AS/NZS 4777.2:2020 Technical Information

STP 12-50, STP 15-50, STP 20-50, STP 25-50

Version 1.1 | 26/06/2023

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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:

Inverter model
STP 12-50
STP 15-50
STP 20-50
STP 25-50

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.

The following inverters have not been tested to AS/NZS 4777.2:2020 for multiple inverter combinations: STP 12-50, STP 15-50, STP 20-50, STP 25-50

3 Connecting to the inverter

3.1.1 Required equipment

a. Laptop with WiFi and/or Ethernet port with a Web Browser eg. Chrome, Firefox, Edge.
    i. Due to file size it is recommended to download the firmware prior to site visit.

3.1.2 Connection

a. Via WiFi connection – refer to **3.1.2.1**
b. Via Ethernet – refer to **3.1.2.2**

3.1.2.1 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.

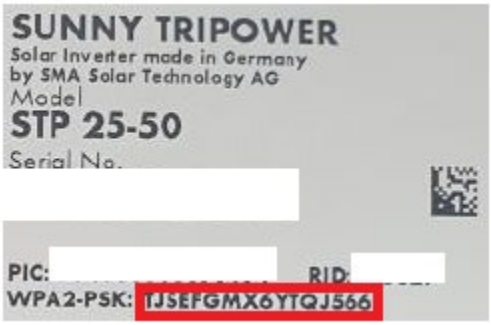


Image 1: *Example of WPA password*

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

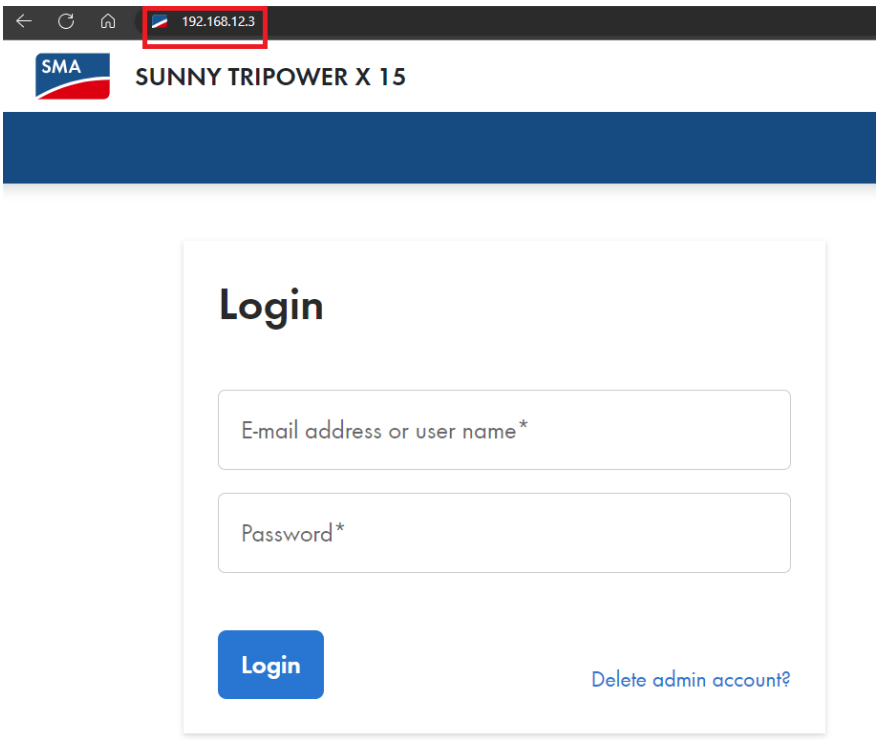


Image 2: Wi-Fi Login Menu

3.1.2.2 Connecting via Ethernet

a. Connect your laptop to the inverters ethernet port.

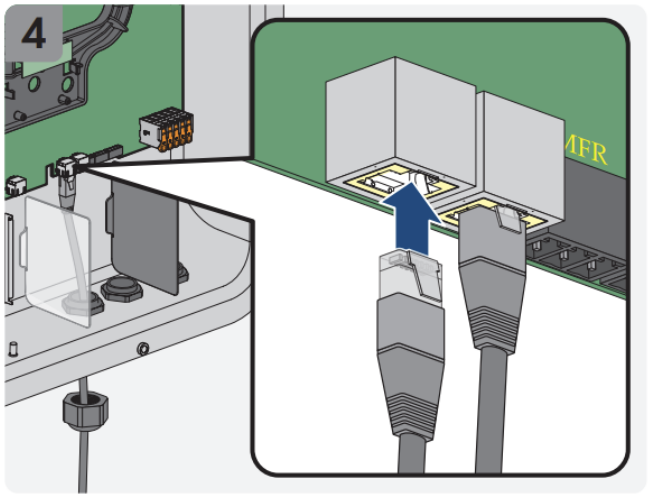


Image 3: *Ethernet connection*

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

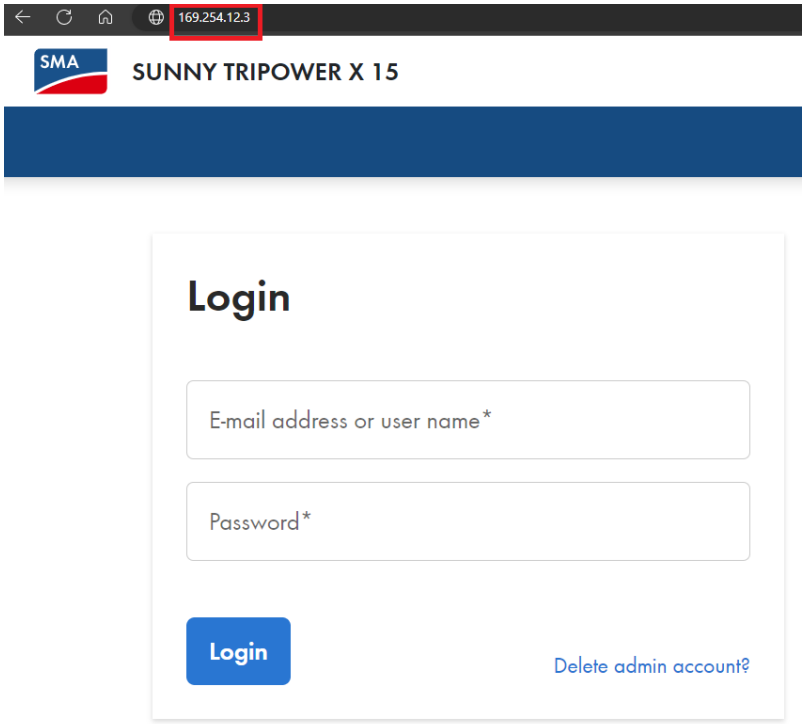


Image 4: *Ethernet Login Menu*

4 Commissioning Inverter

NOTE: First production of STP X inverters does not come with minimum firmware required. To update the firmware commissioning of the inverter needs to be completed first.

Commissioning the inverter can be done by:

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 DNSP	[AU] AS/NZS 4777.2:2020 Generator Region NZ

Table 2: *AS/NZS4777 Standard by DNSP*

4.1 Via Web Browser

Please refer to section **3.1.2** for connection via Wi-Fi or Ethernet.

4.1.1 Commissioning Wizard

NOTE: The commissioning wizard is only shown upon first connection, after successful commissioning a factory reset needs to be performed before the wizard will be shown again. Adjustments to parameters etc. do not require a factory reset.

1. Check the firmware version, internet connection and continue.

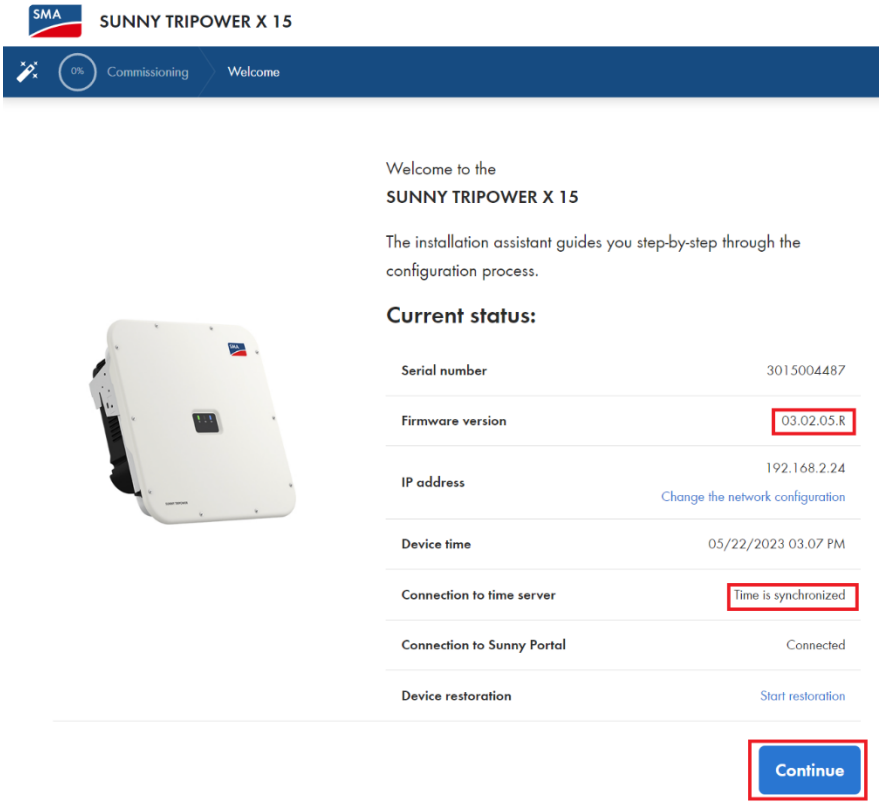


Image 5: *Commissioning Wizard Step 1*

2. Setup a user account, make note of the username and password as this cannot be reset without performing a user account factory reset.

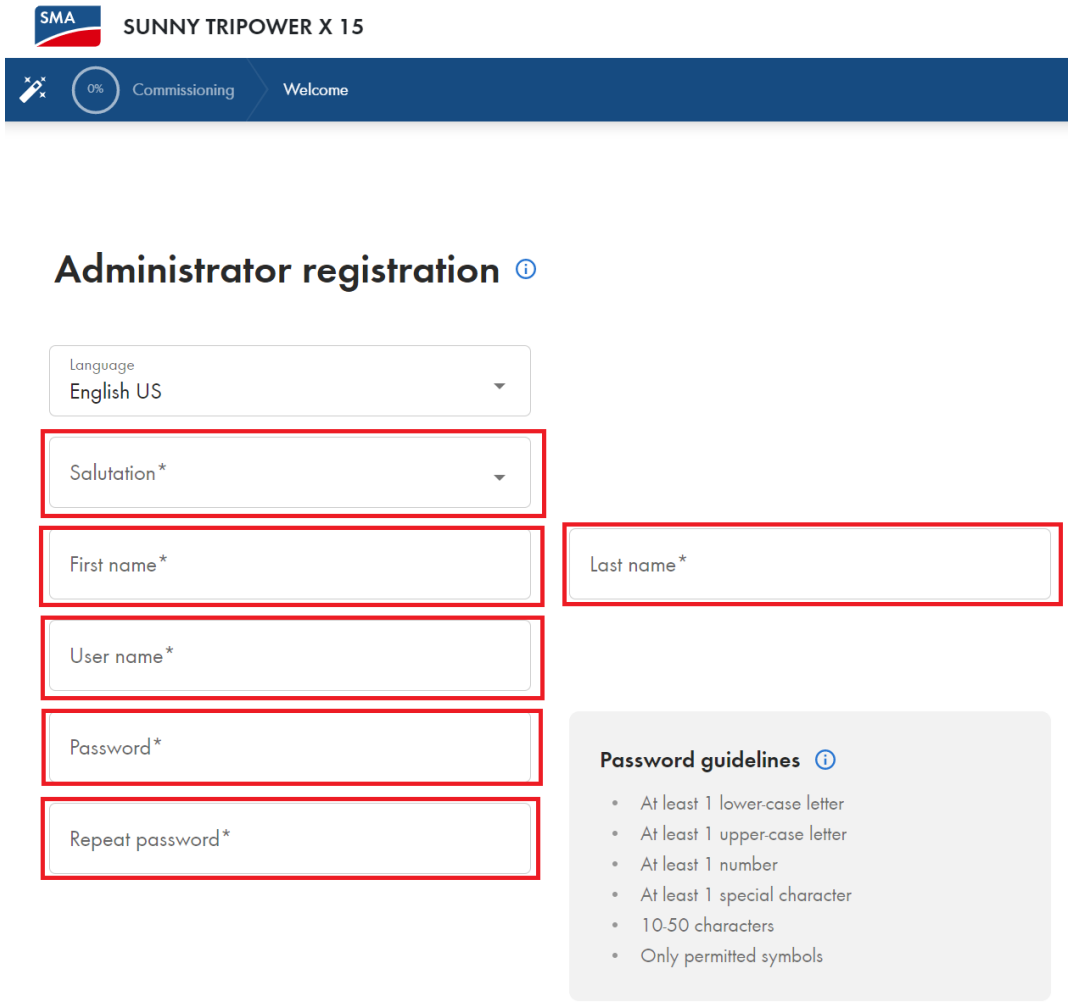


Image 6: *Admin account*

3. Create a device name and select system manager, then continue.

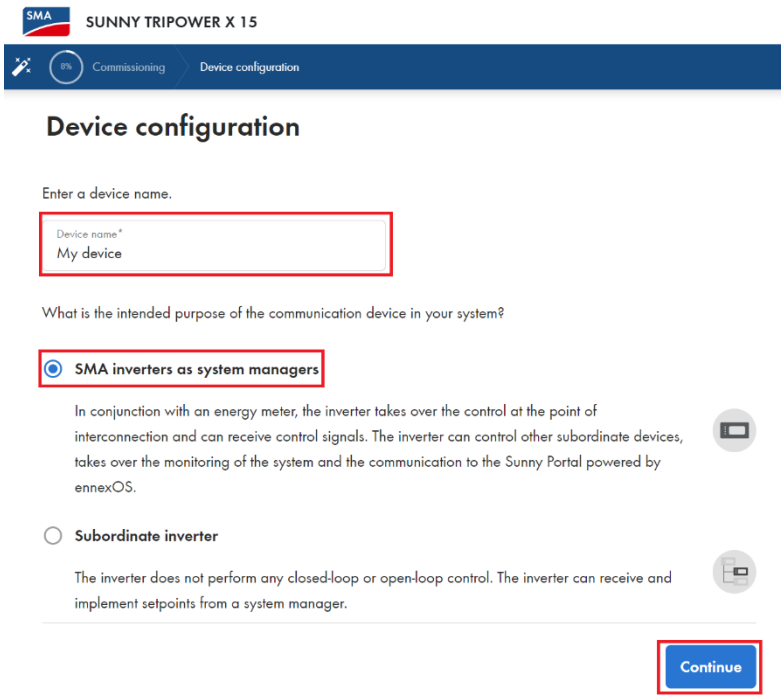


Image 7: *Device config*

4. Tick all boxes and continue.

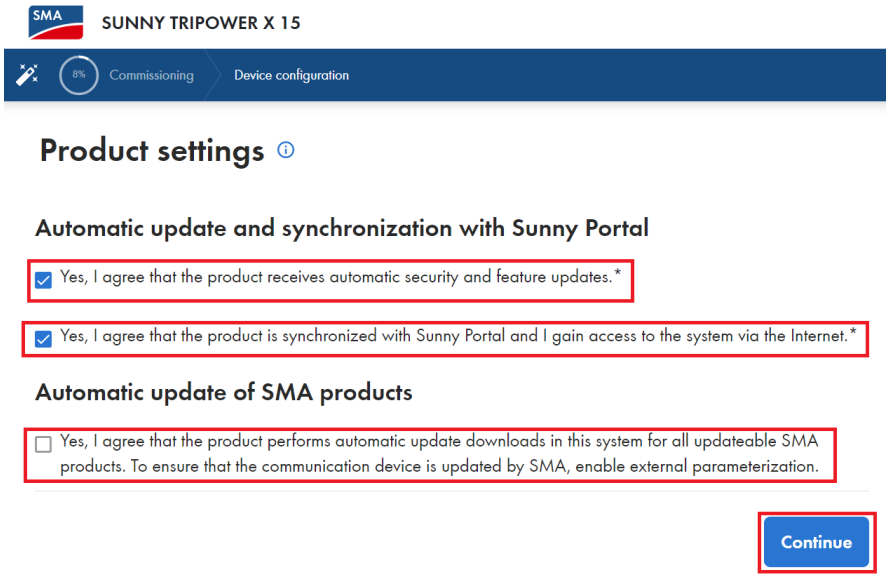


Image 8: *Automatic updates*

5. For this technical document addition of 3rd party, extra devices will not be covered.
6. If firmware is up to date as per table 3, then select the right country standard from the list.

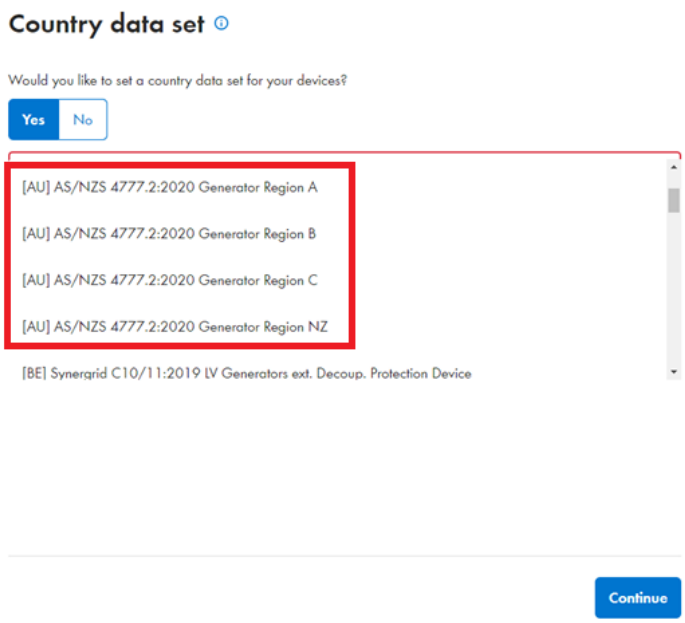


Image 9: *Selection of Country Standard*

7. After step 6, the remaining steps are only for export limiting which is not covered in this document.
8. Once the initial setup is complete, and the firmware is not up to date then you can continue to section 5 to perform the firmware update.

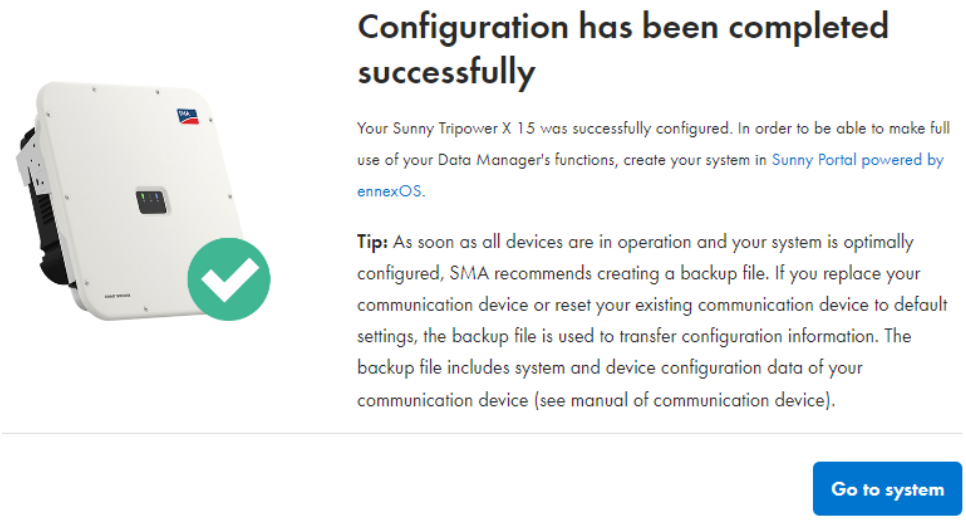


Image 10: *Commissioning Complete*

4.1.2 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 or via email on service@sma-australia.com.au.

5 Firmware update

Please refer to **Table 1** 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
STP 12-50 STP 15-50 STP 20-50 STP 25-50	2.06.04.R

Table 3: *Minimum Firmware Requirements*

5.1 Procedure

5.1.1 Required equipment

a. Laptop with WiFi and/or Ethernet port with a Web Browser eg. Chrome, Firefox, Edge.
    i. Due to file size it is recommended to download the firmware prior to site visit.

5.1.2 Connection

a. Via WiFi connection – refer to **3.1.2.1**
b. Via Ethernet – refer to **3.1.2.2**

5.1.2.1 Updating Firmware

a. Enter the **Username** as configured during initial commissioning.
b. Once logged in navigate to the **Configuration > Update and backup** via the menu.

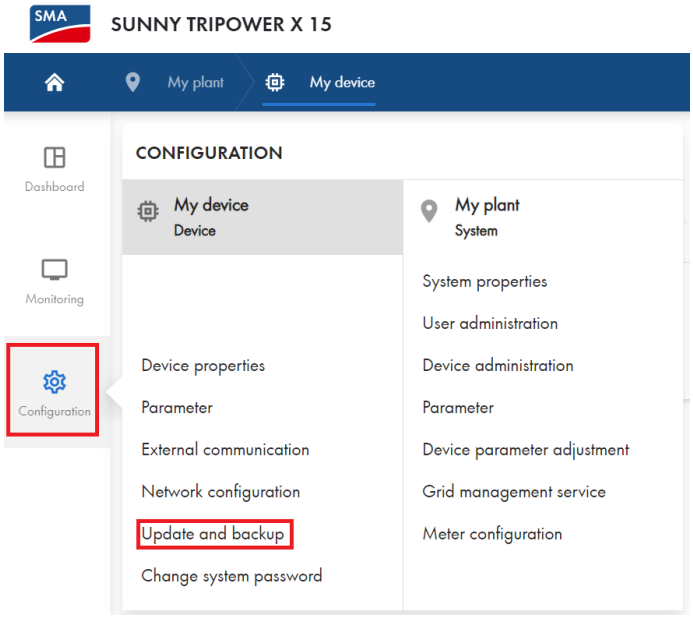


Image 11: *Update the Firmware*

c. Click on **Select the file...** locate the appropriate firmware update on your device and click **Start Update**.

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 5 minutes after losing connection, before reconnecting to the inverter's WebUI.
When the update is complete, you will be able to verify this by navigating to **Events** and finding an entry **Update completed**.

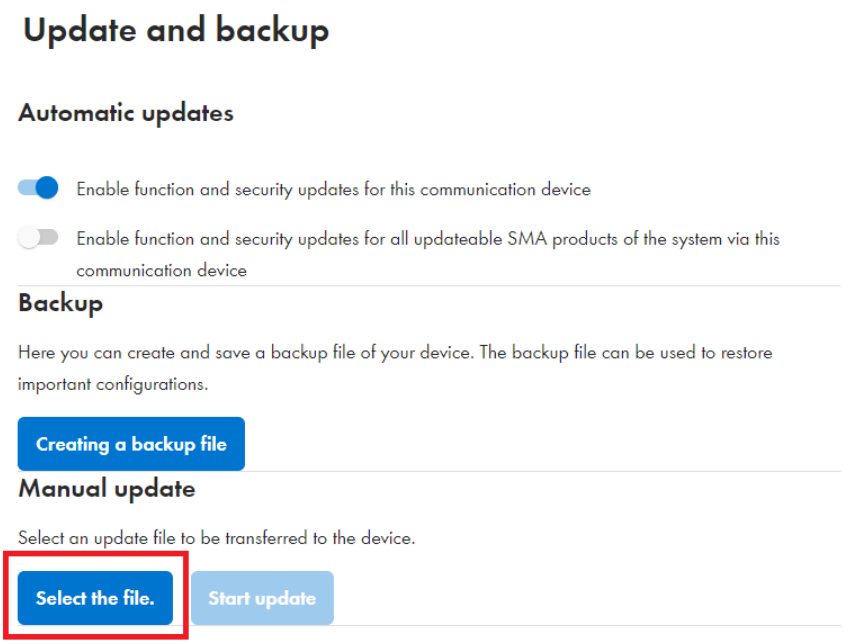


Image 12: *Firmware Update selection*

6 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

6.1 Country Standard & Firmware

1. Login to the inverter via methods in section 3.1.2.
2. Select the inverter name or SN in the webUI.

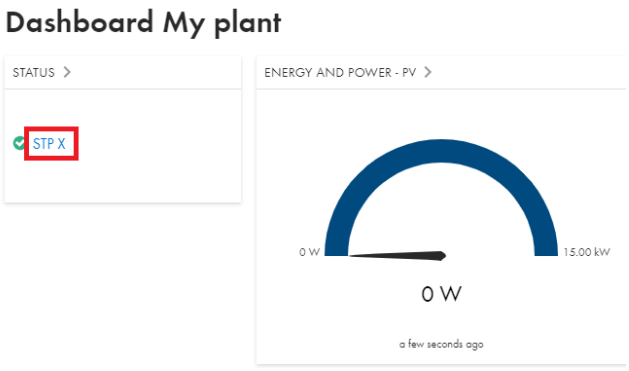


Image 13: *Selecting device*

3. Click on Configuration > Parameters.

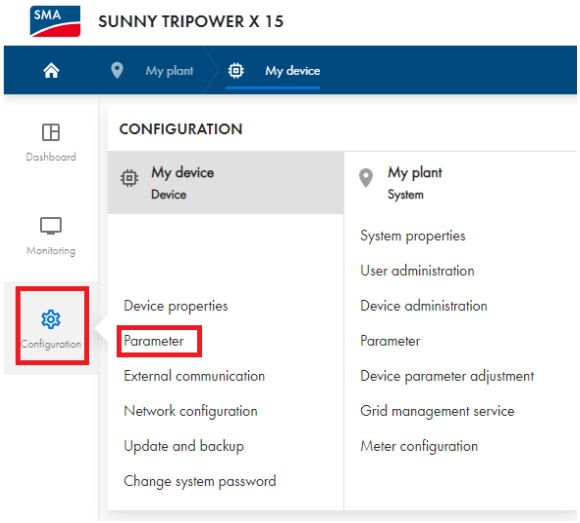


Image 14: *Parameter adjustment*

4. Enter in the search term “grid monitoring”.

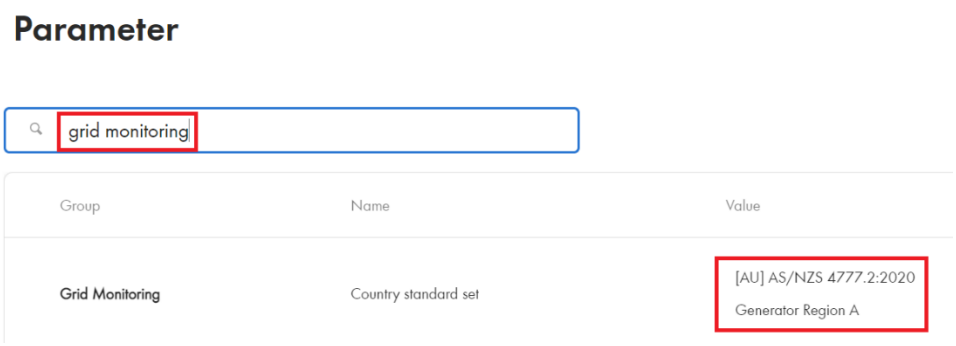


Image 15: *Country Standard*

5. To check firmware, under the same menu type in “firmware”.

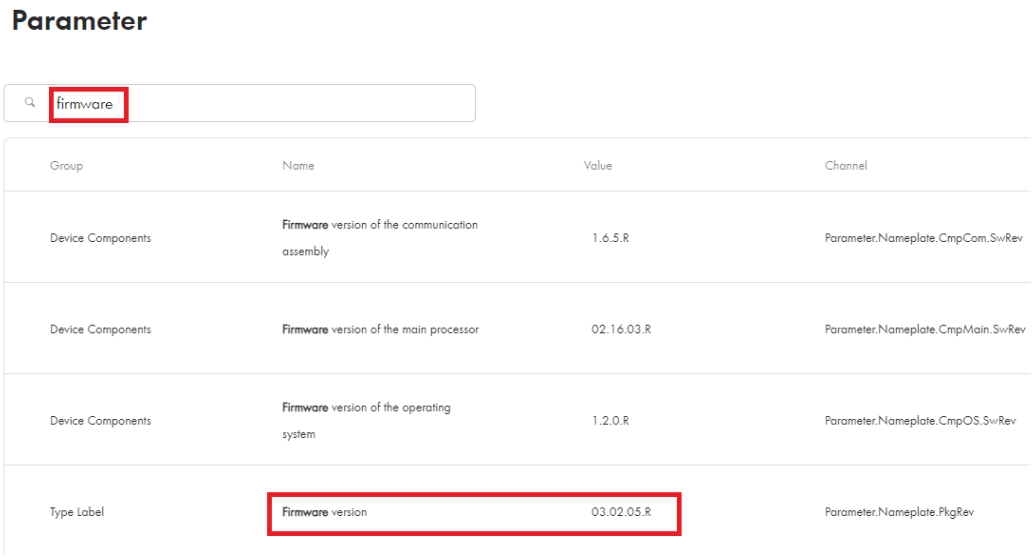


Image 16: *Checking Firmware*

6.2 Grid Protection and Power Quality Settings

6.2.1 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.

6.2.2 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.

6.2.3 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.

6.2.4 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.

6.2.5 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.

6.2.6 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.

6.2.7 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.

6.2.8 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*

7 Export Limiting

The STP X currently does not support Export limiting as per AS/NZS4777.2:2020, this section will be updated in the future when this is tested.

8 Earth Fault Alarm

The inverter detects earth faults by the measurement of insulation resistance between the DC side and ground prior to operation, and residual current during operation. Earth faults (and other faults) trigger the inverter's earth fault alarm. The following is a summary of these alarms.

Inverter model	Visual LED on Inverter	Audible alarm	Remote Alarm
STP 12-50 STP 15-50 STP 20-50 STP 25-50	Yes	No	Optional via Sunny Portal

Table 4: *Earth Fault Alarm*

8.1 Sunny Portal Remote Alarm Setup

The inverter's Earth Fault Alarm can be configured once the plant is registered in Sunny Portal. In the event of an earth fault, a report with the corresponding events will be emailed to nominated addresses. A report will then be sent every hour until the earth fault is acknowledged in Sunny Portal or cleared.

For instructions on how to register your plant in Sunny Portal, please refer to the respective Sunny Portal User Manual for your plant:

- Webconnect (no communication devices): User Manual - SUNNY PORTAL powered by ennexOS (sma.de)

Once your plant is registered in Sunny Portal, continue to set up the Earth Fault Alarm using the following instructions:

1. Login to your Sunny Portal account on ennexos.sunnyportal.com.

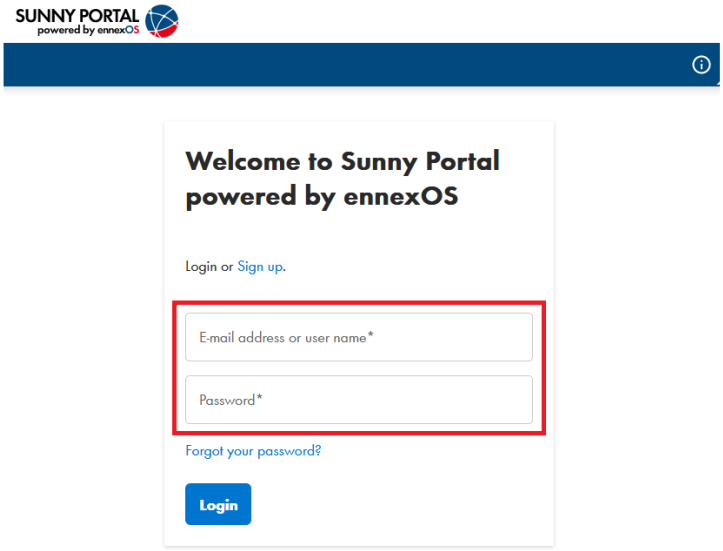


Image 19: *EnnexOS Login*

2. Expand the **Configuration** tab and select **Notifications**.

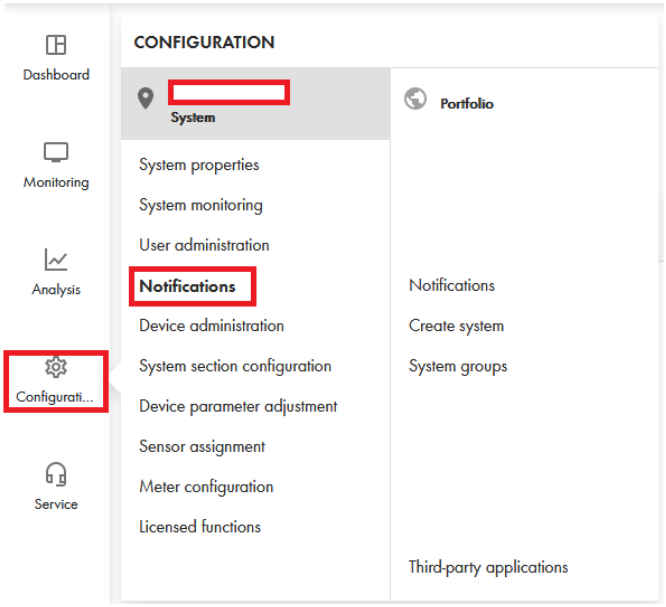


Image 20: *Notification*

3. Expand the drop-down menu at the top of the page and select the option **Event report for errors in accordance with the standard**.

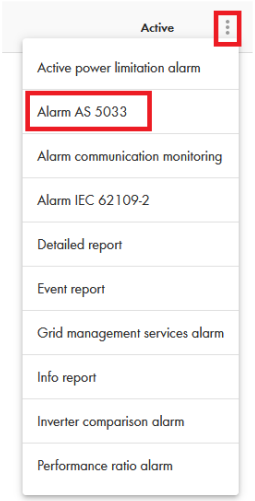


Image 21: *Event Report Selection*

4. Once selected the report is automatically created with the email used to login to Sunny Portal as the default address.

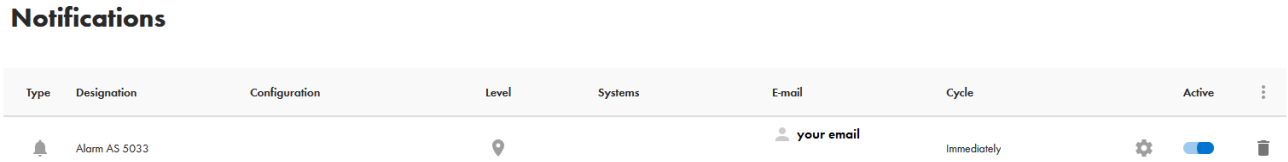


Image 22: *Earth Fault alarm*

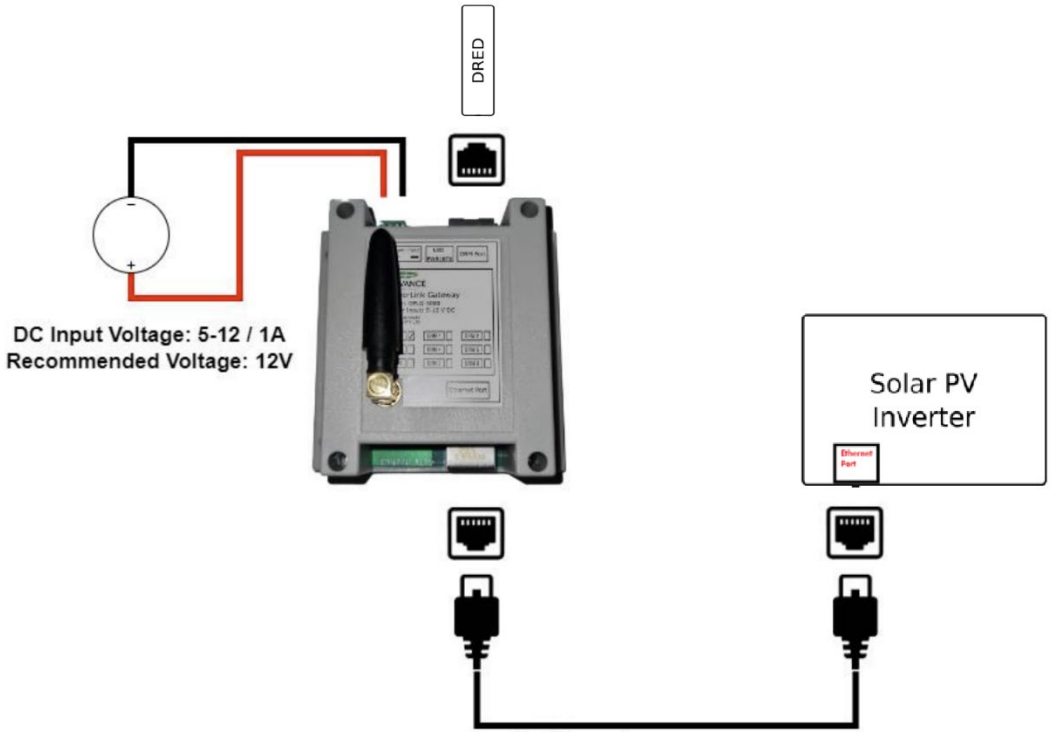
5. You have now set up the Earth Fault Alarm for your inverter.

9 DRED / DRM

9.1 Connection to a DRED

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

Olivance Powerlink - Olivance



The modbus TCP parameter must be enabled on the inverter.

1. Login to the inverter's WebUI as an installer, refer to section **3.1.2** or **4.1** depending on different connection methods.
2. Navigate to **Configuration > External Communication > Carry out initial configuration** and **check Enable Modbus server.**

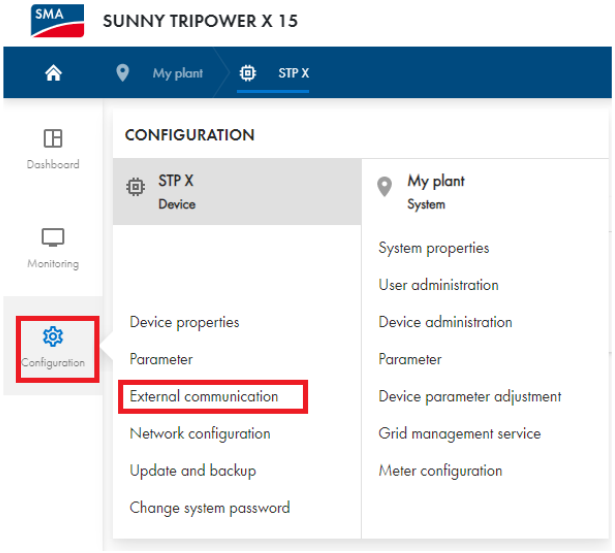


Image 23: *External Communication*

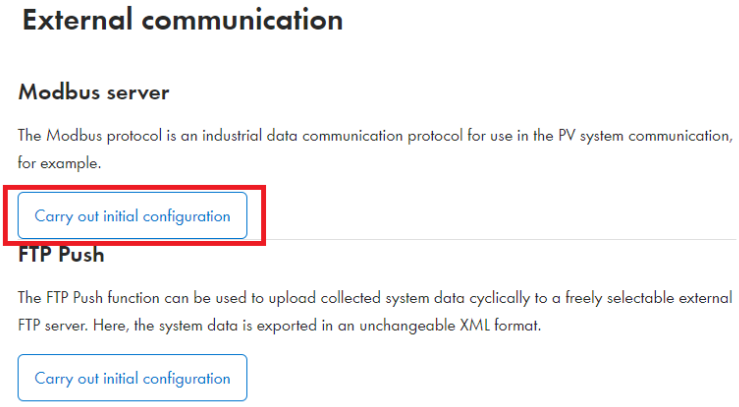


Image 24: *Modbus Configuration*

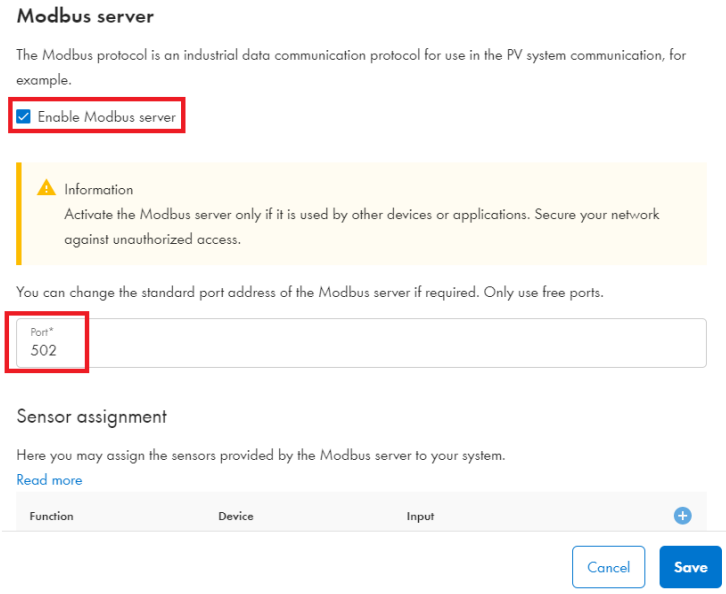


Image 25: *Enabling Modbus*

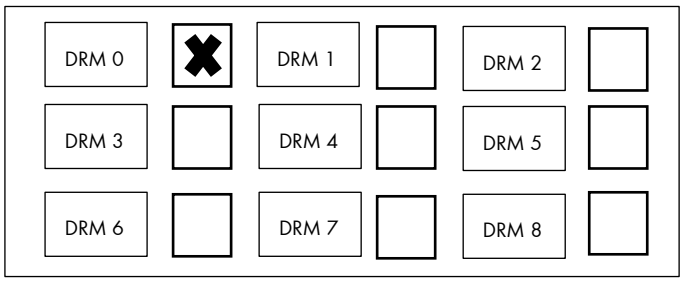
9.2 DRM Modes

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

STP 12-50, STP 15-50, STP 20-50, STP 25-50

9.3 DRM Labelling

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



Example DRM Model Label

Example DRM Port Label

10 Startup and Shut Down Procedure

Incorrect startup/shut down procedure can damage the inverter, make sure to follow the instructions below.

Please consult with a qualified person before performing the below steps.

10.1 Startup Procedure

1. If the DC load-break switch has been protected with a padlock, open and remove the padlock on the DC load-break switch.
2. Switch on the **DC load-break switch**.

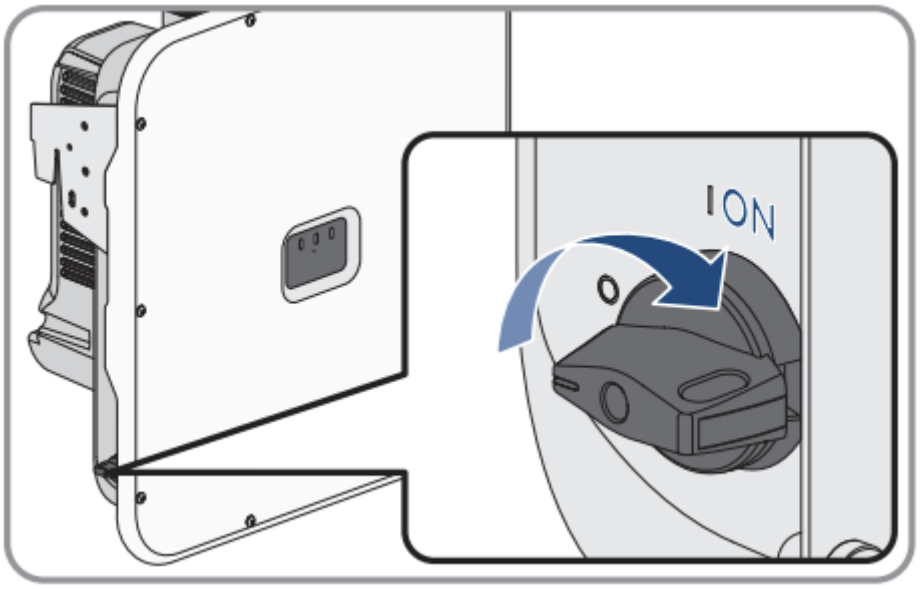


Image 26: *DC isolator on*

3. Switch on the **Main Switch - Inverter Supply**, marked in the switchboard.
4. Inverter LEDs should all turn on during initial startup, wait 60 seconds before checking.
5. If the green LED is still flashing, the conditions for activating feed-in operation are not yet met. As soon as the conditions for feed-in operation are met, the inverter starts with feed-in operation and, depending on the available power, the green LED will light up continuously or it will pulse.

10.2 Shut Down Procedure

1. Switch off the **Main Switch – Inverter Supply**, marked in the switchboard.
2. Switch off the **DC load-break switch**.

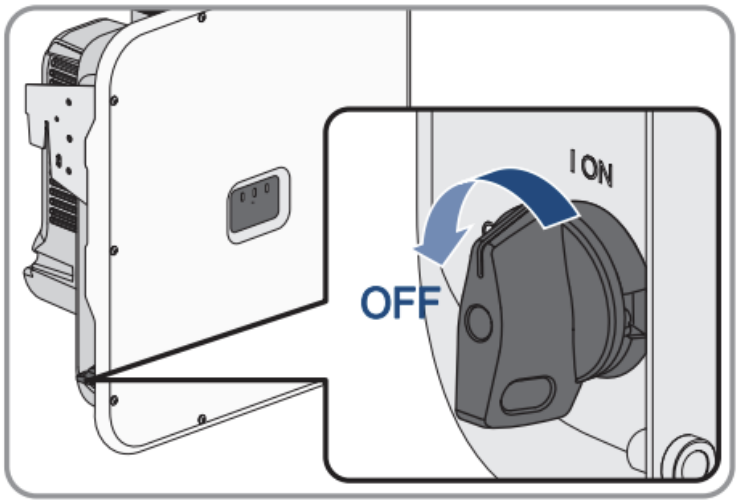


Image 27: *DC isolator off*

3. When required lock the **DC load-break switch**.

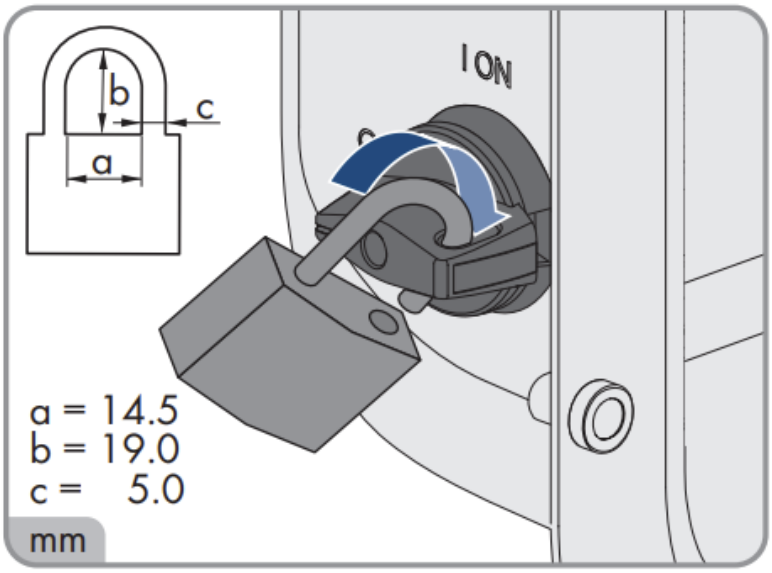


Image 28: Locking DC isolator

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.