Parallel Configuration Guide for PCS and BMS Systems

Introduction: The purpose of this guide is to familiarize installers and technicians on properly setting up an Avalon ESS for multi-inverter multi-BMS use. The goal being full use of up to 12 battery modules in stacks of 6 with 2 BMS.

Scope: This document covers the parallel configuration of two PCs and BMS units to meet specific requirements.

Systems Overview:

Requirements:

- Before initiating parallel operation, update the firmware of each unit (Gateway, SEP, PCS, BMS)
- Conduct initial testing with one PCS and one BMS to ensure proper functionality.
- Once individual units are confirmed to work fine, proceed with parallel configuration.

BMS Setup Guide

Step 1: Upload Firmware

- Begin by uploading the firmware for all BMS units separately. Use Installer App or Web Console

Updating via Installer App:

SOP Avalon BMS upgrade .docx

	Step	# of People	Expected Time	Tools and Special Tools	Special Knowledge
1	Access Installer App (Using Phone)	1	1 minute	Smartphone	Avalon Installer App
2	Update Firmware (Installer App)	1	10 minutes	Smartphone	Understanding of firmware updates within the installer App

Updating via Web Console:

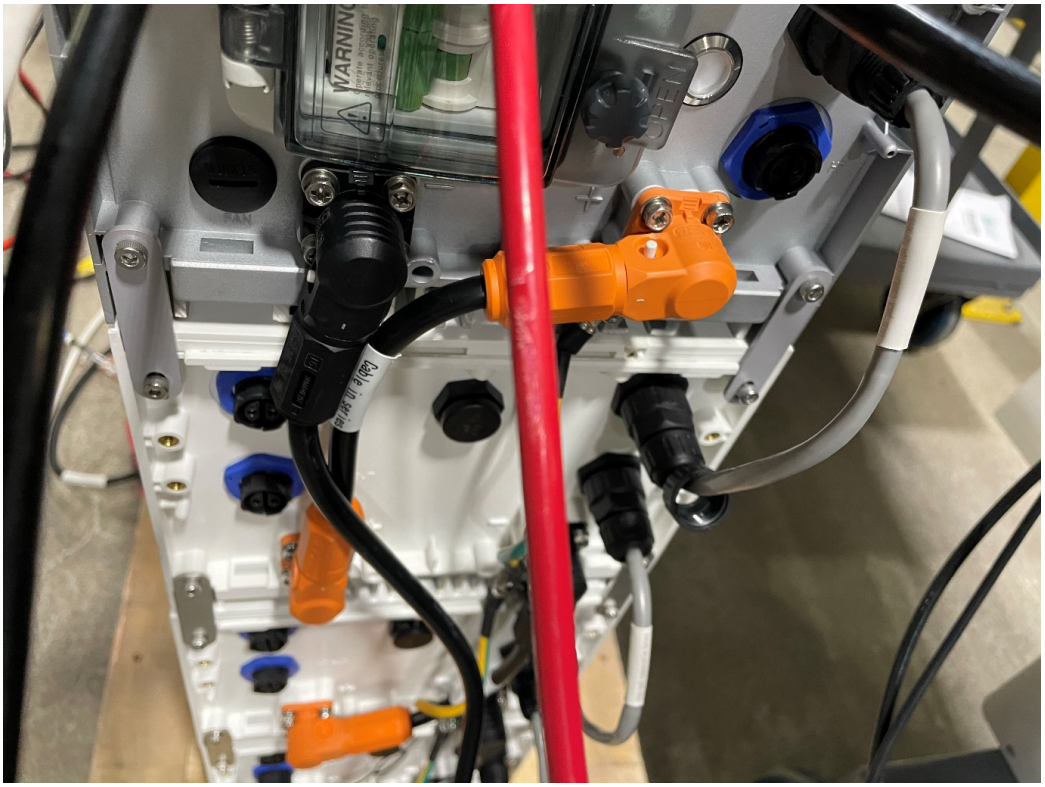
	Step	# of People	Expected Time	Tools and Special Tools	Special Knowledge
1	Access Web Console	1		Laptop, Internet access.	Knowledge of finding IP

					address, Wi-Fi network credentials
2	Update Firmware (Local Web Console)	1	10	Laptop, Internet access	Knowledge of using Web Console

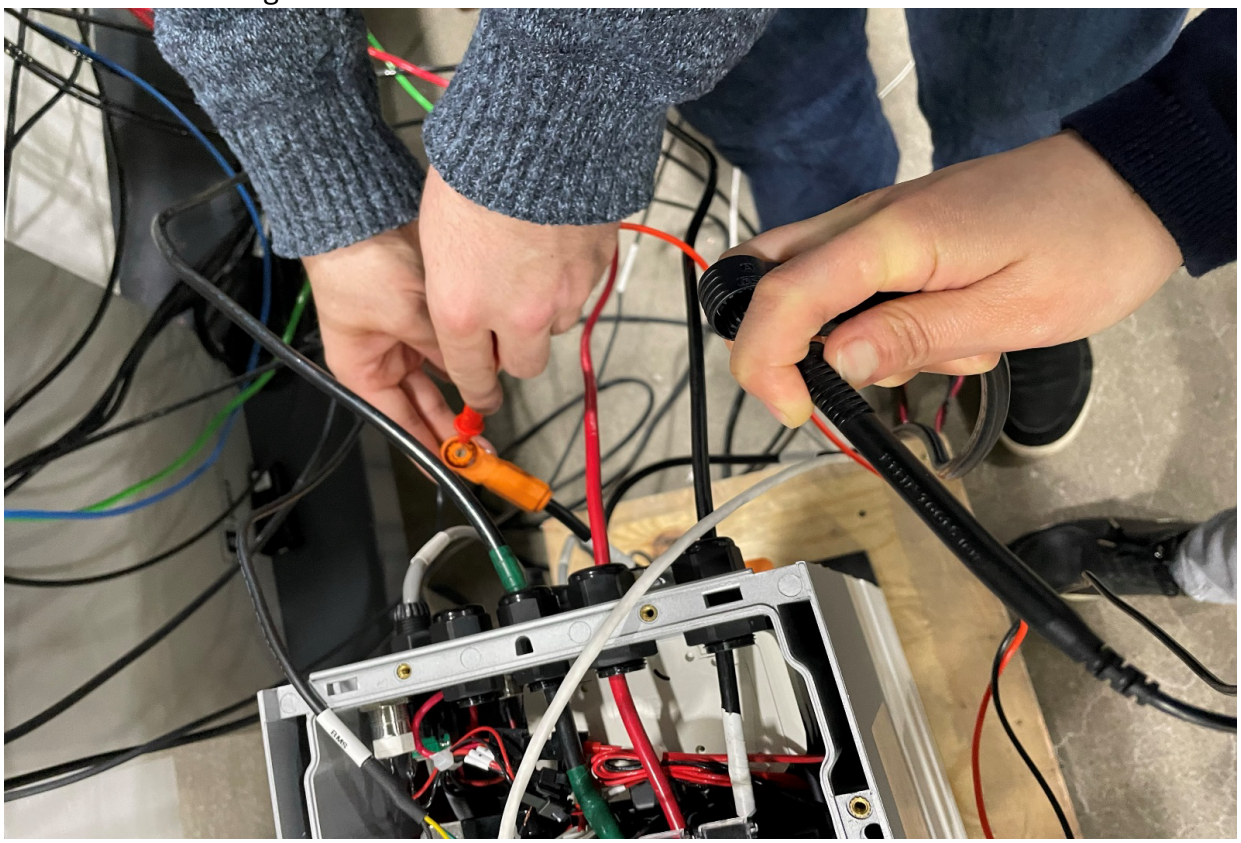
Step 2: Verify BMS and Battery Compatibility

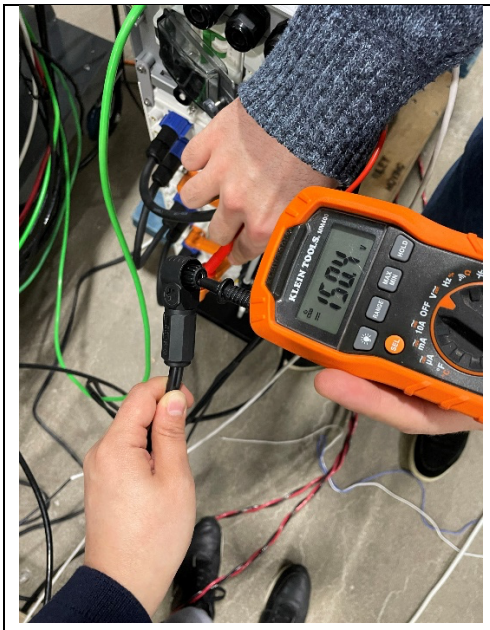
	Step	# of People	Expected Time	Tools and Special Tools	Special Knowledge
1	Check 1st BMS Voltage	1	10 minutes	Multimeter	Understanding of electrical measurements, ability to use a multimeter
2	Check 2nd BMS Voltage	1	10 minutes	Multimeter	Understanding of electrical measurements
3	Ensure Voltage Range	1	5 minutes	N/A	Understanding of electrical measurements

- Ensure that the voltage of each battery matches the specified requirements and is within the acceptable range. Each battery module must be within 0.25V DC of one another during commissioning
- Keep the voltage gap between battery stacks as small as possible. A BMS voltage gap of 3V DC per stack or less is acceptable.



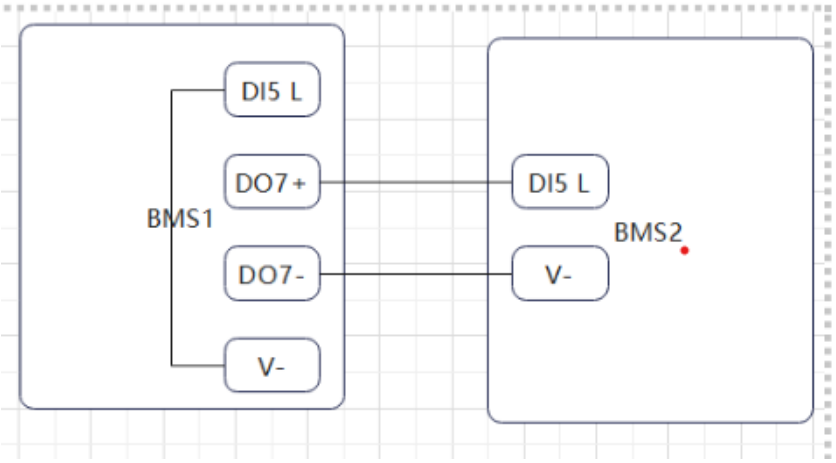
Utilize a multimeter to ensure the voltage between the positive (+) and negative (-) wires coming to the BMS.

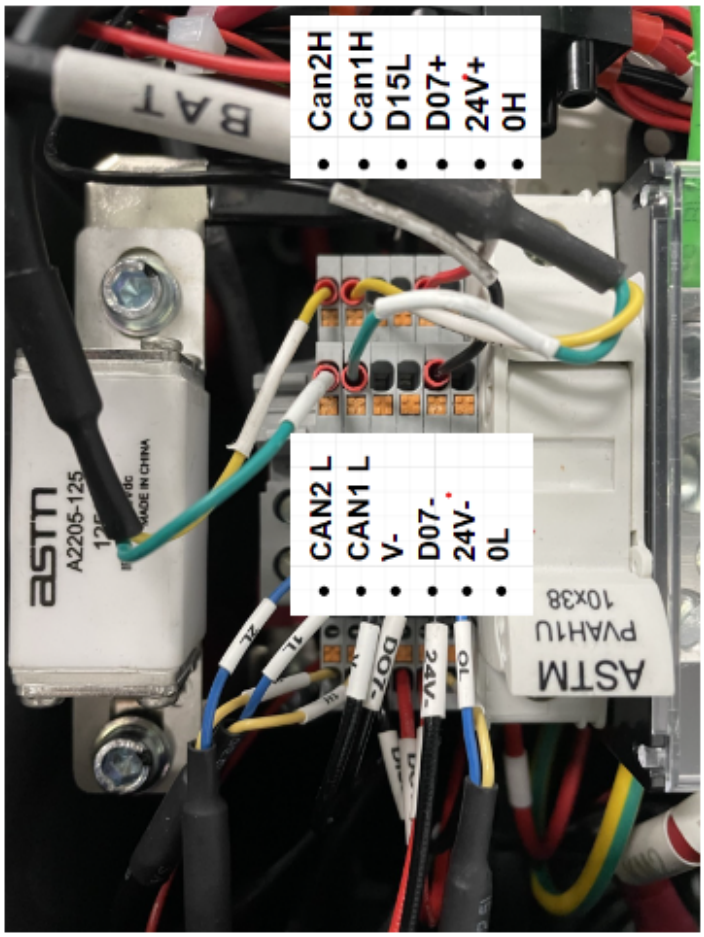


	
1st BMS	2nd BMS

Step 3: Connect Signal Lines.

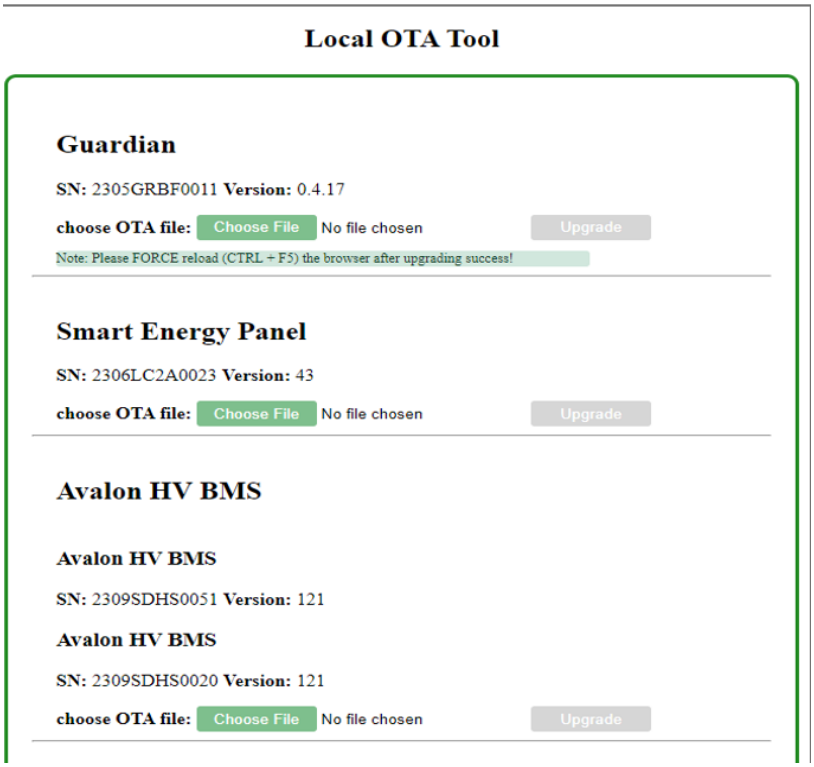
- Connect the signal lines for each BMS unit. ****Do not connect the positive and negative poles of the batteries in parallel at this stage.****
- Ensure that the signal lines are connected correctly according to the guides.
- Power on each battery individually after connecting the signal lines.
- BMS1 Master and BMS 2 Slave.

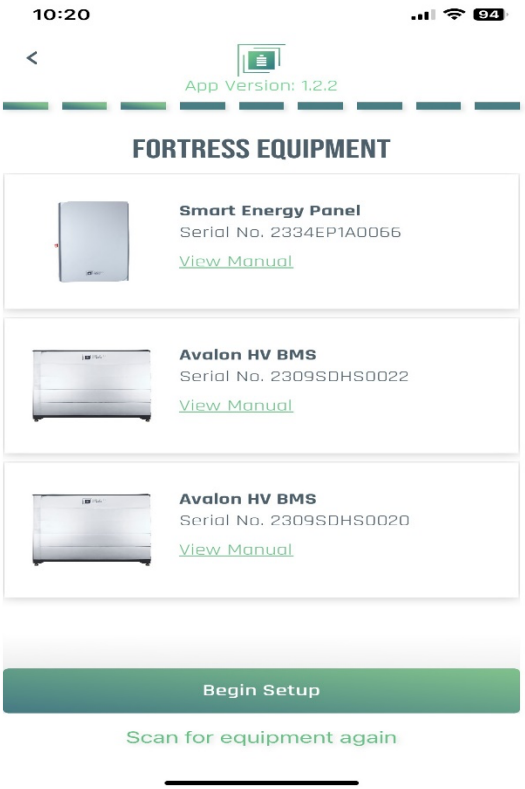




Step 4: Access BMS Web Console or Installer App

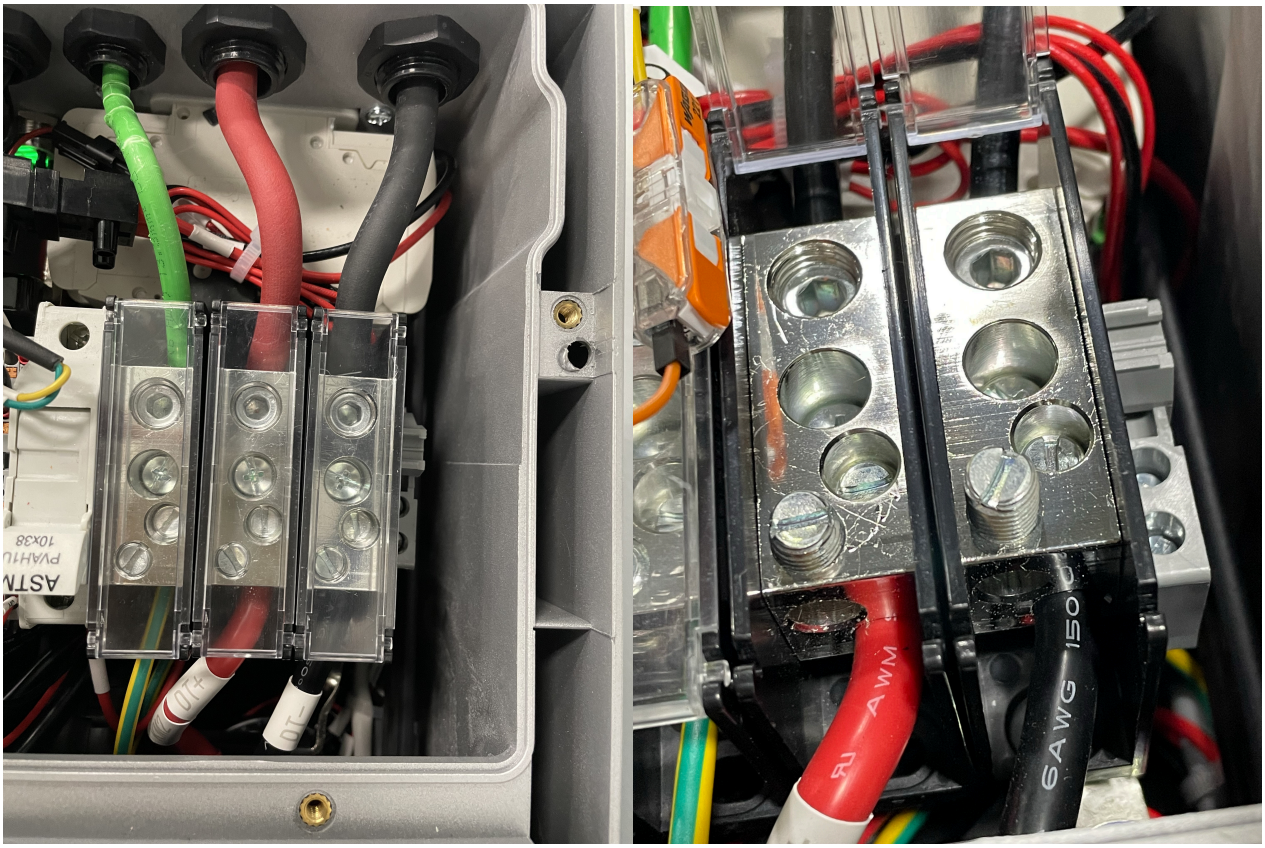
- Once the batteries are powered on, access the web Console or Installer App functionality to verify their connectivity and functionality.
- Confirm that all BMS units are detected and accessible through the Web Console or Installer App.
- Once communication is successful, turn off Master and Slave BMS before connecting power lines.



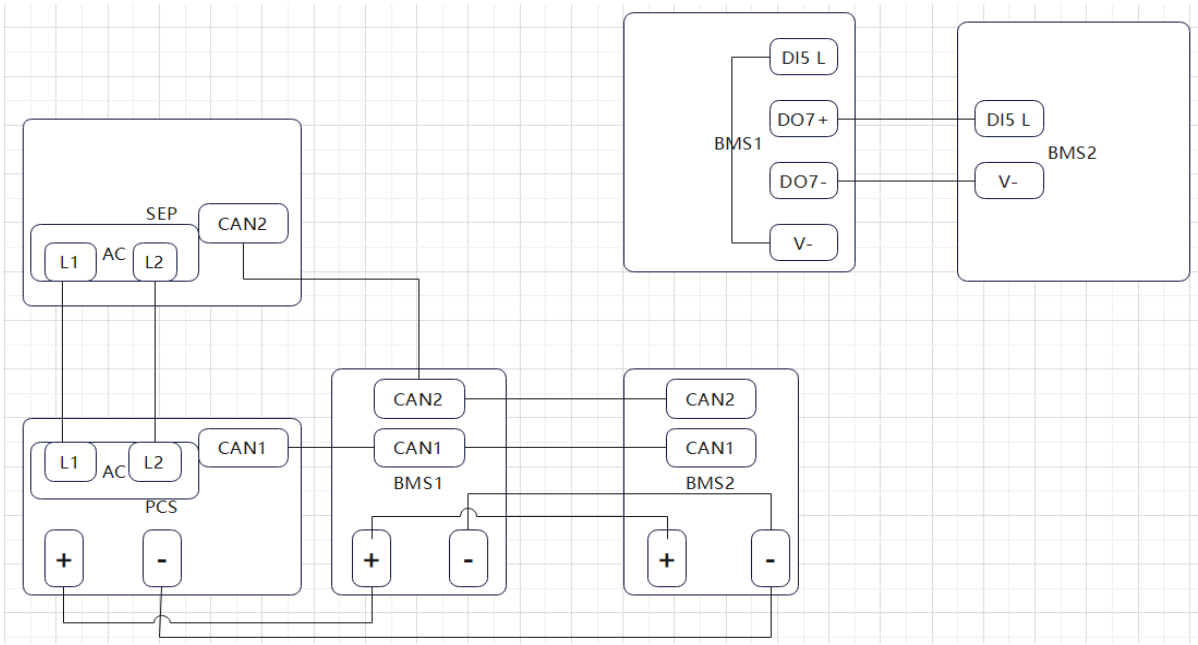


Step 5: Connect Power Lines

- Connect the power lines, establishing a parallel connection between the positive and negative poles of the batteries.
- Completing these final steps will ensure that the BMS setup is properly configured for parallel operation.
- The positive and negative poles coming from the PCS will be connected to a Master BMS
- From the Master BMS, the positive and negative terminals will be connected to the corresponding terminals of a Slave BMS. ** This is for 1 SEP, 1 PCS and 2 BMS positive and negative poles. **



Use cases: Diagram for 1SEP 1 PCS 2 Parallel BMS



This is Parallel BMS setup

Parallel PCS and BMS

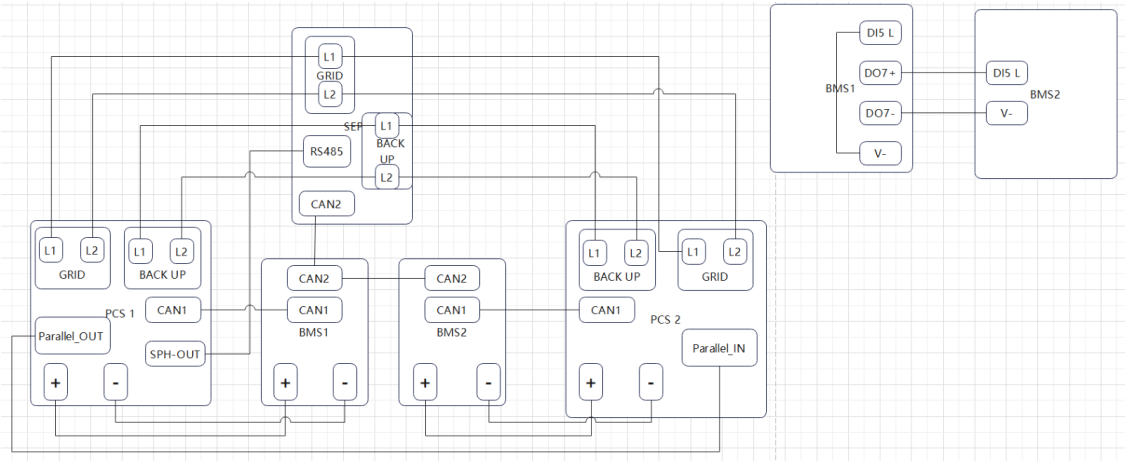
Requirements:

- Before initiating parallel operation, update the firmware of each unit (Gateway, SEP, PCS, BMS)
- Conduct initial testing with one PCS and one BMS to ensure proper functionality.

- Once individual units are confirmed to work fine, proceed with parallel configuration.

	Step	# of People	Expected Time	Tools and Special Tools	Special Knowledge
1	Parallel System Wiring	2	2-3 hours		
2	Parallel System Communication Setup	1	45 minutes		Wiring diagram
3	Configuring Using Installer App	1		Smartphone	Knowledge of using the Installer App

1. Parallel System Wiring
   - Parallel BMS
   - Connect to each Inverter PV input independently.
   - Ensure each Inverter connected to the Avalon HV Battery
   - Parallel connect the AC power grid output.
   - Backup output:



PCS 1 and BMS1 as Master, PCS 2 and BMS 2 as Slave

2. Parallel Communication Setup:

- From SEP to Master PCS all the Communication Cables as regular.
- Use N-1 double-ended network cables with reinforced shielding for parallel communication.

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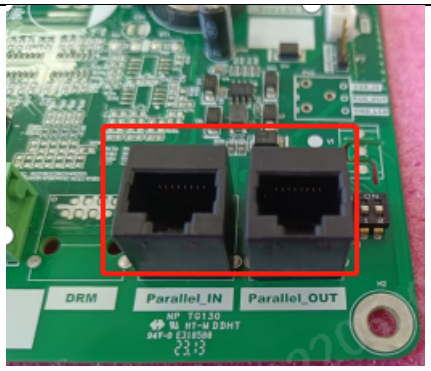
<td> 
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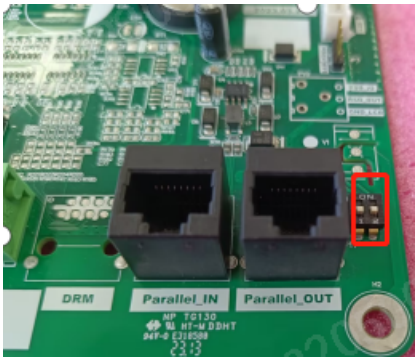
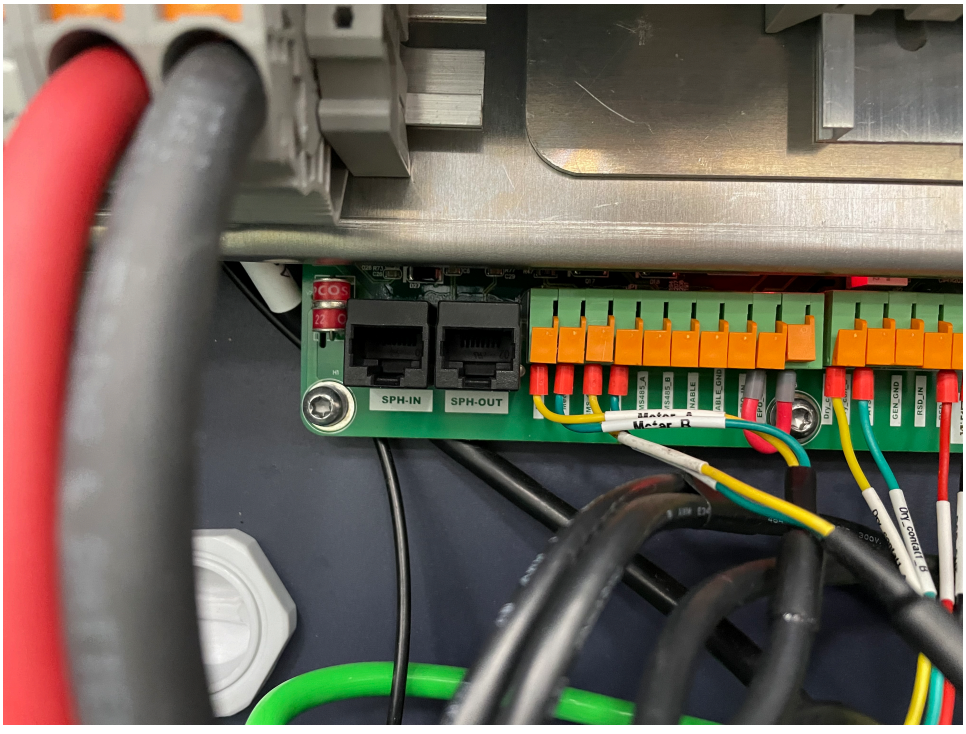
- Connect the network cable to the communication port of both the master and slave units (Parallel_IN, Parallel_OUT), staggering the interfaces between them.
- Set DIP switches 1 & 2 of the first and last PCSs to ON, and those of other slave PCS to OFF



3. Configuring Using Installer App:

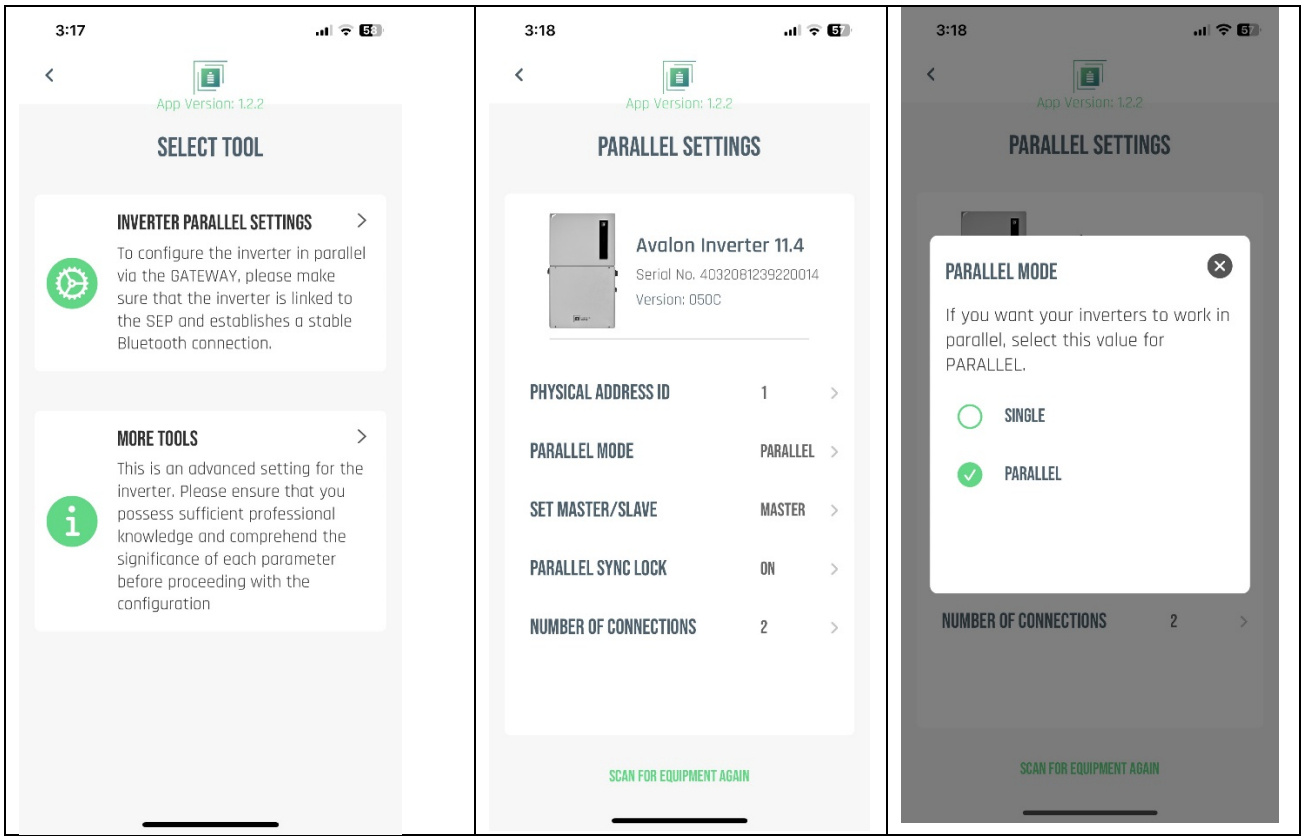
- Using Installer App set up the first Master PCS



- Proceed to connect SPH IN to the 2nd PCS and configure it's settings according to using the Installer App

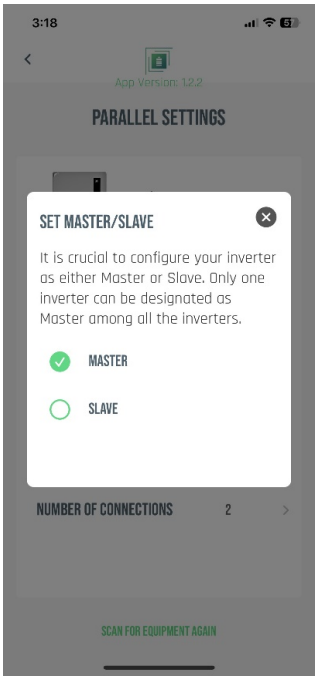
Master and Slave Configuration:

- Configure PCS 1 and BMS 1 as the master units, responsible for controlling and coordinating the system's operation.



- Inverter Parallel Settings
- Parallel Mode – Parallel
- Set Master/Slave
- Parallel Sync lock ON

Proceed to connect SPH IN to the 2nd PCS and configure it's settings according to using the Installer App



Final Verification

Upon successful completion of the setup process, verify the system configuration as follows:

- Check the Product List in the Installer App
- Check the Web Console portal to see all the products.