



SP SYNC - 3 Phase Installation Notes

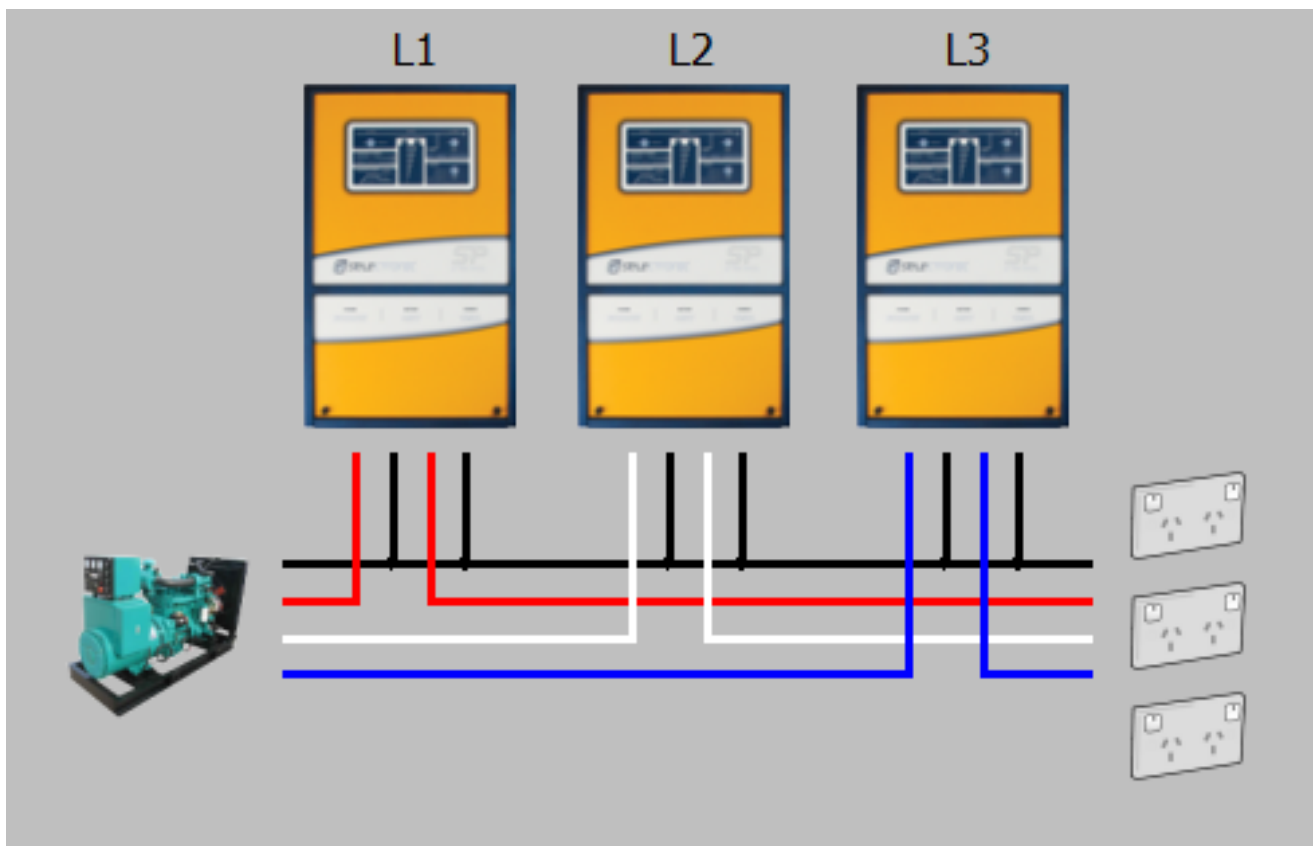
Introduction

SP SYNC – 3 Phase Installation Notes detail the configuration of 3 SP PRO inverters in conjunction with the SP SYNC box to make a 3 phase inverter system. One SP PRO is installed per phase. The SP SYNC box connects to all three SP PROs and allows them to operate together as a 3 phase inverter. The L1 phase is the prime controller of the 3 phase system. It controls the operation mode of the system, the synchronisation to the AC source, controlling of the generator, system state of charge monitoring etc. The L2 and L3 phase SP PROs are controlled by the L1 phase SP PRO via the SP SYNC interface.

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

Wiring Overview

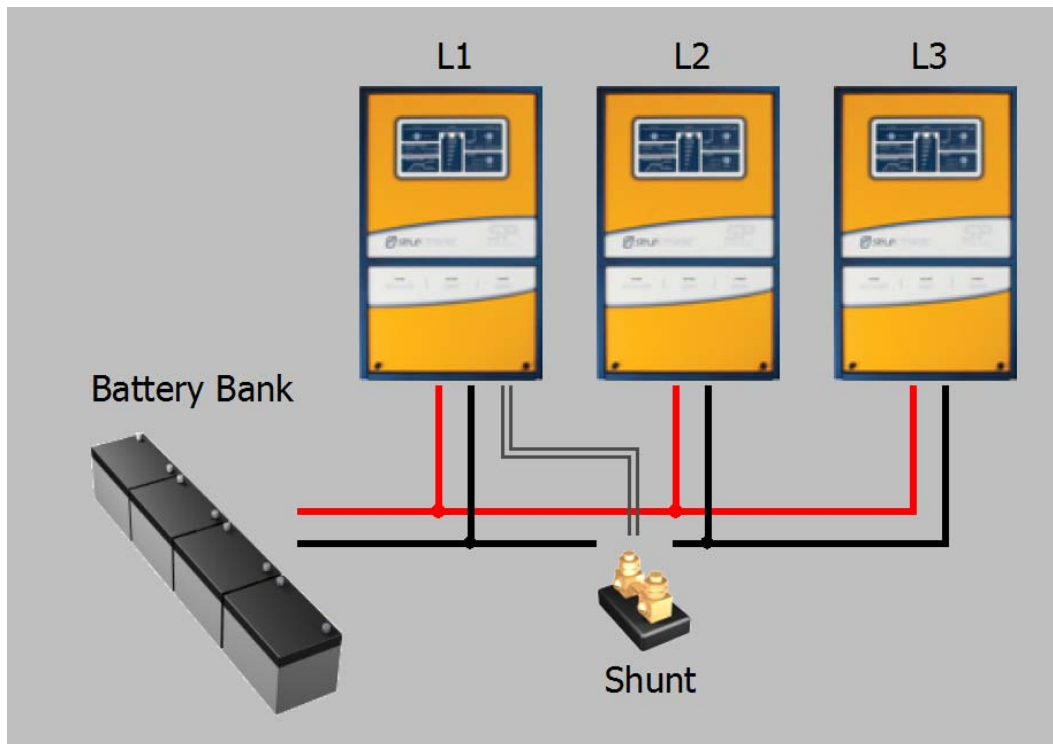
The following is an overview of the connections which form part of the SP PRO 3 phase system.



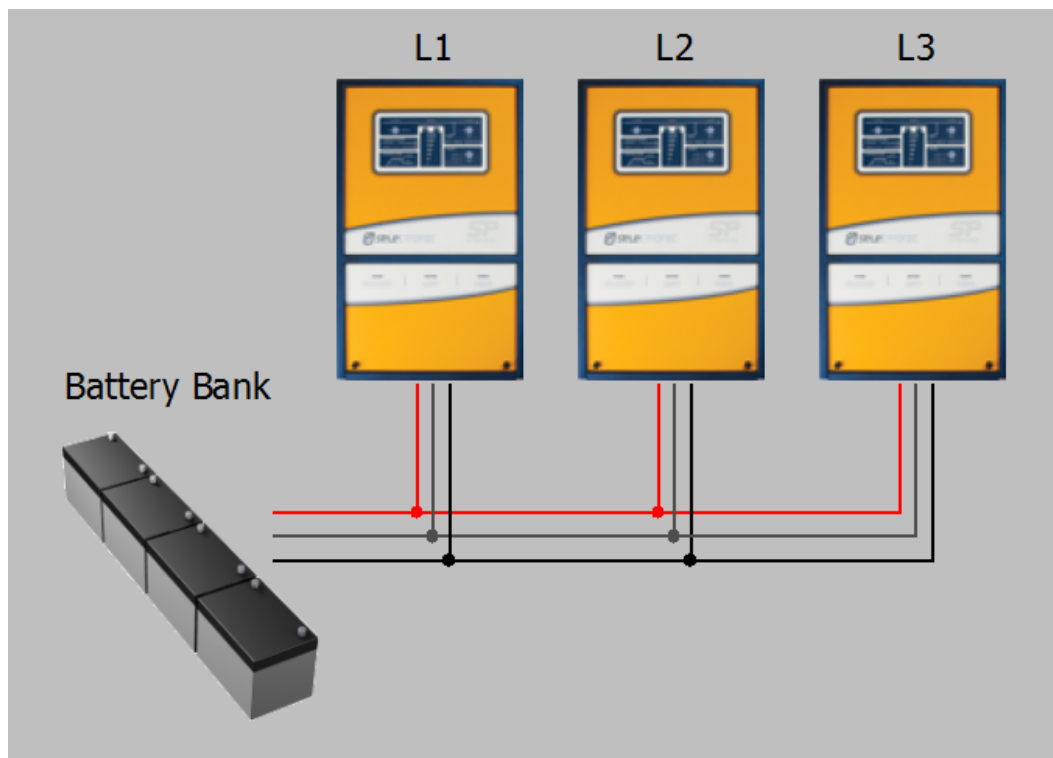
SP PRO 3 Phase AC wiring layout

Note: Circuit breakers and Earth Wires are not shown on the diagram for clarity.

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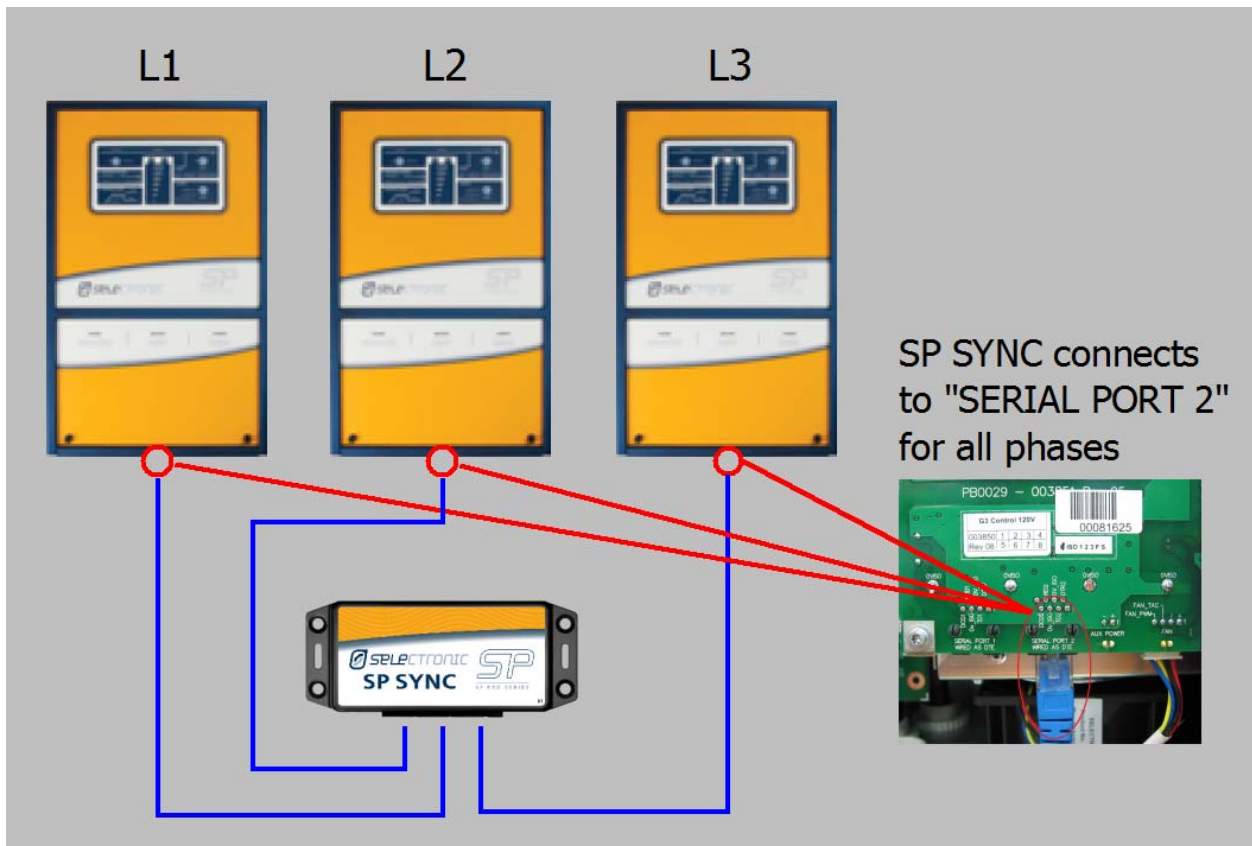
SP PRO 3 Phase main DC wiring layout*



SP PRO 3 Phase DC pre-charge and midpoint wiring layout*

**Note: Circuit breakers / fuses are not shown on both diagrams for clarity*

SP SYNC 3 Phase Installation Notes



SP SYNC wiring details

SP SYNC 3 Phase Installation Notes



Installation

The SP PRO units are 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.

AC Wiring

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 the SP PRO isolators would not alter the bonding between Neutral and Earth.

In addition, the Neutral conductors from each phase must be connected. All the Neutral connections from L1, L2 and L3 AC Source must be connected together at the same common point. All the Neutral connections from L1, L2 and L3 AC Load must be connected together at the same common point.

3 Phase circuits which have loads that cannot tolerate a phase failure must be protected by a Phase Failure Relay.

Main DC Wiring

L2 and L3 phases must have their main negative battery connection wired in series with a shunt. The sense wires from the shunt are connected to the shunt input on the expansion card on the L1 phase SP PRO. The "Shunt A" input of the expansion card is to be connected to the SP PRO L2/L3 side of the shunt. The "Shunt B" input of the expansion card is to be connected to the battery side of the shunt. This enables the L1 SP PRO to include the charge and load current accumulations from the L2 and L3 phases in its *state of charge* monitoring. The L1 main battery negative is not wired through the shunt.

Care must be taken to ensure that the cabling is rated to carry the current for the segment that it is installed in. The negative connection from the shunt to the battery will be carrying the combined current of 2 SP PRO inverters.

All DC cabling must be protected by suitable fuses or circuit breakers of sufficient capacity. Refer to the user manual for further details.

Pre-charge and Midpoint Wiring

The pre-charge and midpoint wiring can be wired as a bus arrangement and connected to the battery via a common connection for all 3 phases. If a bus arrangement is used, then all SP PROs will be pre-charged together. The pre-charge and midpoint wiring must be protected by suitable fuses or circuit breakers of sufficient capacity.

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SP SYNC Wiring

The SP SYNC interface must be connected to the "SERIAL PORT 2" on all 3 of the SP PRO inverters. It cannot be connected to the "SERIAL PORT 1" socket of any inverter. The SP PROs can connect to any of the ports on the SP SYNCH interface as they are not designated for any particular phase.

SP PRO Configuration – Additional Configuration Settings

The following details the additional settings required to activate the 3 phase mode on the SP PRO system. When configuring the system it is necessary to program all three SP PRO inverters. It is good practise to start with the L1 Phase as this will prevent false alarms on the L2 and L3 phases while loading the configurations.

All 3 phases must have their configuration programmed before attempting to start the system from Idle mode to On mode.

It is recommended to create a separate SP LINK configuration file for each SP PRO phase and add the prefix "L1", "L2" or "L3" to the appropriate file.

System – Multiple Phase Settings

Each SP PRO must be configured to the correct phase that it the connected to. Each SP PRO must be set to a different phase.

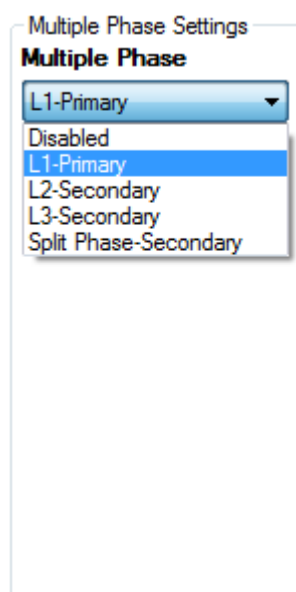
Disabled: SP PRO is set for normal single phase operation. *This setting is not used in a 3 phase system*

L1- Primary: SP PRO is set as L1 phase in a 3 phase system

L2 – Secondary: SP PRO is set as L2 phase in a 3 phase system

L3 – Secondary: SP PRO is set as L3 phase in a 3 phase system

Split Phase – Secondary: *This setting is not used in a 3 phase system.*

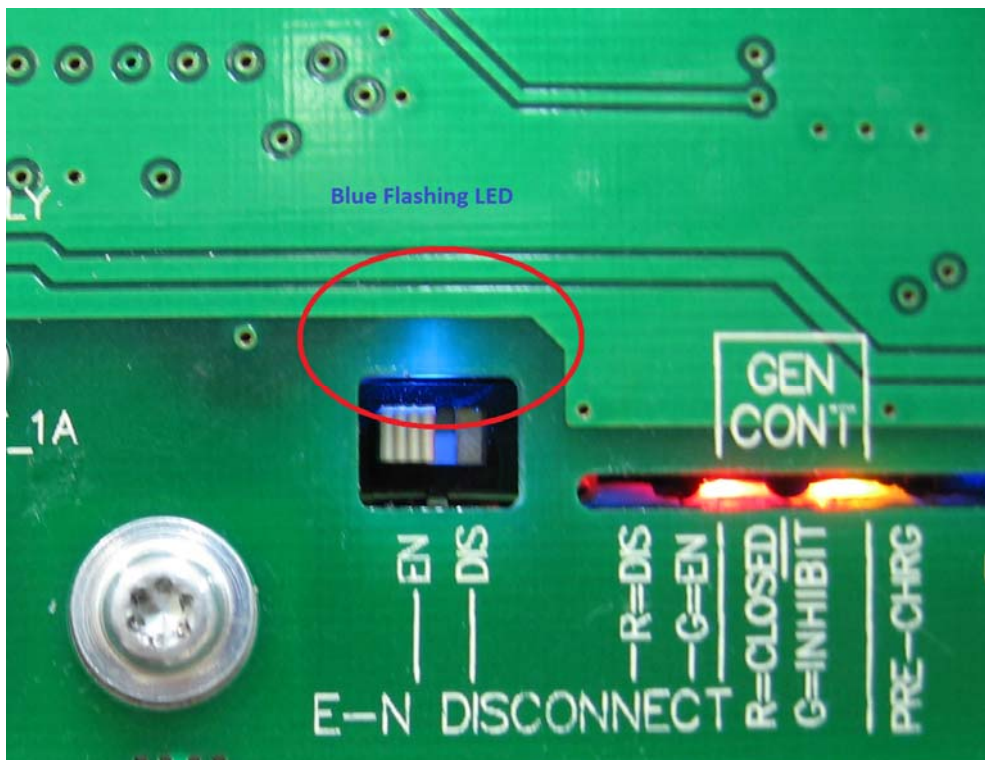


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Verifying Phase Settings

The phase settings can be verified on each SP PRO by observing the blue LED on top of the E-N disconnect switch inside the SP PRO. For standard single phase systems this LED flashes at a rate of one flash repeated every one second. When programmed to L1, the LED flashes at a rate of one flash repeated every two seconds. When programmed to L2, the LED flashes at a rate of two rapid flashes repeated every two seconds. When programmed to L3, the LED flashes at a rate of three rapid flashes repeated every two seconds.



It is highly recommended to label each phase on the front panel with the supplied phase labels to make identification of the phases easier once the covers are installed.

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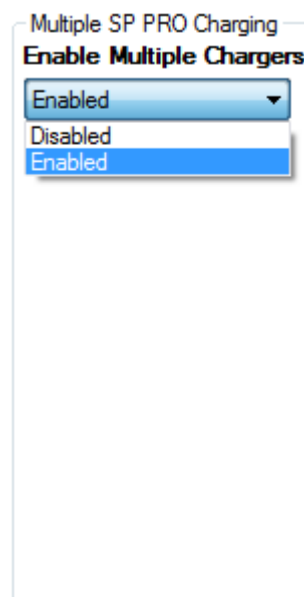


System – Multiple SP PRO Charging

In order for multiple SP PROs (as in a 3 phase system) to share the charging of the battery bank, it is necessary to enable the multiple chargers setting.

Disabled: SP PRO is set for normal single phase, single SP PRO operation. *This setting is not used in a 3 phase system.*

Enabled: SP PRO is set to share the charging with the other SP PROs.



When configuring “Multiple SP PRO Charging” it is recommended to synchronise the inverter charging states via the digital inputs and outputs on the expansion card. Refer to Technical Note TN0046, “SP PRO linked charged states via expansion card” for further details.

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Shunts

If the supplied shunt has been wired in to the system, then it must be configured on the L1 SP PRO as follows:

Name = Multiple SP PROs
Max Voltage = 75mV
Max Current = 400A

Shunt 1

Name
Multiple SP PROs ▼

Max Voltage
[25 - 100 mV]
75 ▲▼

Max Current
[25 - 500 A]
400 ▲▼

Note: In "Multiple SP PROs" mode, shunt currents are displayed with a sign; a positive (+) number means charging and a negative (-) number means discharging.

If an additional shunt is required for monitoring any other battery currents, then the shunt must be connected to the other shunt input on the L1 phase expansion card. No shunts should be connected to the L2 or L3 phase expansion cards.

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SoC Control

The SoC is managed by the L1 phase. SoC needs to be enabled on L1, and disabled on L2 & L3 phases.

SoC Control

Disabled

Battery Capacity

Each SP PRO needs to have the "Battery Capacity" setting configured to the full amp hour capacity of the battery bank that it is connect to.

Battery Capacity

[100 - 10000 Ah]

625

Max. Charge Current

The charger current settings will be different on the L1 phase than the setting on L2 and L3 phases.

When the external shunt is installed as detailed on page 2, L1 phase must be configured to the full charge current required by the battery bank

L2 & L3 phases must be configured to one third of the charge current required by the battery bank.

Charge Settings

Max. Charge Current
(as % of of Battery Capacity)
[1 - 100 %]

25 156 A

Initial Return
[45.6 V - Float V]

50.4

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Battery Charger Voltage settings and Temperature Compensation

All of the battery charger voltages should and temperature compensation settings should be the same on all 3 phases. All 3 phases must have their battery temperature sensor connected. All 3 temperature sensors must be bonded to the same location on the battery bank.

When the external DC Shutdown and Generator Lock Out Override

The low battery voltage generator start and DC shutdown voltages need to be lower on L2 and L3 than L1. This allows L1 to start the generator before any of the phases' shutdown.

DC Shutdown	SoC Shutdown	Generator Lock Out Override	On Low SoC
Battery 0% Load [39.6 - 48.0 V] 45.8	Enabled	On Low Battery Voltage	Enabled
Battery 100% Load [39.6 - 48.0 V] 40.8	Shutdown SoC [0 - 100 %] 40	0% Battery Load [39.6 - 48.0 V] 48.0	Start SoC [1 - 100 %] 40
Recovery Voltage [45.6 - 52.8 V] 48.0		100% Battery Load [39.6 - 48.0 V] 43.9	Stop SoC [1 - 100 %] 50

AC Source Power

Each SP PRO needs to have the "AC Source Power" setting configured to the amount of power that is available on the phase that the SP PRO is connected to. In the case where the SP PRO is connected to a generator, each SP PRO will need to be configured to one third of the generator's rating.

AC Source Power
[0.1 - 62.5 kVA]
7.5 kVA

SP SYNC 3 Phase Installation Notes



Operation

Once the SP PRO units are installed and configured correctly, the system is controlled by the L1 phase. Changing the system operational mode (from "Idle" mode to "Run" mode, or Run to Idle) is done via the "Mode" button on the L1 phase. L2 and L3 phases will follow the operational mode of L1 automatically. The "Mode" buttons on L2 and L3 phases are not used.

Additional Information

Note that the 3 phase system requires all 3 of the SP PRO inverters to be hardware revision. SPMCxxxx series SP PROs need to be revision 11 or higher. SPLCxxxx series SP PROs need to be revision 1 or higher.

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