

SP PRO SelectSun Managed AC Coupling Installation Notes



SP PRO SelectSun Managed AC Coupling

INTRODUCTION

The SP PRO Managed AC Coupling provides a method of linking the SelectSun three phase string inverter to the SP PRO via the AC Load supply so that regardless of whether the grid or a generator is connected, the SP PRO can manage and control the SelectSun three phase string inverters. The SelectSun can only be AC coupled with three SP PRO inverters in an advanced Multiphase configuration.

Note: This document needs to be read in conjunction with the SP PRO Instruction Manual and SelectSun Instruction Manuals.

Applicable SelectSun models	AMP Three Phase kit	Wireless Kit	Suitable System Application	
			Off Grid	On Grid
Order				
SelectSun 20K Order code: 005301	Order code: 005304 (Required)	Order code: 005326 (Optional)	✓	✓
SelectSun 40K Order code: 005302	Order code: 005304 (Required)	Order code: 005326 (Optional)	✓	✓

IMPORTANT INFORMATION

- The SelectSun can only be configured while minimum 200Vdc is applied to the solar inputs.
- Make sure the AMP Three Phase kit is on site (Order code 005304).
The SelectSun will not communicate to the SP PRO without the kit.
- For Wireless RS485 communication please order the SelectSun Wireless RS485 link kit (Order Code: 005326).
- To extend the range of the wireless devices, please order the Patch Antenna (Order code 004810).

ADDITIONAL INFORMATION

For more installation information go to: <http://www.selectronic.com.au/manuals/>

This document applies for SP PRO Series II Rev 21 and above

SP PRO SelectSun Managed AC Coupling Installation Notes



INSTALLATION CHECK LIST

The follow table summarises the steps taken to set up a SelectSun in a Managed AC Coupled system. Once the system has been installed, use the following table to check off that each step has been completed.

Refer to the pages following the tables for detailed information on each of the installation steps.

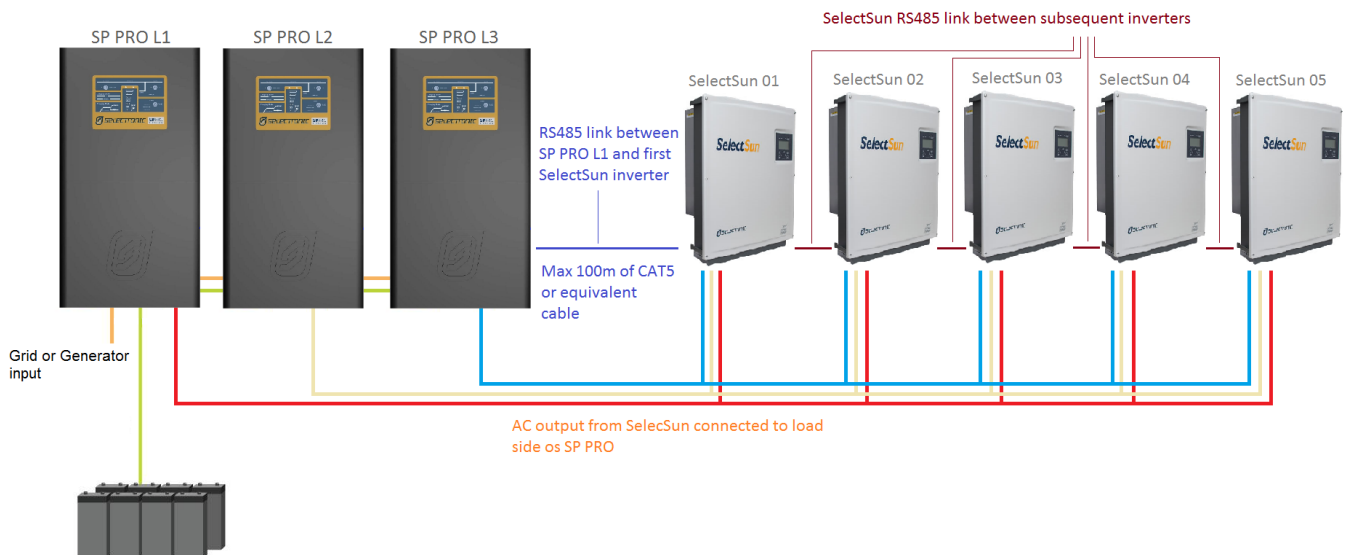
Installation step		Pages	SP PRO Series 2
1	Install SP PROs as per manual		✓
2	Install and Configure batteries		✓
4	SP PRO Firmware Requirement – 11.00 or higher	5	✓
5	SelectSun AC Wiring	6	✓
6	SelectSun Communications connection for SelectSun Inverter 01	8	✓
7	SelectSun Communications link for multiple installed SelectSun Inverters	10	✓
8	Configure SP PRO Note: The SP PRO must be configured via SP LINK "Site Configuration Wizard" before configuring SelectSun Inverter	11	✓
9	Configure the SelectSun inverter for the first time	12	✓
10	Test system function	16	✓

SP PRO SelectSun Managed AC Coupling Installation Notes



THE OVERVIEW

The diagram below shows a managed AC coupled system with five SelectSun inverters.



System Requirements

To successfully install an SP PRO SelectSun managed system, there are particular requirements that need to be met.

- Combined maximum AC output of all the connected SelectSun inverters must not exceed twice the continuous rating of the SP PRO.
- Battery bank must be sized to suit the SP PRO model and the combined maximum AC Output power of the SelectSun inverters.
- SP PRO inverter must have firmware version 11.00 or greater.
- Maximum of five SelectSun inverters per three phase.

SP PRO SelectSun Managed AC Coupling Installation Notes



MINIMUM BATTERY CAPACITY FOR SOLAR HYBRID & OFF GRID SYSTEMS

Each application will have a minimum battery capacity and a maximum allowable PV, please refer to the battery manufacturers data sheet as well as the guidance given in the SP LINK Site Configuration Wizard.

Note:

- a. For a Solar Hybrid (grid connected) system, the minimum battery capacity that must be connected to the SP PRO varies depending on SP PRO model.
When the system is islanded (e.g. during a grid outage) the SP PRO will limit the output of the AC coupled solar based on the actual installed battery size.
- b. For an Off Grid system, the minimum battery capacity that must be connected to the SP PRO varies depending on SP PRO model, an overriding minimum battery capacity and the combined maximum SelectSun AC Output.

SP PRO SelectSun Managed AC Coupling Installation Notes



SP PRO FIRMWARE REQUIREMENTS

1. SP PRO Software Version 11.00 or higher is required. To check software revision run SP LINK, connect to the SP PRO and go to Data View – Technical Data – “SP PRO Revision” and “Software Version”
 2. The SP PRO must be Series II and revision 21 or above.
- Older revisions of firmware must be updated to firmware revision 11.00 or higher.
 - Do **NOT** change any configuration settings until firmware is updated.

Inverter	
SP PRO Model	Control Board Serial
SPMC482-AU	139787
SP PRO Ratings	Control Board Revision
48V DC, 7.5kW, 240V AC	23
SP PRO Serial Number	Control Board Mod Status
141419	
SP PRO Revision	Power Board 1 Serial
21	138797
SP PRO Mod Status	Power Board 1 Revision
	4
Software Version	Power Board 1 Mod Status
11.00 M4	
String Inverters Supported	Power Board 2 Serial
Fronius	138749
Grid Connect SW Version	Power Board 2 Revision
2.00	4
SP PRO Total Run Time	Power Board 2 Mod Status
19207.2 h	

Data View – Technical Data screen

SP PRO SelectSun Managed AC Coupling Installation Notes



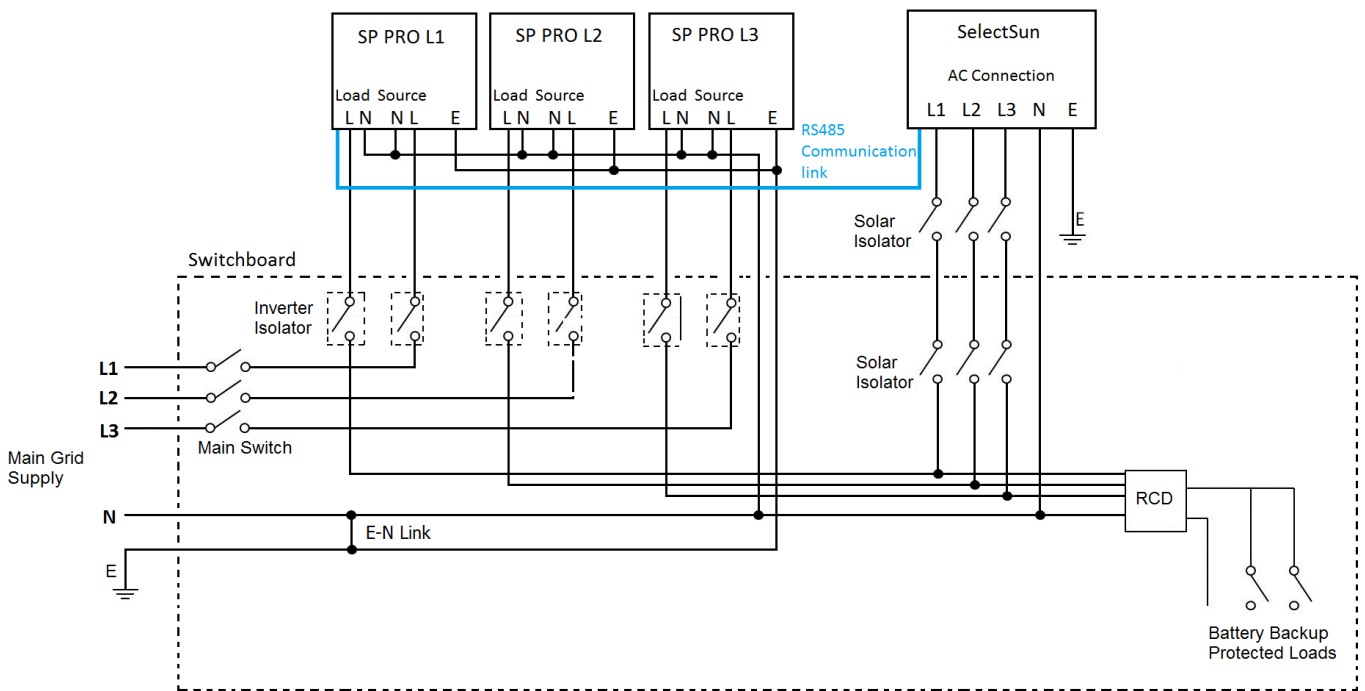
INSTALLATION

The SP PRO must be installed in an advanced three phase configuration. Refer to IN0052_01 Installation of an Advanced Multiphase system.

It is good practice to number each SelectSun inverter from 1 up to 5 so that each inverter can be easily referenced within SP LINK.

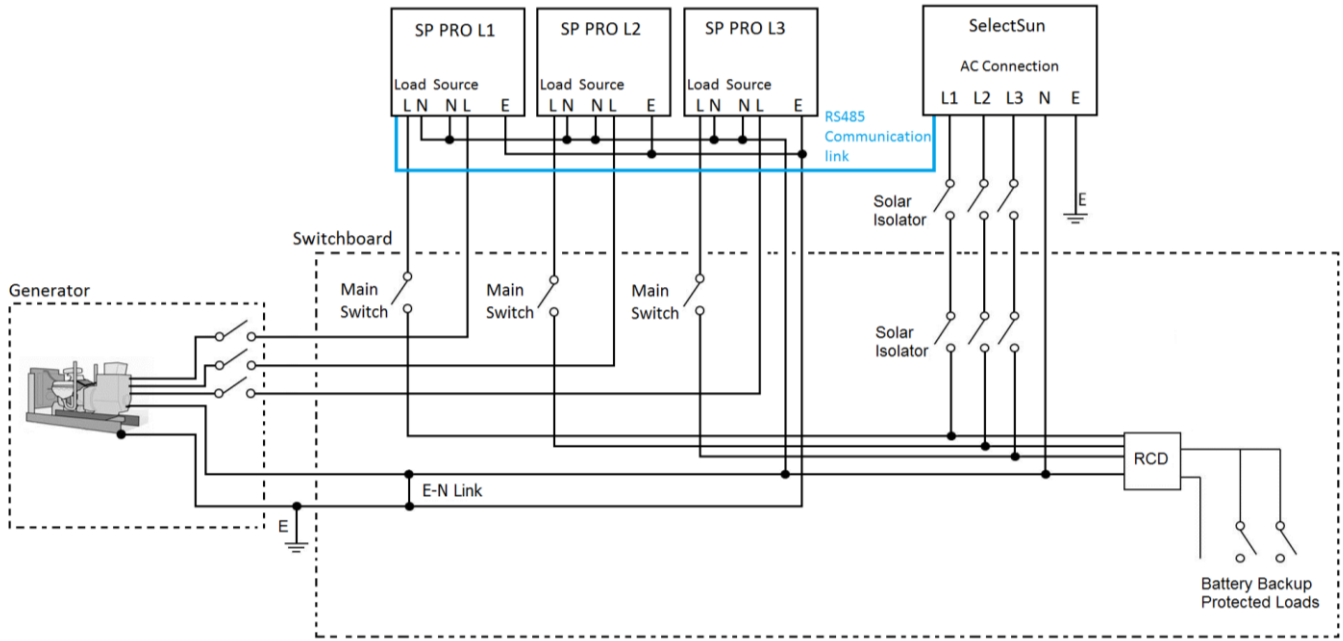
SELECTSUN AC WIRING

The SelectSun AC output wiring must be connected to the AC Load terminals of the SP PRO in accordance with local wiring rules for correct operation.



SelectSun AC Wiring guide for Grid connected installation

SP PRO SelectSun Managed AC Coupling Installation Notes



SelectSun AC Wiring guide for Off Grid installation

Note: The system will NOT function correctly if the SelectSun inverters are installed on the AC Source side of the SP PRO.

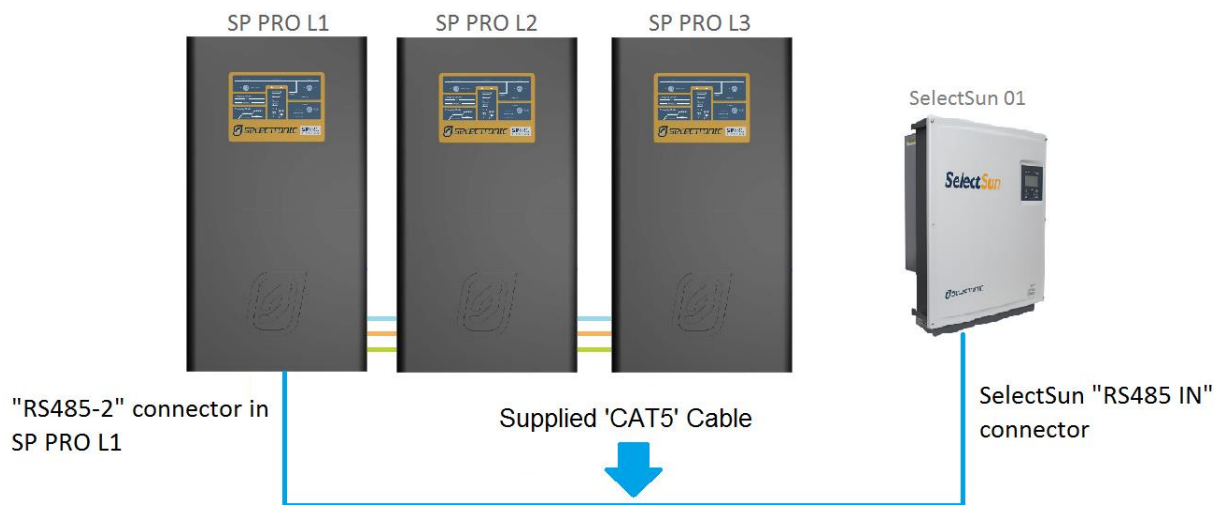
SP PRO SelectSun Managed AC Coupling Installation Notes



RS485 CONNECTION TO FIRST SELECTSUN

The communication link always starts at the SP PRO L1 and links to the SelectSun inverter 01 "RS485 IN", then connects to all the SelectSun inverters in a daisy chain arrangement and finishes at the last SelectSun inverter.

NOTE: The SelectSun requires the AMP Three Phase kit to successfully communicate to the SP PRO (Order code: 005304).



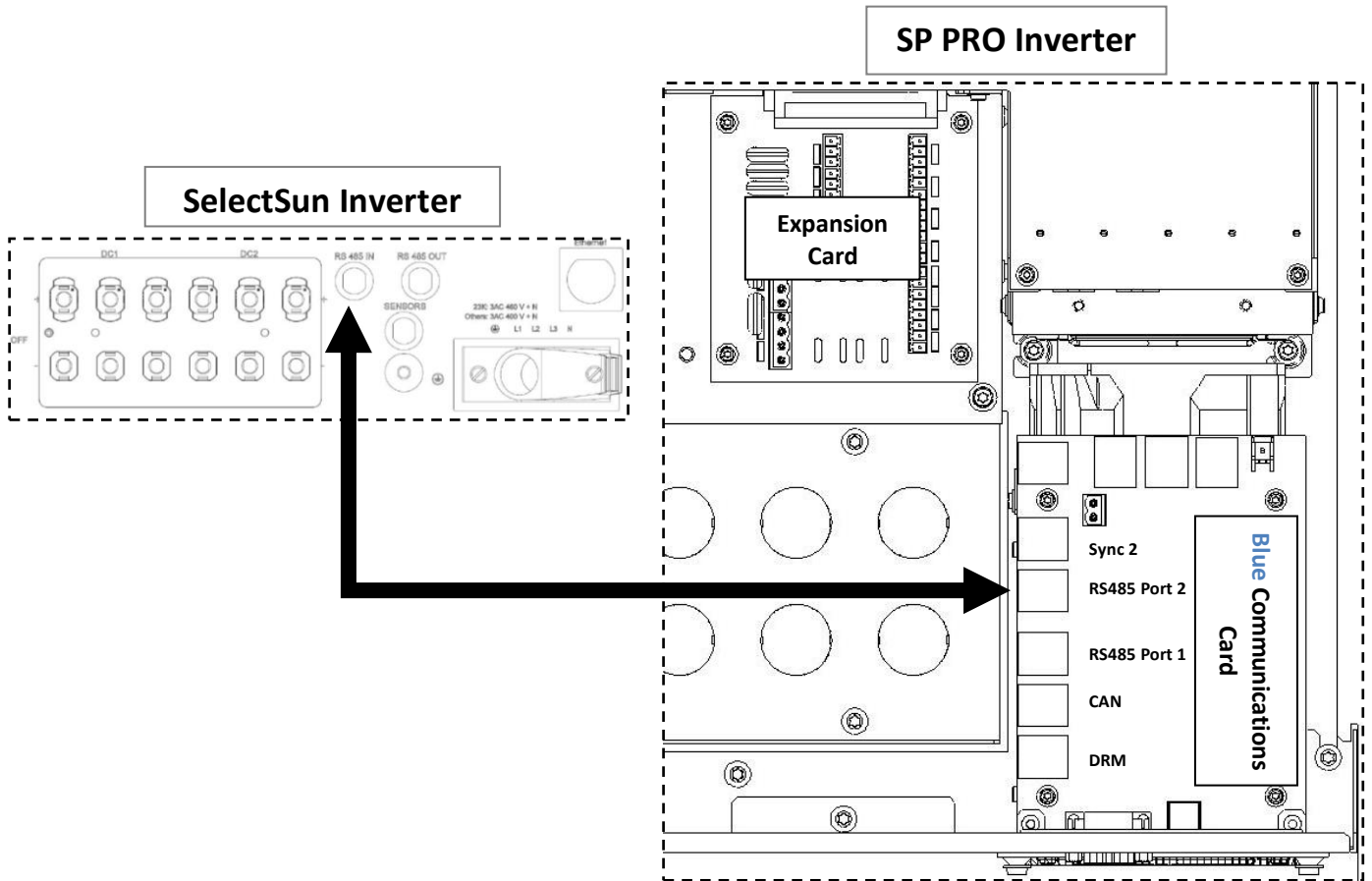
Connect the two supplied SelectSun communication loom to SelectSun inverter 01 "**RS485 IN**" and "**RS485 OUT**".



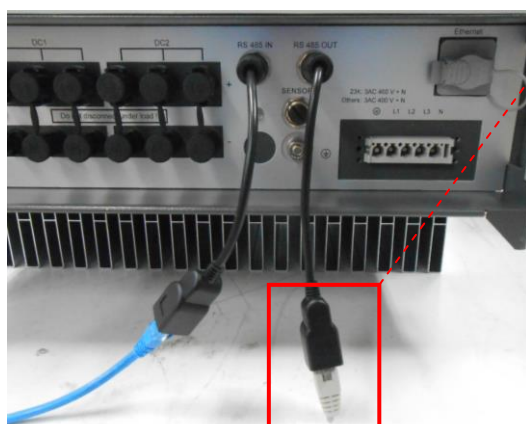
SP PRO SelectSun Managed AC Coupling Installation Notes



Using the supplied 'CAT5' network cable connect one end to the SP PRO serial communication PCA **RS485 Port 2** and the other end to SelectSun inverter 01 "**RS485 IN**".



The last SelectSun inverter of the daisy chain must be terminated. Connect the supplied RJ45 termination connector to SelectSun "RS485 OUT".



SP PRO SelectSun Managed AC Coupling Installation Notes



CONNECTING SELECTSUN LINK BETWEEN INVERTERS 02 TO 05

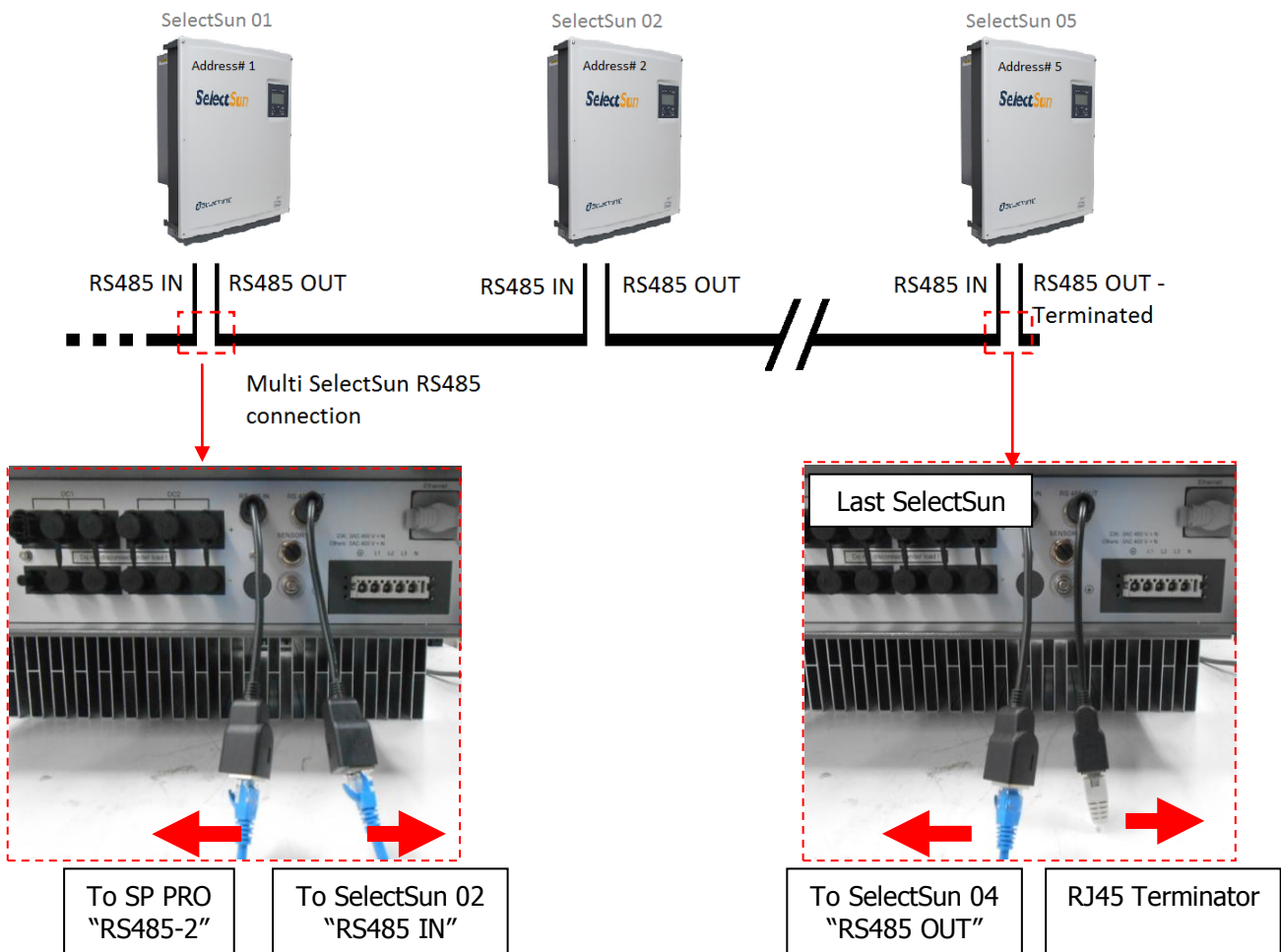
The following configuration outlines the connection for multiple SelectSun inverters to the first SelectSun inverter (SelectSun inverter 01).

If only a single SelectSun inverter is installed, skip to the next section page 11 (CONFIGURATION – ADDITIONAL SETTINGS)

Located on the bottom of the SelectSun inverter there are two RS485 connectors labelled as "RS485 IN" and "RS485 OUT". The SelectSun RS485 is designed to interface with multiple SelectSun inverters in a daisy chain arrangement as shown below.

When looping a SelectSun inverter to another SelectSun inverter, use a network patch lead and connect the "RS485 OUT" from Inverter 01 to "RS485 IN" of inverter 02 and "RS485 OUT" from inverter 02 to "RS485 IN" of inverter 03... etc, until all inverters in the system are connected.

The last SelectSun inverter of the daisy chain must be terminated. Connect the supplied RJ45 termination connector to SelectSun "RS485 OUT".



SP PRO SelectSun Managed AC Coupling Installation Notes



CONFIGURATION – ADDITIONAL SETTINGS

It is recommended that the Site Configuration wizard (in SP LINK 11.00 or higher) be used to configure the SP PRO settings. Using the wizard will ensure all SP PRO settings are compatible with the managed AC coupled system.

The settings detailed below will be set when the Site Configuration Wizard is used to configure the SP PRO. Only the settings required to enable SelectSun Managed AC Coupling are shown. The remainder of systems settings will be set by the Site Configuration Wizard.

The SP PRO **must** be configured **before** any of the SelectSun inverters are energised.

Make sure in the SP LINK tab CONFIGURATION SETTINGS > SYSTEM the follow settings are set.

- Set **String Inverter** to **SelectSun**.
- **Number of Devices** is set to the number of SelectSun inverters installed in the system.

The screenshot shows the 'Managed AC Coupled Solar' configuration window. The 'Islanding Power Limit*' is set to 4.8 kW. The 'AC Source Limit Monitor' section has 'Monitoring Direction' set to 'Export' and 'Trip Power Limit' set to 50.00 kW. The 'Trip Time*' is set to 5 seconds. The 'L1' section has 'String Inverter*' set to 'SelectSun' and 'Number of Devices*' set to 1. 'Fallback Power' is set to 'Disabled'.

SP LINK - Configuration Settings – System tab

In the example used above, one SelectSun inverter is connected to the SP PRO.

SP PRO SelectSun Managed AC Coupling Installation Notes



SELECTSUN CONFIGURATION

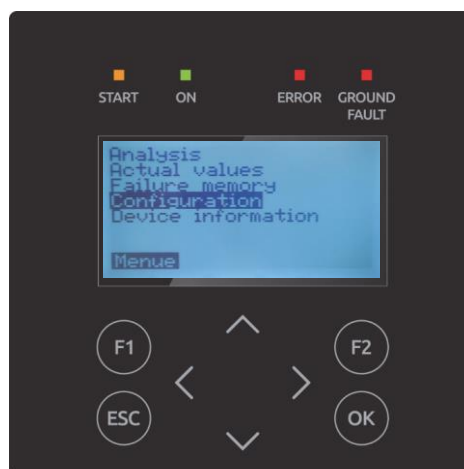
The settings listed below are required to be configured in each SelectSun inverter in order for the system to operate correctly.

Each SelectSun inverter must be set to an inverter **Slave address from 1 to 5** as appropriate.

1. Isolate the AC and connect the DC supply to the SelectSun inverter(s) and ensure that the DC supply (Minimum 200Vdc) is present at the SelectSun inverter.
2. When the SelectSun inverter is powered for the first time, Step through the initial stages of commissioning the inverters Country Code, Grid select...etc, until the following is displayed on the screen.



3. Once the display is active on the SelectSun inverter, enter the main menu. To enter main menu, press the **F1** button once, then using the **DOWN** key (∇), scroll to "**Configuration**" and press **OK**. The **ESC** is also used to escape back to the previous menu.



SP PRO SelectSun Managed AC Coupling Installation Notes



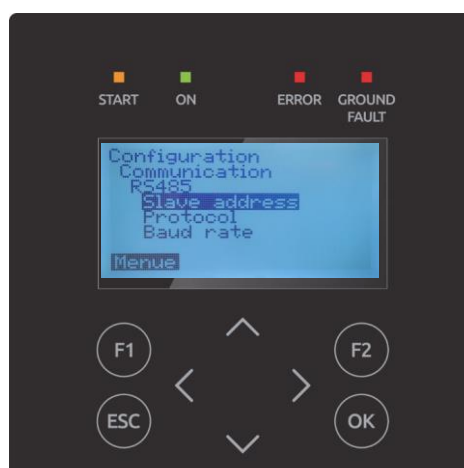
4. Scroll to **Communication** and press **OK**.



5. Scroll to **RS485** and press **OK**.



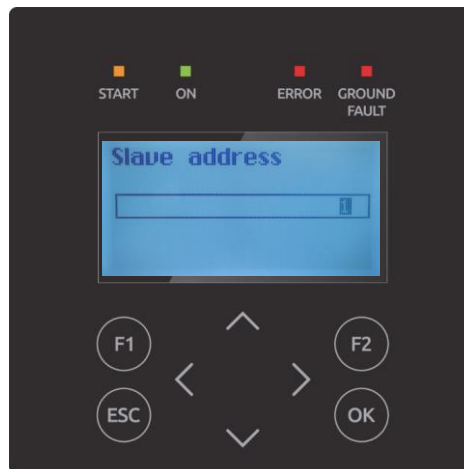
6. Scroll to **Slave address** and press **OK**.



SP PRO SelectSun Managed AC Coupling Installation Notes

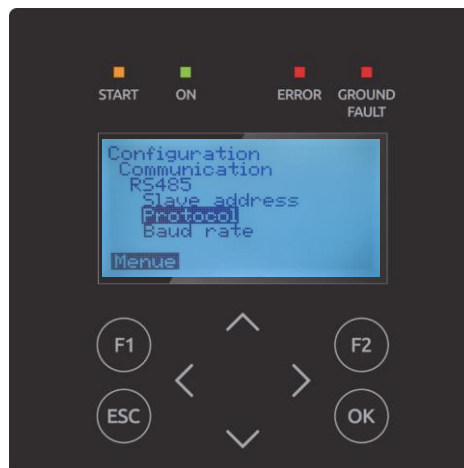


7. Set the **Slave address** and press **OK**.



- If only one SelectSun inverter is installed then the address must be set to 1.
- If more than one SelectSun inverter is installed then the address must be allocated sequentially starting from 1 (i.e. first SelectSun = 01, second SelectSun = 02, third SelectSun = 03 etc)
- Once the "Inverter Number" is selected, press the **OK** button to configure and return to the "RS485" menu.

8. Scroll to **Protocol** and press **ENTER**.



SP PRO SelectSun Managed AC Coupling Installation Notes



- Set the **Protocol** to 4 and press **OK**. This must be applied for all SelectSun inverters installed.



- Press the **ESC** button four times to return to the main display.



- If there are multiple SelectSun inverters installed, repeat for all others.
- When all is configured, the SelectSun inverter display screen will cycle through the amount of energy currently fed automatically.

Continue to section "System Commissioning – Additional Tests" page 16

SP PRO SelectSun Managed AC Coupling Installation Notes



SYSTEM COMMISSIONING – ADDITIONAL TESTS

In addition to the normal system testing that would be performed, the following additional tests must be performed as detailed below.

Note: Make sure that only DC is connected at this stage.

COMMUNICATIONS LINK VERIFICATION

The correct operation of the SelectSun Managed AC Coupling relies on the Communications Link. It is vital that the communications link (RS485) connection has been setup correctly before operating the AC coupled system.

1. Check that all the RS485 connections have been connected correctly.
2. Isolate the AC and connect the DC supply to the SelectSun inverter. Make sure that the DC supply is present at the SelectSun inverter and its display is on.
3. Using SP LINK, connect to the SP PRO. In the Data View > Now tab there should be a model number displayed for each of the installed inverters.

AC Coupled Solar #1
SelectSun 20
RS485 Device Address: 1

AC Energy Today
0.0 kWh

AC Power
0.00 kW

AC Volts
0.0 V

AC Current
0.0 A

DC Power
0.00 kW

DC Volts
199.0 V

DC Current
0.0 A

Temperature
24 °C

AC Power Peak Today
0.00 kW

The communication link may be further tested using the AC Solar Link Test found in SP LINK under the Service Settings tab.

1. In the Service Settings tab click the "Reset Counters" button.
2. Wait 2 minutes and check that the error count remains at zero for all the connected SelectSun inverters. (An error count of 5 or less per minute is acceptable but in this case it is good practice to check the wiring and that the termination resistors are set correctly in the SP PRO and SelectSun.

Once the Communications link has been verified for each SelectSun inverter, the AC feeds to each SelectSun inverter can be switched on and full system testing and verification can be performed.

TESTING THE FAILSAFE ON THE RS485 LINK

Once the system is operational, unplug the RS485 communications link from the SP PRO to the SelectSun inverters. Wait 1 minute and check that the output of each of the SelectSun inverters has dropped to approximately 0.1kW.

AC Solar Link Test
Errors or non-responses from grid-tie inverters can indicate quality of link.

Counting while grid tie inverter is off is normal.

Link #1 0

Link #2 0

Link #3

Link #4

Link #5

Reset Counters

SP PRO SelectSun Managed AC Coupling Installation Notes



Appendix I: Wireless RS485 for SelectSun Link

INTRODUCTION

This instruction will show how to install the Wireless RS485 link Kit (Order code 005326).

This details the additional steps needed to install a Wireless RS485 link into a SP PRO SelectSun Managed AC Coupled system.

Important information

1. This document needs to be read in conjunction with:
 - SP PRO AU Instruction Manual
 - Relevant SelectSun Installation Manual
2. SD1100 RS485 Wireless adaptors are powered from the supplied plug packs. The plug packs must be connected to the same AC power circuit as the connected SelectSun inverters. This is normally the AC load side of the SP PRO.
3. To extend the range of the wireless devices, please order the Patch Antenna (Order code 004810).

Additional information

Selectronic web site – <http://www.selectronic.com.au> or contact the Selectronic team.

Legend to diagrams in this document



SP PRO inverter



SelectSun Three Phase Grid inverter



SD1100 RS485 Wireless adaptor with dipole antenna



SD1100 RS485 Wireless adaptor with patch antenna

SP PRO SelectSun Managed AC Coupling Installation Notes



OVERVIEW

The diagrams below illustrate the options for three phase managed AC coupled system with SelectSun inverters.

NOTE: When using multiple Wireless RS485 device pairs use Patch Antennas on each of the devices at the local end of the system (SP PRO end). This will reduce the interference between devices. Keep patch antennas separated by a minimum of 300mm.

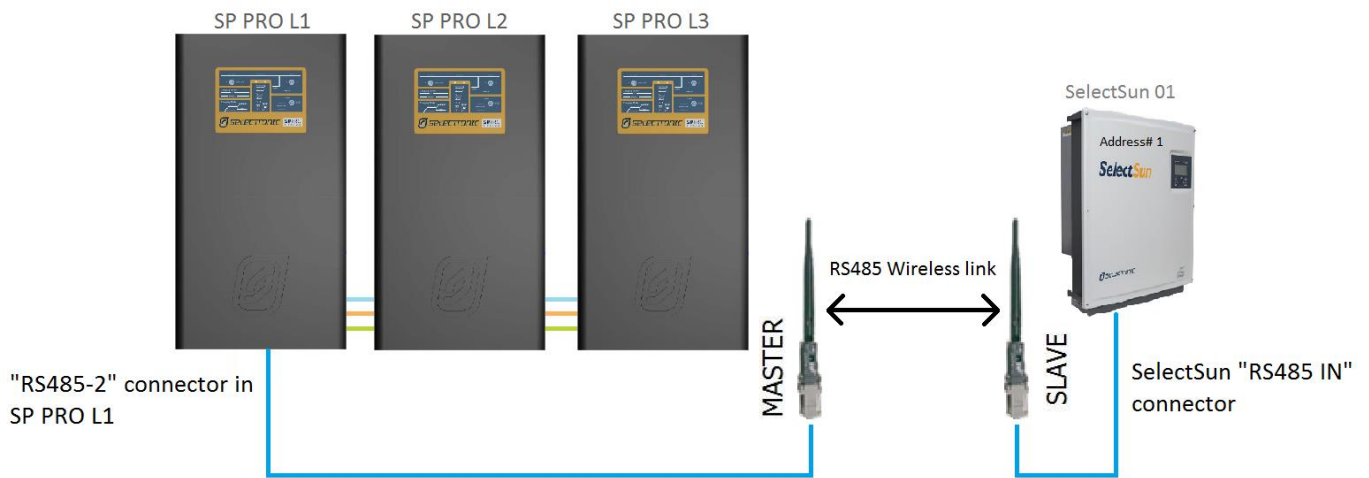


Figure 1: Three phase system with one wireless SelectSun

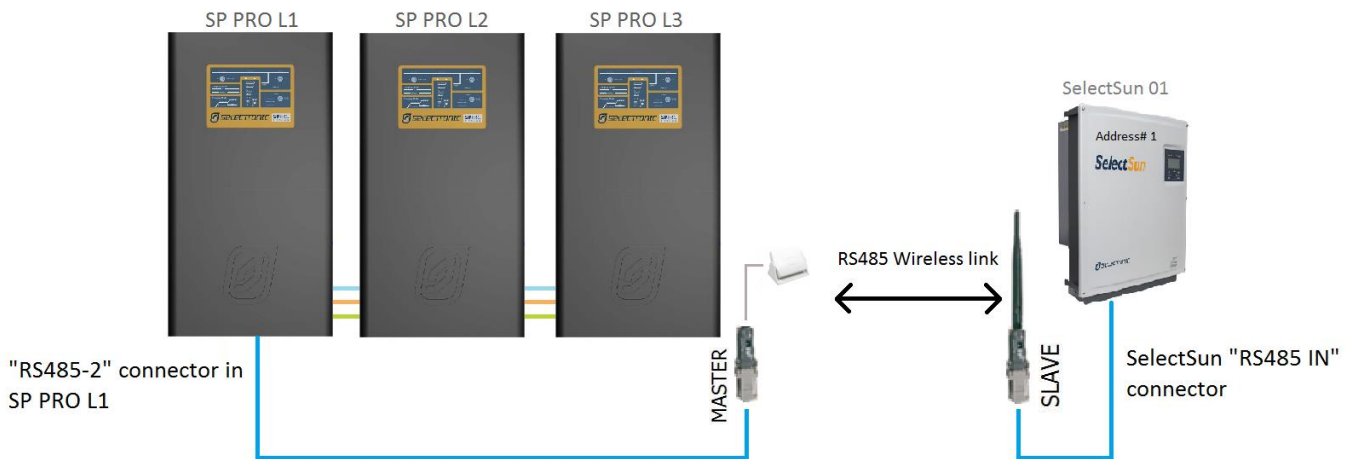


Figure 2: Three phase system with one wireless SelectSun using Patch Antenna

SP PRO SelectSun Managed AC Coupling Installation Notes

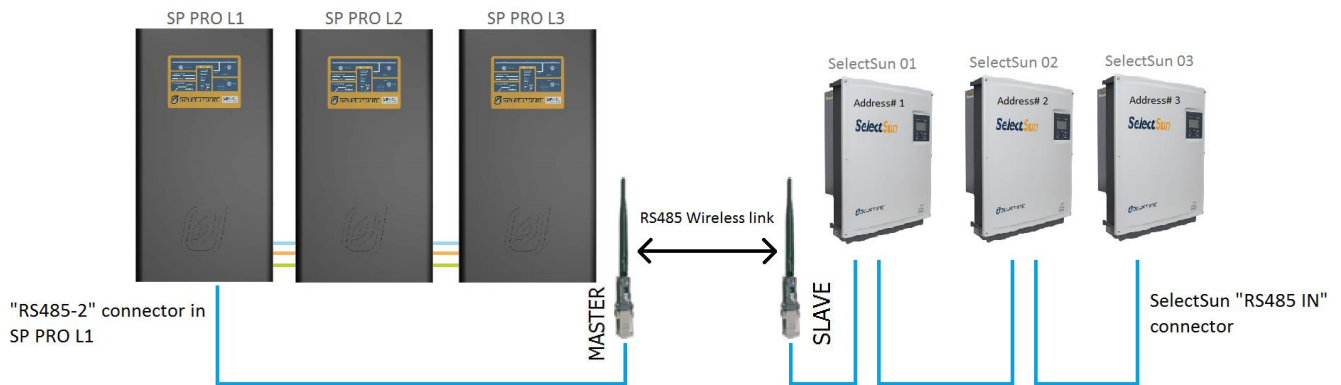


Figure 3: Three phase system with multiple wireless SelectSun's

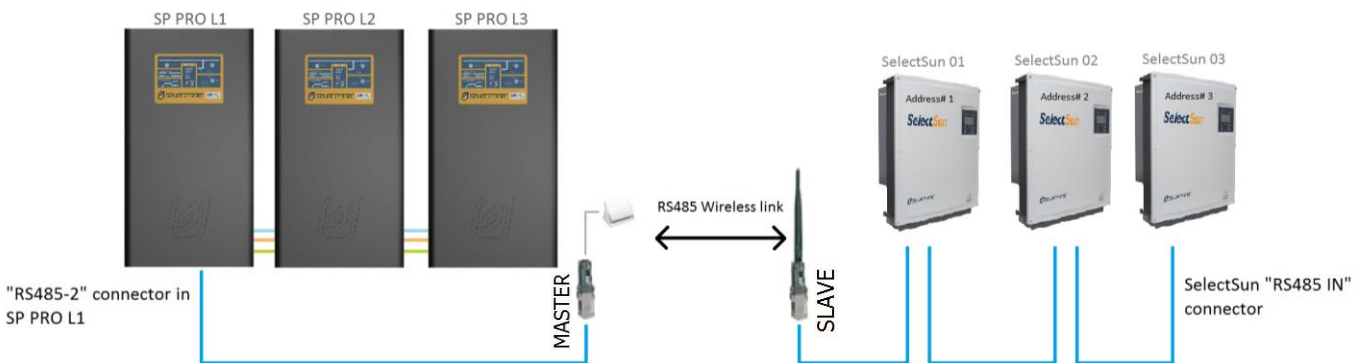


Figure 4: Three phase system with multiple wireless SelectSun's using Patch Antenna

SP PRO SelectSun Managed AC Coupling Installation Notes



WIRELESS LINK RESTRICTIONS

The wireless link uses the same frequency band as Wi-Fi and Bluetooth (2.4GHz). Any obstructions between the two devices or interference from other devices using the same frequency band (other blue tooth or Wi-Fi devices) will have a significant impact on their range.

To achieve the maximum range of 200m there must be line of sight between the two devices and no interference. As a rule of thumb each obstruction that is equivalent to a stud wall will reduce the distance by about 20%. Mud brick walls, double brick or concrete walls will have a much larger impact on the range.

Any obstruction from the landscape such as levy banks, hills or undulation land will totally block the signal and the wireless link will not work.

If more than one wireless link is required within the same installation (such as a three phase system or multiple remote sites) then the interference between the devices will further reduce the distance. In this case it is recommended that a patch antenna be used on all local Wireless devices.

Extending the Wireless Range

If the required distance is longer than the specified 200m clear line of site, or there is multiple devices being used then the range of the devices can be extended by replacing the dipole antenna with a "patch" antenna. The table 1 below gives an indication of the expected range when using a combination of dipole and patch antennas:

Table 1: Maximum "Line of site" distance between Wireless RS485 device pairs.

Local Wireless device antenna	Remote wireless device antenna	Max distance, one pair of devices (line of sight)	Max. distance, multiple pair of devices (line of sight)
Dipole (supplied)	Dipole (supplied)	200m	Not recommended
Patch – Optional (stock code 004810)	Dipole (supplied)	300m	150m
Patch – Optional (stock code 004810)	Patch – Optional (stock code 004810)	500m	250m



Optional Patch Antenna to extend the range of the wireless devices (Selectronic Order Code 004810)

Note: Patch Antenna is directional and must be mounted in a fixed position that is directly facing the antenna of the other wireless device.

SP PRO SelectSun Managed AC Coupling Installation Notes



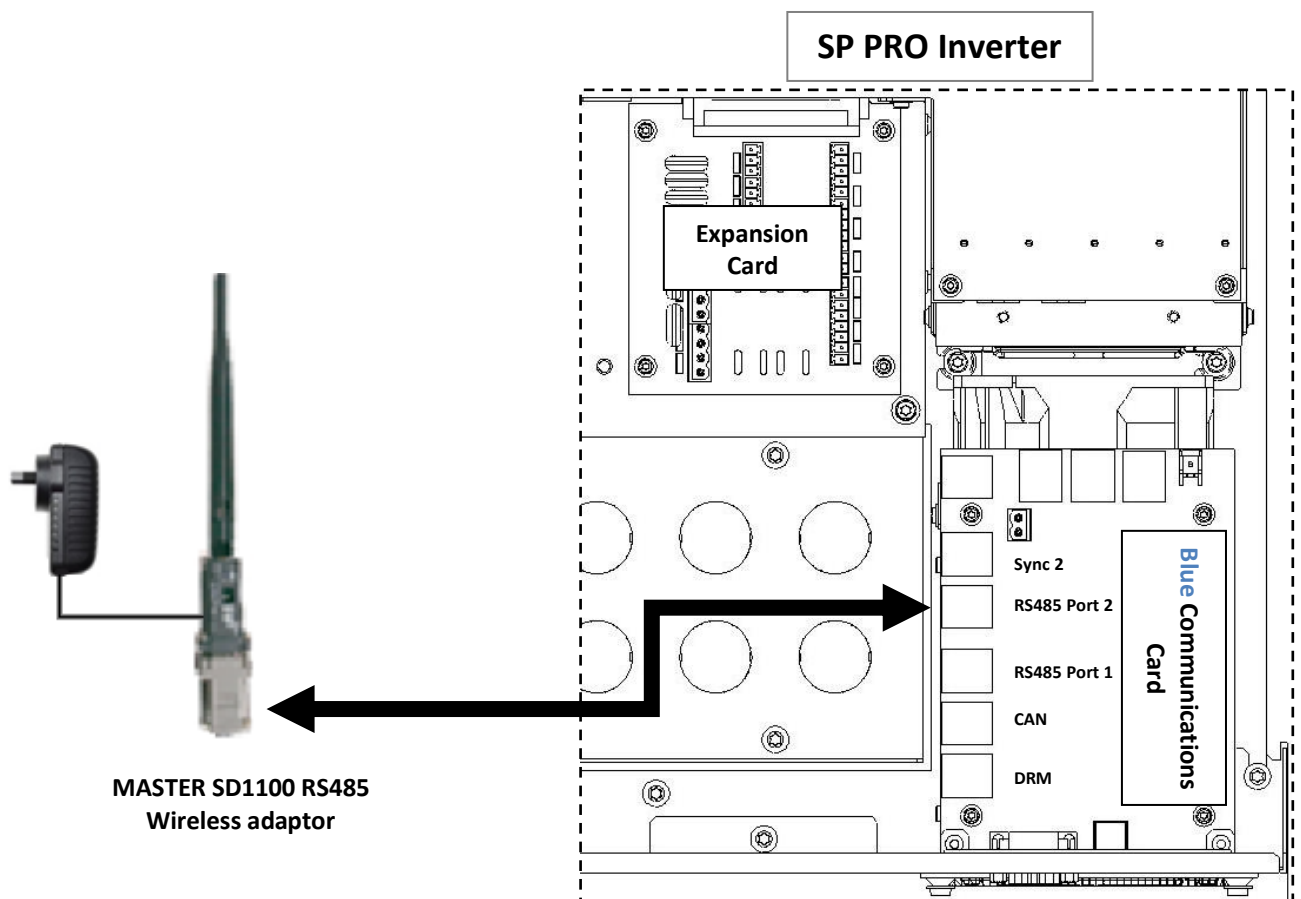
WIRELESS RS485 INSTALLATION

Wireless connection to SP PRO

Connect one end of supplied 'CAT5' network cable to the SP PRO Serial Communication PCA **RS485 Port 2**.

Connect the other end of the 'CAT5' network cable to the **MASTER** SD1100 RS485 Wireless adaptor.

Note: SD1100 RS485 Wireless adaptors are powered from the supplied plug packs. The plug packs must be connected to the same AC power circuit as the connected SelectSun inverters.



SP PRO Connections (inside unit) – RS485 Port 2 RJ45 connector to AC Coupled Interface PCA and to MASTER SD1100 RS485 Wireless adaptor

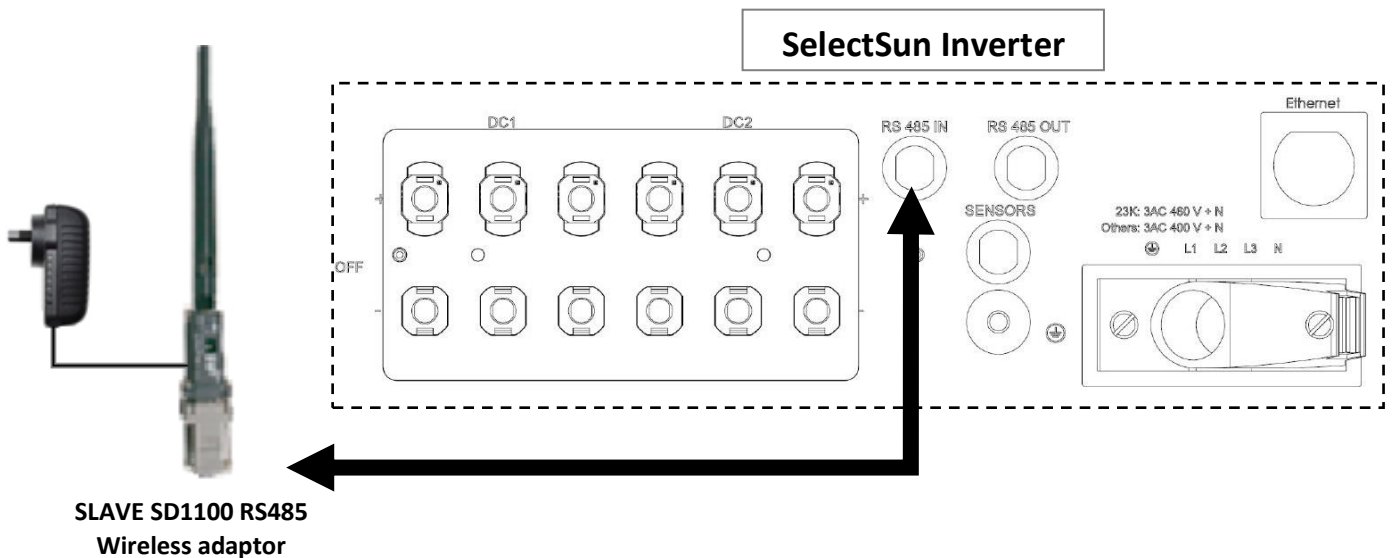
SP PRO SelectSun Managed AC Coupling Installation Notes



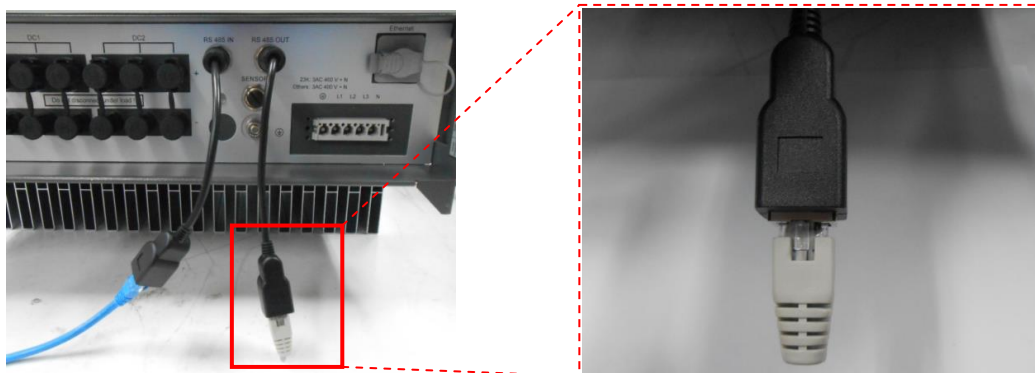
Wireless connection to SelectSun

Using the supplied 'CAT5' network cable connect one end to the SLAVE SD1100 RS485 Wireless adaptor and the other end to SelectSun "RS485 IN".

Note: SD1100 RS485 Wireless adaptors are powered from the supplied plug packs. The plug packs must be connected to the same AC power circuit as the connected SelectSun inverters. This is normally the AC load side of the SP PRO.



The last SelectSun inverter of the daisy chain must be terminated. Connect the supplied RJ45 termination connector to SelectSun "RS485 OUT".



POWER FOR THE WIRELESS RS485 DEVICES

The RS485 devices are powered from the supplied plug packs. The plug packs must be connected to the same AC power circuit as the connected SelectSun inverters. This is normally the AC load side of the SP PRO.

