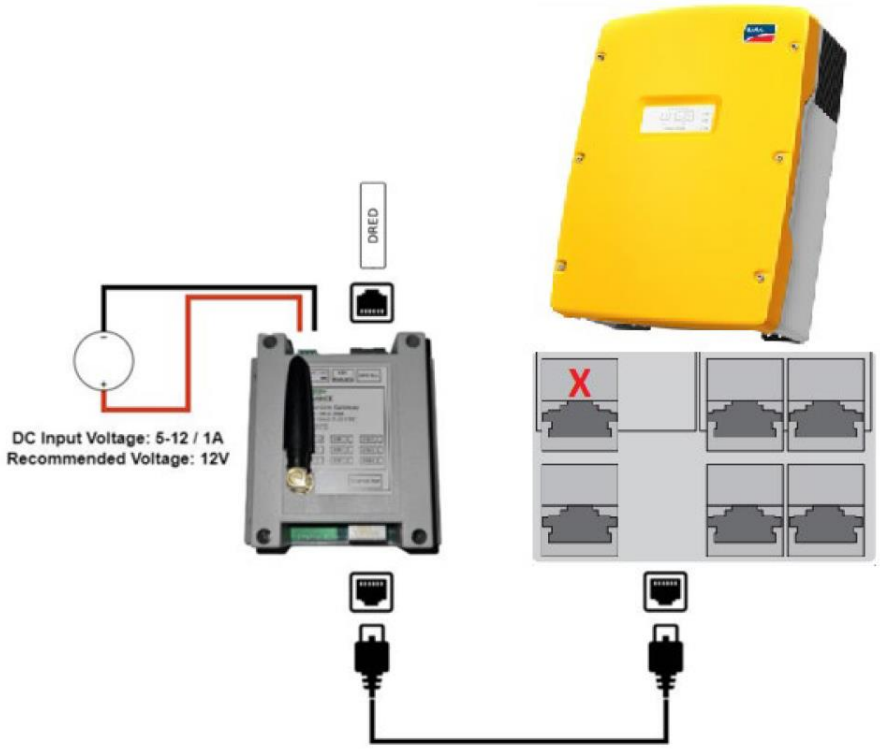

Image 23: *DRC connection*

The modbus TCP parameter must be enabled on the inverter.

1. Login to the inverter's WebUI as an installer, refer to section **4.2** depending on different connection methods.
2. Navigate to **Device Parameters > External Communication > Modbus > TCP server > activated > yes**

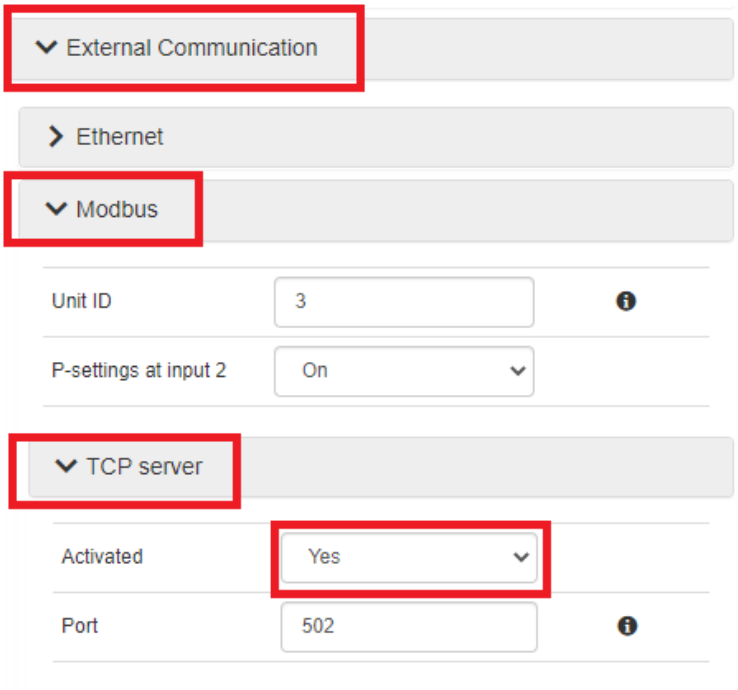

Image 24: *Enabling Modbus*

12.2 DRM Modes

Currently DRM0 is the only DRM mode available for the following inverter models:

SI6.0H-13, SI8.0H-13

12.3 DRM Labelling

The DRC must be labelled with the DRM mode and the RJ45 with the DRM Port.

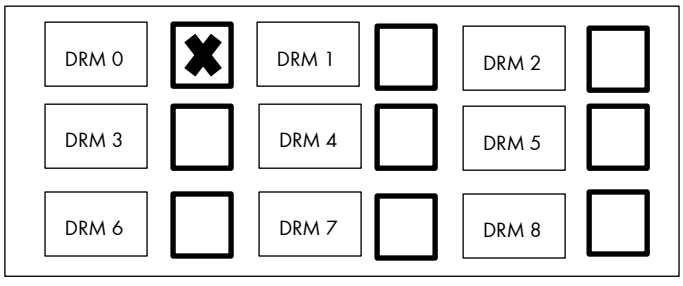

Image 25: *Example DRM*

Image 26: *Example DRM Port*

13 Earth Fault Alarm

If batteries with earth fault monitoring are connected to the inverter, this cannot be read/evaluated by the inverter and the alarm is not passed on by the inverter.

An additional alarm and monitoring device approved by the battery manufacturer for passing on the earth fault must be installed in this case.

This concludes the document, if you have any questions you can reach out to Solaracademy@sma-australia.com.au for pre-sales/installation questions or service@sma-australia.com.au for after sales support.