

SP PRO Series I to Fronius Managed AC Coupling Installation Notes



SP PRO Series I to Fronius Managed AC Coupling

SUITABLE FOR SINGLE PHASE SYSTEMS ONLY

INTRODUCTION

The Fronius Managed AC Coupling can be retrofitted to a single phase configuration of the Selectronic SP PRO Series I inverter using the GXI-RS485 ADPT adaptor (stock code 005077) to provide a method of linking the Single phase Fronius Primo range of grid tie inverters to the SP PRO Series I via the AC Load supply. This enables the SP PRO to manage and control the Fronius grid tie inverters.

Each SP PRO series I can manage a maximum of five Fronius grid tie inverters by commanding each grid tie inverter to output the right amount of power that is needed to simultaneously supply the load, export any excess and maintain the battery bank at any particular point in time. This is done via a communications link which also serves to retrieve all the operational data for display and logging by the SP PRO series I.

This document details the steps needed to install the managed system. It is assumed that the SP PRO series I and Fronius inverters have been installed as per their individual installation instructions with this instruction only detailing the additional allowance of a communications link between the inverters.

Note: This document needs to be read in conjunction with the SP PRO Series I Instruction Manual and the Fronius Primo Instruction Manual.

ADDITIONAL INFORMATION

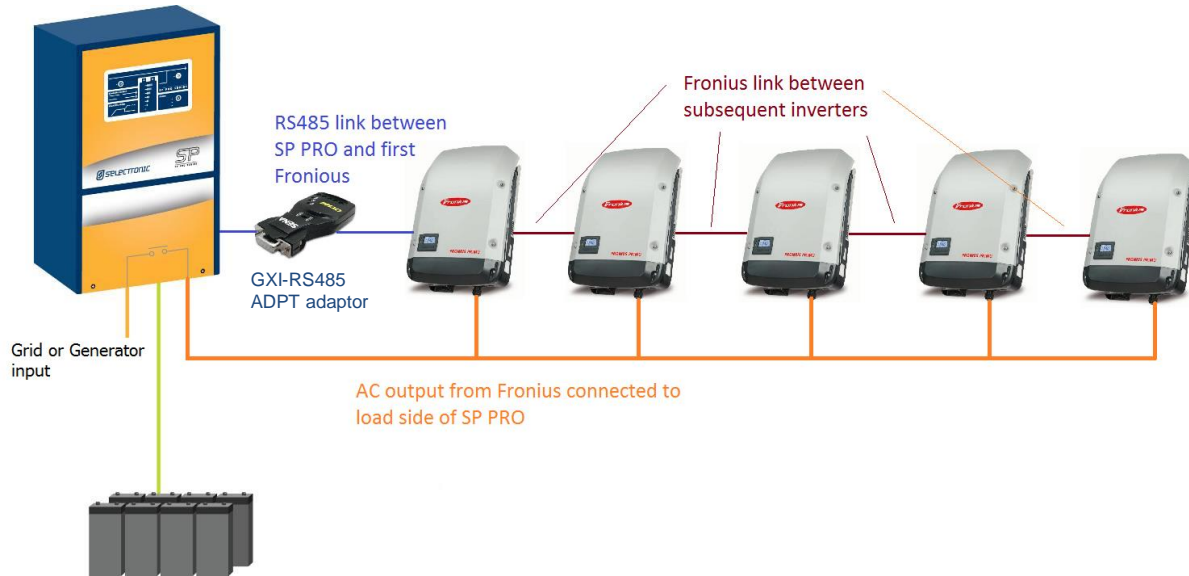
Selectronic web site – <http://www.selectronic.com.au> or contact the Selectronic Sales Team.

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OVERVIEW

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



SYSTEM REQUIREMENTS

To successfully install a SP PRO Series I - Fronius managed system, there are particular system requirements that need to be met.

- This installation document is applicable to SP PRO series I inverters only.
- Combined maximum AC output of all the connected Fronius inverters must not exceed twice the continuous SP PRO output power rating.
- Battery bank must be sized to suit the SP PRO model and the combined maximum AC Output power of the Fronius inverters.
- SP PRO and Fronius inverters must have firmware version 9.01 or higher installed.
- The Fronius Primo must be Selectronic Certified.
- Maximum of five Fronius inverters per SP PRO

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SP PRO MODEL AND MINIMUM BATTERY CAPACITY FOR SOLAR HYBRID SYSTEMS

For a Solar Hybrid (grid connected) system, the minimum battery capacity that must be connected to the SP PRO inverter varies depending on SP PRO model only. The following table defines the minimum battery capacity for each 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 (see table 3 in Appendix I)

Minimum Battery Capacity for Solar Hybrid Systems (@C10) ^{1,2}							
Lead acid battery in Blue , Lithium battery in Red							
	SP PRO Model Family						
Combined max. Fronius AC Output	SPMC240	SPMC241	SPMC481	SPMC482	SPMC1201	SPLC1200	SPLC1202
1-15 kW	180 Ah (4.3kWh) 1.5kWh	180 Ah (4.3kWh) 1.5kWh	180 Ah (8.6kWh) 3.0kWh	180 Ah (8.6kWh) 3.0kWh	100 Ah (12kWh) 4.0kWh	250 Ah (30kWh) 10kWh	250 Ah (30kWh) 10kWh
16-30kW	Not valid	Not valid	Not valid	Not valid	Not valid	250 Ah (30kWh) 10kWh	250 Ah (30kWh) 10kWh
40 kW	Not valid	Not valid	Not valid	Not valid	Not valid	Not valid	250 Ah (30kWh) 10kWh

Table 1: Solar Hybrid: Minimum Battery capacity for each SP PRO model and AC solar

Notes:

1. Battery capacity is C10 rating.
2. Round battery capacity up as appropriate to available battery sizes.

Ensure that the system meets these minimum battery capacity requirements. Any battery combinations larger than the minimum are suitable.

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SP PRO MODEL AND MINIMUM BATTERY CAPACITY FOR OFF GRID SYSTEM

The minimum battery capacity that must be connected to the SP PRO inverter varies depending on SP PRO model, an overriding minimum battery capacity and the combined maximum Fronius AC Output. The following table defines the minimum battery capacity for each SP PRO model.

Minimum Battery Capacity for Off Grid (@C10) ^{1,2}							
Lead acid battery in Blue, Lithium battery in Red							
	SP PRO Model						
Combined max. Fronius AC Output	SPMC240	SPMC241	SPMC481	SPMC482	SPMC1201	SPLC1200	SPLC1202
2 kW	180 Ah (4.3kWh) 2.6kWh	180 Ah (4.3kWh) 2.6kWh	180 Ah (8.6kWh) 3.0kWh	180 Ah (8.6kWh) 3.0kWh	100 Ah (12kWh) 4.0kWh	250 Ah (30kWh) 10kWh	250 Ah (30kWh) 10kWh
3 kW	240 Ah (6kWh) 4.0kWh	240 Ah (6kWh) 4.0kWh	180 Ah (8.6kWh) 4.0kWh	180 Ah (8.6kWh) 4.0kWh	100 Ah (12kWh) 4.0kWh	250 Ah (30kWh) 10kWh	250 Ah (30kWh) 10kWh
4 kW	320 Ah (8kWh) 5.3kWh	320 Ah (8kWh) 5.3kWh	180 Ah (8kWh) 5.3kWh	180 Ah (8kWh) 5.3kWh	100 Ah (12kWh) 5.3kWh	250 Ah (30kWh) 10kWh	250 Ah (30kWh) 10kWh
5 kW	400 Ah (10kWh) 6.6kWh	400 Ah (10kWh) 6.6kWh	200 Ah (10kWh) 6.6kWh	200 Ah (10kWh) 6.6kWh	100 Ah (12kWh) 6.6kWh	250 Ah (30kWh) 10kWh	250 Ah (30kWh) 10kWh
6 kW	480 Ah (12kWh) 8.0kWh	480 Ah (12kWh) 8.0kWh	240 Ah (12kWh) 8.0kWh	240 Ah (12kWh) 8.0kWh	100 Ah (12kWh) 8.0kWh	250 Ah (30kWh) 10kWh	250 Ah (30kWh) 10kWh
7 kW	Not valid	560 Ah (14kWh) 9.3kWh	280 Ah (14kWh) 9.3kWh	280 Ah (14kWh) 9.3kWh	112 Ah (14kWh) 9.3kWh	250 Ah (30kWh) 10kWh	250 Ah (30kWh) 10kWh
8 kW	Not valid	640 Ah (16kWh) 10.6kWh	320 Ah (16kWh) 10.6kWh	320 Ah (16kWh) 10.6kWh	128 Ah (16kWh) 10.6kWh	250 Ah (30kWh) 10.6kWh	250 Ah (30kWh) 10.6kWh
9 kW	Not valid	720 Ah (18kWh) 12.0kWh	360 Ah (18kWh) 12.0kWh	360 Ah (18kWh) 12.0kWh	144 Ah (18kWh) 12.0kWh	250 Ah (30kWh) 12.0kWh	250 Ah (30kWh) 12.0kWh
10 kW	Not valid	Not valid	400 Ah (20kWh) 13.3kWh	400 Ah (20kWh) 13.3kWh	160 Ah (20kWh) 13.3kWh	250 Ah (30kWh) 13.3kWh	250 Ah (30kWh) 13.3kWh

Table 2a: Off Grid: Minimum battery capacity for each SP PRO model and AC solar

...continued next page

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Minimum Battery Capacity for Off Grid (@C10)^{1,2} Lead acid battery in Blue, Lithium battery in Red

Combined max. Fronius AC Output	SP PRO Model						
	SPMC240	SPMC241	SPMC481	SPMC482	SPMC1201	SPLC1200	SPLC1202
11 kW	Not valid	Not valid	Not valid	440 Ah (22kWh) 14.6kWh	176 Ah (22kWh) 14.6kWh	250 Ah (30kWh) 14.6kWh	250 Ah (30kWh) 14.6kWh
12 kW	Not valid	Not valid	Not valid	480 Ah (24kWh) 16.0kWh	192 Ah (24kWh) 16.0kWh	250 Ah (30kWh) 16.0kWh	250 Ah (30kWh) 16.0kWh
13 kW	Not valid	Not valid	Not valid	520 Ah (26kWh) 17.3kWh	208 Ah (26kWh) 17.3kWh	250 Ah (30kWh) 17.3kWh	250 Ah (30kWh) 17.3kWh
14 kW	Not valid	Not valid	Not valid	560 Ah (28kWh) 18.6kWh	224 Ah (28kWh) 18.6kWh	250 Ah (30kWh) 18.6kWh	250 Ah (30kWh) 18.6kWh
15 kW	Not valid	Not valid	Not valid	600 Ah (30kWh) 20.0kWh	250 Ah (30kWh) 20.0kWh	250 Ah (30kWh) 20.0kWh	250 Ah (30kWh) 20.0kWh
20 kW	Not valid	Not valid	Not valid	Not valid	Not valid	320 Ah (40kWh) 26.6kWh	320 Ah (40kWh) 26.6kWh
25 kW	Not valid	Not valid	Not valid	Not valid	Not valid	400 Ah (50kWh) 33.3kWh	400 Ah (50kWh) 33.3kWh
30 kW	Not valid	Not valid	Not valid	Not valid	Not valid	500 Ah (60kWh) 40.0kWh	500 Ah (60kWh) 40.0kWh
35 kW	Not valid	Not valid	Not valid	Not valid	Not valid	Not valid	570 Ah (70kWh) 46.6kWh
40 kW	Not valid	Not valid	Not valid	Not valid	Not valid	Not valid	650 Ah (80kWh) 53.3kWh

Table 2b: Off Grid: Minimum battery capacity for each SP PRO model and AC solar

Notes:

1. Battery capacity is C10 rating.
2. Round battery capacity up as appropriate to available battery sizes.

Ensure that the system meets these minimum battery capacity requirements. Any battery combinations larger than the minimum are suitable.

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SP PRO AND FRONIUS FIRMWARE REQUIREMENTS

SP PRO Software Version 9.01 or later 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”

- Older revisions of firmware must be updated to firmware revision 9.01 or later.
- Do **NOT** change any configuration settings until firmware is updated.

Note: Selectronic web site – <http://www.selectronic.com.au> for latest SP PRO firmware and Tech Note 34 SP PRO Firmware Update Procedure.

Inverter	
SP PRO Model	Control PCA Serial
SPMC482-AU	146956
SP PRO Ratings	Control PCA Revision
48V DC, 7.5kW, 240V AC	24
SP PRO Serial Number	Control PCA Mod Status
149810	
SP PRO Revision	Power PCA 1 Serial
21	145898
SP PRO Mod Status	Power PCA 1 Revision
	4
Software Version	Power PCA 1 Mod Status
9.01.6	
String Inverters Supported	Power PCA 2 Serial
ABB Solar, Fronius	145904
Grid Connect SW Version	Power PCA 2 Revision
2.00	4
SP PRO Total Run Time	Power PCA 2 Mod Status
940.1 h	

Data View – Technical Data screen

FRONIUS PRIMO MUST BE SELECTRONIC CERTIFIED

The Fronius Primo inverter must be Selectronic Certified. Other Fronius Primo inverters will not operate correctly with the SP PRO in a managed AC coupled configuration.



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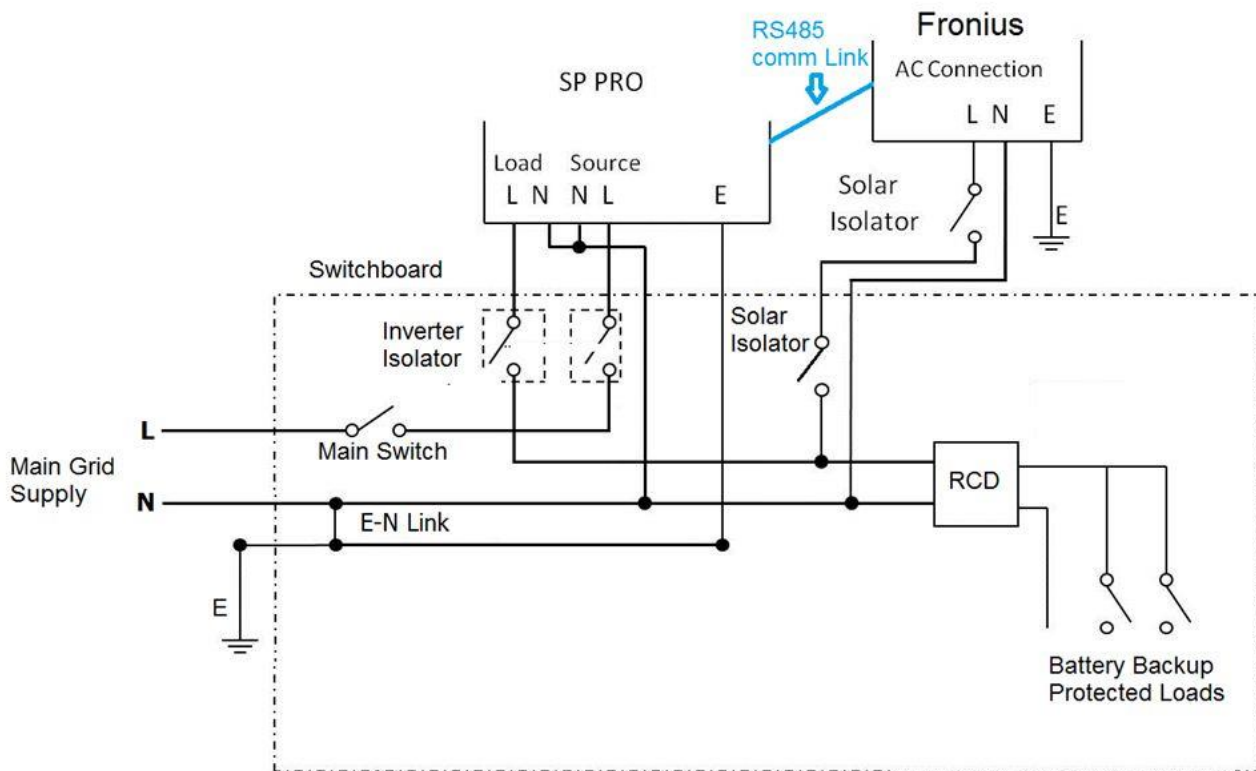


INSTALLATION

The SP PRO and Fronius inverters should be installed as per their respective installation instructions. Particular instructions directly related to Managed AC Coupling are listed below.

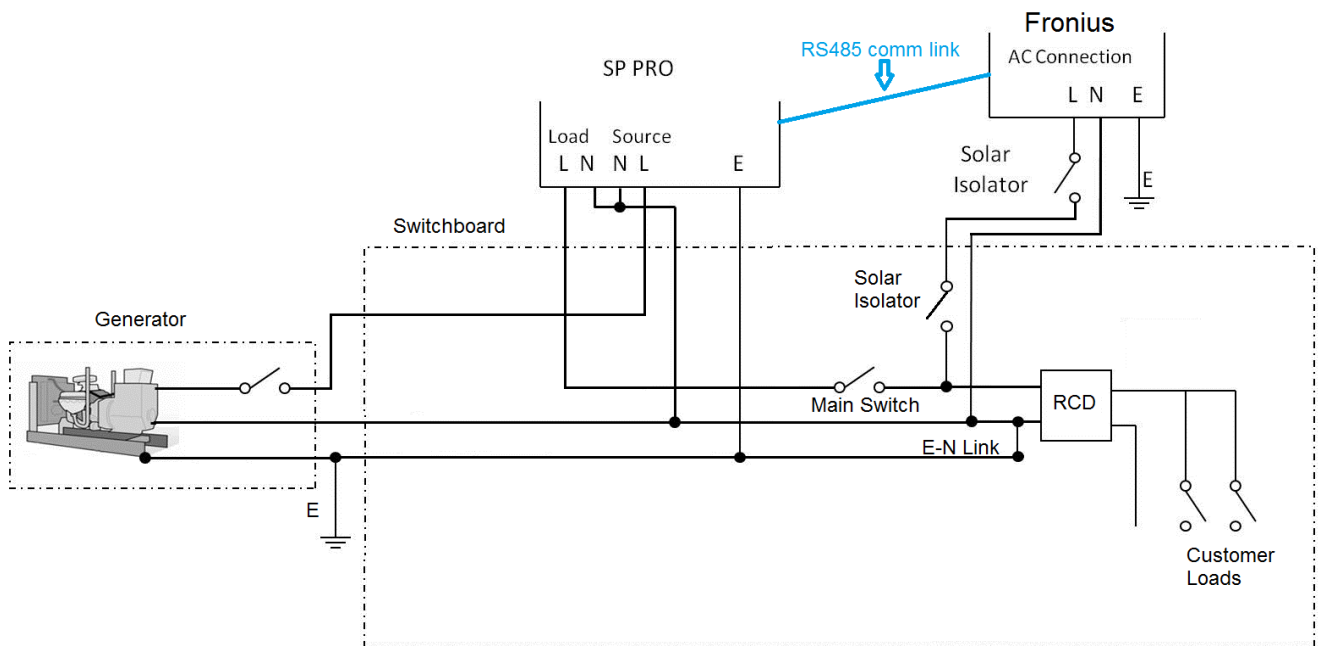
FRONIUS AC WIRING

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



Fronius AC Wiring guide for Grid connected installation

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Fronius AC Wiring guide for Off Grid connected installation

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

COMMUNICATIONS LINK (RS485)

The communication link always starts at the SP PRO end (Sena LTC100 adaptor) and then connects to the first Fronius inverter (Master). The Fronius link is used to connect subsequent Fronius inverters ON the same phase as the SP PRO. Do Not Connect Fronius inverters on different phases together.



SP PRO Series I to Fronius Managed AC Coupling Installation Notes

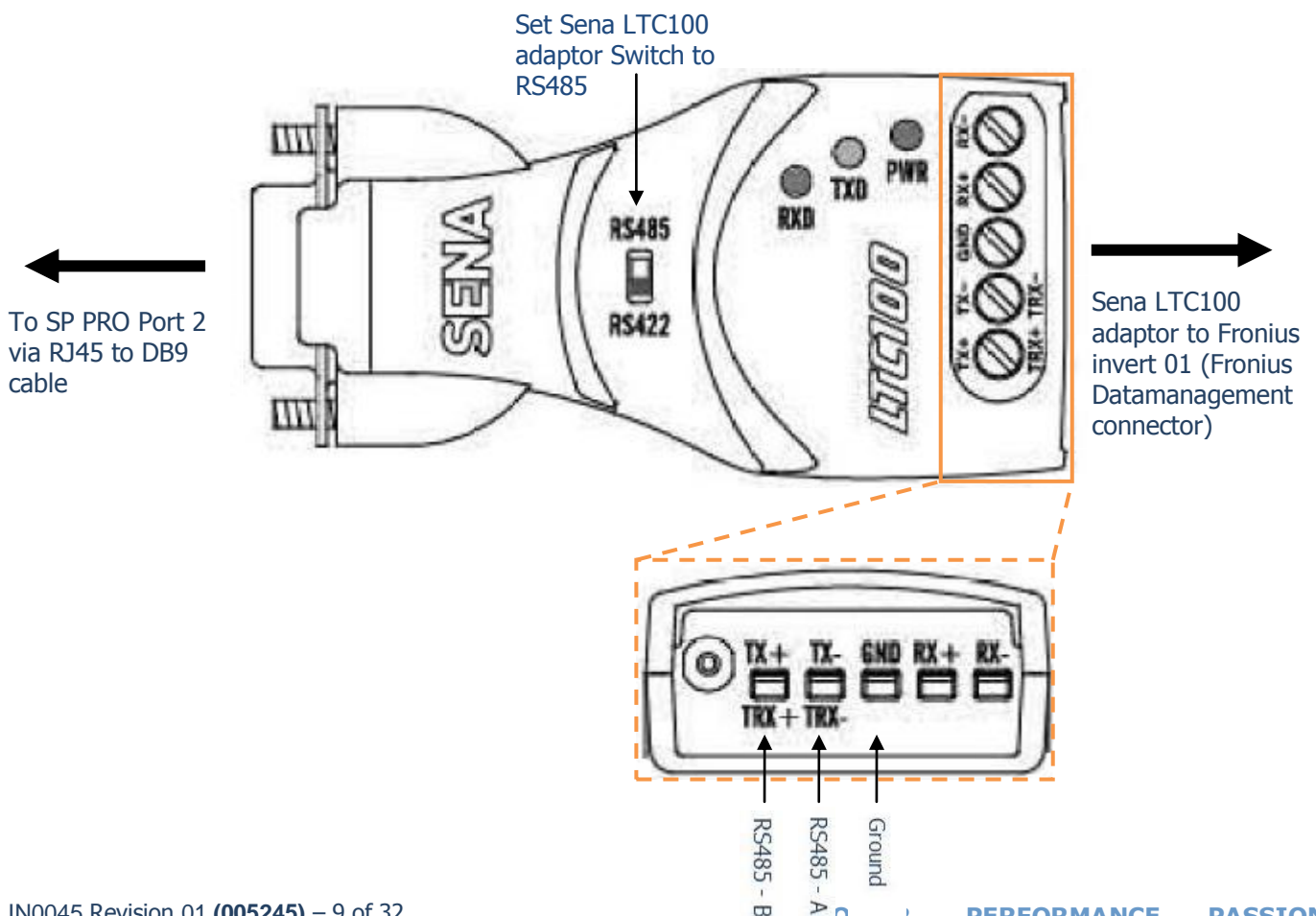


To install the Sena LTC100 adapter, use the RJ45 to DB9 lead and connect the Sena LTC100 adapter to the SP PRO Series I **Serial Port 2**. Then using 'CAT5' network cable or similar make, connect the Sena LTC100 adaptor to Fronius inverter 01 (Master) as per Table 1, Fronius Datamanager connector (see section "Fronius RS485 Connection to Inverter 01 (Master)" Page 10).

Note: Ensure that the Sena LTC100 adaptor switch is set to RS485.

Sena LTC100 connections	Signal	Typical Wire Colour (May vary with different CAT5 leads)	Fronius RS485 Connector
RX-	Not Used	-	-
RX+	Not Used	-	-
GND	Ground	Green	-
TX- / TRX-	RS485 - A	Orange	RS485 D-
TX+ / TRX+	RS485 - B	Orange/White	RS485 D+

Table 1: Sena LTC100 adaptor to Fronius connections and wire colours

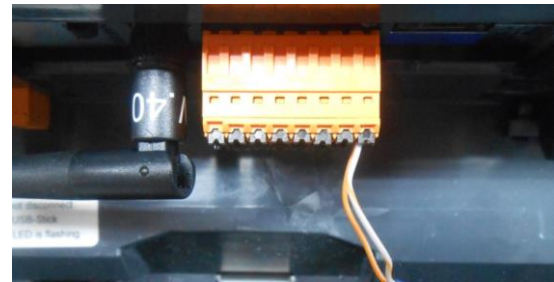
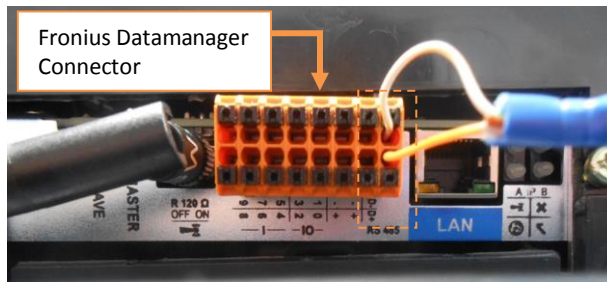


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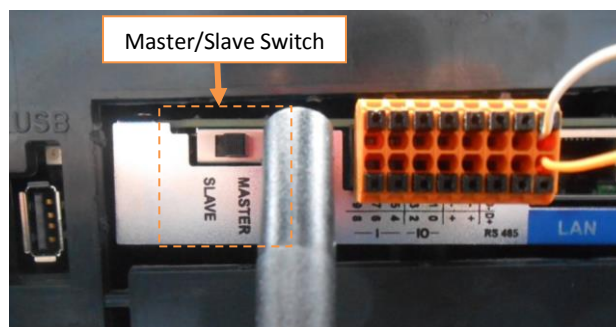
FRONIUS RS485 CONNECTION TO INVERTER 01 (MASTER)

Using the CAT5 network cable, connect the two wires from the Sena LTC100 adaptor to the Fronius Datamanager connector, RS485 D+ and RS485 D-. The RS485 terminals are located on the right hand side edge of the connector as illustrated.



Connection of Sena LTC100 adaptor to Fronius Datamanager connector

Set the Master/Slave switch (located on the left hand side of the orange connector) to "MASTER" as illustrated.



Master/Slave switch set to "MASTER"

Notes:

1. Wire colours may vary with different CAT5 cables.
2. The Ground wire (GND) from the SP PRO RS485 communication link is not connected.

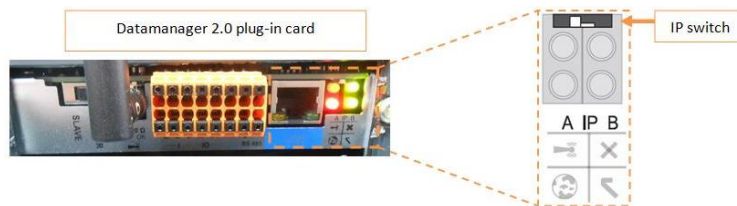
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CONNECTING FRONIUS LINK BETWEEN INVERTERS 02 TO 05

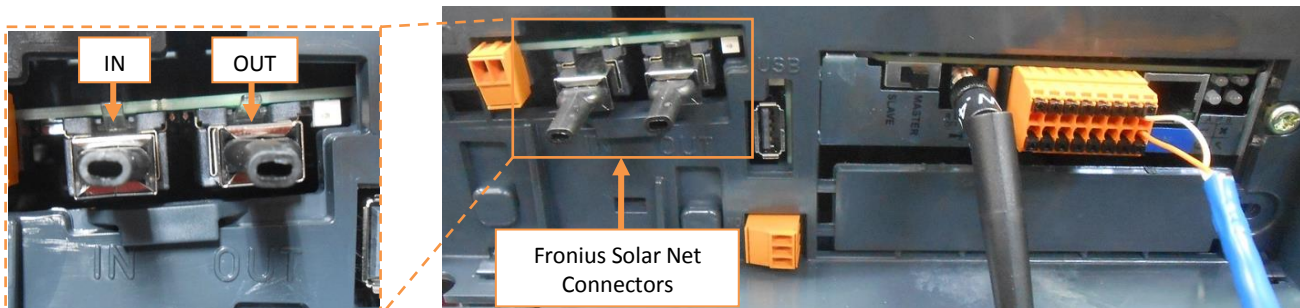
The following configuration outlines the connection for multiple Fronius Inverters to the Master Fronius Inverter (Fronius Inverter 01). **Skip to the next step if only a single Fronius Inverter is installed.**

Note: when connecting multiple Fronius inverters together it is important that the IP Switch must be set to position B for Fronius inverters 02 to 05. Only Fronius inverter 01 (Master) the IP switch is required to be set to position A.



The Datamanager 2.0 plug-in card – IP switch is set to position A for master only

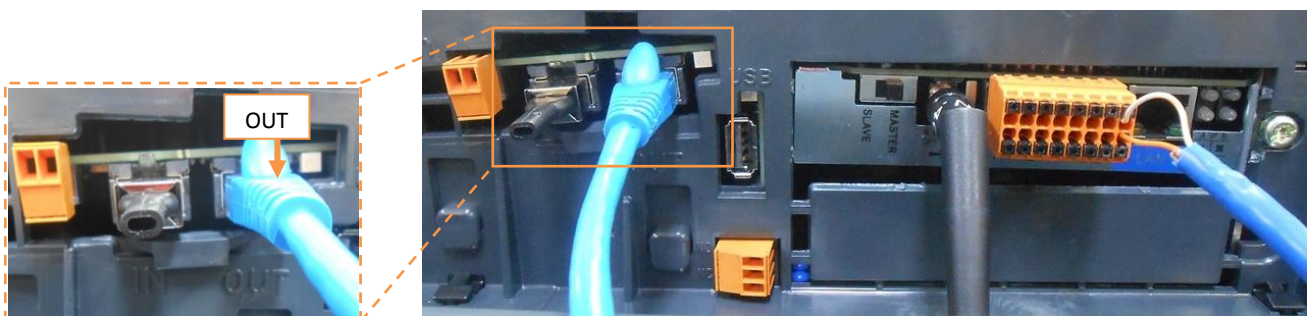
Inside the Fronius Inverter there are two RJ45 connectors (Fronius Solar Net Connector) with termination connectors installed. The Fronius Solar Net connectors are designed to interface with multiple Fronius inverters in a daisy chain arrangement via the input "IN" (Right hand RJ45 connector) and output "OUT" (Left hand RJ45 connector) connectors.



Fronius Solar Net Connectors with termination: "IN" located on LHS & "OUT" located on RHS

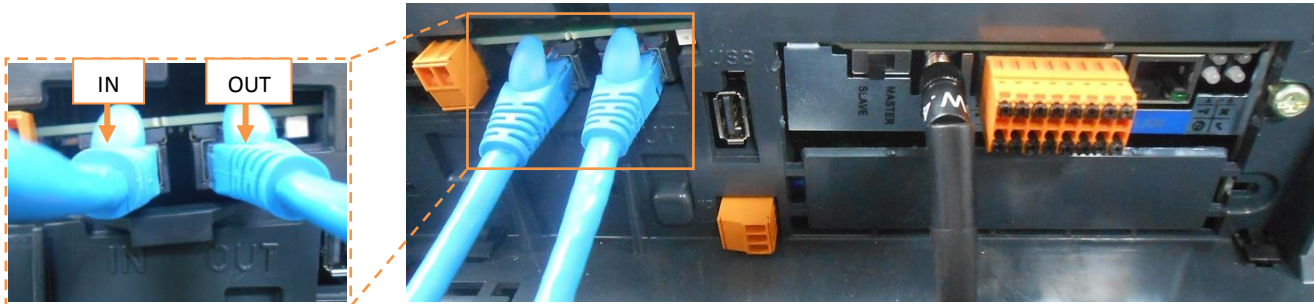
*NOTE: The termination connectors **MUST** be fitted to any unused connectors otherwise the SP PRO will not communicate to any Fronius inverters in the system.*

Using a network patch lead connect the "OUT" (Fronius Solar Net) from Fronius Inverter 01 (Master) to the "IN" of Fronius Inverter 02.



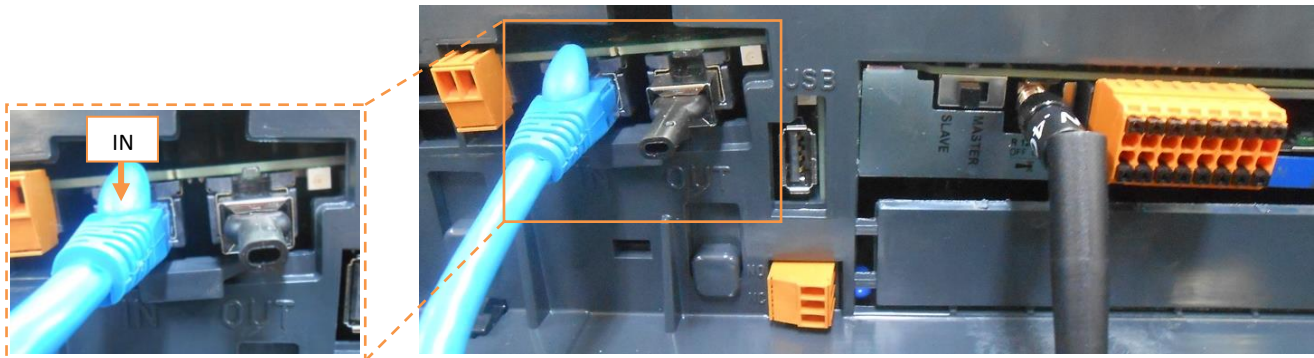
Fronius link - Fronius Inverter 01 "OUT"

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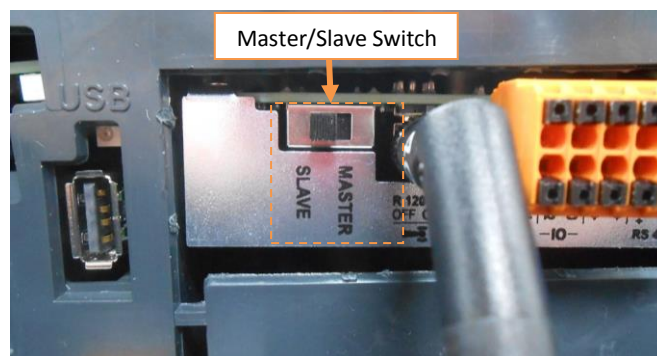
Fronius link - Fronius Inverter 02 "IN" & Fronius Inverter "OUT"
(Fronius connection on intermediate inverters)

Using another patch lead, connect the "OUT" from inverter 02 (above) to the "IN" of inverter 03 and so on until all inverters in the system are connected.



Fronius link - Last Fronius Inverter on communication link ("IN")

For all the inverters numbered 02 and above, set the Master/Slave switch (located on the left hand side of the orange connector) to "SLAVE" as illustrated.



Fronius Inverters 02 to 05: Master/Slave switch set to "SLAVE"

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CONFIGURATION – ADDITIONAL SETTINGS

It is recommended that the Site Configuration wizard (in SP LINK 9.1 or higher) be used to configure the SP PRO settings. Using the wizard will ensure all the 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 Fronius 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 Fronius inverters are energised.

The Fronius inverters, Protocol must be set to Solar Net and the Inverter Number set sequentially from 01. (See "Programming the Fronius" section).

SETTINGS THAT ARE SET BY SITE CONFIGURATION WIZARD

In the SP LINK tab CONFIGURATION SETTINGS > SYSTEM the follow settings are set.

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

The screenshot shows the 'Managed AC Coupled Solar' configuration window. It contains the following settings:

- String Inverter:** A dropdown menu set to 'Fronius'.
- Number of Devices:** A numeric input field set to '2' with a range of '[1 - 5]'.
- Fallback Power:** A dropdown menu set to 'Disabled'.
- Islanding Power Limit:** A numeric input field set to '5.0' with a range of '[0.1 - 15.0 kW]' and a unit dropdown set to 'kW'.
- Grid Export Limit Monitor:**
 - Over Export Trip Time:** A numeric input field set to '20' with a range of '[0 - 1000 s]'.
 - Over Export Trip Limit:** A numeric input field set to '50.00' with a range of '[0.0 - 250.0kW]' and a unit dropdown set to 'kW'.

SP LINK - Configuration Settings – System tab

Note: Port 2 Communication settings will not be available once Fronius has been enabled. This is normal operation.

In the example used above, only two Fronius inverters are connected to the SP PRO.

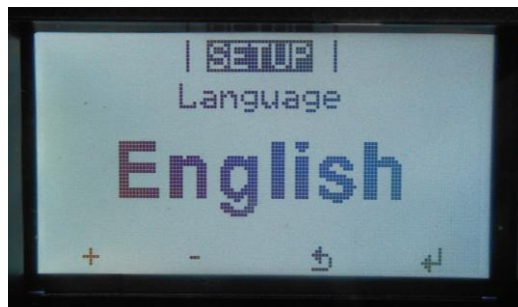
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PROGRAMING THE FRONIUS

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

1. Isolate the DC solar from the Fronius inverter(s) (via the appropriate DC circuit breaker).
Note: **DO NOT** connect the PV solar until system is configured.
2. Ensuring that the SP PRO AC Load supply is present at the Fronius Inverter, switch ON the AC supply to the Fronius inverter.
3. When the Fronius inverter is powered for the first time, select the "language" for the inverter and press the **ENTER** (↵) key.



Then to set the Country, scroll to **AU-Australia** (↓) and press the **ENTER** (↵) key.



Set the "Date" for the inverter and press the **ENTER** (↵) key. Use the '**UP**' (+) and '**DOWN**' (-) keys to shift the numerical values in an ascending/ descending order.

*Note: "Date" will flash after the first **ENTER** (↵) key press, a second **ENTER** (↵) is required to proceed to the next step.*



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Set the "Time" for the inverter and press the **ENTER** (↵) key. Use the '**UP**' (+) and '**DOWN**' (-) keys to shift the numerical values in an ascending/ descending order.
*Note: "Time" will flash after the first **ENTER** (↵) key press, a second **ENTER** (↵) is required to proceed to the next step.*



Set the "MPP Tracker 2" for the inverter to "ON" and press the **ENTER** (↵) key



Note: When the Fronius inverter is powered without the DC, "INFO STATE 523 LOW PV VOLTAGE" will be displayed on the screen.

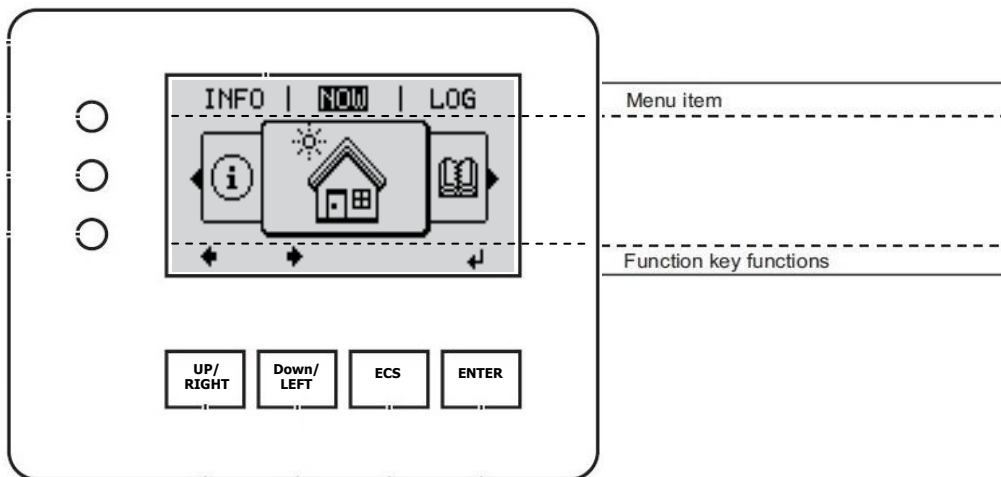


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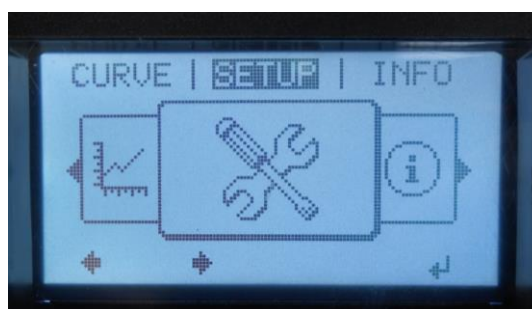


- Once the display is active on the Fronius inverter, access the main menu. To enter the main menu, press the **ESC** (↵) key once, then using the **LEFT** (←) or **RIGHT** (→) keys to scroll through the main menu. To access any of the menu items, press the **ENTER** (↵) key on the selected item. The **ESC** (↵) key is also used to return back to the previous menu or to edit previous digits.

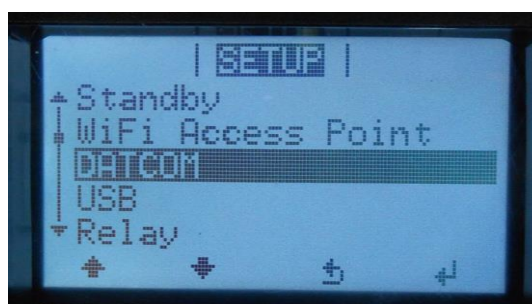
The menu is continuous, when the end is reached the display automatically returns to the first menu item. The '**UP**' (↑) and '**DOWN**' (↓) keys are used to scroll through menu options or to shift numerical scales in ascending/ descending order, they are mainly used in submenus to scroll through the various menu items.



To access the **SETUP** menu, scroll once to the left and press the **ENTER** (↵) key. The **ENTER** (↵) key is used to confirm an action or to access submenus.



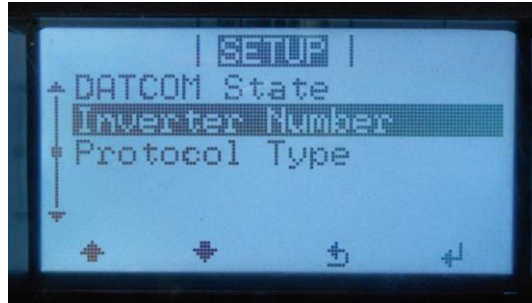
- Scroll to **DATAKOM** (↓) and press **ENTER** (↵).



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6. Scroll to **Inverter Number** (↓) and press **ENTER** (↵).



- a. If only one Fronius inverter is installed then the address must be set to 01.
- b. If more than one Fronius inverter is installed then the address must be allocated sequentially starting from 01 (i.e. first Fronius = 01, second Fronius = 02, third Fronius = 03 etc).
- c. Once the "Inverter Number" is selected, press the **ENTER** (↵) key to configure and return to the "DATACOM" menu.



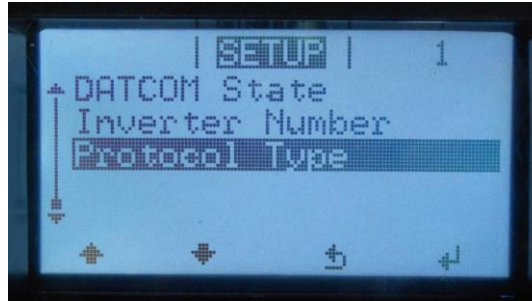
Note:

- a. *The Fronius inverter address starts from 01 to 05, where inverter 1 in SP Link is connected to Fronius inverter Address 01, i.e. Fronius inverter 01 address 01 = inverter 1 SP Link, Fronius inverter 02 address 02 = inverter 02 SP Link, Fronius inverter 03 address 03 = inverter 03 SP Link etc.*
- b. *Do Not skip any address numbers in the sequence when using multiple Fronius inverters.*

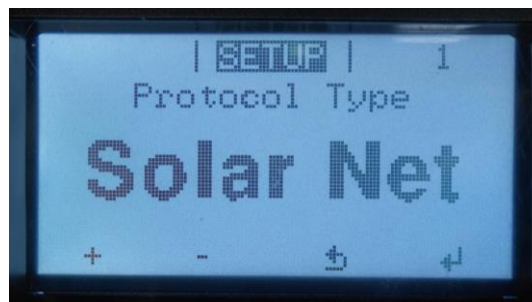
SP PRO Series I to Fronius Managed AC Coupling Installation Notes



7. Scroll to **Protocol Type** (↓) and press **ENTER** (↵).



- Set the Fronius inverter "Protocol Type" to "Solar Net", this will allow the Fronius inverter to specify the appropriate communication protocol to be used to transfer data.
- Once the "Protocol Type" is set to "Solar Net", press the **ENTER** key to configure and return to the "DATACOM" menu.

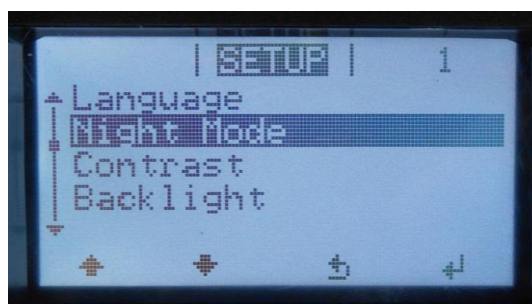


- Press the **ESC** (→) key once to return to the "SETUP" menu.

8. Scroll to **Display Setting** (↓) and press **ENTER** (↵).



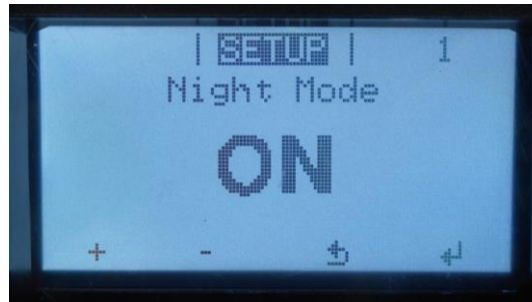
9. Scroll to **Night Mode** (↓) and press **ENTER** (↵).



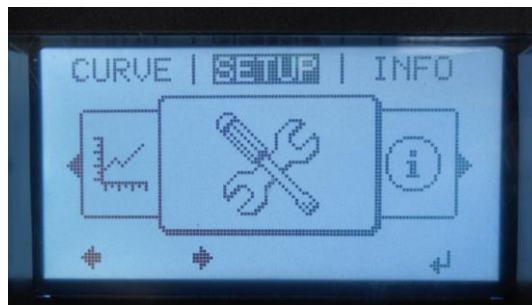
SP PRO Series I to Fronius Managed AC Coupling Installation Notes



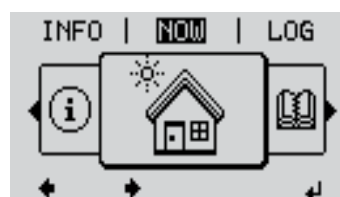
- a. Set the Fronius inverter "Night Mode" to "ON", this will allow the Fronius inverter to control the display operation during the night.
Note: Setting the "Night Mode" will allow communications between the SP PRO and Fronius inverter to stay awake at all times.
- b. Once the "Night Mode" is set to set, press the **ENTER** key to configure and return to the "Display Setting" menu.



10. Press the **ESC** (←) key twice to return to the main menu.



11. If there are multiple Fronius inverters installed, repeat for all others.
12. When all is configured, the Fronius inverter display screen will cycle through the amount of energy currently fed automatically when no key is pressed for 2 minutes or by selecting the "Now" menu.



13. Carry out the Modbus Communication & Fall Back Function Setting in the following section (Page 21).

SP PRO Series I to Fronius Managed AC Coupling Installation Notes



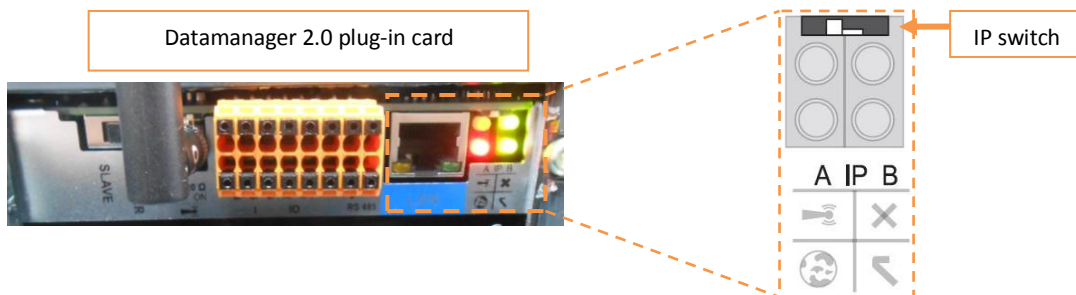
MODBUS COMMUNICATION & FALL BACK FUNCTION SETTING

The settings listed below are all that is required to configure the Modbus communication and Fall back function. The settings are ONLY carried out for Fronius inverter 01 (Master).

Note:

- This section needs to be read in conjunction with the Fronius Datamanager 2.0 manual.*
- The IP Switch must be set to position B for Fronius inverters 02 to 05. Only Fronius inverter 01 (Master) the IP switch is required to be set to position A.*
- Fronius Solar Net termination connectors must be inserted into each empty IN or OUT Solar Net connector socket of the last inverter.*

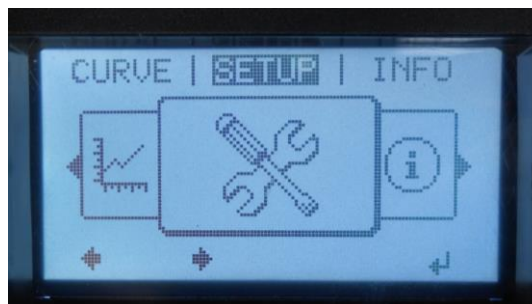
1. Make sure the IP switch on the Datamanager 2.0 plug-in card is set to position A on Fronius inverter 01 (Master).



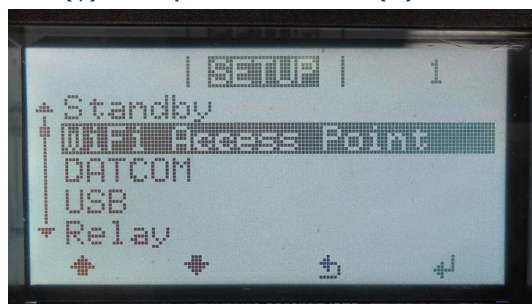
This allows the Fronius Datamanager 2.0 plug-in card to connect via LAN or WLAN to the PC.

Note: When connecting via LAN, connect a network cable from the "LAN" connector on the Datamanager 2.0 plug-in card to the PC.

2. From the main menu, scroll to **SETUP** and press the **ENTER** (↵) key.



3. Scroll to **WiFi Access Point** (↓) and press **ENTER** (↵).

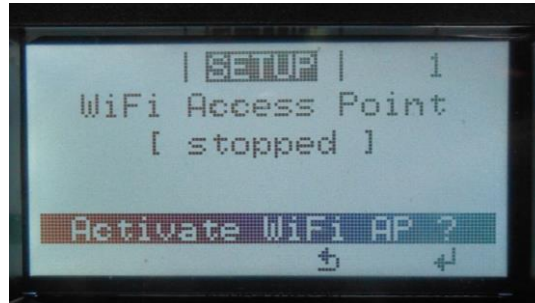


SP PRO Series I to Fronius Managed AC Coupling Installation Notes

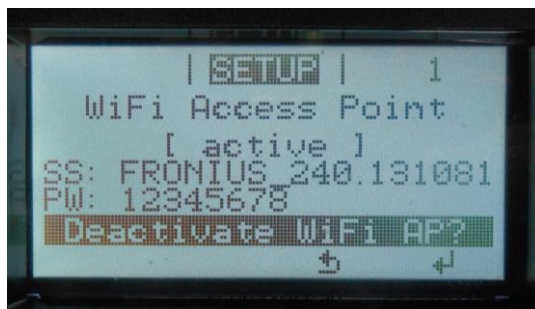


- a. Select "Activate WiFi AP ?" and press **ENTER** (↵).

Note: "Activate WiFi AP ?" will take a couple of seconds to appear on the screen.



- b. The "WiFi Access Point" will activate automatically "active" and the Network Name "SS" and Password "PW" will be displayed on the screen.

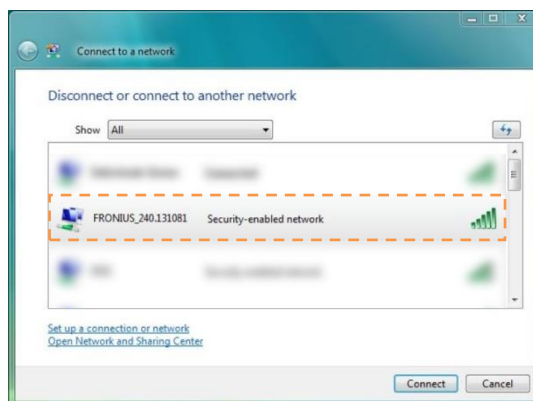


Notes:

1. *DO NOT* select "Deactivate WiFi AP ?", the WiFi signal will be lost.
2. The WLAN WiFi signal stays open for one hour.

- c. From the PC, search for the Network Name displayed on the Fronius inverter and establish a connection to the network. The password network is displayed on the LCD display of the inverter (Default PW: 12345678).

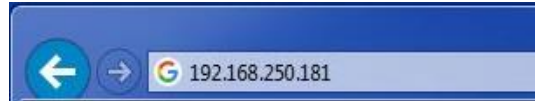
Note: The Fronius inverter establishes a direct WiFi connection between the computer and itself. No internet is required.



SP PRO Series I to Fronius Managed AC Coupling Installation Notes



- d. Open an internet web browser and type the appropriate address for the appropriate connection:
 - i. IP address for WLAN connection: 192.168.250.181

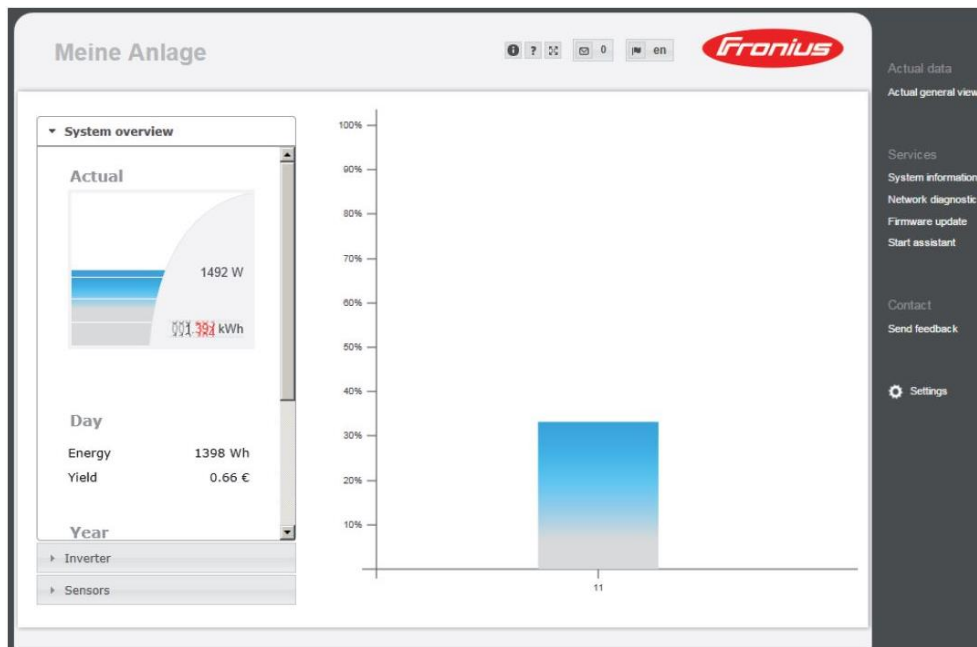


- a. The IP address for the WLAN is linked directly to the start page of the Commissioning Wizard, select the appropriate wizard and follow the instructions.

Note: Read in conjunction with the Fronius Datamanager 2.0 manual.



The Fronius Datamanager 2.0 website start page appears.

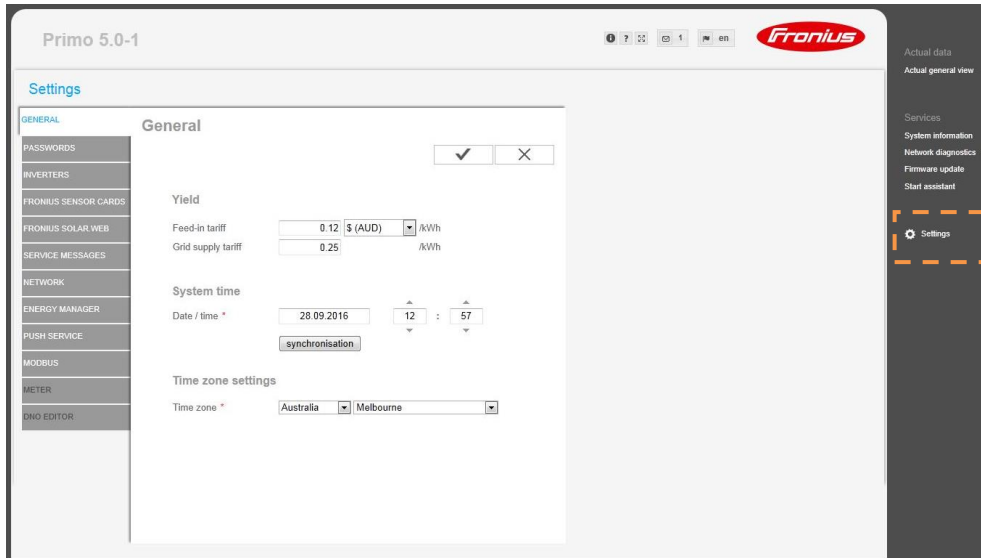


Note: The image is used as an example only, settings may differ.

SP PRO Series I to Fronius Managed AC Coupling Installation Notes

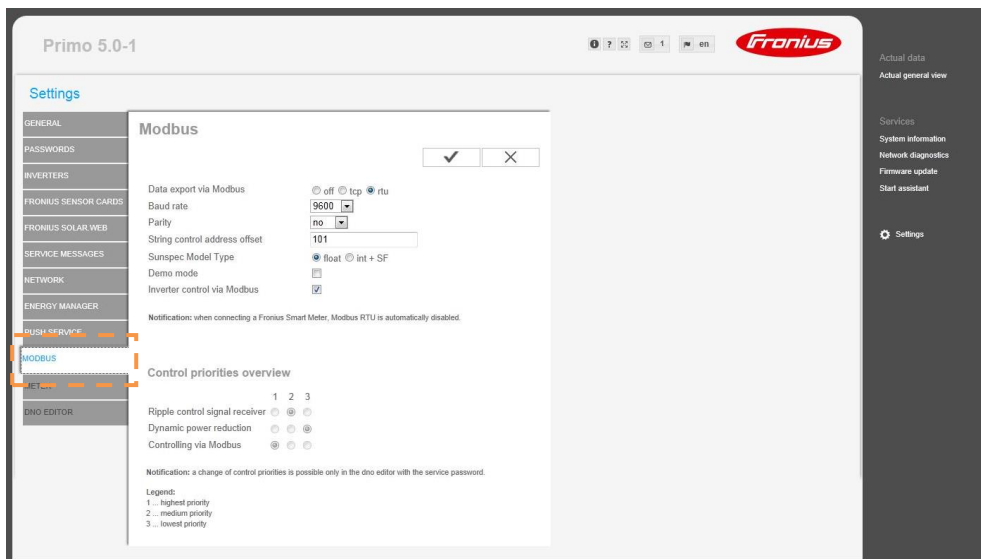


- b. On the Datamanager 2.0 website, select "Settings".



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

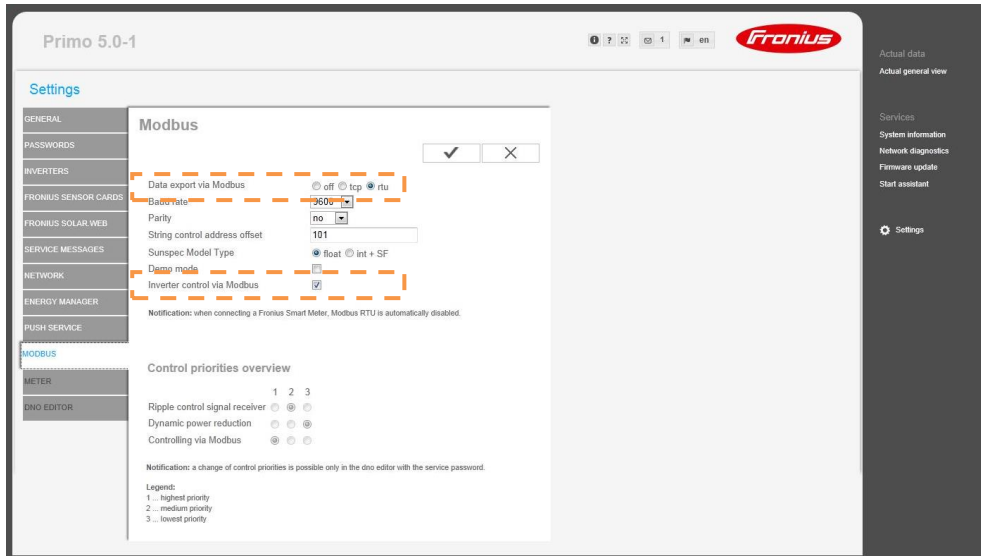
- c. Select the "MODBUS" tab.



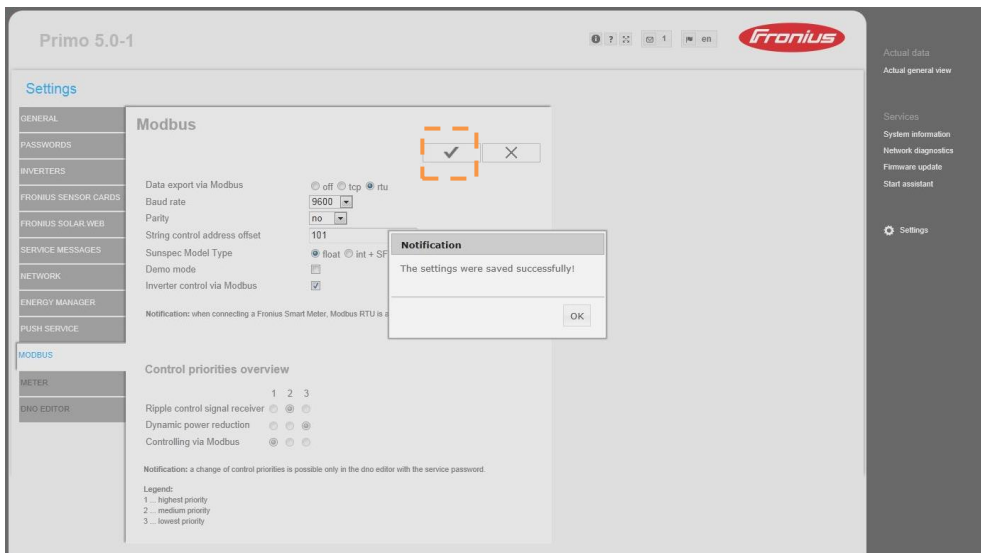
SP PRO Series I to Fronius Managed AC Coupling Installation Notes



- d. Set the "Data export via Modbus" to "rtu" and select "Inverter control via Modbus"



- e. Save the changes made in "Modbus" by selecting the tick (✓) in the top right hand corner of the page. A popup message will appear to indicate the changes made were saved "The settings were saved successfully".



SP PRO Series I to Fronius Managed AC Coupling Installation Notes



f. Select the "DNO EDITOR" tab.

Primo 5.0-1

Settings

DNO editor Primo 5.0-1, on Wednesday, September 28, 2016, 1:00:50 PM

unlocked	Input pattern	Active power	Power factor cosφ	UC output	excluded inverter(s)
<input checked="" type="checkbox"/>	IO 0	100 %	1 ind cap	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	IO 1	60 %	1 ind cap	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	IO 2	30 %	1 ind cap	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	IO 3	0 %	1 ind cap	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	IO 4	%	ind cap	<input type="checkbox"/>	

... not applicable
 ... not considered
 ... pin open
 ... pin closed

Import Export

g. In the "IO Control" table, toggle the boxes in "IO" column and the forth row to white.

Primo 5.0-1

Settings

DNO editor Primo 5.0-1, on Wednesday, September 28, 2016, 1:00:50 PM

unlocked	Input pattern	Active power	Power factor cosφ	UC output	excluded inverter(s)
<input checked="" type="checkbox"/>	IO 0	100 %	1 ind cap	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	IO 1	60 %	1 ind cap	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	IO 2	30 %	1 ind cap	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	IO 3	0 %	1 ind cap	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	IO 4	%	ind cap	<input type="checkbox"/>	

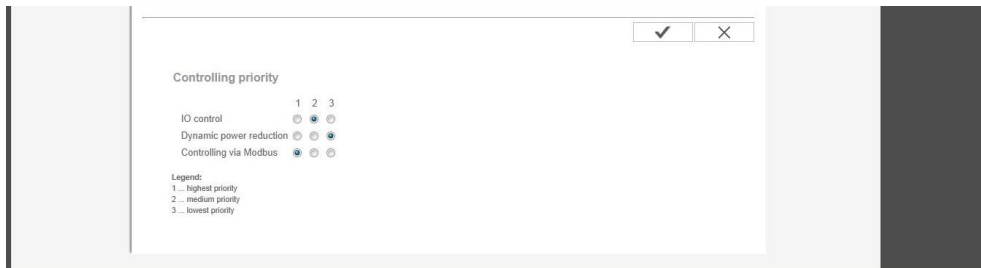
... not applicable
 ... not considered
 ... pin open
 ... pin closed

Import Export

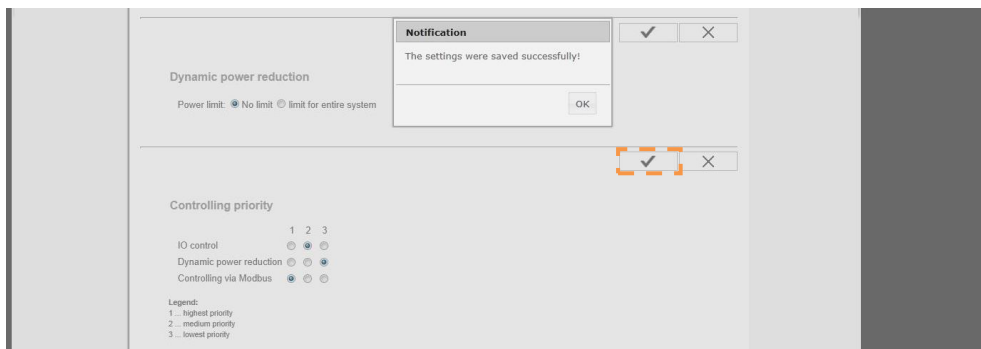
SP PRO Series I to Fronius Managed AC Coupling Installation Notes



- j. In "DNO EDITOR" tab, scroll down to "Controlling Priority" and set:
 - ii. "IO control" to 2
 - iii. "Dynamic power reduction" to 3
 - iv. "Controlling via Modbus" to 1



- k. Save the changes made in "Modbus" by selecting the tick (✓) in the top right hand corner of the page. A popup message will appear to indicate the changes made were saved "The settings were saved successfully".



- l. Carry out the System Commissioning in the following section (Page 29).

SP PRO Series I to Fronius Managed AC Coupling Installation Notes



INVERTER SOFTWARE UPDATE & COUNTRY SETUP

When the Fronius inverter software is outdated, it is important to update the inverter with the latest Software. The following process outlines the steps required to update the Fronius inverter Software.

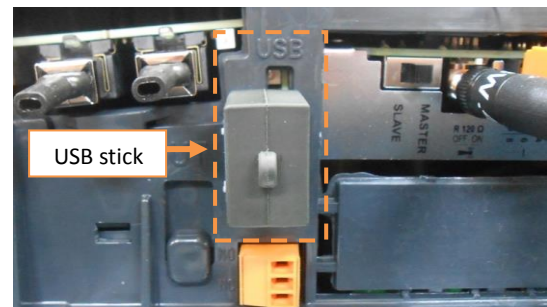
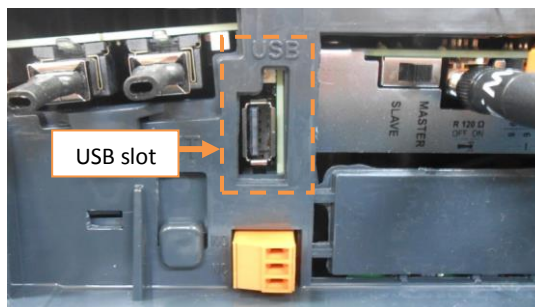
Note: When AS/NZS4777.2:2015 settings are required, the country setup will need to be reloaded back onto the Fronius inverter (Step 7).

1. To download the Fronius Software (.upd), open an internet web browser and type the following address: www.fronius.com/cps/rde/xbcr/SID-A009569B-886ED337/fronius_international/fro27140.upd

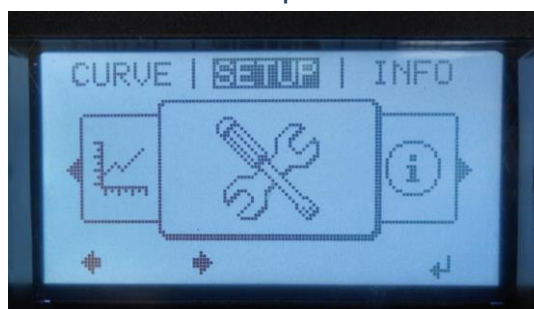


The file will automatically start downloading from the website to the internet browser.

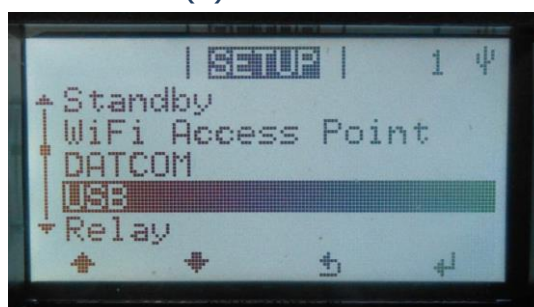
2. Copy the downloaded Software file "fro27140.upd" on to an empty USB stick.
3. Insert the USB stick into the Fronius inverter USB slot.



4. From the main menu, scroll to **SETUP** and press the **ENTER** (↵) key.



5. Scroll to **USB** (↓) and press **ENTER** (↵).



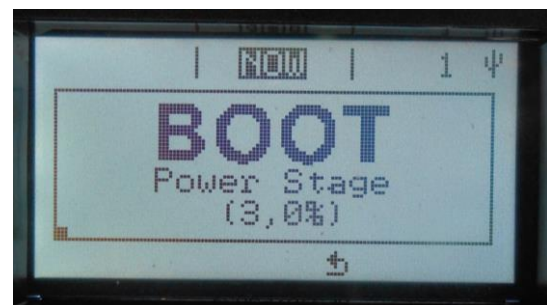
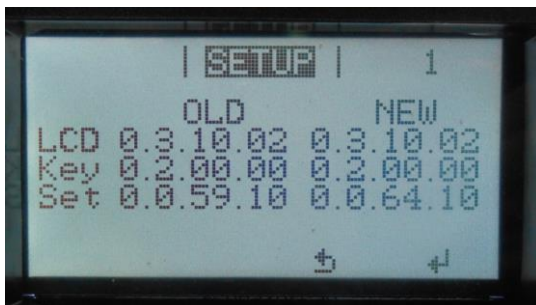
SP PRO Series I to Fronius Managed AC Coupling Installation Notes



6. Scroll to **Software Update** (↓) and press **ENTER** (↵).

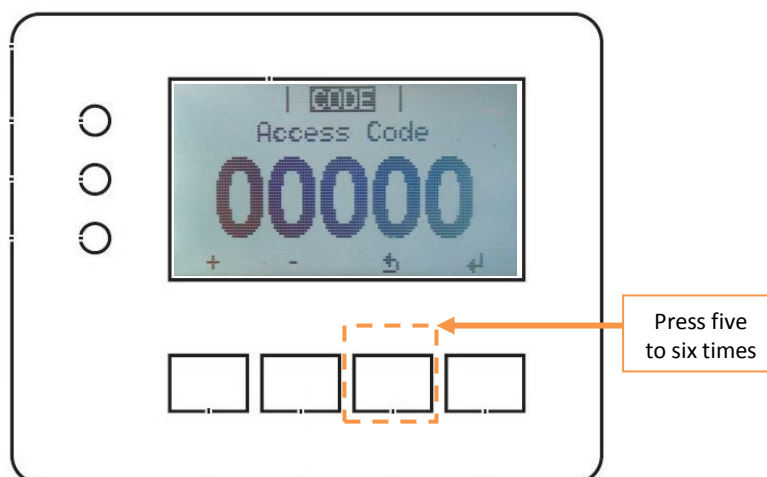


a. Two columns "OLD" and "New" identifying the changes, press and hold the **ENTER** (↵) key until "Boot" is displayed on the screen



b. The inverter will automatically upload the Software and restart to indicate update complete.

7. When the software is updated, it is important to reload the country settings into the inverter. From the main menu press the third button from the left five to six times until "00000" is displayed on the screen.



SP PRO Series I to Fronius Managed AC Coupling Installation Notes



8. Enter the "Access Code" 73887 and press **ENTER** (↵). The "Access Code" will flash after the first **ENTER** (↵) key press, a second **ENTER** (↵) is required to proceed to the next step.



9. Scroll to **AU-Australia** (↓) and press **ENTER** (↵).



10. The Fronius inverter will perform an automatic reset to configure the changes made and return to the main menu.

SP PRO Series I to Fronius 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.

COMMUNICATIONS LINK VERIFICATION

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

1. Check that all the communication cables have been connected correctly.
2. Connect AC to the Fronius inverters. DO NOT connect the PV until commissioning is complete.
3. Using SP LINK, connect to the SP PRO inverter. In the Data View > Now tab there should be a model number displayed for each of the installed inverters.

AC Coupled Solar	
Total Power	0.00 kW
Power #1 (Primo 4.0-1)	0.00 kW
Power #2 (Primo 3.0-1)	0.00 kW
Percent Power	1.0 %
Total Capacity	7.00 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 Fronius inverters. (An error count of 3 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 Fronius Inverters.

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

Once the Communications link has been verified for each Fronius inverter, the DC feeds to each inverter can be switch on and full system testing and verification can be performed.

SP PRO Series I to Fronius Managed AC Coupling Installation Notes



Appendix I : Islanding power limit vs battery capacity

Islanded power limit (kW) with Lead Acid batteries

Battery Capacity Ah (C10)	SP PRO Model						
	SPMC240	SPMC241	SPMC481	SPMC482	SPMC1201	SPLC1200	SPLC1202
100	Not valid	Not valid	Not valid	Not valid	6.3kW	Not valid	Not valid
180	2.3kW	2.3kW	4.5kW	4.5kW	11.3kW	Not valid	Not valid
250	3.1kW	3.1kW	6.3kW	6.3kW	15.0kW	15.6kW	15.6kW
300	3.8kW	3.8kW	7.5kW	7.5kW	15.0kW	18.8kW	18.8kW
400	5.0kW	5.0kW	10.0kW	10.0kW	15.0kW	25.0kW	25.0kW
500	6.0kW	6.3kW	10.0kW	12.5kW	15.0kW	30.0kW	31.3kW
600	6.0kW	7.5kW	10.0kW	15.0kW	15.0kW	30.0kW	37.5kW
650+	6.0kW	8.8kW	10.0kW	15.0kW	15.0kW	30.0kW	40.0kW

Table 3: Limit of AC coupled solar during islanding vs battery capacity for lead acid batteries.

Islanded power limit (kW) with Lithium batteries

Battery Capacity kWh	SP PRO Model						
	SPMC240	SPMC241	SPMC481	SPMC482	SPMC1201	SPLC1200	SPLC1202
1.5	1.1kW	1.1kW	Not valid	Not valid	Not valid	Not valid	Not valid
2.0	1.5kW	1.5kW	Not valid	Not valid	Not valid	Not valid	Not valid
3.0	2.3kW	2.3kW	2.3kW	2.3kW	2.3kW	Not valid	Not valid
4.0	3.0kW	3.0kW	3.0kW	3.0kW	3.0kW	Not valid	Not valid
5.0	3.7kW	3.7kW	3.7kW	3.7kW	3.7kW	Not valid	Not valid
6.0	4.5kW	4.5kW	4.5kW	4.5kW	4.5kW	Not valid	Not valid
7.0	5.2kW	5.2kW	5.2kW	5.2kW	5.2kW	Not valid	Not valid
8.0	6.0kW	6.0kW	6.0kW	6.0kW	6.0kW	Not valid	Not valid
10	6.0kW	7.5kW	7.5kW	7.5kW	7.5kW	7.5kW	7.5kW
12	6.0kW	9.0kW	9.0kW	9.0kW	9.0kW	9.0kW	9.0kW
14	6.0kW	9.0kW	10.0kW	10.5kW	10.5kW	10.5kW	10.5kW
20	6.0kW	9.0kW	10.0kW	15.0kW	15.0kW	15.0kW	15.0kW
30	6.0kW	8.8kW	10.0kW	15.0kW	15.0kW	22.5kW	22.5kW
40	6.0kW	8.8kW	10.0kW	15.0kW	15.0kW	30.0kW	30.0kW
50	6.0kW	8.8kW	10.0kW	15.0kW	15.0kW	30.0kW	37.5kW
55+	6.0kW	8.8kW	10.0kW	15.0kW	15.0kW	30.0kW	40.0kW

Table 4: Limit of AC coupled solar during islanding vs battery capacity for lithium batteries.