

Battery Inverter

Sunny Island



Part 1: Off-grid Commissioning & Batteries

Presented by:

Dean Xue - Applications Engineer

Flexible. Reliable.
Made in Germany.



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Sunny Island Off-grid Part 1 Agenda



1	Off-grid Overview	10 min
2	Batteries	10 min
3	Commissioning	20 min
4	Q&A	20 min

SMA Sunny Island Systems



- **Off-grid systems up to 288kW**

Why it is a popular inverter:

- ROBUST
- RELIABLE
- FLEXIBLE
- COMPATIBLE WITH A RANGE OF BATTERIES
- FREE MONITORING
- 10YR WARRANTY



SUNNY ISLAND 4.4 / 6.0 / 8.0



Technical Data

Power (30min rating)	4.4 / 6.0 / 8.0 kW _{AC}
DC Voltage	48 V _{DC}
Efficiency	98.2% (max.) / 97.9% (η-euro)
Weight	44 kg
Dimensions	470 x 612 x 242 (W x H x D, mm)

Single Phase, Transformer

Main Benefits / Key Selling Points:

- > **Improved safety** with ELV battery input
- > **Reduce reliance on grid-supply** electricity & increase self consumption of PV electricity
- > Proven **reliability** in harsh Australian conditions
- > Full **grid support** capability
- > Suitable **for single and three phase** applications, and most common battery chemistries

Monitoring / Interfaces

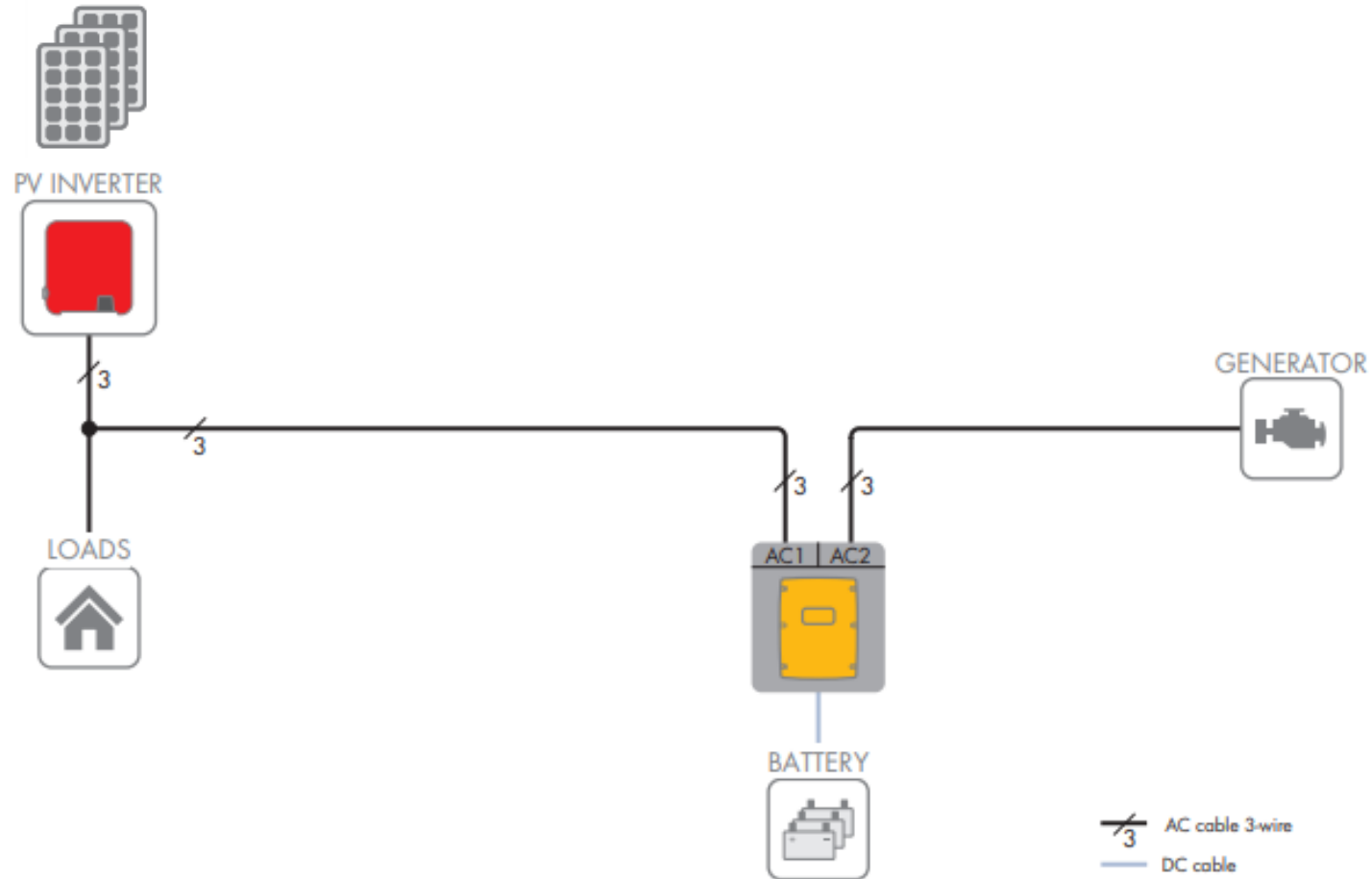
- > Ethernet, WLAN
- > COMSync, BatTemp, BMS
- > Free system monitoring & error reporting via Sunny Portal
- > Full visibility of energy flows from PV, Battery & Grid*

Models

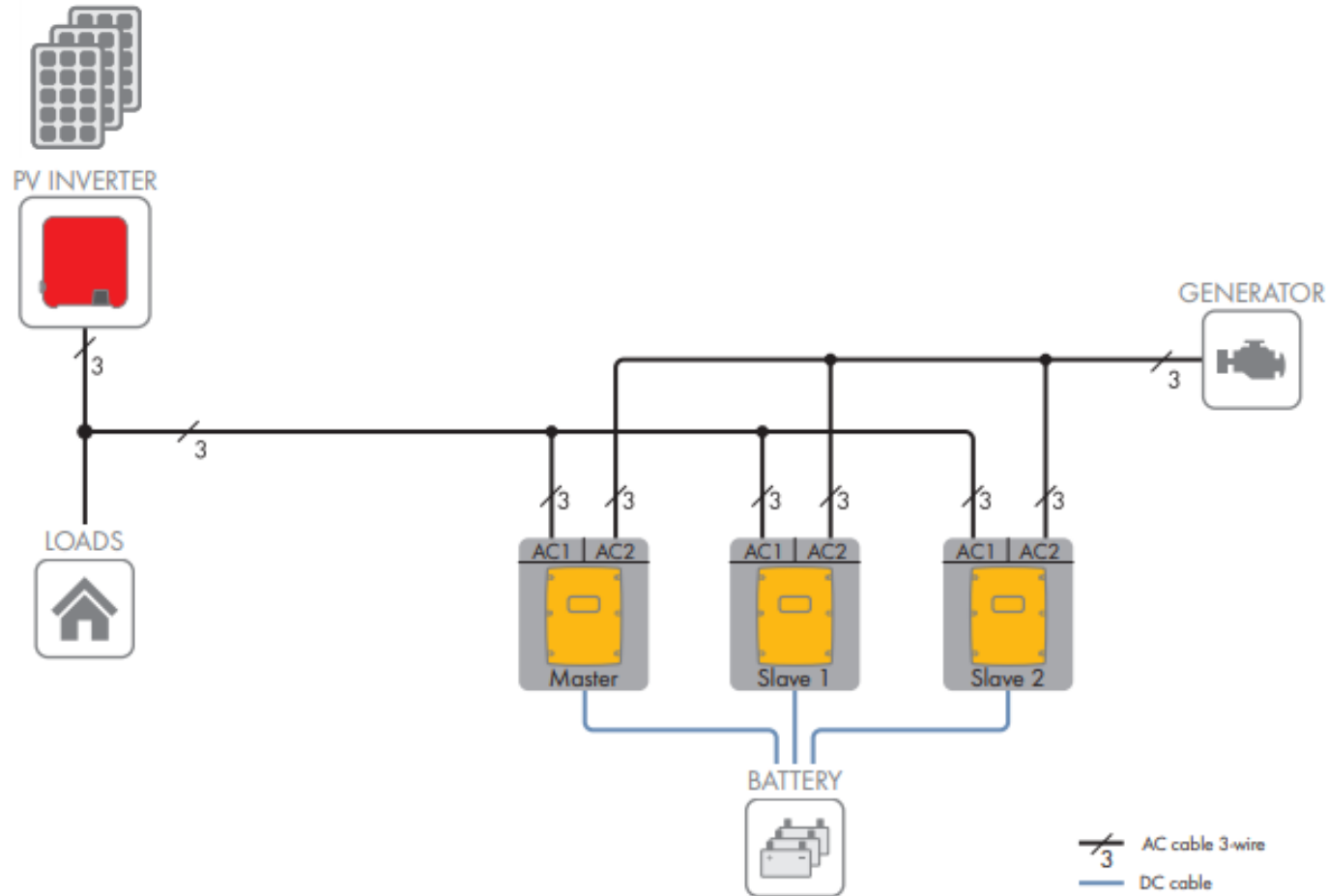
- > SI4.4M-13, SI6.0H-13, SI8.0H-13

* Grid as backup.

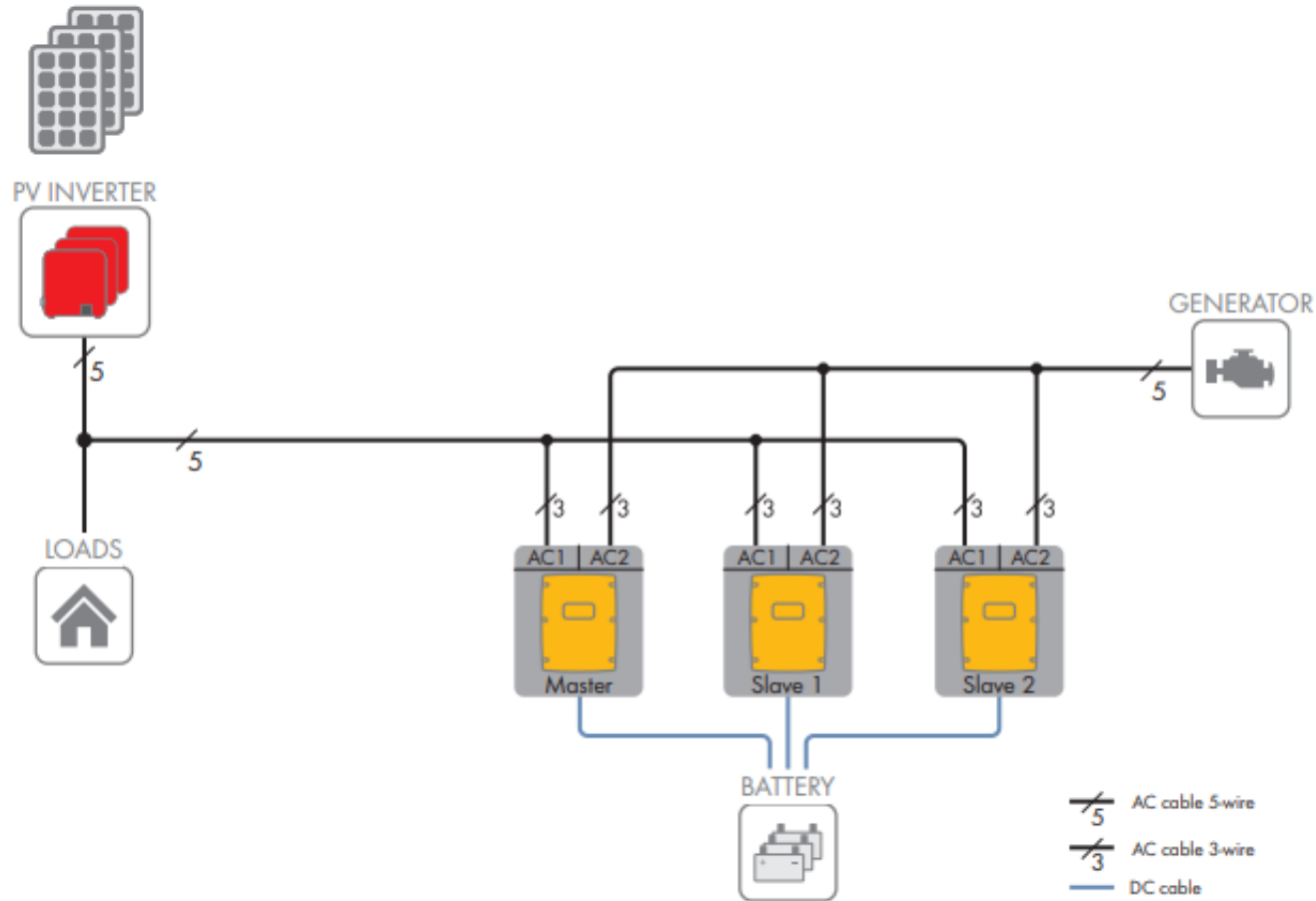
Single Phase AC Coupled Off-grid <8kW



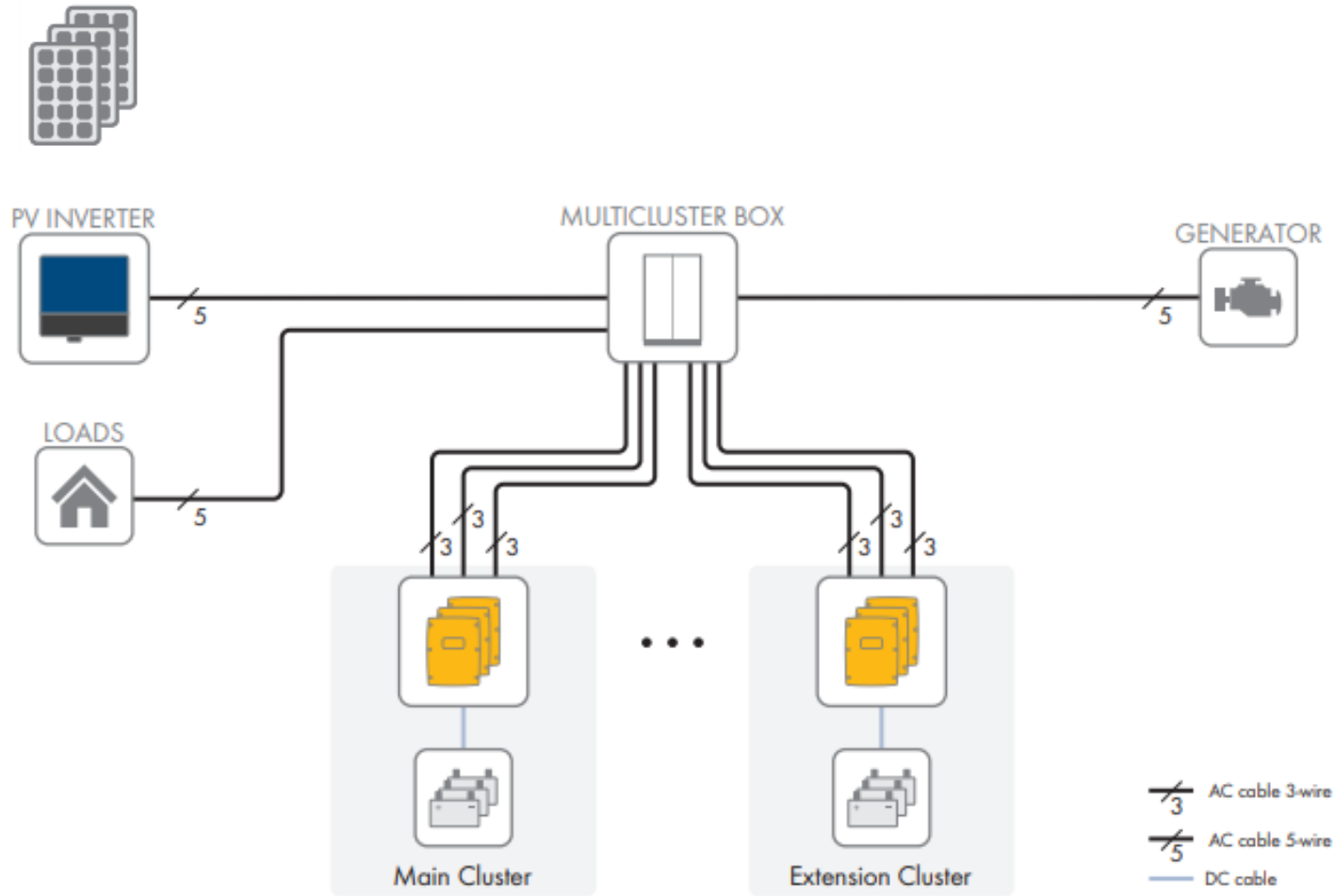
Single Phase AC Coupled Off-grid <24kW



Three Phase AC Coupled Off-grid <24kW



Multi-cluster < 288kW



Batteries



Lead Acid (FLA/VRLA)



Lithium Ion



Batteries – Lead Acid



Lead Acid (FLA/VRLA)



- Majority of Lead Acid batteries are compatible with SI.
- Always check with battery manufacturer for recommended charge settings prior to install, for battery longevity & warranty.
- Minimum sizing recommendation.
 - 100Ah/kWp of PV

Batteries – Managed Lithium-ion



Managed Lithium Ion



- **Only batteries tested by SMA R&D will be put into the battery compatibility list for Sunny Island.**
- **Undersized battery bank issues.**
 - Unexpected shut down
 - Overcharging due to sudden load change
- [Battery compatibility list for SI](#)
- **Minimum sizing requirement.**
 - 50Ah/kW_p of PV

Batteries – Unmanaged Lithium-ion

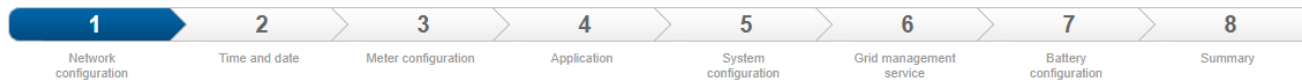


Unmanaged Lithium Ion



- **Unmanaged Lithium batteries while not officially supported by SMA can be used.**
- **Limited support from SMA service.**
- **Relies on battery manufacturer for correct charging parameters for safety reasons.**

Off-grid SI Commissioning Overview



Network configuration

Networks configured

Network name	Type of communication	IP address of the device	Status
	WLAN	██████	⊗ No connection
	Ethernet	██████	⊙ Ok

Type of communication

Ethernet WLAN

Automatic configuration switched on ⓘ
 Yes No

IP address ⓘ

Subnet mask ⓘ

Gateway IP ⓘ

DNS server IP ⓘ

Save and next

ⓘ User information

Network configuration

You can integrate the product, depending on its features, either into your local network via Ethernet using a cable or wireless via WLAN. Select the respective option under **Type of communication**.

Configuring Communication via Ethernet

You can either obtain the network settings automatically from a DHCP server or configure them manually. Select the desired option under **Automatic configuration switched on**.

If you want to configure the network settings manually, you have to enter the required network data additionally.

Direct Ethernet Connection

If you want to establish a direct connection to the device via a network cable, you need to activate the automatic configuration of the Ethernet interface. Select the option **Yes** under **Automatic configuration switched on**.

Information: You will find the IP address of the device on which you are currently logged into in the status bar below in the user interface after having completed the configuration procedure. You will require the IP address to call up the user interface in the local network.

With automatic configuration via DHCP, you can determine the IP address of the device assigned by the DHCP server by checking the settings of your router (refer to the router manual) or using network-scanning software.

Step 1 & 2: Network configuration/Date & Time

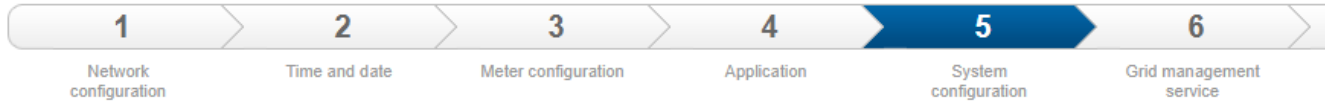
Step 4: Application

Step 5: System Configuration

Step 7: Battery Selection

Step 8: Summary

Step 5: System Configuration



System configuration

Type
Single phase

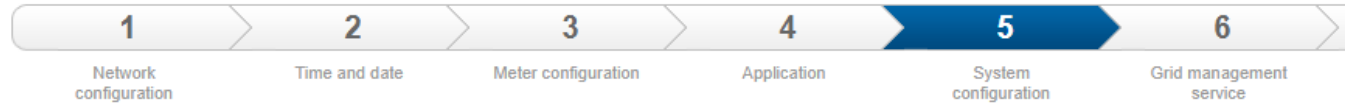
External sources
Generator

Nominal current
16.000 A
(0.000 A ... 80.000 A)

Back Save and next

Type > **1-Phase**
External Sources > **Generator/Mains/Both**
Nominal Current > **Current per phase (A)**

Step 5: System Configuration



System configuration

Type
Three-phase

System
Single-cluster

External sources
Generator

Nominal current
16.000 A
(0.000 A ... 50.000 A)

Type > **3-Phase**
System > **Single Cluster**
External Sources > **Generator/Mains/Both**
Nominal Current > **Current per phase (A)**

Back Save and next

Step 5: System Configuration



System configuration

Type
Three-phase

System
Multi-cluster

Cluster type in multi-cluster
Main-cluster

Type of AC distribution
Multicuster Box 6
Multicuster Box 12
Multicuster Box 12 2
Multicuster Box 36
Multicuster Box 6

Nominal current
60.000 A
(0.000 A ... 80.000 A)

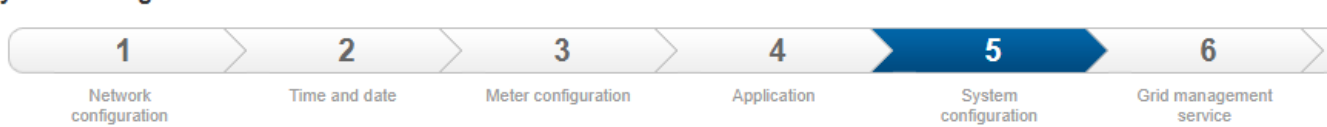
Back Save and next

- Type > **3-Phase**
- System > **Multi-cluster**
- Cluster Type in Multi-cluster > **Main-cluster**
- Type of AC Distribution > **Multi-cluster Box 6/12/36/12-20**
- External Sources > **Generator/Mains/Both**
- Nominal Current > **Current per phase (A)**

Step 5: System Configuration



System configuration



System configuration

Type
Three-phase

System
Multi-cluster

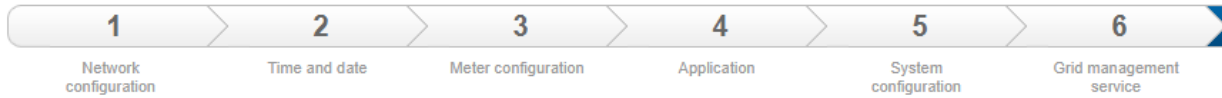
Cluster type in multi-cluster
Extension cluster

Address
1
(1 ... 11)

Back Save and next

Type > **3-Phase**
System > **Multi-cluster**
Cluster Type in Multi-cluster > **Extension cluster**
Address > **1-11**

Step 7: Battery Configuration



Battery configuration

Type

Lithium-Ion (Li-Ion) ▼

Flooded lead acid batt. (FLA)

Lithium-Ion (Li-Ion)

Valve Regulated Lead Acid battery (VRLA)

Nominal capacity

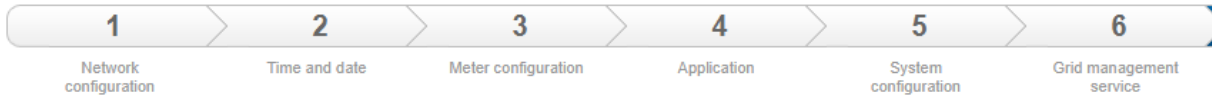
166 Ah

(50 Ah ... 10,000 Ah)

Back Save and next

Type > **Li-on**
Nominal Capacity > **Wh/48V for Li-on**

Step 7: Battery Configuration



Battery configuration

Type	Voltage	Nominal capacity
Valve Regulated Lead Acid battery (VRL) ▾	48V ▾	166 Ah (100 Ah ... 10,000 Ah)

Back Save and next

Type > **VRLA/FLA**
Nominal Capacity > **C10 rating**

Emergency charging of the battery > **Should only be used with support from SMA service and battery manufacturer.**

Step 8: Summary



Summary

Network configuration

Automatic speedwire configuration switched on	Yes
Wi-Fi is turned on	No

Time and date

Automatic time synchronization	Yes
Time zone	(UTC+10:00) Canberra, Melbourne, Sydney

Meter configuration

Speedwire meter serial no.	1901708796
----------------------------	------------

Application

Country standard set	Island mode
Set country standard	-----
Nominal voltage and frequency	230V_50Hz

System configuration

Cluster configuration	Single phase
Grid forming generator	Generator
Nominal generator current	10.000 A

Grid management service

Battery configuration

[Export all parameters](#) [Export the summary](#)

[Back](#)

[Continue](#)

i User information

Summary

The summary lists the settings made while running the installation assistant.

Confirm all settings are correct and then click on continue.

Battery Charge Settings (Lead Acid or Unmanaged Lithium)



▼ Charge		
Maximum charging current	<input type="text" value="81.130"/> A	(10.000 A ... 900.000 A)
Time for boost charge	<input type="text" value="2"/> h <input type="text" value="0"/> min	(1 min ... 10 h)
Time for equalization charge	<input type="text" value="0"/> d <input type="text" value="10"/> h	(1 h ... 2 d)
Time for full charge	<input type="text" value="5"/> h	(1 h ... 20 h)
Maximum discharge current	<input type="text" value="900.000"/> A	(0.000 A ... 900.000 A)
Cell charge nominal voltage for boost charge	<input type="text" value="2.40"/> V	(2.20 V ... 2.70 V)
Cell charge nominal voltage for full charging	<input type="text" value="2.45"/> V	(2.30 V ... 2.70 V)
Cell charge nominal voltage for equalization charge	<input type="text" value="2.45"/> V	(2.30 V ... 2.70 V)
Cell charge nominal voltage for float charge	<input type="text" value="2.25"/> V	(2.20 V ... 2.40 V)
Cycle time full charge	<input type="text" value="14"/> d	(1 d ... 180 d)
Cycle time equalization charge	<input type="text" value="40"/> d	(7 d ... 365 d)
Temperature compensation	<input type="text" value="0.004"/> V/°C	(0.000 V/°C ... 0.010 V/°C)

Maximum Charge Current >
In A(DC)

Duration >
Per charge cycle for Boost/Full/Equalisation

Charge Voltage >
Per cell for Boost/Full/Equalisation/Float

Cycle Time >
In days between Full/Equalisation charge

Temperature Compensation >
In V/°C above/below 25 °C

Battery Protection Settings



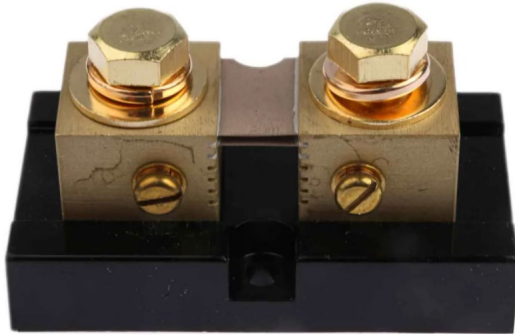
Protection mode		
Start time [A]	22:00:00	(00:00:00 ... 23:59:59)
Start time [B]	17:00:00	(00:00:00 ... 23:59:59)
End time [A]	06:00:00	(00:00:00 ... 23:59:59)
End time [B]	09:00:00	(00:00:00 ... 23:59:59)
Limit of battery state of charge [A]	20.0 %	(1.0 % ... 70.0 %)
Limit of battery state of charge [B]	15.0 %	(1.0 % ... 70.0 %)
Limit of battery state of charge [C]	10.0 %	(1.0 % ... 70.0 %)

Start/End Time [A] > Start and finish of battery protection level 1.

Start/End Time [B] > Start and finish of battery protection level 2.

Limit of battery state of charge A/B/C > Default 20%/15%/10%

Battery Shunt (Lead Acid/Unmanaged Lithium)



Use of DC shunt.

- For DC/DC chargers
- Improve SI SOC calculations

Compatible with 50mV/60mV shunts

Current Sensor Type > 50mV/A or 60mV/A

Current Sensor gain > In (A)

Battery current sensor > **Execute**
Sunny Island needs to be in standby

Current sensor type (60mV 50mV)
50 mV/A
60 mV/A

Current sensor gain (0 A ... 1,800 A)

Calibration

Battery current sensor



QUESTIONS?

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The background of the slide is a photograph of a swimming pool. In the foreground, a person is diving into the water, creating a large splash. In the background, two other people are standing on the pool deck, watching. The scene is set outdoors with lush green trees and a bright sky. The text 'Thank you!' is overlaid in large white font on the left side of the image.

Thank you!

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