



Installation of an Advanced Multiphase system

Introduction

This instruction will show how to install the (Advanced Multiphase) AMP Three Phase kit (Order code 005304) and AMP Split Phase kit (Order code 005307) for a Three Phase or Split Phase system.

NOTE: The Advanced Multiphase configuration is not suitable for series I SP PRO inverters.

Overview of Steps:

1. Install the SP PRO inverters
2. All batteries must be installed according to the manufactures installation manual
3. Update the firmware in each SP PRO while the **green** Communication Card (**green** comm card) is still installed
4. Install the **blue** or **black** Communication Card 2017 in each SP PRO
5. Update Firmware in each **blue** or **black** Communication Card 2017
6. Install the Sync cables between each SP PRO
7. Connect SP LINK and Configure the SP PRO

Preparation

- If installing a three phase system, make sure the AMP Three Phase kit is on site (Order code 005304)
- If installing a Split phase system, make sure the AMP Split Phase kit is on site (Order code 005307)
- This document needs to be read in conjunction with the SP PRO Instruction Manual and SP LINK instruction manual (both found in SP LINK Help menu)

SP PRO Interactive Inverter Charger

Installation Note



Summary of steps

The following is a summary of the steps needed to complete the installation.

Once the installation is completed, use the below points as a check list:

Installation step	Pages	
1	Install the SP PRO inverters including the DC and AC wiring. Leave the original green comm cards in each SP PRO.	3 – 5
2	Install and Configure Batteries (DC Power is required to the SP PRO to complete process)	
3	Install the latest version of SP LINK (11.14 or higher) on your computer.	6
4	Connect to each SP PRO via USB on the original green comm card using SP LINK	6
5	Update each SP PRO firmware using SP LINK.	6 – 8
6	Install the blue or black comm card in each SP PRO	9
7	Update firmware in each blue or black comm cards using SP LINK	10 – 13
8	Connect SP PRO multiphase SYNC connection and terminators	14
9	Reset each of the SP PRO inverters back to factory defaults	15
10	Create the configuration for SP PRO using the Site Configuration Wizard in SP LINK	16 – 17
11	Connect to SP PRO L1 via SP LINK, assign the inverters to each phase and save configuration	17 – 18
12	Test system function	19 – 21

Extra information when updating from existing multiphase to Advanced Multiphase:

When updating an existing split phase or three phase system simply follow the instructions in this manual with consideration for the following points.

1. ONLY Series II SP PROs can be updated to Advanced Multiphase.
2. The 800A (or 600A) System SoC current shunt is not required in an Advanced Multiphase configuration. Unless there are thermal issues, the existing shunt may be left in the system. There is no need to disconnect the sense wires as the SP PRO will be configured to ignore this shunt.
3. Each SP PRO inverter must be set to factory default at the point specified in this installation note (see page 15). The existing configuration cannot be used.
4. The existing configuration cannot be used once the system has been updated to Advanced Multiphase. A new configuration must be created using the Site Configuration Wizard. Any additional configuration settings can be added after the configuration is created by the wizard.

SP PRO Interactive Inverter Charger

Installation Note



Installation

The SP PRO units must be installed as per the installation instructions in the user manual. Special attention needs to be paid to the minimum spacing between the SP PROs as outlined in the **Preparation** section of the installation manual (page 11).

Place the supplied Phase labels (L1, L2 and L3) on the top right hand corner of each of the SP PRO inverters. This will help to identify each inverter during system commissioning and testing.

AC Wiring

The SP PRO Three Phase AC wiring layout is shown in Figure 1.

Attention must be paid to the Neutral conductor and connection through to the loads. The neutral conductor connecting to the loads must be maintained such that operation of any external SP PRO isolators would not alter the bonding between Neutral and Earth.

AC Source Neutral connections from L1, L2 and L3 must be connected together at the same common point.

AC Load Neutral connections from L1, L2 and L3 must be connected together at the same common point.

Three phase circuits which have loads that cannot tolerate a phase failure must be protected by a Phase Failure Relay (not supplied).

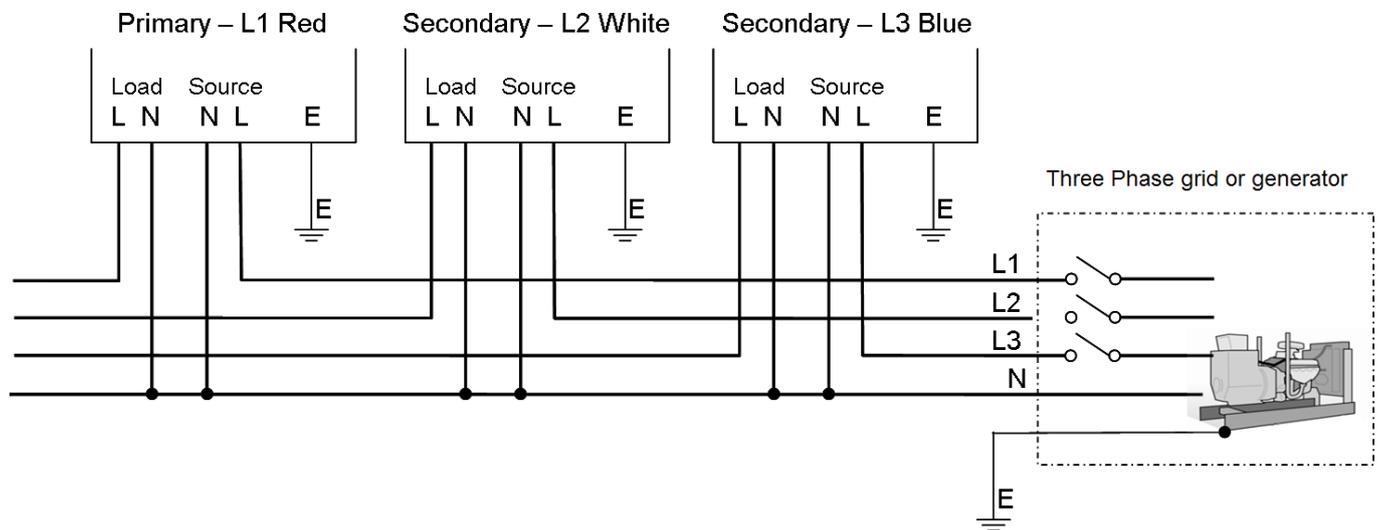


Figure 1: SP PRO Three Phase AC wiring layout

NOTE: for Split phase only 2 SP PRO inverters are used (L1 Primary and Split Secondary)

SP PRO Interactive Inverter Charger

Installation Note



Main DC Wiring

The SP PRO Three Phase main DC wiring diagram is illustrated in Figure 2.

Attention must be taken to ensure that the cabling is rated to carry the current for the segment in which it is installed.

All DC cabling between the battery bank and battery protection must be a minimum of 3 off 70mm² V90HT cables or equivalent. After the DC battery protection and the current shunt the cables can be split into 3 circuits, each a minimum of 70mm² V90HT cables. Each circuit is protected by a 250A HRC fuse or DC circuit breaker.

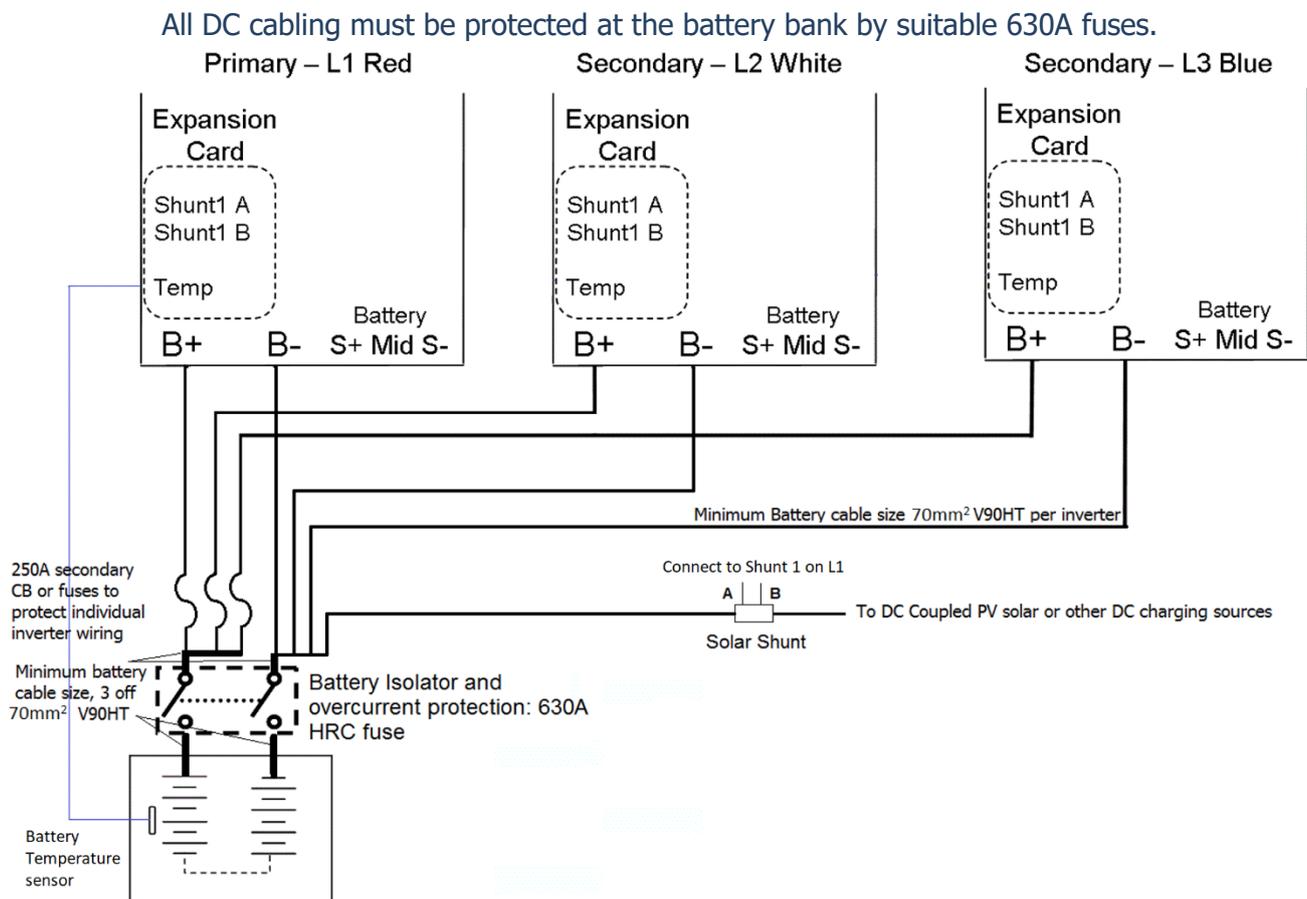


Figure 2: SP PRO Three Phase main DC wiring layout

NOTE: for Split phase only 2 SP PRO inverters are used (L1 Primary and Split Secondary)

SP PRO Interactive Inverter Charger

Installation Note



Pre-charge and Midpoint Wiring

The PRO Three Phase DC pre-charge and midpoint wiring layout is shown in Figure 3.

The pre-charge wiring is wired as a bus arrangement and connected to the battery via a common connection for all three phases. This will allow all three SP PROs to be pre-charged together.

The Midpoint wiring need only be connected to L1. L1 carries out the battery sense and midpoint readings for the three phase system.

The pre-charge and midpoint wiring must be protected by suitable fuses or circuit breakers

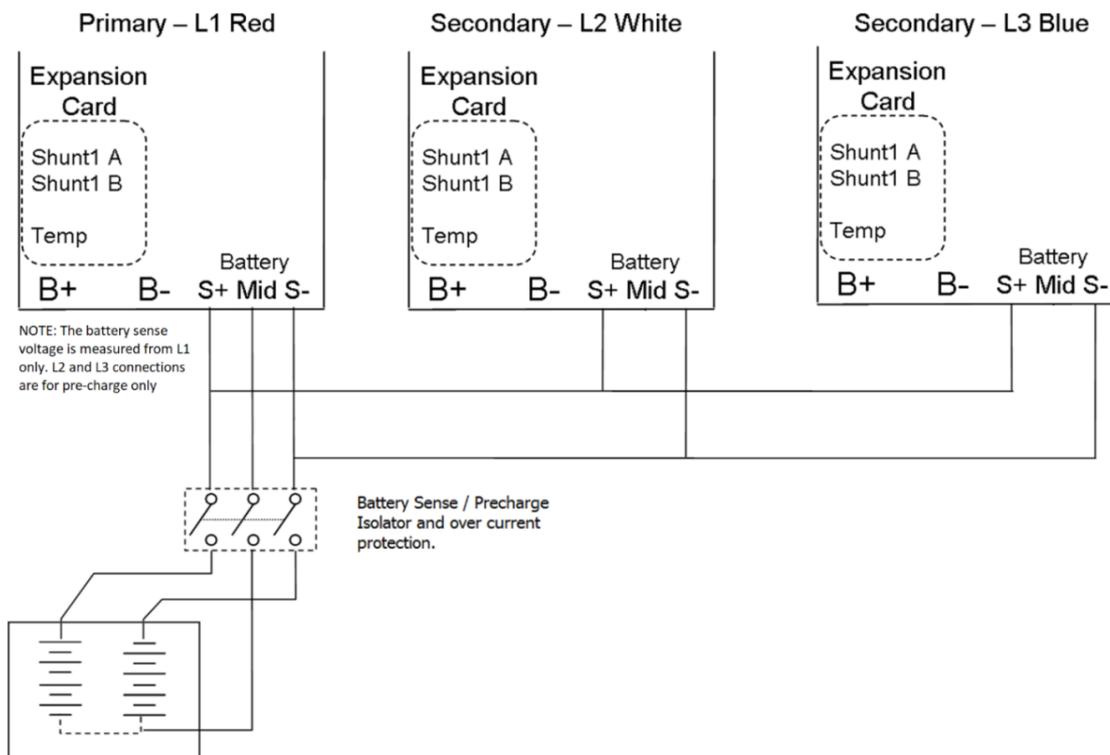


Figure 3: SP PRO Three Phase DC pre-charge and midpoint wiring layout
NOTE: for Split phase only 2 SP PRO inverters are used (L1 Primary and L2 Split Secondary)

Pre-charge with managed battery system

When installing a managed battery system such as BYD lithium, the pre-charge wiring maybe required. Please check the battery installation note for verification. In this case the midpoint connection (Mid) is not required. (See document *IN0051_xx 005293 Installation of Managed Batteries*)

DC Start-up and shutdown procedure when Pre-charge is installed

Start-up

- Turn on the Battery Sense / Pre-charge isolator (See Fig 3). Wait until the SP PRO comes on.
- Turn on the Battery Isolator (see Fig 2)

Shutdown

- Turn off the Battery Isolator
- Turn off the Battery Sense / Pre-charge isolator

SP PRO Interactive Inverter Charger

Installation Note



SP PRO Firmware Update

The SP PRO firmware must be 11.09 or higher. You must install SP LINK 11.14 or higher on a Windows computer, connect to the SP PRO and update its firmware. This is done by following the steps below:

1. Leave the original **green** comm card in the SP PRO until the firmware update process is complete.
2. Download the SPLINK software from the Selectronic Web site and install it on a Windows PC. Windows XP, Vista, 7, 8.1 and 10 are supported.

<http://www.selectronic.com.au/sppro/splink.htm>

3. Connect the PC to the each SP PRO in turn via the supplied USB cable.
4. Connect the DC power to the SP PRO.

Wait until the front panel LEDs are stable.

NOTE:

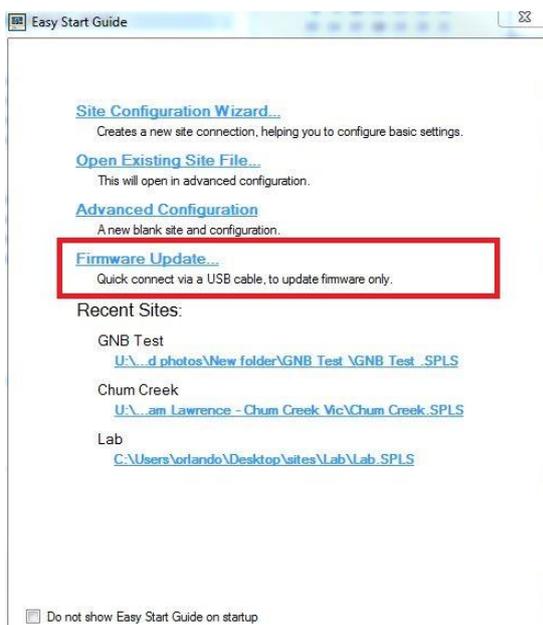
- a. During the SP PRO power up, the front panel display cycles through three stages. First, all LEDs turn green from bottom up, second, all LEDs turn red from bottom up and third, some LED's will be flashing while the battery LEDs are ON solid green. The third stage is what is referred to as stable.

5. Start Selectronic SP LINK.



Selectronic
SP LINK

6. Select "Firmware Update..."

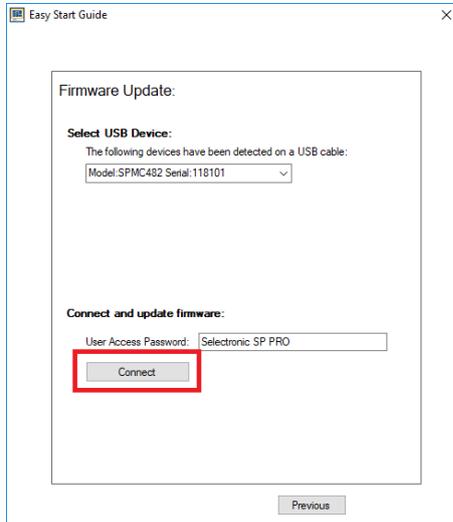


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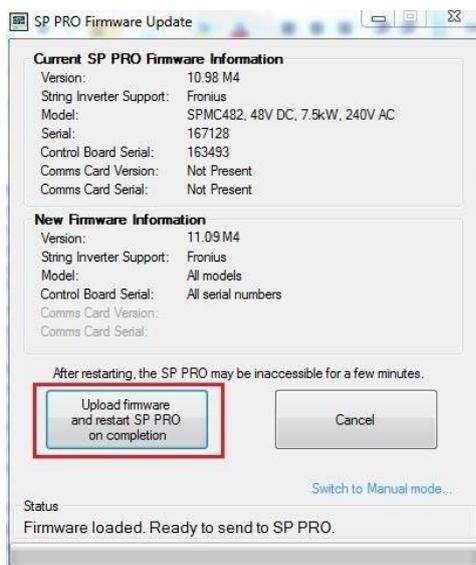
Installation Note



- The Easy Start Guide will automatically detect when the SP PRO is ON. Click "Connect" to start the SP PRO Firmware Update process.



- In the SP PRO Firmware update screen click on the **Update firmware and restart SP PRO on completion** button.



Important:

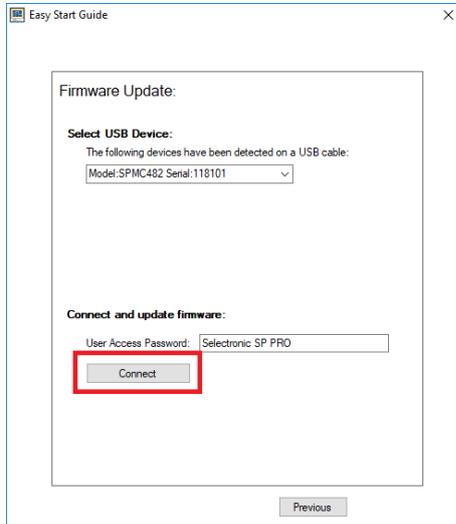
- Some batteries may turn themselves OFF during the firmware update. If this occurs, turn the batteries ON, close the SP PRO Firmware Update window and reconnect to the SP PRO. Continue Firmware update (step 7 and 8), repeat the process until the firmware is updated.
- In the case where the SP PRO firmware upload is complete and the batteries turn OFF while the SP PRO is performing a firmware upgrade, turn the batteries ON and wait until the front panel LEDs are stable. This may take a few minutes.

SP PRO Interactive Inverter Charger

Installation Note



9. Once the SP PRO has restarted, wait another 20 seconds then click "Connect" on the Firmware Update screen or restart SP LINK.



10. The "Update firmware and restart SP PRO on completion" button should be disabled. Make sure the "Current SP PRO Firmware Information Version" is 11.09 or higher.



11. Disconnect SP LINK and power down the SP PRO inverter. All Lights on the front panel will be OFF. The three blue lights across the top will still be lit if there is AC source power (grid or generator). This is OK.

Repeat step 1 to 11 for each of the SP PRO inverters

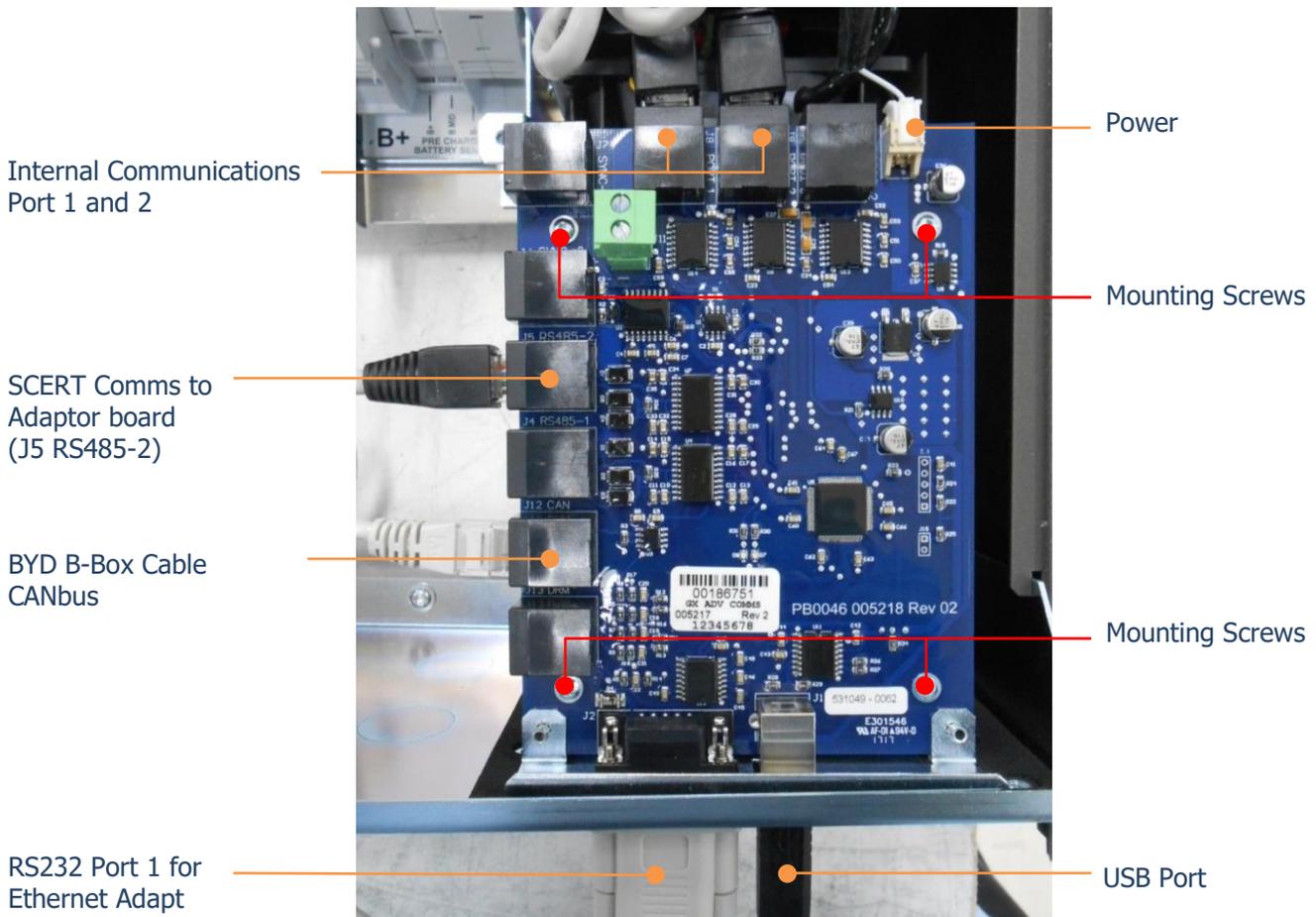
SP PRO Interactive Inverter Charger

Installation Note



Installing the blue or black Comm Card in ALL the SP PRO inverters

1. Make sure that the All SP PRO inverters are powered down. All Lights on the front panel will be off. The three blue lights across the top will still be lit if there is AC source power (grid or generator). This is OK.
2. Remove the 4 Torx screws holding the original **green** comm card in the SP PRO.
Do not throw away the Torx screws, the screws will be used to remount the **blue or black** Communication Card. (Mounting Screws)
3. Remove the 2 short grey RJ45 connectors from the Control Board in the SP PRO. (Internal Communications Ports 1 and 2)
4. Remove the white, 2 pin plug on the top right corner of the **green** comm card (Power)
5. Remove the original **green** comm card.
6. Connect the white, 2 pin plug to the top, right corner of the **blue or black** comm card. (Power)
7. Connect the two, small grey RJ45 leads to the **blue or black** comm card and into the Control board in the SP PRO. (Internal Communications Ports 1 and 2)
8. Screw down the **blue or black** comm card into the SP PRO using the 4 Torx screws.



Repeat step 1 to 8 for each SP PRO inverter

SP PRO Interactive Inverter Charger

Installation Note



Update Communications Card Firmware

The Communication Card firmware must be 2.00 or higher.

A Communication Card with firmware 0.05 or higher can be updated using SP LINK.

To check and update the firmware as required, follow the steps below:

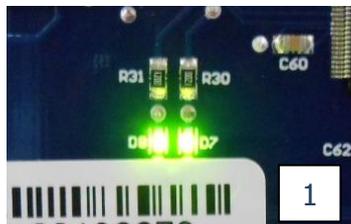
1. Connect the DC power to the SP PRO. This is done as follows:
Wait until the front panel LEDs are stable.

NOTE:

- a. During the SP PRO power up, the front panel display cycles through three stages. First, all LEDs turn green from bottom up, second, all LEDs turn red from bottom up and third, some LED's will be flashing while the battery LEDs are ON solid green. The third stage is what is referred to as stable.
2. After the SP PRO has powered up and the front panel LEDs are stable, check the green LEDs on the [blue](#) or black comm card.

The right LED should be steadily ON.

The left LED should be ON or flash approximately once per second (for BMS connected battery).



3. Start Selectronic SP LINK.

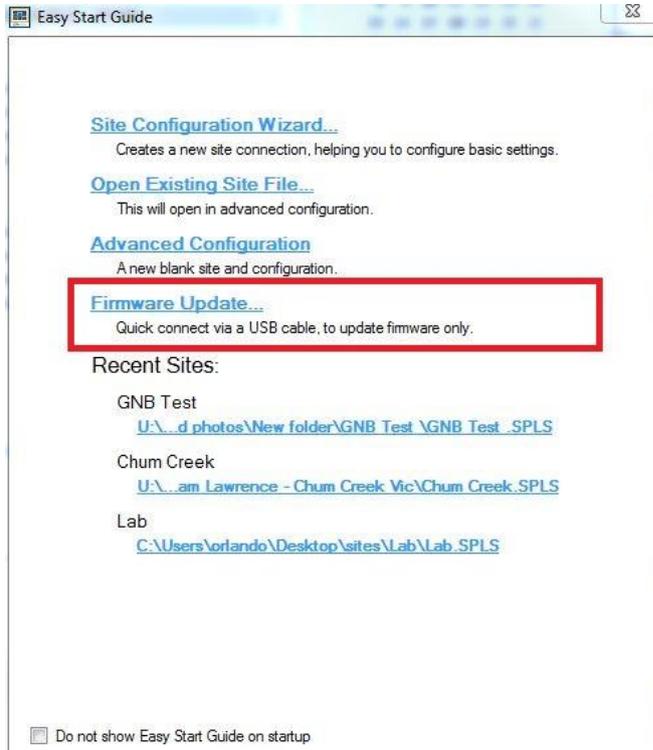


Selectronic
SP LINK

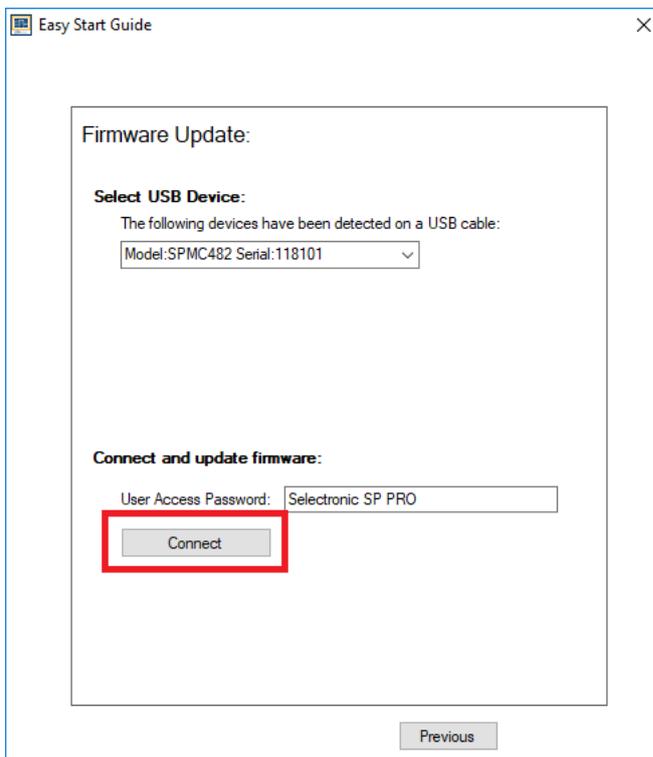
SP PRO Interactive Inverter Charger Installation Note



4. At the Easy Start Guide, select "Firmware Update..."



5. The Easy Start Guide will automatically detect when the SP PRO is ON and USB cable is plugged into the SP PRO and computer.
Click "Connect" to start the Firmware Update process.



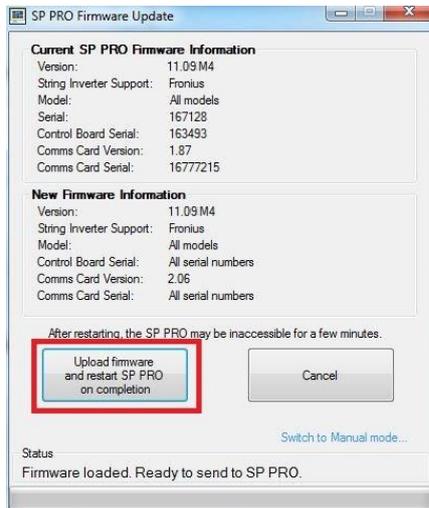
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Installation Note



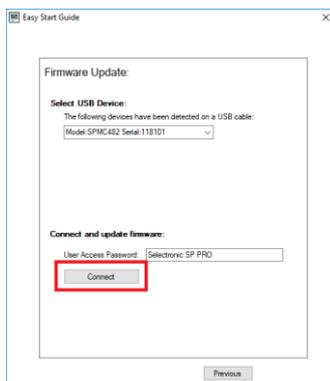
6. In the SP PRO Firmware update screen click on the **Update firmware and restart SP PRO on completion** button.

Note: If firmware is already up to date then the "Update firmware and restart SP PRO on completion" button will be disabled. Continue to "SP PRO Configuration" page 18



Important:

- a. Batteries may turn OFF during the firmware update. If this occurs, turn the batteries ON, close the SP PRO Firmware Update window. Reconnect to the SP PRO and continue Firmware update (step 7 and 8). Repeat the process until the firmware is updated.
 - b. In the case where the SP PRO firmware upload is complete and the batteries turn OFF while the SP PRO is performing a firmware upgrade, turn the batteries ON and wait until the front panel LEDs are stable. This may take a few minutes.
7. After the update is completed, the SP PRO will automatically restart. You will need to wait about 2.5 minutes for the blue or black comm card to restart. Communications with the SP PRO will be lost during this time.
 8. Once the SP PRO has restarted, wait another 20 seconds then click "Connect" on the Firmware Update screen or restart SP LINK.



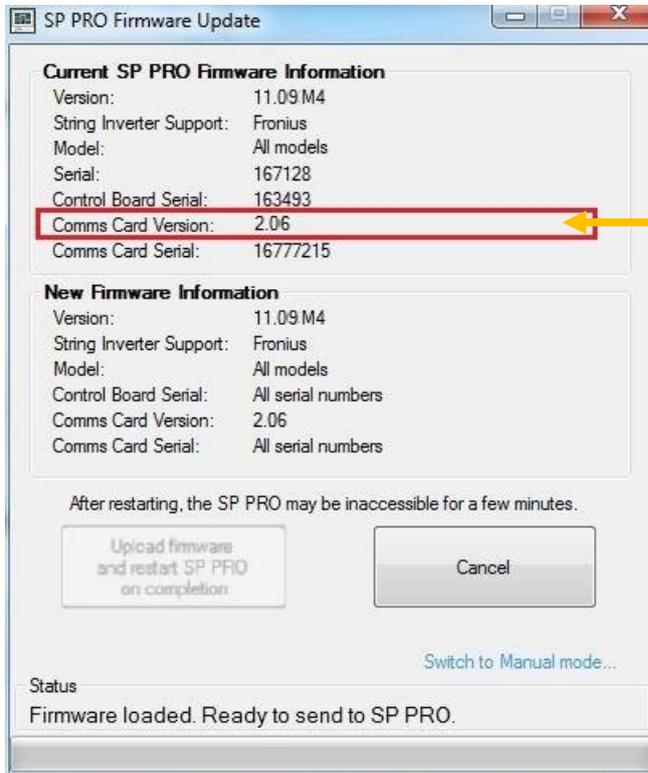
SP PRO Interactive Inverter Charger

Installation Note



9. Make sure the "Comms Card Version" is 2.06 or higher.

Note: If the blue or black comm card Firmware is up to date then the "Update firmware and restart SP PRO on completion" button will be disabled.



Note: The blue or black comm card info will be displayed on the screen.

Repeat step 1 to 9 for each of the SP PRO inverters

SP PRO Interactive Inverter Charger

Installation Note



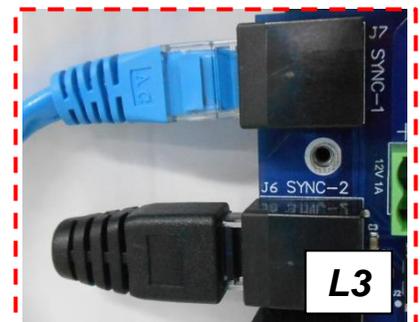
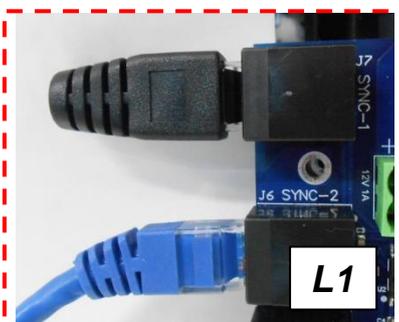
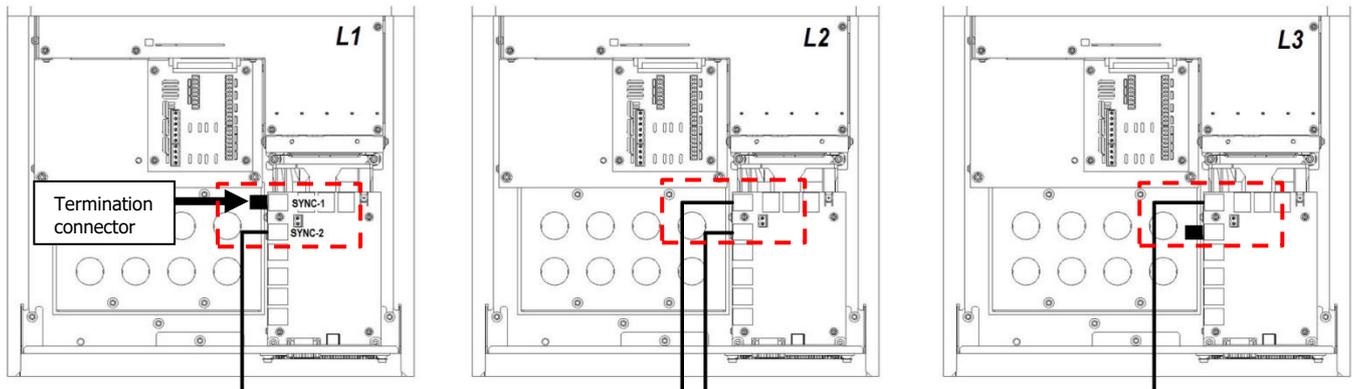
SP PRO SYNC Connection

Each SP PRO must be interlinked via its SYNC interface. With reference to the diagram below (*SYNC interface interconnections*) connect each SP PRO together via either SYNC1 or SYNC 2 connection using the supplied "network" type cables. Only two cables are required to connect the three SP PRO units. Both SYNC1 and SYNC 2 connection points are the same and either can be used.

Note: Termination connectors **MUST** be fitted to any unused SYNC connectors otherwise the SP PRO will not communicate properly to any SP PRO inverters in the system.

The SP PRO SYNC connectors are designed to interface with multiple SP PRO inverters in a daisy chain arrangement via the "SYNC-1" and "SYNC-2" connectors on the blue or black comm card.

1. Connect one of the two provided Termination connectors to "SYNC-1" for SP PRO inverter 1 (L1).
2. Using a network patch lead, connect "SYNC-2" from SP PRO inverter 1 (L1) to "SYNC-1" of SP PRO inverter 2 (L2).
3. Using another patch lead, connect the "SYNC-2" from SP PRO inverter 2 (L2) to "SYNC-1" of SP PRO inverter 3 (L3) and so on until all inverters in the system are connected.
4. Connect the second Termination connector to the final SP PRO inverter in the system.



SYNC connection of the SP PRO is now complete

NOTE: for Split phase only 2 SP PRO inverters are used (L1 Primary and Split Secondary)

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Installation Note



Reset each SP PRO back to factory defaults

Each SP PRO must be set back to factory defaults. This process clears out the current configuration in the SP PRO so it is ready to accept the three phase configuration.

To reset to factory default, on the front panel of the SP PRO:

1. Press and hold the **Generator** and **Alarm** buttons (B),
2. Whilst still holding these buttons, when the SP PRO beeps do a short press on the **On** button (C),
3. All Green front panel LEDs will come on. Let go of the **Generator** and **Alarm** buttons,
4. The SP PRO will now reset and go through the start-up sequence.



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Installation Note



SP PRO Configuration

The Site Configuration Wizard is used to create a Multiphase configuration for the SP PRO. All communications and configuration is via L1 inverter only. Once the system is configured, communications directly to the L2 or L3 serial or USB ports is not possible.

1. Make sure the USB lead is connected between the L1 SP PRO and PC.
2. Make sure the DC power is present at all of the SP PRO inverters.

Wait until the front panel LEDs are stable.

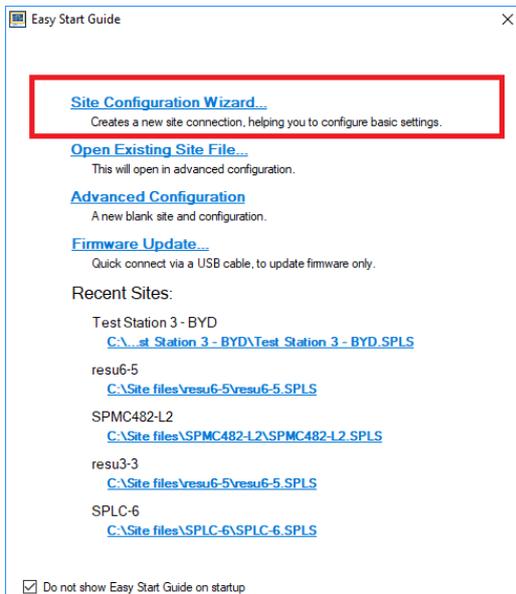
NOTE:

- a. During the SP PRO power up, the front panel display cycles through three stages. First, all LEDs turn green from bottom up, second, all LEDs turn red from bottom up and third, some LED's will be flashing while the battery LEDs are ON solid green. The third stage is what is referred to as stable.
3. Start Selectronic SP LINK.



Selectronic
SP LINK

4. Select "Site Configuration Wizard" and step through the wizard to setup the system to suite the appropriate application.



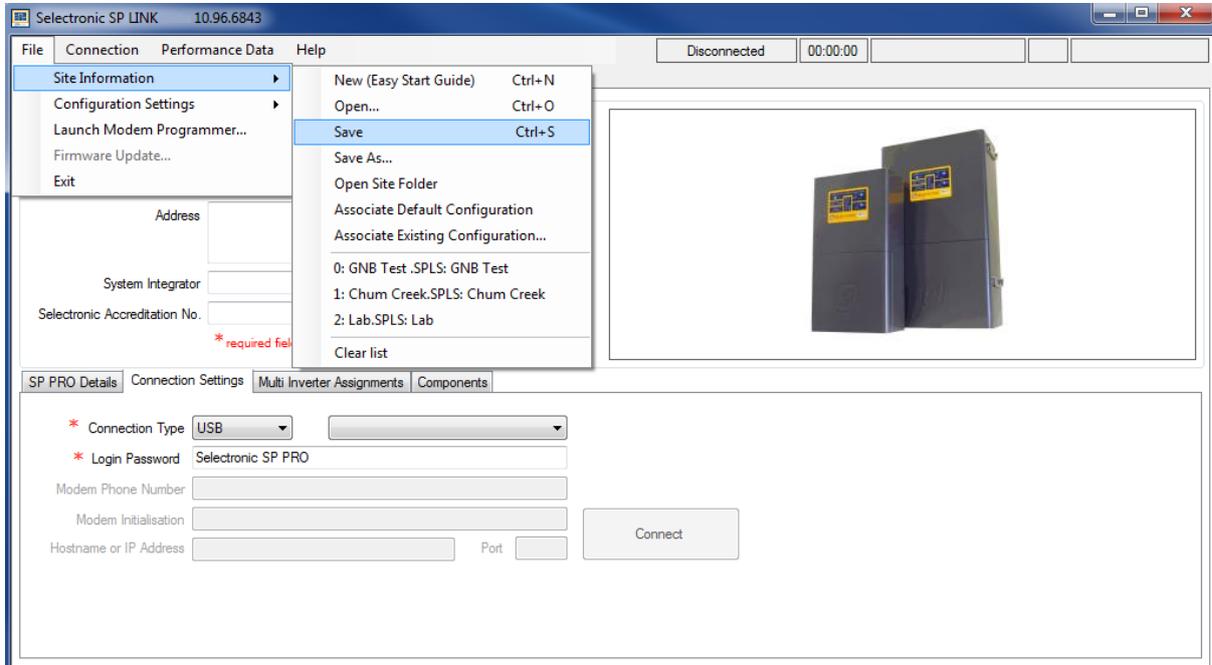
Note: For more information with the "Site Configuration Wizard", right click on the page and a help guide will appear to help setup the system.

SP PRO Interactive Inverter Charger

Installation Note

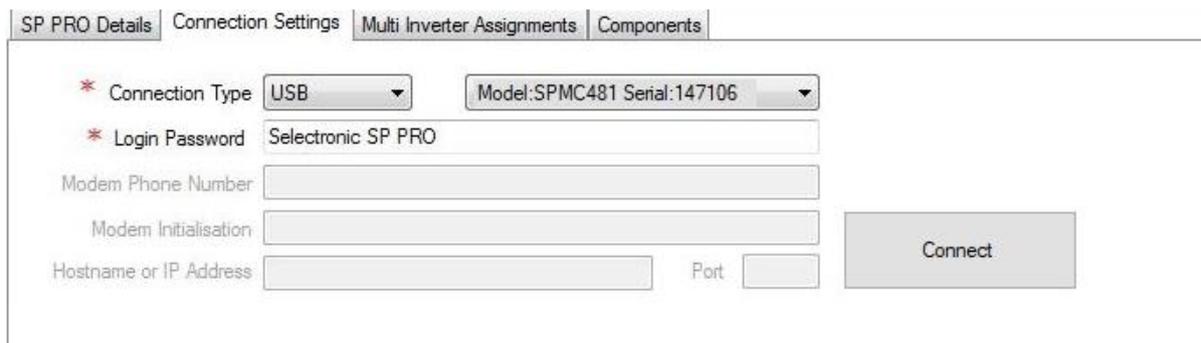


When all settings have been configured in "Site Configuration Wizard", From the menu bar, select File > Site Information > Save. This is to save the created site.



Note: The image is used as an example only, settings may differ.

5. SP LINK will automatically detect when the SP PRO is ON and the USB cable is connected. Click "Connect" to connect to the SP PRO.



Note: The image is used as an example only, settings may differ.

SP PRO Interactive Inverter Charger

Installation Note



- Go to the Multi Inverter Plan tab. Drag and drop the serial numbers in the Unassigned Inverters box to L2 or L3 as appropriate.

Hint: To identify an inverter, double click on a serial number and the battery LEDs on the associated inverter will flash RED for 3 seconds.

SP PRO Details | Connection Settings | Multi Inverter Plan | Components

Multi Phase Orientation: None

Unassigned Inverters: 139570, 178627
Drag and Drop serial numbers of unassigned inverters to their intended phase.
Double-click a serial to identify it by flashing front panel LEDs

Save the assigned layout to the SP PROs: Save Assignments

L1	L2 (120°)	L3 (240°)	Split (180°)
Phase Controllers 118101			
Phase Followers			

Unassigned Assigned but not Configured Configured

- Once the inverters are assigned, click "Save Assignments". The default settings passcode is 74.

SP PRO Details | Connection Settings | Multi Inverter Plan | Components

Multi Phase Orientation: Three Phase

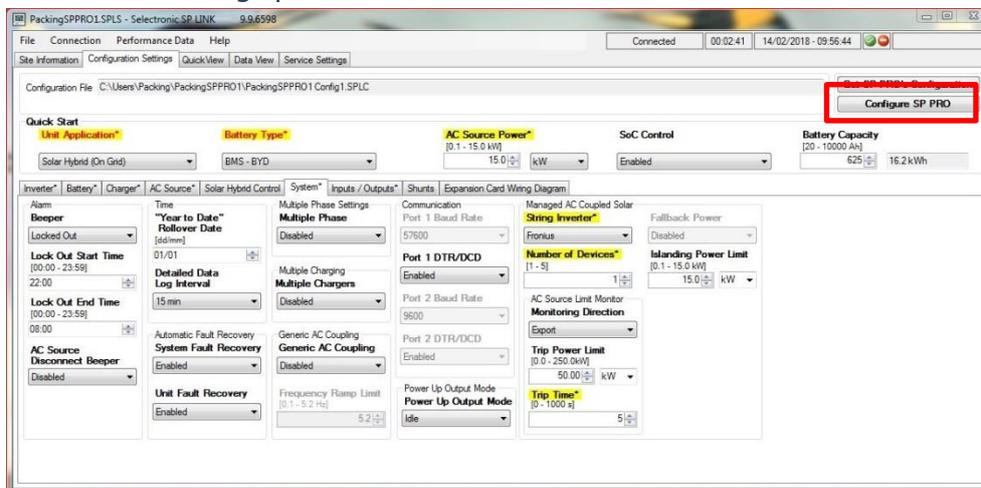
Unassigned Inverters: (Empty)
Drag and Drop serial numbers of unassigned inverters to their intended phase.
Double-click a serial to identify it by flashing front panel LEDs

Save the assigned layout to the SP PROs: Save Assignments

L1	L2 (120°)	L3 (240°)	Split (180°)
Phase Controllers 118101, 139570, 178627			
Phase Followers			

Unassigned Assigned but not Configured Configured

- At the Configuration Settings tab, click the "Configure SP PRO" button. The default settings passcode is 74.



Note: The image is used as an example only, settings may differ.

SP PRO Configuration is now complete

SP PRO Interactive Inverter Charger

Installation Note



Operation of the SP PRO

Once the SP PRO units are installed and configured correctly, the system is controlled by the SP PRO inverter 1 (L1). The L2 and L3 inverters will follow the operational mode of L1 automatically.

The ON buttons on L2 and L3 are disabled. The ON button on L1 turns all inverters ON/OFF.

1. Turn OFF the main DC breaker, waiting 20 seconds and turn back ON.
2. After the SP PRO has powered up and the front panel LEDs are stable, check the green LEDs on the [blue](#) or [black](#) comm card.

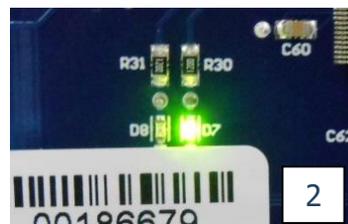
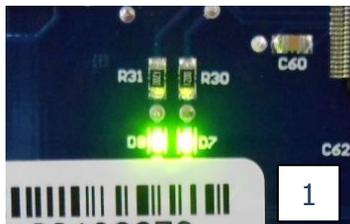
Note: During the SP PRO power up, the front panel display cycles through three stages. First, all LEDs turn green from bottom up, second, all LEDs turn red from bottom up and third, some LED's will be flashing while the battery LEDs are ON solid green. The third stage is what is referred to as stable.

The right LED should be steadily ON.

The left LED will function as follows:

1. For Unmanaged battery systems – Left LED on steady
2. For Managed battery systems – Left LED will flash approximately once per second.

NOTE: After power up, there may be a delay of up to 60 seconds before the left LED starts flashing.



SP PRO Interactive Inverter Charger

Installation Note



3. In SP LINK navigate to "Data view > Multi Phase". If the system is working correctly, All SP PRO inverters connected in the system will provide real time reading from each phase.

System	DC Total	DC on L1	DC on L2	DC on L3	DC on Split
Battery Voltage: 57.4 V	Battery Current Total: -0.9 A	Battery Current L1: -0.3 A	Battery Current L2: -0.3 A	Battery Current L3: -0.3 A	Battery Current Split: -0.3 A
Battery SoC: 95.0 %	DC Coupled Solar Total: 0.00 kW	DC Coupled Solar L1: 0.00 kW	DC Coupled Solar L2: 0.00 kW	DC Coupled Solar L3: 0.00 kW	DC Coupled Solar Split: 0.00 kW
Battery Charger Stage: Absorb	AC Total	AC on L1	AC on L2	AC on L3	AC on Split
AC Load Frequency: 50.0 Hz	Load Power Total: 0.17 kW	Load Power L1: 0.29 kW	Load Power L2: 0.01 kW	Load Power L3: 0.01 kW	Load Power Split: 0.01 kW
AC Source Status: AC Source in Tolerance	Source Power Total: -0.57 kW	Source Power L1: -0.20 kW	AC Source Power L2: -0.19 kW	AC Source Power L3: -0.17 kW	AC Source Power Split: -0.17 kW
AC Source Frequency: 50.0 Hz	Inverter Power Total: 0.00 kW	Source Voltage L1: 247.5 V	AC Source Voltage L2: 247.5 V	AC Source Voltage L3: 250.1 V	AC Source Voltage Split: 250.1 V
Output Mode: Idle	AC Coupled Solar Total Power Total: 0.91 kW	AC Coupled Solar on L1 Power L1: 0.91 kW	AC Coupled Solar on L2 Power L2: 0.00 kW	AC Coupled Solar on L3 Power L3: 0.00 kW	AC Coupled Solar on Split Power Split: 0.00 kW
	Capacity Total: 20.00 kW	Target Power L1: 0.0 %	Target Power L2: 0.00 kW	Target Power L3: 0.00 kW	Target Power Split: 0.00 kW

4. SP LINK can also provide individual information for each SP PRO inverters on different phases. Select "L1 or L2 or L3" in SP LINK to display the SP PRO's distinct information.

Inverter	Factory Set Options	Component Life
SP PRO Model: SPMC482-AU	Country: Australia	(Component's rated life consumed so far)
Control Board Serial: 117300	Power Control Mode: Enabled	Power Board 1 Capacitors: 1.5 %
SP PRO Ratings: 48V DC, 7.5kW, 240V AC	SP LINK Login: Password Not Required	Power Board 2 Capacitors: 1.5 %
Control Board Revision: 20	Comms Card Serial: 186684	Fan: 0.1 %
Comms Card Revision: 2	Comms Card Mod Status: 2.00	
SP PRO Serial Number: 118101	Power Board 1 Serial: 115763	
Control Board Mod Status: 1	Comms Card SW Version: 2.00	
SP PRO Revision: 21	Power Board 1 Revision: 3	
SP PRO Mod Status: 1	Power Board 1 Mod Status: 3	
Software Version: 11.00 M4	Power Board 2 Serial: 115746	
String Inverters Supported: Fronius	Power Board 2 Revision: 3	
Grid Connect SW Version: 2.00	Power Board 2 Mod Status: 3	
SP PRO Total Run Time: 20199.0h		

Additional information

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