



# Sanctuary™ 12K Energy Storage System (ESS)

8kW AC / 12kW PV Hybrid Inverter / Charger and 13.5kWh - 40.5kWh Lithium Iron Phosphate Battery

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# READ THIS INSTALLATION GUIDE IN ITS ENTIRETY BEFORE OPERATING THE UNIT.

This unit provides safe, silent, and renewable electric power. It is very important to carefully read this Installation Guide before using the product. Keep this guide for future reference.

Carefully read and comply with all safety directives. Otherwise, personal bodily injury or death may result.

Follow these directives for safe use:

- **Caution: Only qualified personnel/technicians can install and service this device with or without a battery.**
- **Do not turn on the system until final continuity check is performed.**
- Before using the inverter, read the instructions and warning signs for the Lithium battery and all relevant sections in the manual and commissioning guide.
- Do not disassemble the inverter. If you need maintenance or repair, contact a professional service center. Improper reassembly may result in electric shock or fire and will void the warranty.
- To reduce risk of electric shock, disconnect all wires before performing maintenance or cleaning. Turning off the unit alone does not reduce this risk.
- For optimum performance of the inverter, follow the specifications when selecting the appropriate cable size. It is very important to correctly operate the inverter.
- Be cautious when using metal tools near the battery. Dropping a tool on or in the unit may cause a spark or short circuit in the battery or other electrical parts, and may even cause an explosion.
- Strictly follow the installation procedure when disconnecting the AC or DC terminals. Refer to the Installation section of this guide for details.
- **Grounding instructions:** Connect the inverter to a permanent, grounded wiring system. Be sure to comply with local requirements and regulations when installing the inverter.
- Do not connect to the mains when there is a short circuit in the DC input.
- This system includes heavy equipment. Use lifting assistance during installation.

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# Sanctuary ESS Overview

The Sanctuary is a multi-functional Energy Storage System (ESS), which incorporates the functions of an inverter, solar charger, battery charger, generator (not included), and lithium iron phosphate battery. The Sanctuary is commissioned and monitored by way of Lion App, available on smart phone and PC.

The Sanctuary ESS can be considered your own personal power plant. Whether you are covering essential loads or covering an entire home, the correct sizing of the Sanctuary is key for the system to function properly. Before sizing, you must review the Sanctuary technical specifications.

To size the system, consider the loads you would like the Sanctuary to cover. Typical essential loads are refrigeration, furnace, lights, Internet, and garage door.

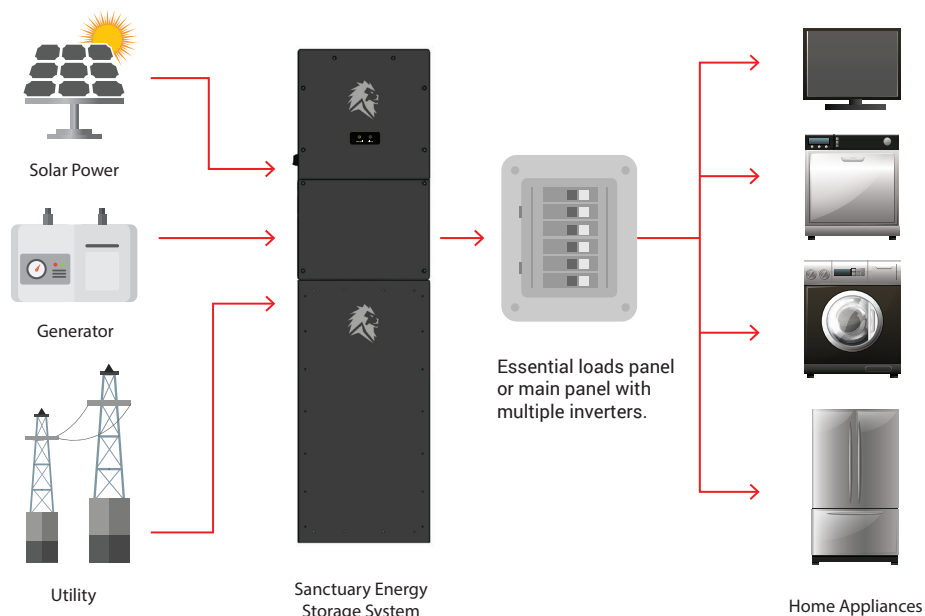
Review your existing load center and identify the breaker size for each of the loads you would like to cover. Note - any load larger than a 30 amp breaker will require multiple inverters to cover. Using the code compliant load calculation method for your jurisdiction, determine the number of continuous amps required to cover the desired loads. Each Sanctuary system can provide for 33.3AAC off-grid (stand alone), anything more than this will require additional Sanctuary system(s) to be placed in parallel (please contact Lion Energy for more details).

Note that the Sanctuary is only sold with both the inverter and battery as a system, as both are required for full functionality of the unit. If paired with solar, we recommend a minimum of 3kW of PV input per 13.5kWh (per battery of energy storage).

## Basic System Architecture

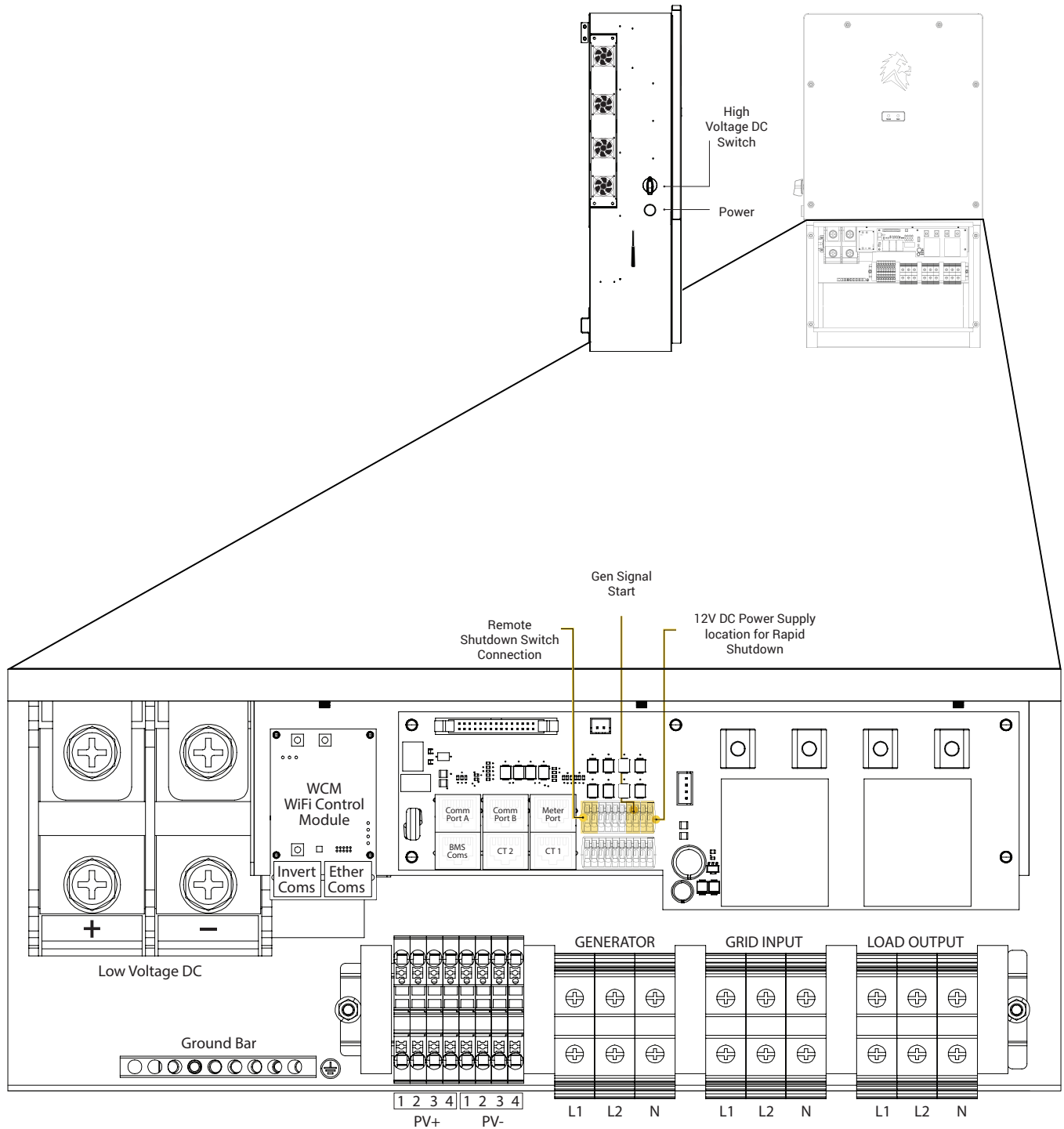
This figure depicts the basic application of the Lion Sanctuary System. Power is fed into the system from the power grid, solar power array or generator to have a complete running system.

The Lion Sanctuary Energy Storage System can provide power for residences, including appliances, communication equipment, lights and other devices.





# Inverter Overview




# Inverter Parts and Components



**12K Inverter**  
(#50170168)

1 Per Inverter



**Inverter Standoff Bracket Set**

1 Per Inverter



**Inverter Wall Mount**

1 Per Inverter



**CT Pair**

1 Per Inverter




**Inverter Wall mount Bracket Set**  
(#50170168)

2 Per Inverter



**Cat5 Cable (10')**  
(#90000136)

1 Per Inverter



**AWG@ Black Eylet-Eyelet Cable (24")**  
(#90000516)

1 Per Inverter



**AWG@ Red Eylet-Eyelet Cable (24")**  
(#90000517)

1 Per Inverter



**Busbar Set**  
(#90000508)

# Battery Parts and Components



**13.5kWh Battery**  
(#50170132)

1 Per Battery



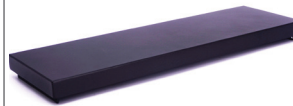
**Battery Bracket**

1 Per Battery



**Freestanding Wire Box**  
(#90000504)

1 Per Battery



**Wire Box Cover**  
(#90000506)

4 Per Battery



**Wire Box Housing Bolts**  
(#90000518)

1 Per Battery



**AWG2 Battery  
Cable Red (55")**  
(#90000501)

1 Per Battery



**AWG2 Battery  
Cable Black (55")**  
(#90000500)

1 Per Battery



**Battery COM Cable**  
(#90000508)

1 Per Battery

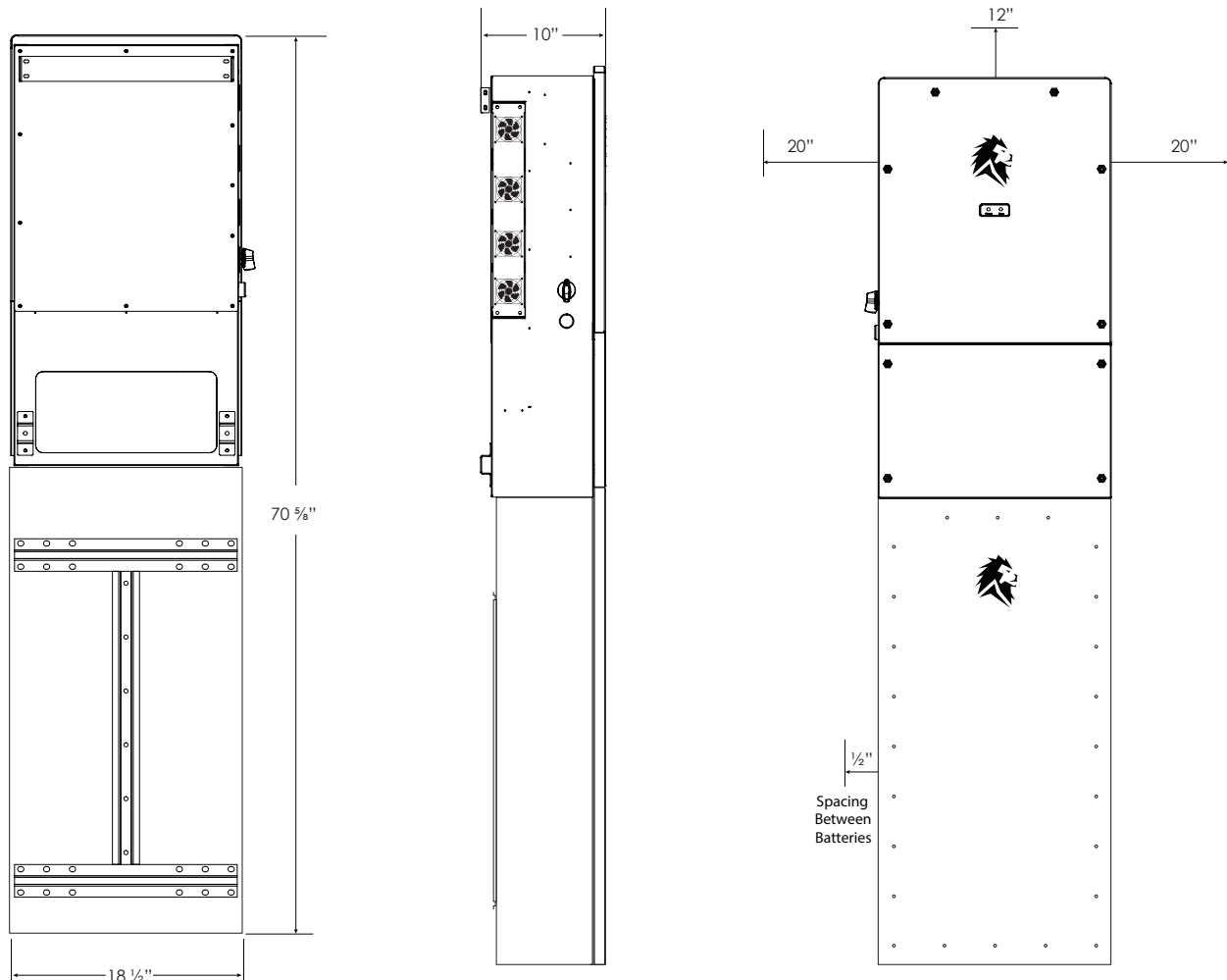


**RJ45 4-Port Splitter**  
(#90000509)

# Installation Location

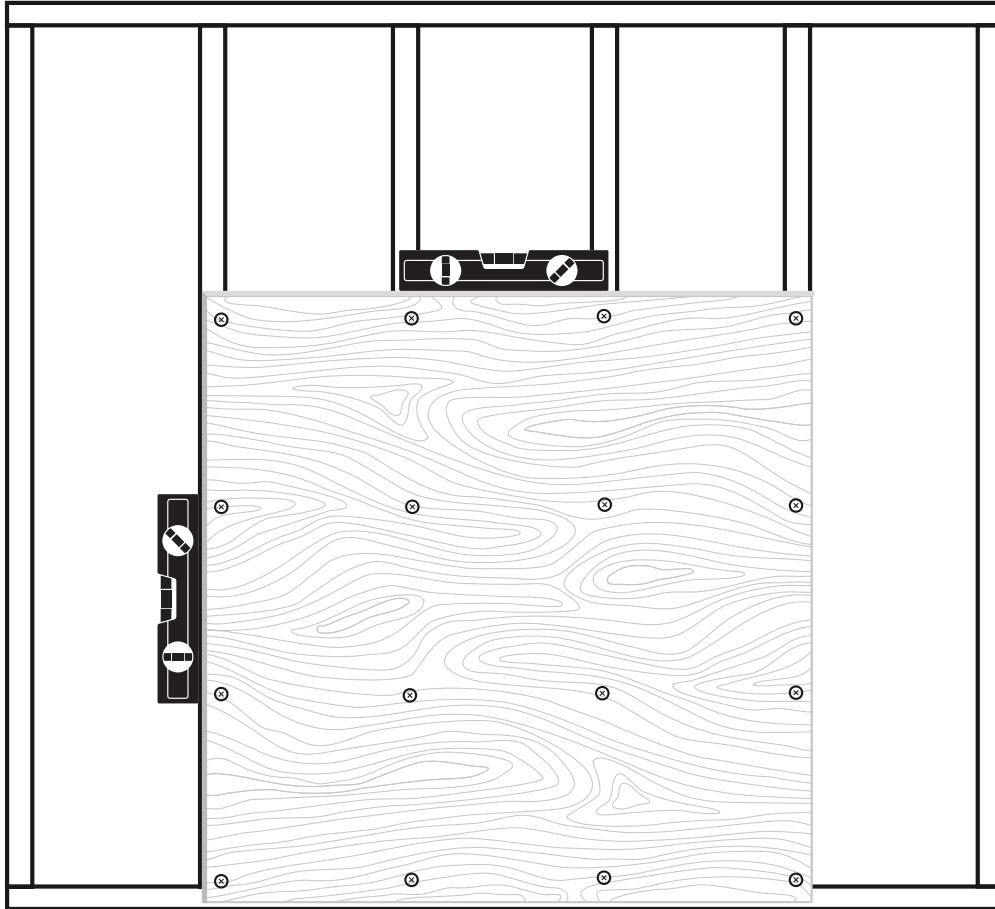
Before installing the Lion Sanctuary System (inverter/charger and battery), consider the following when choosing a location for installation:

- Install the Sanctuary System in a climate controlled location, regulated temperature between 32° to 86° F. The Sanctuary ESS cannot be installed in a living space. In other words, the Sanctuary ESS needs to be installed in a garage or utility/storage room, not your family room.
- Be sure to keep other objects and surfaces away from the unit to permit adequate heat dissipation and provide space for wiring access. For proper air circulation, provide a clearance of at least 20 inches to the side and at least 12 inches above the inverter (Battery only requires 0.5" clearance between batteries).
- To reduce installation costs, it is recommended to install the Sanctuary near existing electrical panels when possible.
- Note that the inverter, fans, and other internal components emit sound at 60dB (slightly louder than a standard computer fan).



## Location Preparation:

The Lion Sanctuary ESS battery is designed to be mounted on a wall using a French Cleat system, the inverter is designed to be mounted to the top of the battery and directly to the wall. It is recommended that you install a suitable material such as plywood onto an existing wall for anchoring. Before mounting the brackets ensure the plywood itself is square and level.



After the plywood sheet has been firmly anchored to the wall, the next step will be to install the mounting brackets.

# Mounting Brackets

**Step 1:** Mount Inverter standoff brackets and Inverter wall mount brackets to the back of the inverter.

**Step 2:** Measure a minimum of 30½" from the floor to the top of the battery bracket and secure the battery bracket to the wall.

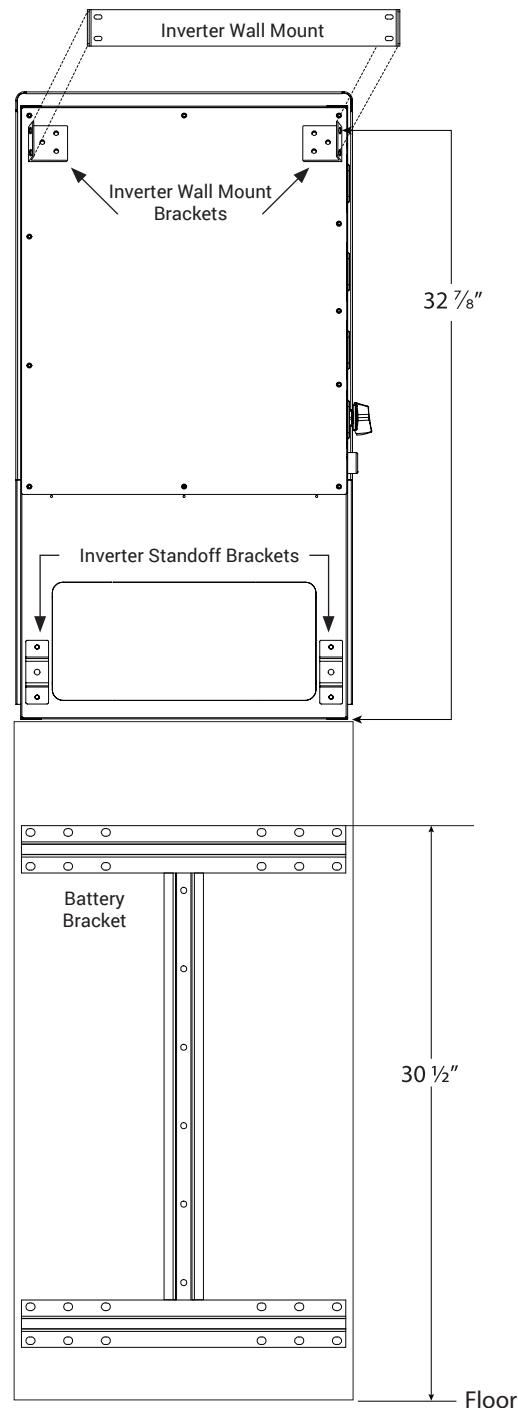
**Step 3:** Mount battery on the battery bracket.

**Step 4:** Measure 32 7/8" from the top of the battery to the top of the inverter wall-mount bracket. Mark placement and secure inverter wall mount.

**Step 5:** Mount inverter

**Additional batteries should be mounted at the same height as mounted in step 1 and 2.**

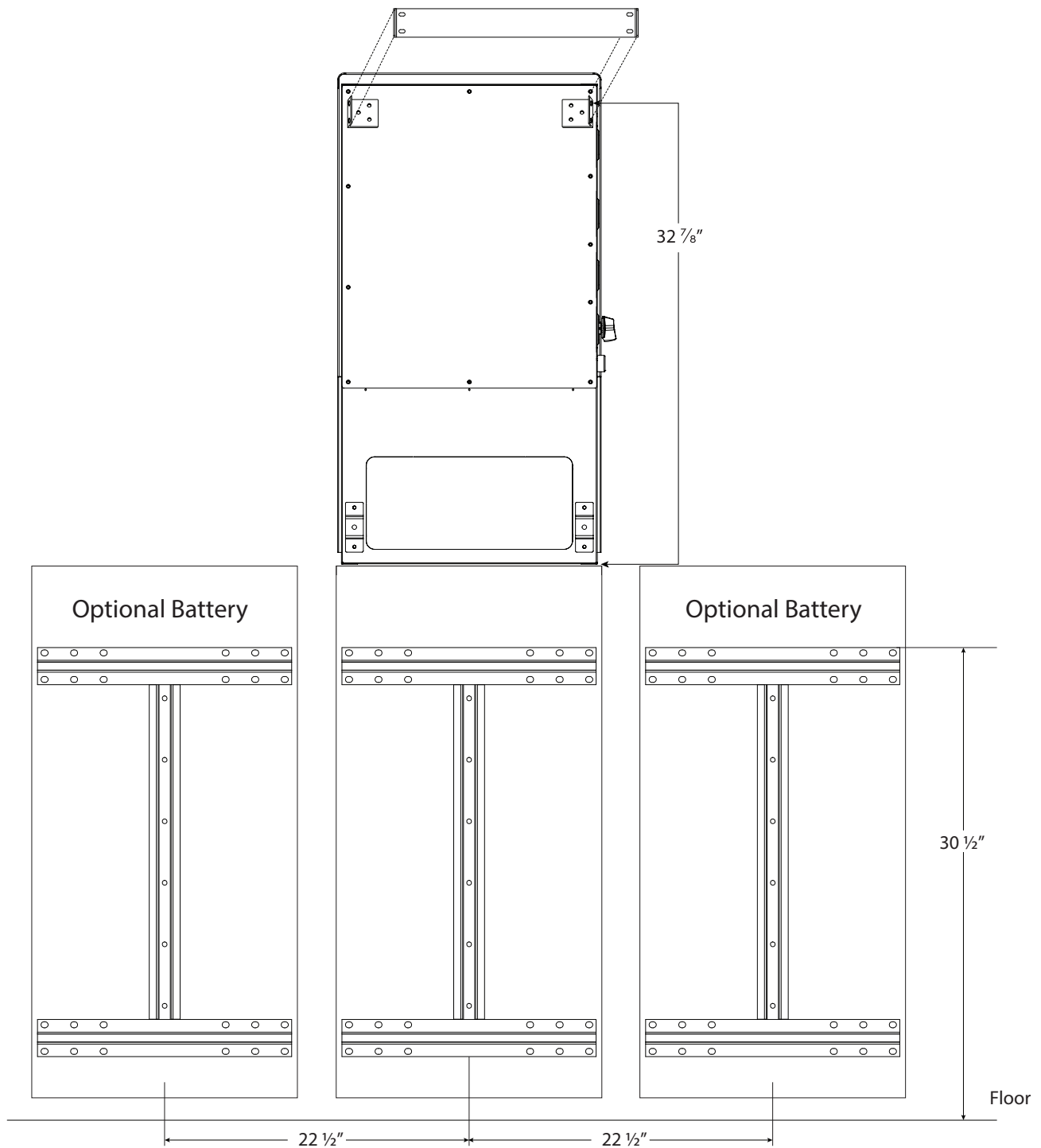
**If mounting multiple inverters follow the spacing guidelines as previously mentioned**



## Multiple Inverter Setup

To provide proper airflow you must space the **inverters 20"** from each other.

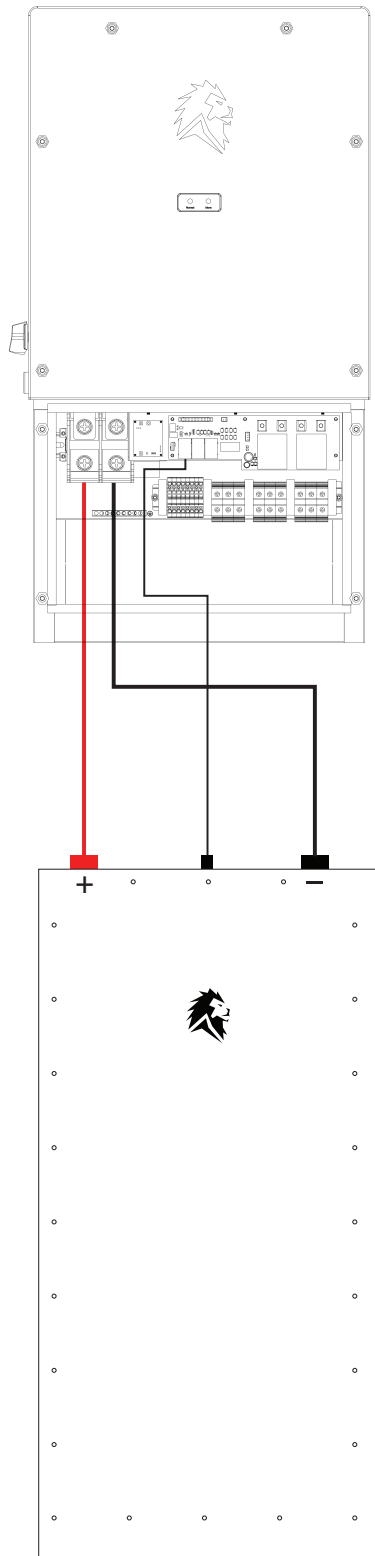
## SANCTUARY INSTALLATION GUIDE



(Yields a recommended 4" spacing between batteries for ease of installation)

**Minimum battery spacing allowable is 0.5 inches as stated on UL Certificate.**

# Low Voltage DC Wiring: 1 Inverter



## When wiring 1 inverter to 1 battery,

first check the voltage of the Battery. It should be between 45-55.6VDC. If it is not, contact LionESS support at (435) 244-3352.

Connect the battery cables to the inverter **first**. Now connect the cables to the battery receptacles last.

Next, connect the BMS communication cable to the port labeled RJ45 on the inverter and then connect the 4-pin aviation connector to the battery.

## When wiring 1 inverter to multiple batteries,

**Step 1:** Connect the provided eyelet to eyelet battery cables to the inverter first, then to the provided busbars.

**Step 2:** Using the provided battery cables, connect all negative cables from the negative busbar to the negative battery receptacles,

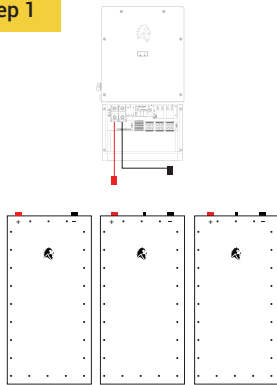
**Step 3:** Now connect the positive cables from the positive busbar to the positive battery receptacles.

**Step 4:** Next, connect the provided BMS communication cable splitter to the RJ45 port labeled BMS Coms on the inverter. Connect each battery BMS communication cable to each 4-pin aviation connector on each battery.

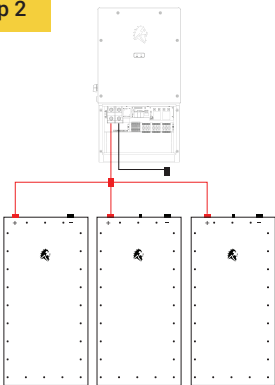


## SANCTUARY INSTALLATION GUIDE

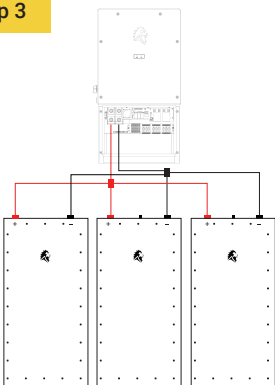
Step 1



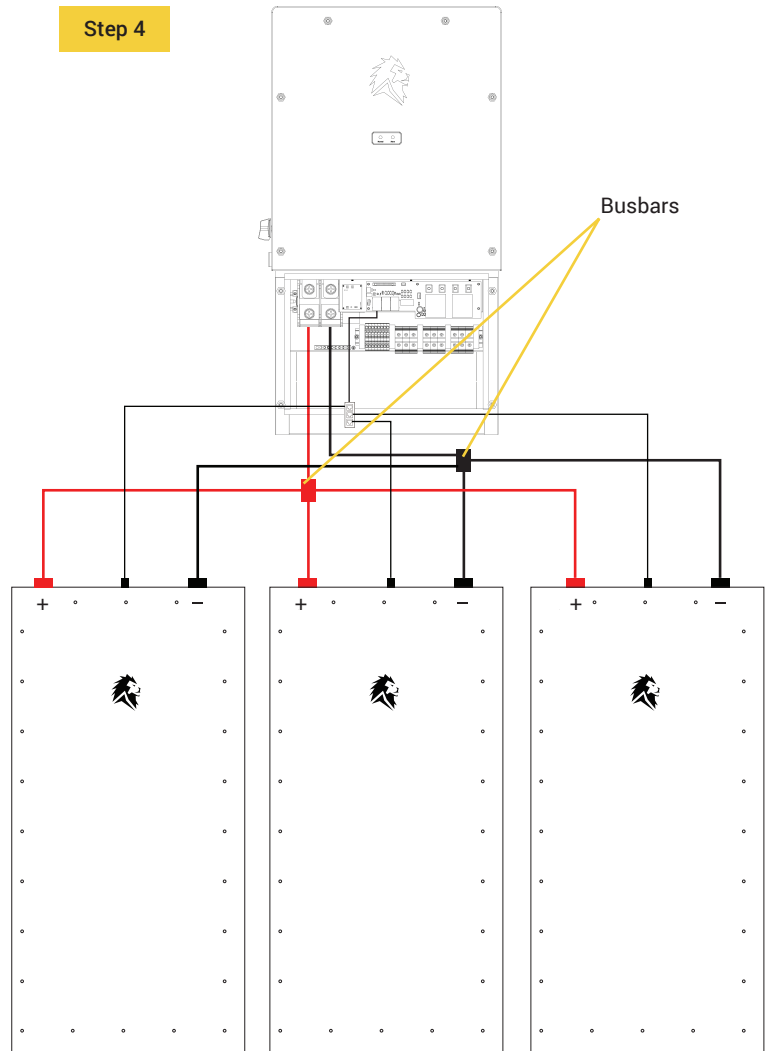
Step 2



Step 3



Step 4



### Battery Voltage

When connecting multiple batteries, check voltage on each battery first. Batteries must be within 0.5V in order to connect in parallel.

# Low Voltage DC Wiring: Multiple Inverter

## (3 Inverters, 6 Batteries)

**Step 1:** Mount busbars directly below each inverter. Connect busbars to each other. Recommended to add 225A T-Fuse to positive cable between busbars. (cables and T-Fuses not provided).

**Step 2:** Using the provided eyelet to eyelet cables connect each inverter to their corresponding busbar.

**Step 3:** Connect the negative (-) battery cables to the battery receptacles.

**Step 4:** Connect the positive (+) battery cables to the battery receptacles last.

**Step 5:** Connect the BMS Com Splitter to the bottom left RJ45 port labeled BMS Coms on the Parent Inverter. Next, connect each battery BMS Coms cable to the BMS Com Splitter. Lastly, connect the 4-pin Aviation end to each battery.

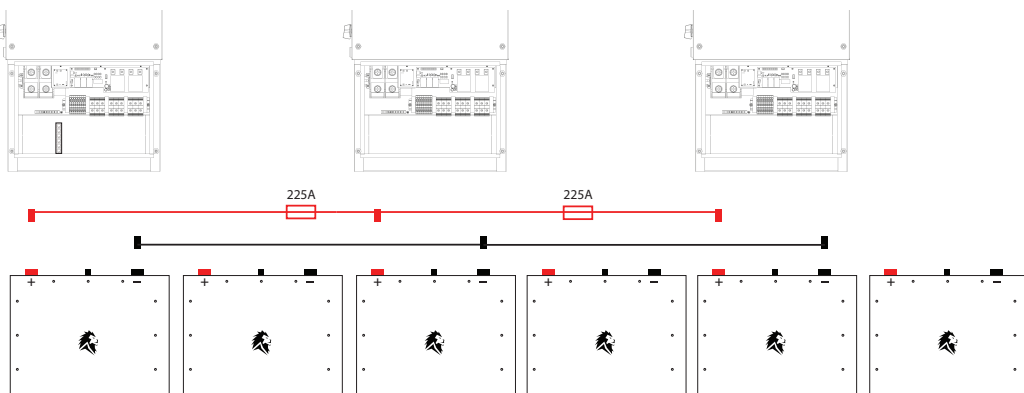


### Battery Voltage

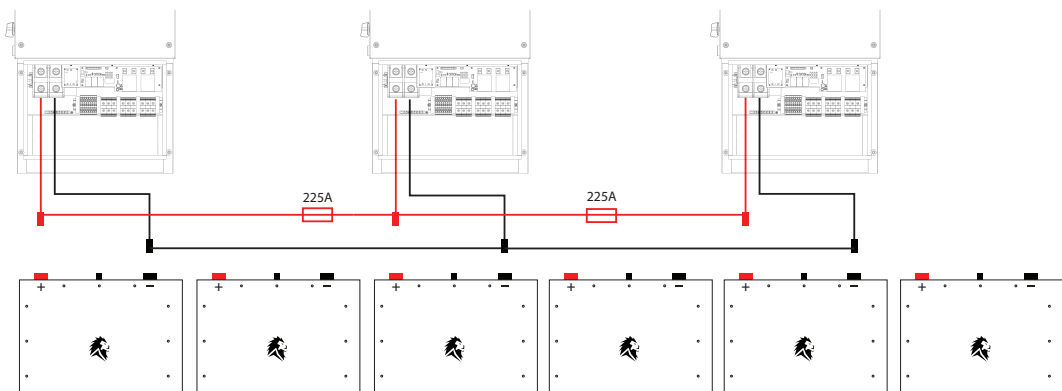
When connecting multiple batteries, check voltage on each battery first. Batteries must be within 0.5V in order to connect in parallel.

When connecting busbars battery cables must be the same length throughout the entire system and have a correct degree and voltage rating.

Step 1

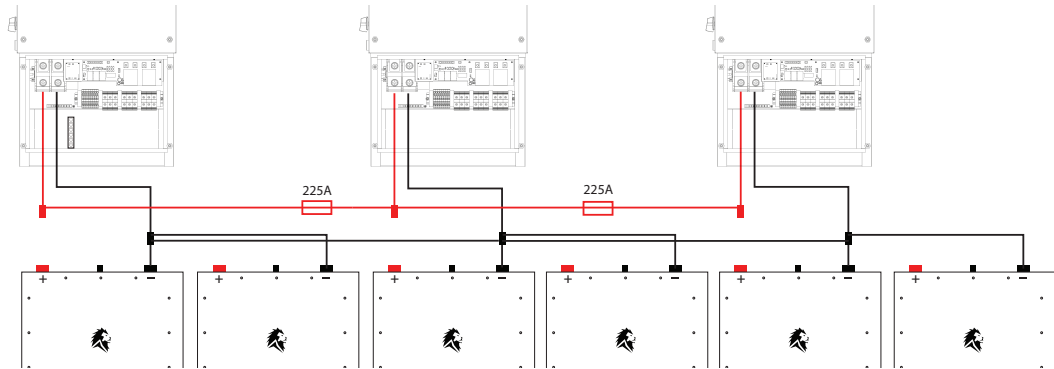


Step 2

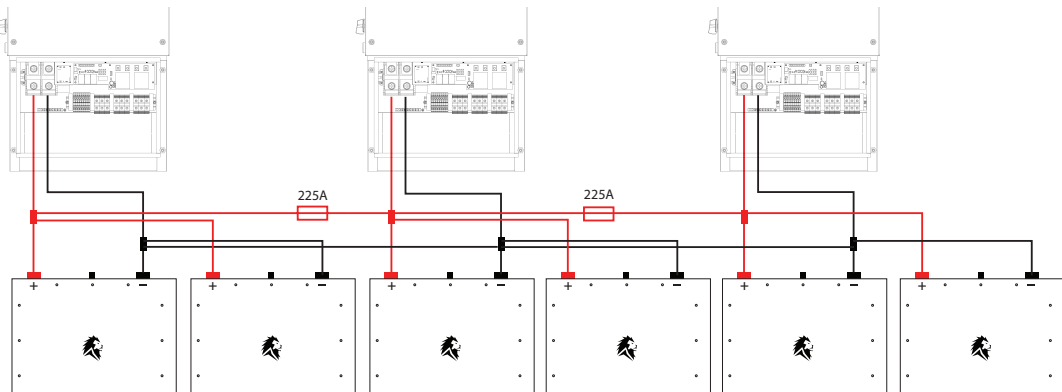


# SANCTUARY INSTALLATION GUIDE

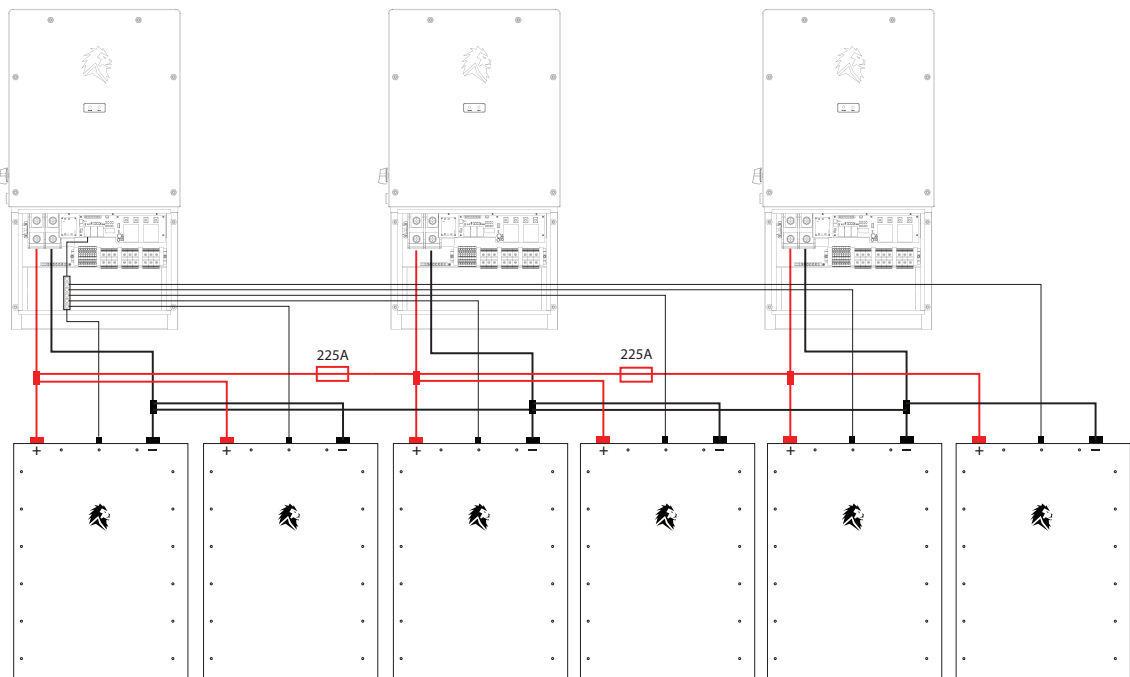
Step 3



Step 4

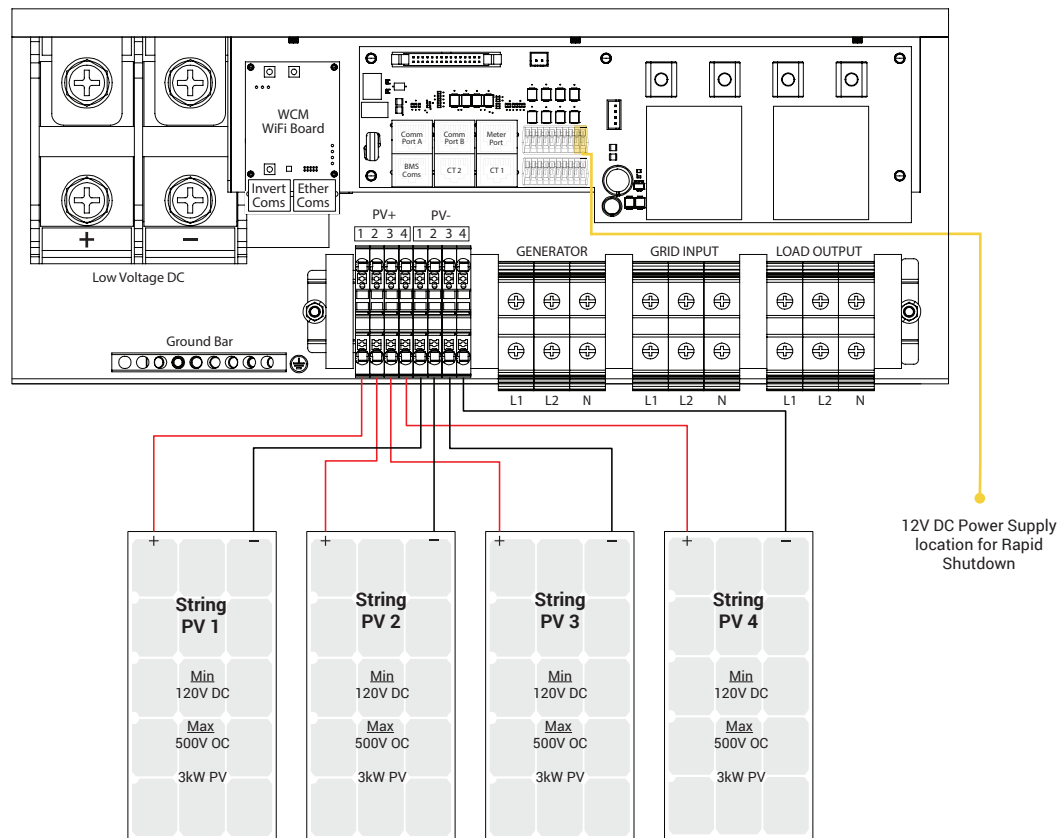


Step 5



# High Voltage DC Wiring

The Sanctuary Inverter has 4 MPPT's that are capable of 3kW of solar each, for a total of 12kW's. The minimum allowable voltage is 120V DC. The maximum allowable voltage is 500VOC. The max PV ISC is 15ADC per MPPT. When configuring your PV strings, you must account for the panel wattage rating and voltage. Refer to the Sanctuary technical specifications for further detail.



## Professional wiring installation

All wiring must be performed by a licensed electrician.



## High voltage

There will be high voltage in the unit so be careful while installing the system.



## Correctly connect positive and negative

Before making the final DC connection or turning on the high-voltage DC switch / disconnect, be sure the positive (+) connects to positive (+) and negative (-) connects to negative (-).

### PV Connection

It is important for system safety and efficient operation to use the appropriate cables for the PV module connections. To reduce risk of injury, use the recommended cable size given in the table below. The Sanctuary system accepts up to 10 AWG wire for PV connection.

### PV Module Wire Connection

Verify correct polarity of all wire connections for the PV modules and PV input connectors. Insert the wires and connect the positive pole (+) of the connection wire to the positive pole (+) of the PV input connector. Connect the negative pole (-) of the connection wire to the negative pole (-) of the PV input connector.



#### **Avoid PV modules with current leakage**

To avoid any malfunction, do not connect any PV modules with possible current leakage to the inverter. For example, grounded PV modules will cause current leakage to the inverter. When using PV modules, be sure there is no negative grounding.



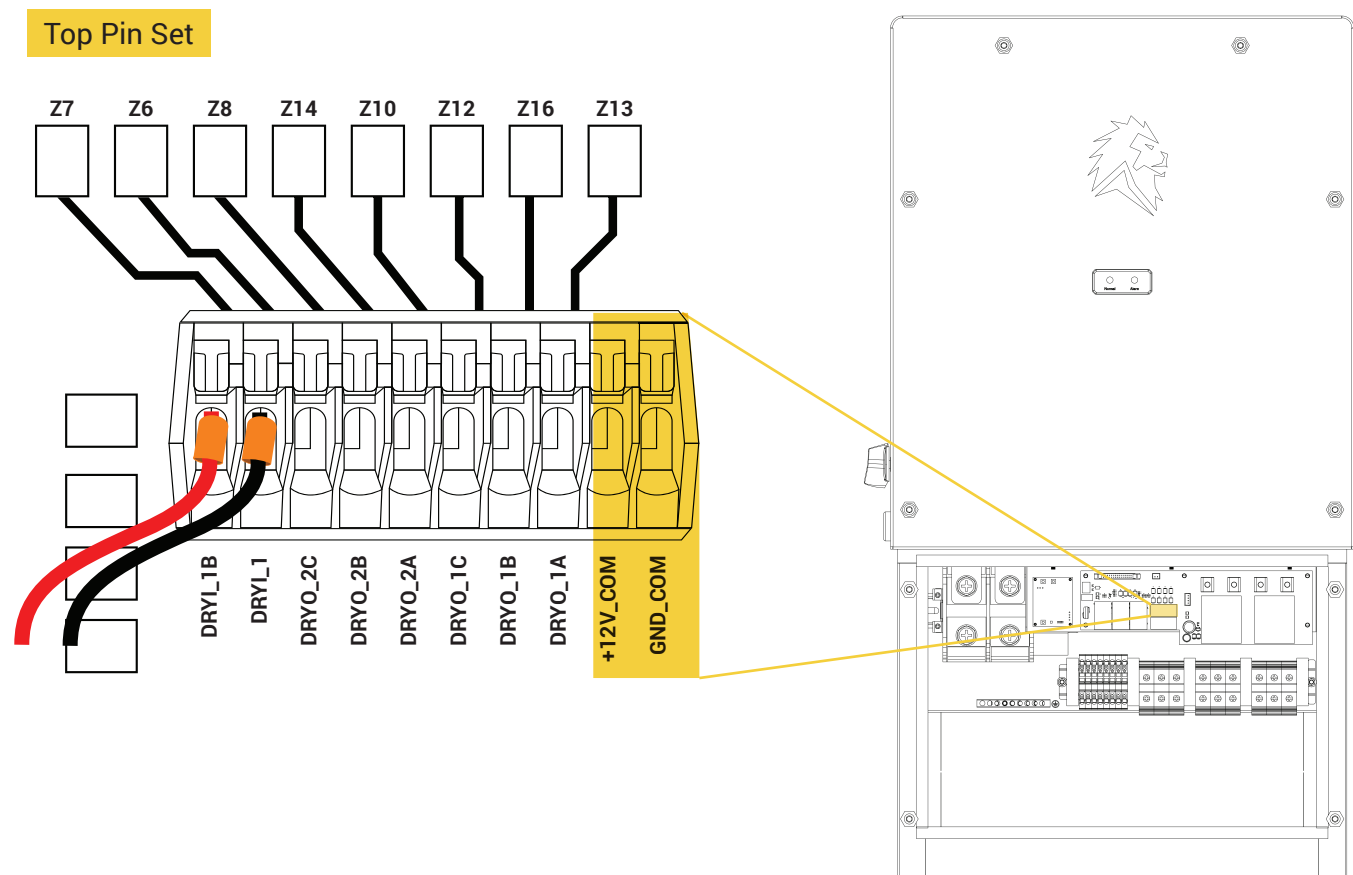
#### **Use surge protection**

Use a PV junction box that provides surge protection. Otherwise, damage from a lightning strike to a PV module may result in damage to the inverter.

# Rapid Shutdown

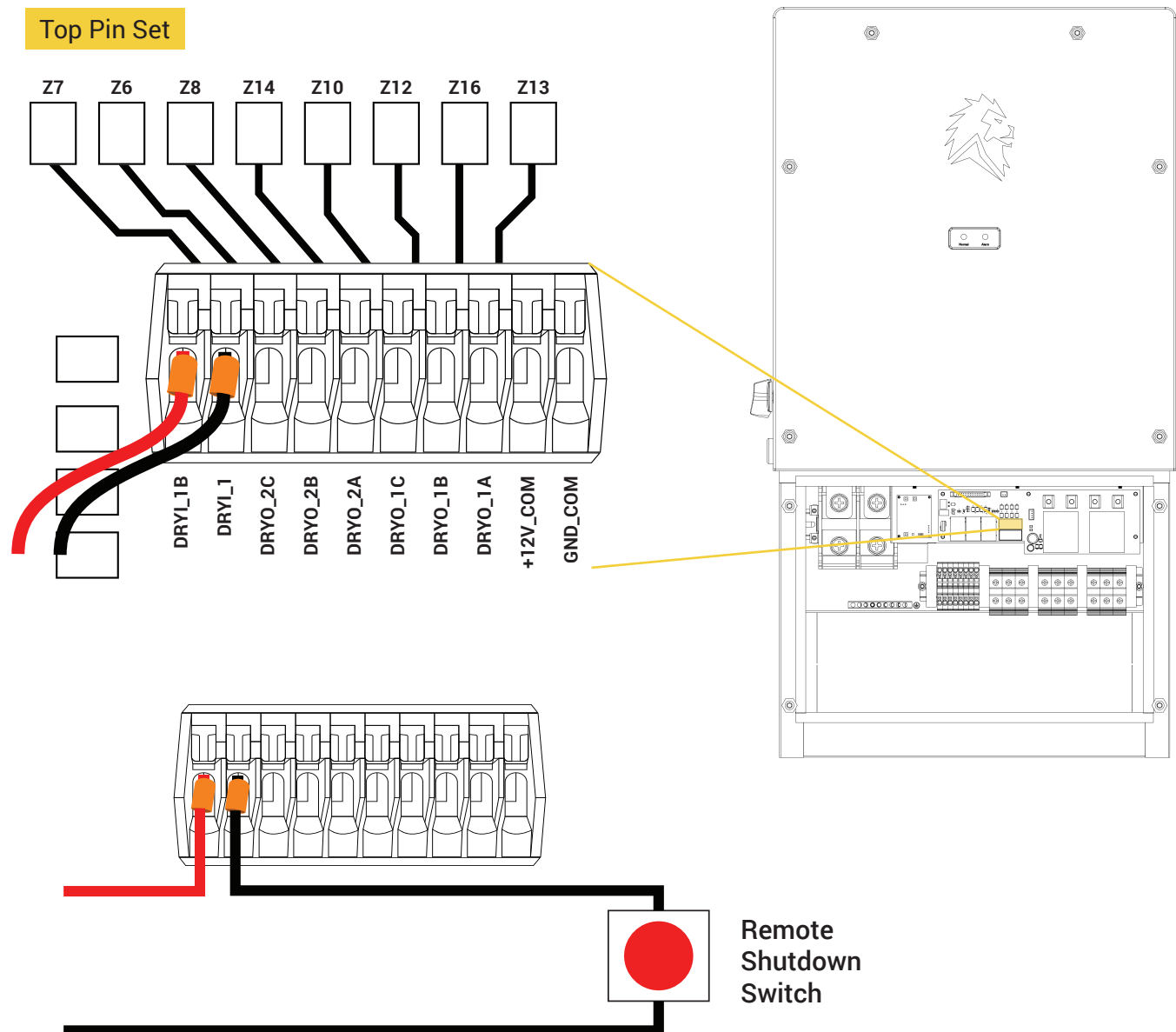
The Sanctuary inverter has a built in 12 Volt DC power supply for a rapid shutdown (RS) transmitter. The RS transmitter is polarity sensitive.

The 12 Volt supply is located as highlighted below:



# Remote Shutdown Switch

If you are installing a remote shutdown switch, remove the black wire on the 12 volt circuit board on the inverter. Next, mate this wire and run one wire out to the remote shutdown switch. Then on the other side of the switch, run one wire back and connect it into the contact where the black wire used to be on the circuit board.



# AC Wiring: 1 Inverter

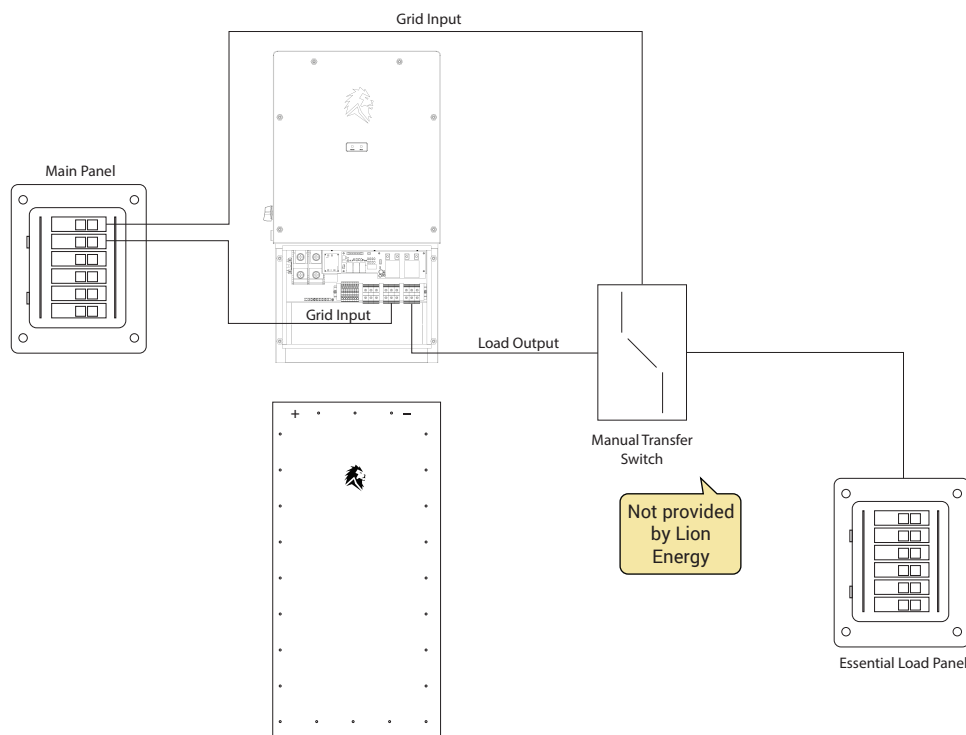
For grid-tied installation, the Sanctuary is capable of up to a 90 Amp grid-supplied pass-through. The grid input power must come from an appropriately sized circuit breaker. The maximum wire size the inverter terminals can accept is 2 AWG copper.

## Inverter to cover Essential Loads

### Install two breakers into the Main Panel.

One breaker will be the grid input for the Sanctuary Inverter. The load output of the Sanctuary Inverter will go to a 3-position manual transfer switch. The next breaker will go from the Main Panel directly to the 3-position manual transfer switch. From the manual transfer switch, lines will go directly into the Essential Loads Panel.

\*\* Take note: A 3-position manual transfer switch is recommended but not required \*\*



### L1 L2 PHASING

It is of vital importance that the grid input and load output phases on multiple breakers match. Crossing phases WILL cause a catastrophic failure on the equipment **See continuity testing on page 27**



# AC Wiring: Multiple Inverter

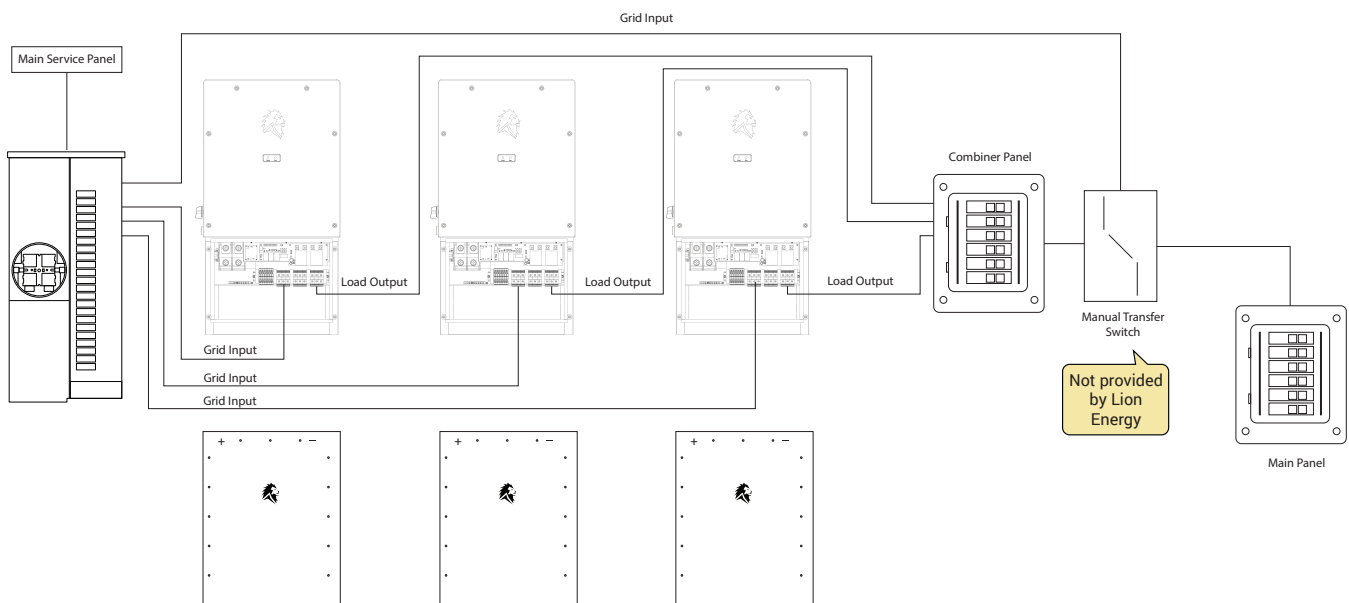
For a Grid-Tied installation, the Sanctuary is capable of up to a 90 Amp grid-supplied pass-through. The grid input power must come from an appropriately sized circuit breaker. The maximum wire size the inverter terminals can accept is 2 AWG copper.

## 3 Inverters to cover whole home backup

Between the Meter and the existing Main Panel, install a combiner panel with 4 breakers. Three breakers will be the grid inputs for each of the Sanctuary Inverters. The fourth breaker will go from the combiner panel directly to the 3-position manual transfer switch. The load output of each Sanctuary Inverter will go to a combiner panel. Then from the combiner panel to the 3-position manual transfer switch. From the manual transfer switch, lines will go directly into the Essential Loads Panel.

\*\* Take note: A 3-position manual transfer switch is recommended but not required \*\*

\*\* Anytime multiple inverters are installed, a continuity test must be performed to ensure all phases match before powering up \*\*



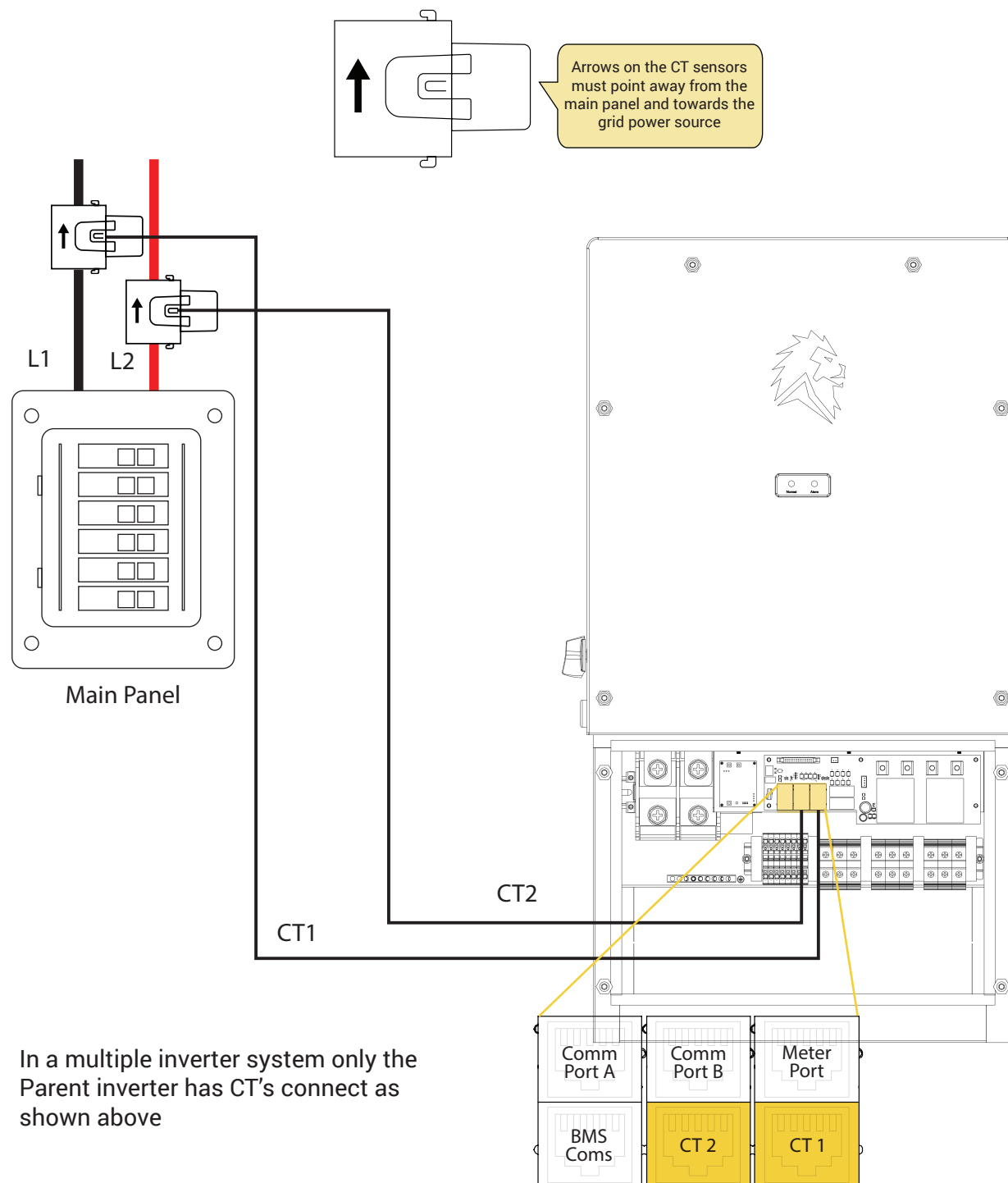
## Breaker Sizing

The three breakers feeding the sanctuary system from the main panel need to be the same amp rating with a maximum of 90A each. The fourth breaker that directly feeds the manual bypass should be roughly equal to the total of the other three breakers. For (example 3 breakers @ 70A ea to feed the sanctuary units and a 200A breaker to go to the manual transfer panel.)

Grid input and load output breakers must be the same size.

# CT Installation

Using the provided CT's, clamp the CT loops in front of the main service panel with the arrow on the CT pointed away from the Sanctuary ESS towards the grid.

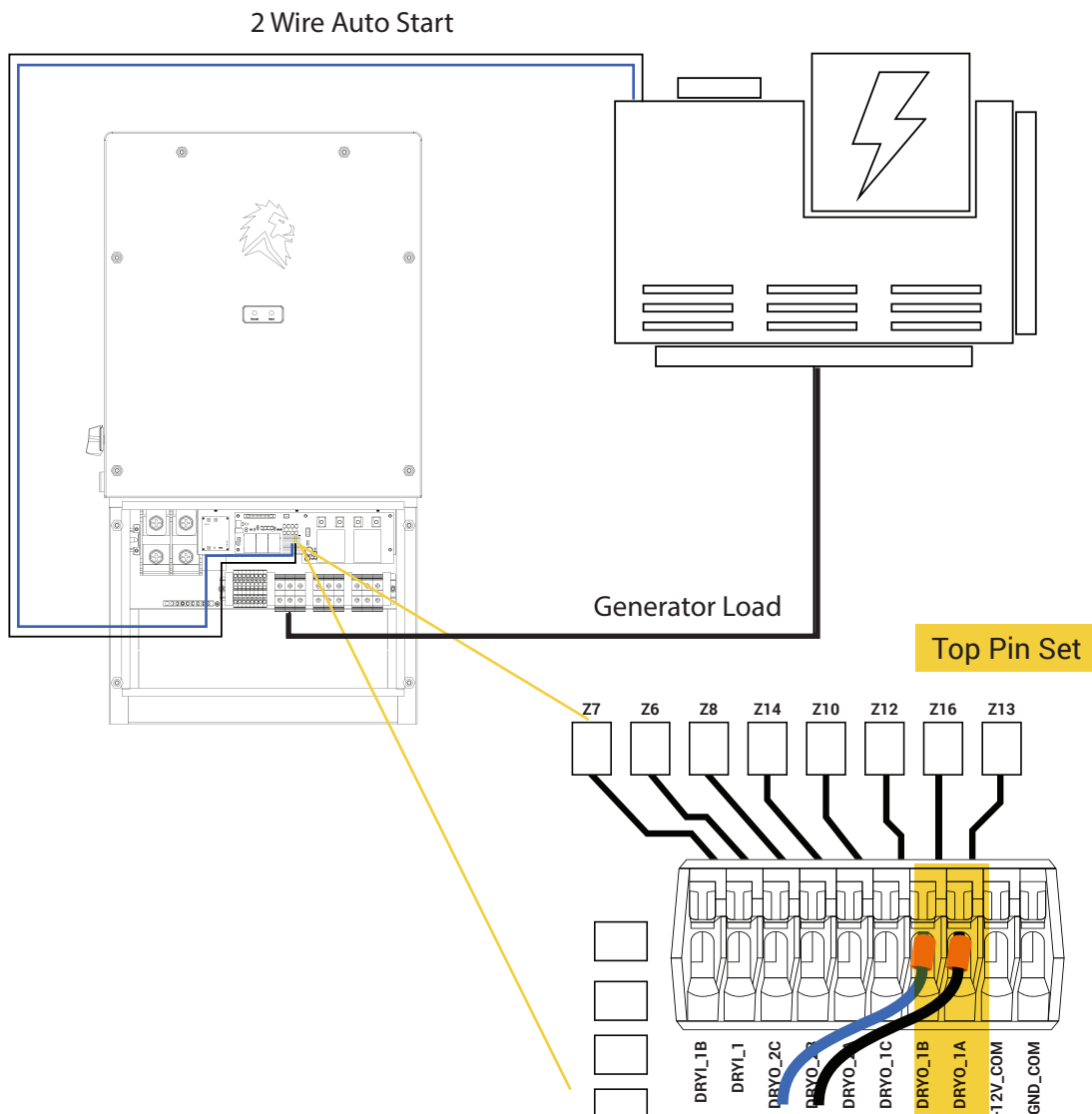


In a multiple inverter system only the Parent inverter has CT's connect as shown above

# Generator Wiring : 1 Inverter

The Sanctuary ESS is compatible with 240V split phase home backup generators. The Sanctuary can function with both a manual or an auto start feature. It can accept up to 8kW of input power through the Gen input to cover loads and to charge batteries. The generator functions are only available when the grid is not present.

To wire a generator to the Sanctuary ESS, the generator AC output will go directly into the Gen input of the Sanctuary inverter. If the generator has a remote two wire auto start feature, these lines must be wired into the DRYO\_1B and DRYO\_1A ports on the inverter circuit board.



## Generator Wiring: Multiple Inverter



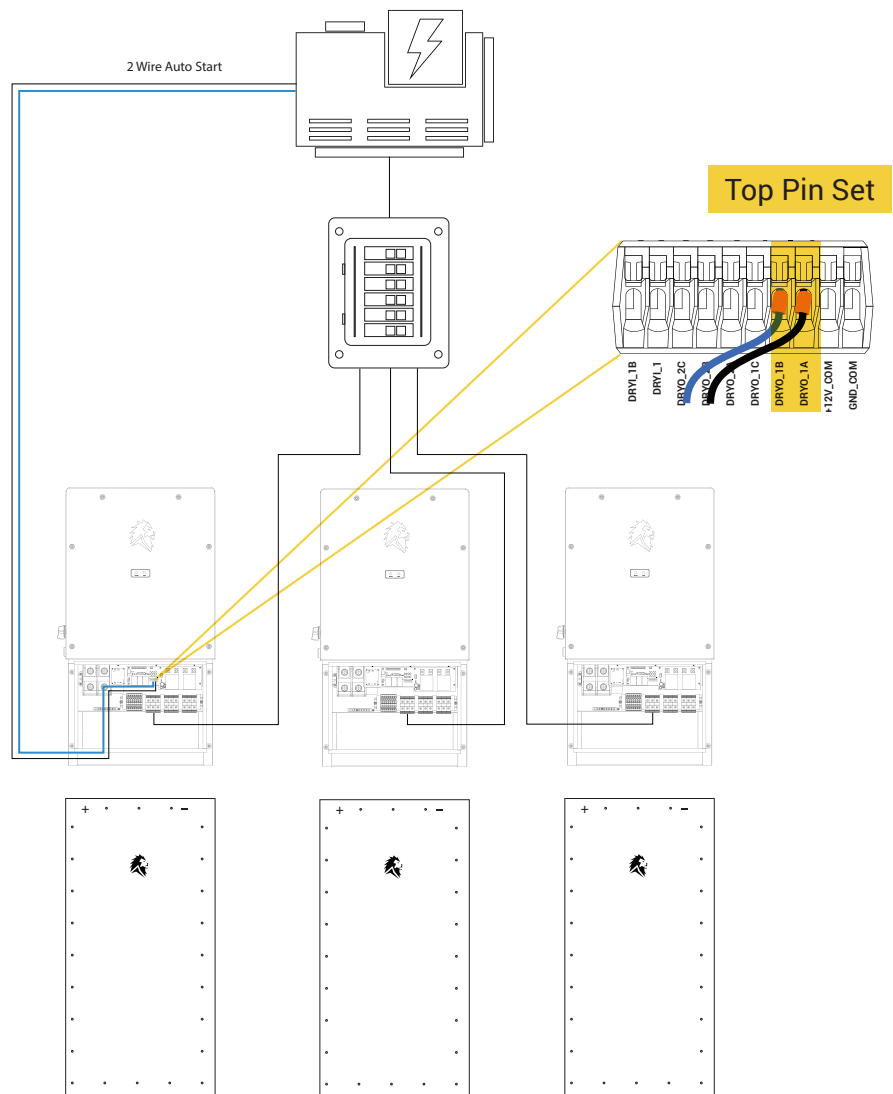
## L1 L2 PHASING

It is of vital importance that the grid input and load output phases on multiple breakers match. Crossing phases WILL cause a catastrophic failure on the equipment **See continuity testing on page 25**

The Sanctuary ESS is compatible with 240V Split Phase home backup Generators. The Sanctuary can function with both a manual or an auto start feature. It can accept up to 8kW of input power through the Gen Input to cover loads and to charge batteries. The Generator function is only available when the grid is not present.

When the install consists of multiple inverters, the generator AC output needs to be wired to a combiner panel. From the combiner panel, lines will go to each Sanctuary Inverter's Gen Inputs. If the generator has a remote two wire auto start feature, these lines must be wired into the Parent inverters the DRYO\_1B and DRYO\_1A inputs.

**\*\*\* Any time multiple inverters are installed, a continuity test must be performed to ensure all phases match before powering up.**



## Breaker Sizing

The three breakers feeding the sanctuary system from the generator combiner panel need to be the same amp rating with a maximum of 35A each.

# Continuity Testing: Single Inverter

When installing a multiple inverter Sanctuary, it is essential to not cross phases. This means, Line 1 needs to remain Line 1 on Grid Input and Load Output for all Inverters. Line 2 needs to remain Line 2 on Grid Input and Load Output for all Inverters. Neutral needs to remain the same as well. There are three ways phases can be crossed. Physical wiring, the physical bussing of the service panel, and the breaker itself. A simple way to ensure phases have not been crossed is to conduct a continuity test.

**In order to perform Continuity Testing, you first must ensure power is off to electrical associated with the Sanctuary ESS install.**

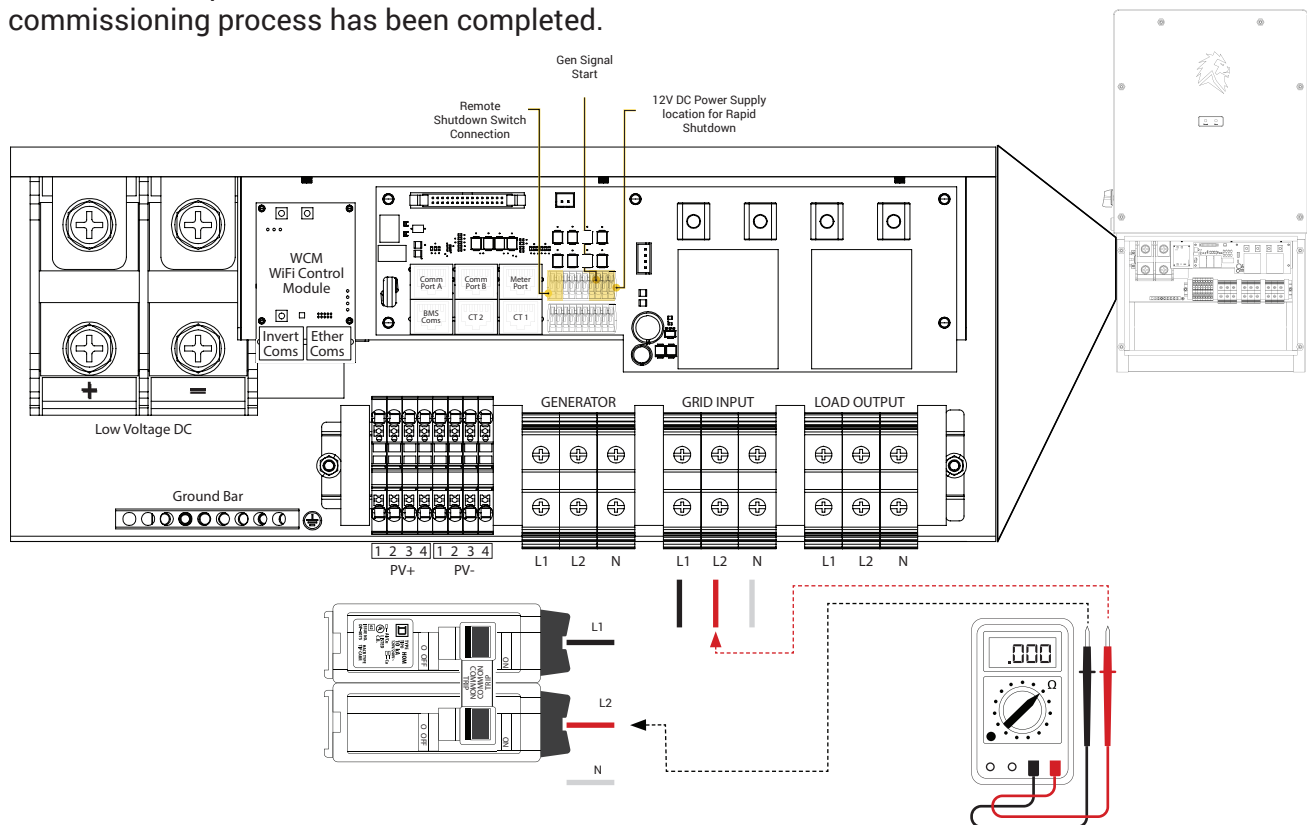
With the main breaker off in the panel where the Grid Input Breakers reside, turn on the Grid Input Breaker to the first inverter. Using a Digital Multimeter, switch the dial to the Ohms ( $\Omega$ ) symbol.

Touch the leads together to make sure a beep is emitted. Next, touch and hold one lead on the L1 terminal on the Grid Input Breaker. Place and hold the other lead on the Grid Input L1 terminal on the inverter as shown. A beep will emit the L1 phase matches.

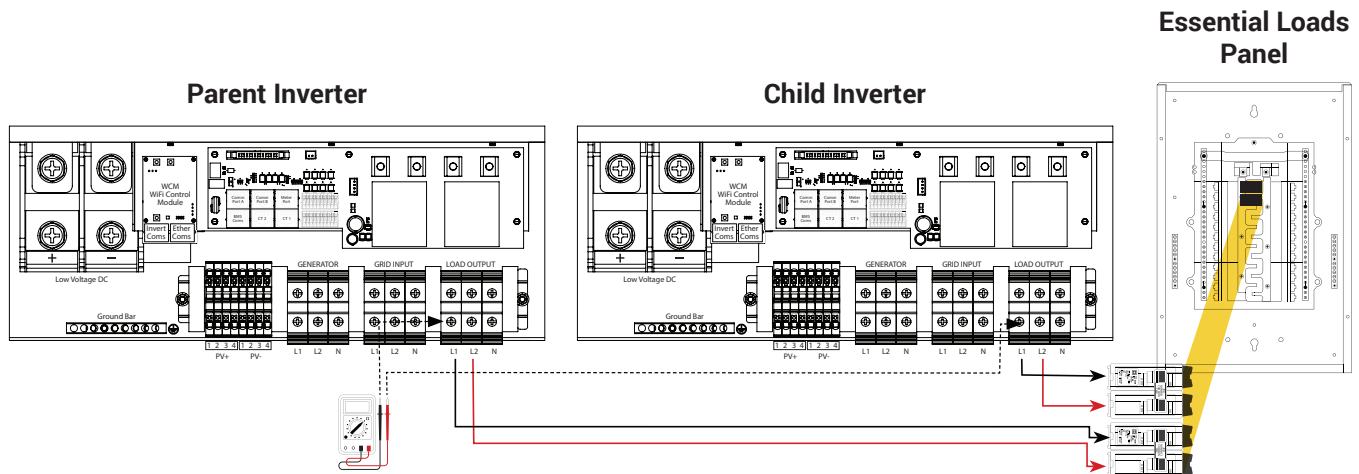
Perform this same test for L2 and Neutral.

Follow these same steps for each grid input breaker as well as load output breaker. If at any point, an alarm is not emitted, you have a crossed phase. This needs to be dressed and fixed immediately.

After performing continuity testing and ensuring no phases are crossed, turn off the load output breaker for all inverters. These will remain off until the commissioning process has been completed.



# Continuity Testing: Multiple Inverters



When installing multiple inverters, it is **REQUIRED** that you individually test the phasing on the grid input, generator input, and load output terminals of each inverter.

After installing breakers on any form of panel, you must perform a continuity test between all inverters to ensure that each phase (or line) of the inverters is landed on the same bussing in the panel (ex. L1 of Inverter 1 is on the same bussing as L1 of Inverter 2.) **You must test continuity with a multimeter**, checking the color of wiring is not sufficient since panel manufactures have different layouts of bussing.

To test continuity of the system, you must turn off all power sources to and from the inverter. This includes grid, generator, and solar power sources.

**First**, turn off the inverter by pressing the ON/OFF switch on the left side of the inverter.

**Second**, turn off the grid input breakers feeding the inverters by flipping the breakers to the off position.

**Third**, turn the solar off by turning the DC disconnect switch counterclockwise to the OFF position.

**Fourth**, If utilizing the generator input, check to make sure the generator is OFF.

After all power sources to the inverter are turned off, use your multimeter to check the voltage on ALL terminal blocks including Grid, Generator, and Load Output. Ensure there is no voltage present and do not proceed until this is confirmed.

## Load Output Continuity Testing

After confirming that the inverters have all power sources turned off, there should be no voltage present at the grid input, generator input, or load output terminals. Start by checking the panel to ensure there is no voltage present on the panel. (Note: If voltage is present and the inverters are turned off, there may be another power source feeding the panel.) After confirming the panel is not live, you can now turn on the load output breakers from each inverter. This allows the circuit between the inverters to be closed so you will be able to check continuity of phases between each inverter.

### **Load Output Continuity Testing: L1**

After you have turned the load output breakers on, Turn your multimeter on to test Ohms( $\Omega$ ). Touch the probes together to ensure your multimeter is functioning properly (You should hear an audible ring, if not make sure the probes are plugged in properly and that you have selected the multimeter to ring). Place your black probe on the Parent inverter-load output L1 screw terminal, and the red probe on the Child inverter load output L1 screw terminal. You should be able to hear the multimeter ring, indicating that there is continuity between L1 of the parent inverter and L1 of the child inverter. If your multimeter shows that you have continuity, you can move on to testing L2. (Always double check for mis-wiring by testing continuity of the opposite phases. L1 of the parent and L2 of the child, following this same step by checking continuity between L2 of the parent inverter and L1 of the child inverter. If there is continuity between both legs, this indicates there is a wiring issue and further troubleshooting must take place.)

### **Load Output Continuity Testing: L2**

After you have tested L1 continuity between the inverters, you can test continuity of L2 by following the same steps. Place your black probe on the Parent inverter-load output L2 screw terminal, and the red probe on the Child inverter load output L2 screw terminal.

### **No continuity**

When testing continuity between inverters and there is no indication of continuity between the matching phases, you must re-wire the breakers so that the phases will match. Once you have re-wired the breakers, test for continuity again and ensure that there is continuity between L1 of the parent inverter and L1 of the child inverter. Along with continuity between L2 of the parent inverter and L2 of the child inverter.



### **Continuity Testing**

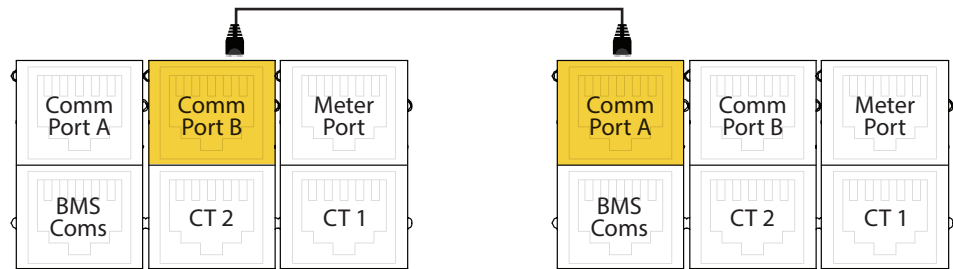
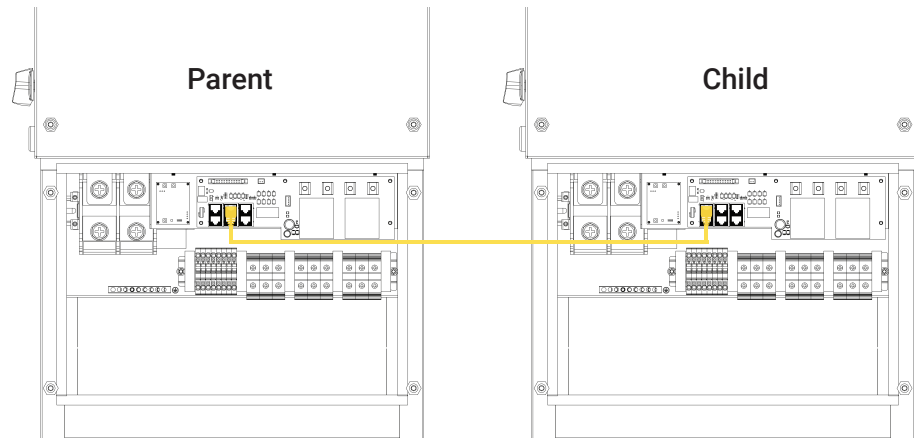
The above example shows a continuity test for the load output. Repeat this same procedure for **Grid Input** and **Generator Input** if utilized.

In a configuration of 3 inverters this process is the same. Test continuity from Parent Inverter to Child 1 then from Child 1 to Child 2.

# Parallel Inverter Connection

When wiring 2 inverters in parallel, using the provided cat5 cable:

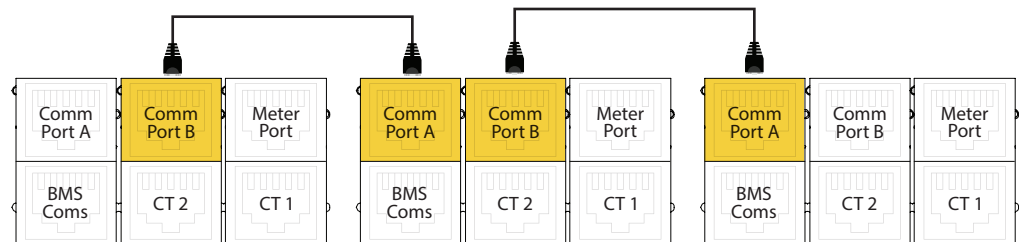
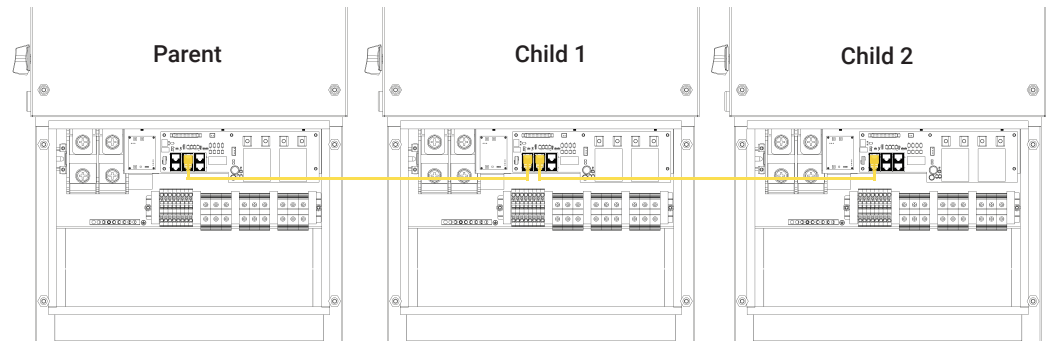
Connect cat5 cable on Parallel B located on the Parent Inverter to Parallel A on the child Inverter as shown.



When wiring 3 inverters in parallel, using the provided cat5 cables:

Connect the first cat5 cable on Parallel B located on the Parent Inverter to Parallel A on the Child 1 Inverter as shown.

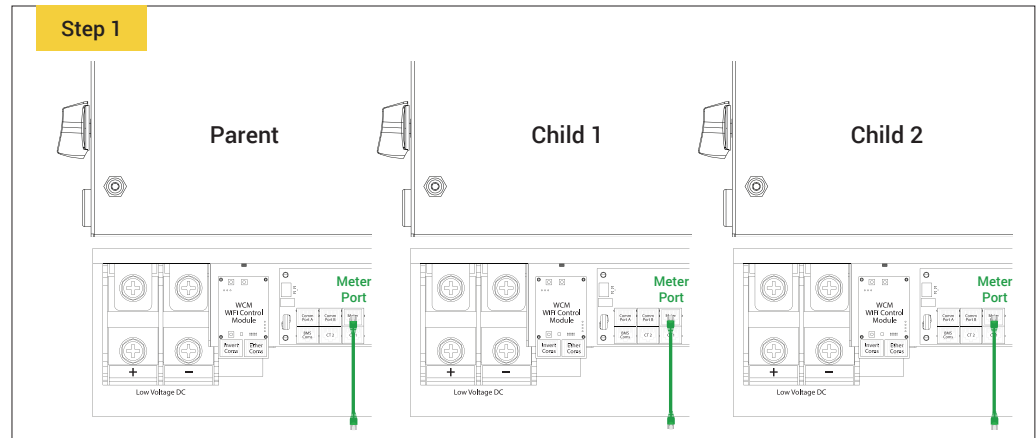
Next, connect a second Cat5 cable from Parallel B on Child 1 to Parallel A on Child 2.



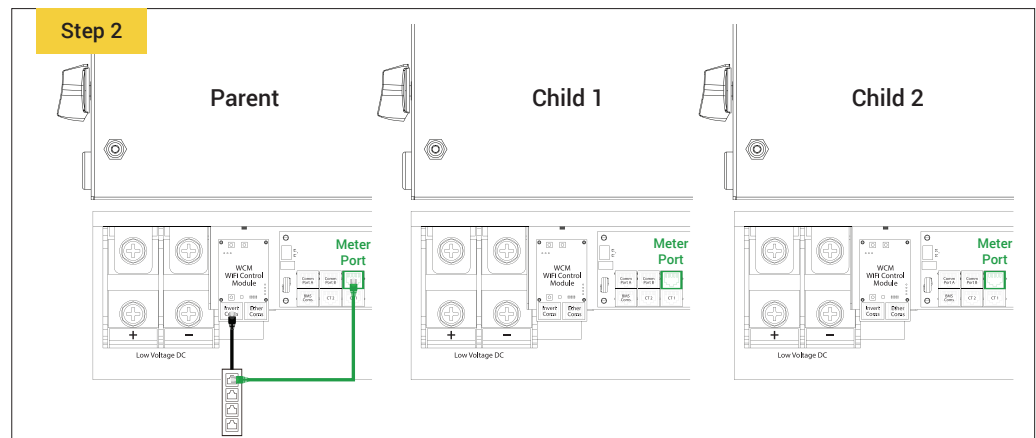


# Inverter Communication (Comm) Wiring

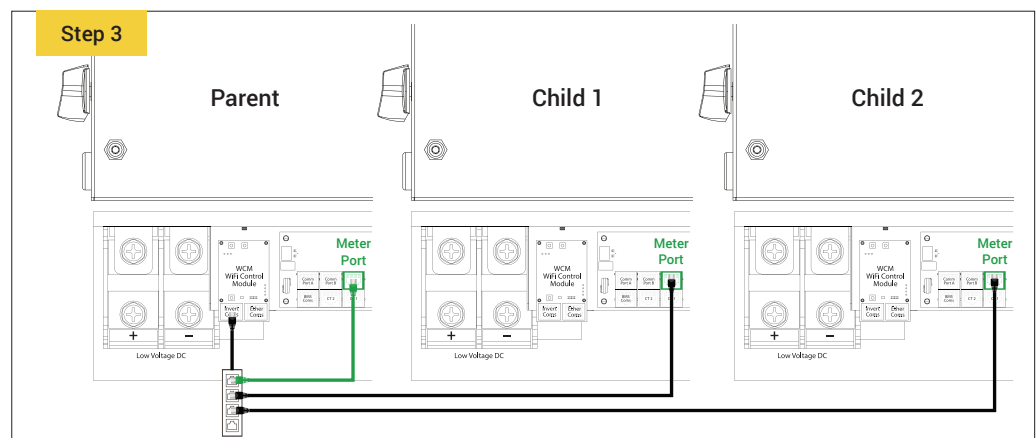
**Step 1:** On the Parent Inverter, unplug the 6.5" Cat 5 patch cable from WCM inverter com port. Leave the other end plugged into the Meter Port. Remove the 6.5" cat5 cable from both Child inverters. (They can be discarded).



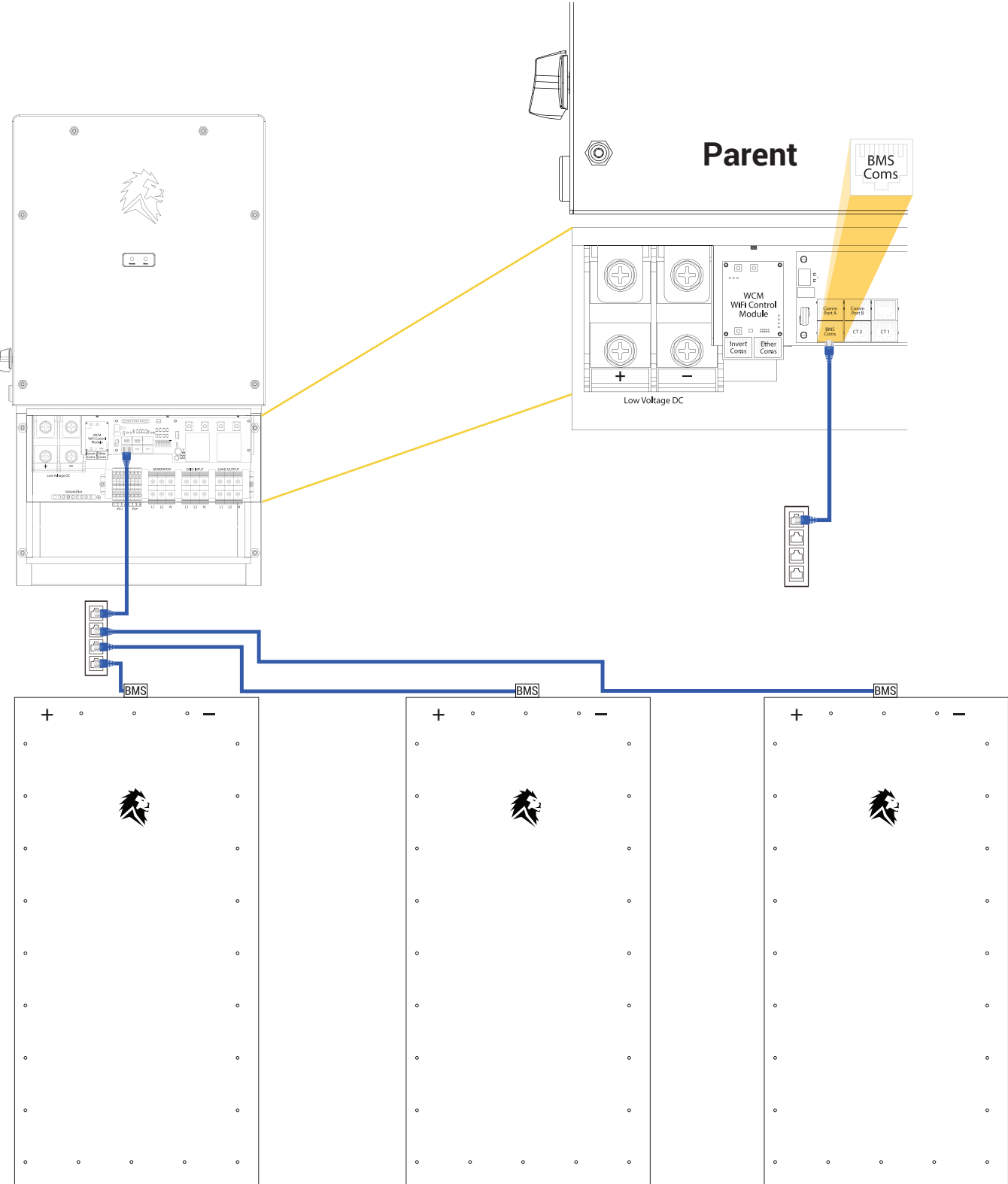
**Step 2:** On the Parent Inverter, connect the provided 4-port RJ45 splitter to the WCM inverter comm port. Next, connect the 6.5" cat5 cable to the RJ45 splitter.



**Step 3:** On the Child inverters, connect one end of the provided 10' cat5 patch cables to the meter port. Connect the other end of the 10' cat5 patch cable to the 4-port RJ45 splitter.

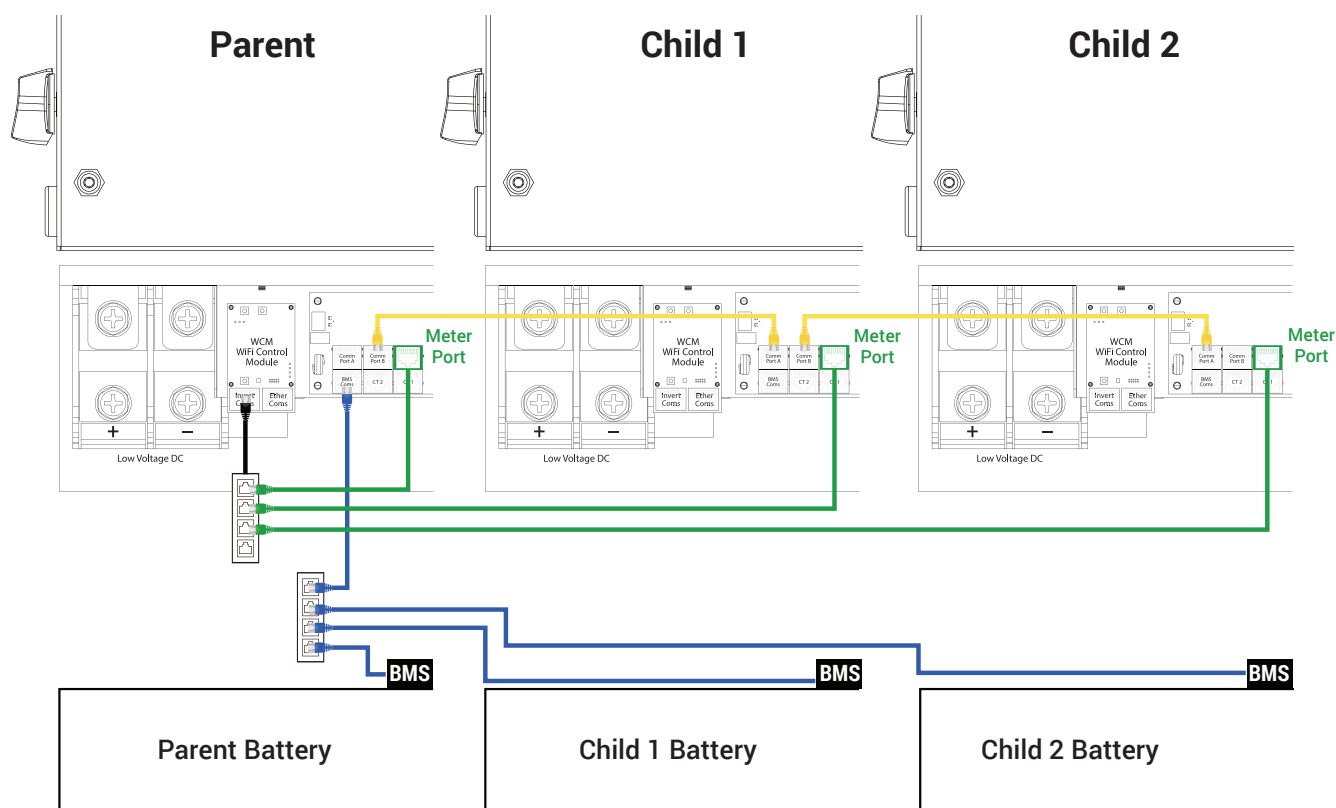


# BMS Communication Cable Wiring



# Inverter Wiring Diagram

- Parallel Communication Wiring
- Communication Wiring
- BMS Communication Cable Wiring

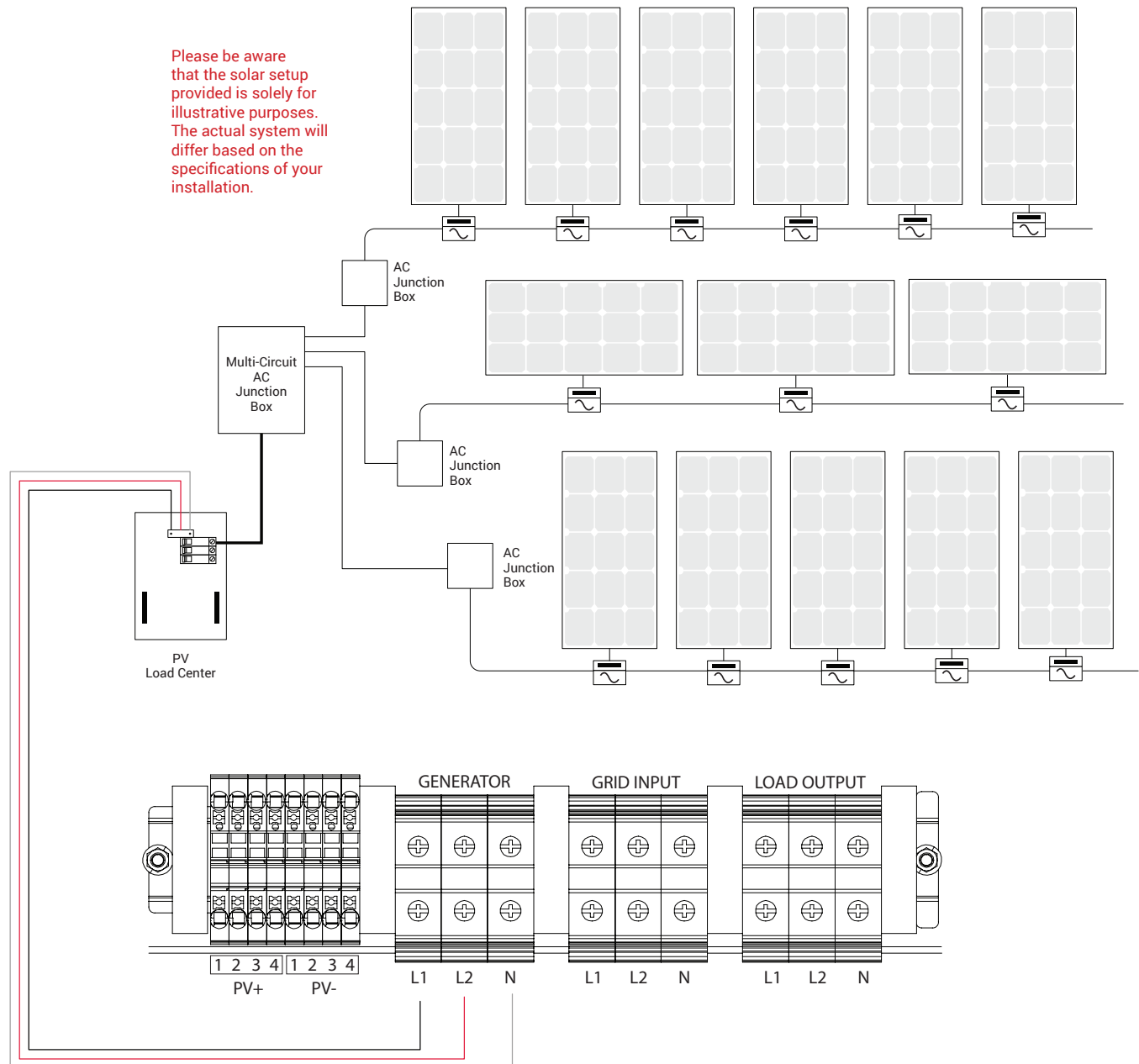


You're now ready to begin the commissioning process. Please make sure you have completed the training and have received a login to the Lion Energy App. Please visit [smart.lionenergy.com](https://smart.lionenergy.com)

## AC Solar

This is not recommended for new installations since it's not as efficient, but it is a convenient option for existing grid-tied systems.

- Connect AC solar to generator port



# Fault Information and Processing

The table below lists the possible fault codes that might occur if the inverter malfunctions.

Error Code	Name	Description	Solutions
A1_0	Over-Current Discharge	Occurs when the load is drawing too much power and the grid is down.	Limit load usage to 8kW total (4kW per leg max) per inverter.  Ensure loads are balanced on each leg.
A1_1	Over-Load	This happens when your load is more than the rated continuous output of the inverter. (i.e.. 8kW Inverter with 10kW load)	Inverter should shutdown or cut load output.  1. Disconnect excessive loads, and wait 5-10 minutes for alarm to clear. 2. If system does not reset, try power cycling the inverter.
A1_2	Battery Disconnected	This happens when the battery is disconnected.	1. Ensure that battery terminals are connected. 2. Make sure battery cables are connected to the inverter. 3. Send wake up command to the battery to ensure the BMS (Battery Management System) is awake. 4. If battery is connected, fault is still present, and voltage is within range- power cycle inverter to clear fault.
A1_3	*Battery Under-Voltage/ Battery Under Capacity	This happens when a battery state of charge (percent) is below the desired/target state of charge.  (ie. target is 20% and you're currently at 15%, or target is 70% and battery is at 65%). Default should be 90%	1. Ensure default depth of discharge is set at 90% 2. If inverter does not charge, use a power supply to charge the battery to at least 10% SOC.
A1_4	*Battery Low Voltage/ Battery Low Capacity	See A1_3 Description.	See A1_3 Description.

## SANCTUARY INSTALLATION GUIDE

Error Code	Name	Description	Solutions
A1_5	Battery Over-Voltage	This happens when battery is over the voltage limit.	<ol style="list-style-type: none"> <li>1. Try power cycling inverter.</li> <li>2. Contact Lion Energy</li> </ol>
A1_6	Grid Low Voltage	This happens when grid input voltage is below the minimum grid voltage.	<ol style="list-style-type: none"> <li>1. Ensure grid input voltage is within range.</li> <li>2. Check the grid input type on inverter settings. Default is US.</li> </ol>
A1_7	Grid Over-Voltage	This happens when grid input voltage is above the maximum grid voltage.	<ol style="list-style-type: none"> <li>1. Ensure grid input voltage is within range.</li> <li>2. Check the grid input type on inverter. Default is US.</li> </ol>
A1_8	Grid Low Frequency	This happens when grid input frequency is below the minimum grid frequency.	<ol style="list-style-type: none"> <li>1. Ensure grid input frequency is within range.</li> <li>2. Check the grid input type on inverter. Default is US.</li> </ol>
A1_9	Grid High Frequency	This happens when grid input frequency is above the maximum grid frequency.	<ol style="list-style-type: none"> <li>1. Ensure grid input frequency is within range.</li> <li>2. Check the grid input type on inverter. Default is US.</li> </ol>
A1_10	Leakage Current (GFCI Fault)	This happens when there is a ground fault.	<ol style="list-style-type: none"> <li>1. Ensure bonding of neutral and ground follow NEC code requirements.</li> <li>2. Check wiring of system, inspect wiring of neutral and ensure it is landed in correct terminals.</li> <li>3. Ensure load output panel is not bonded.</li> </ol>
A1_11	Parallel CAN Communication Fault	This happens when in a parallel configuration inverters are not able to communicate with each other.	<ol style="list-style-type: none"> <li>1. Check to make sure the CAN communication cable is installed correctly.</li> <li>2. Parent: Port B Child: Port A</li> <li>3. Reference installation guide for further instructions.</li> </ol>
A1_12	Grid CT is Reversed	This happens when CTs are installed improperly.	<ol style="list-style-type: none"> <li>1. Switch CT direction.</li> <li>2. Reference installation guide for further instructions.</li> </ol>
A1_13	DC BUS Under-Voltage	This happens when the DC bus is imbalanced.	Power cycle the inverter.

# Fault Information and Processing

Error Code	Name	Description	Solutions
A1_14	DC BUS Over-Voltage	This happens when the DC bus is imbalanced.	Power cycle the inverter.
A1_15	Inverter Over-Current	<p>This happens when the inverter is trying to cover too many loads.</p> <p>This can also happen when multiple inverters are connected, but out of sync</p>	<ol style="list-style-type: none"> <li>1. Decrease loads of inverter.</li> <li>2. Wait for alarm to clear.</li> <li>3. If alarm does not clear power cycle the inverter.</li> </ol>
A2_8	Battery Under Temperature	This happens when the battery is too cold.	<ol style="list-style-type: none"> <li>1. Check the temperature of the inverter</li> <li>2. Check if fans are functioning properly</li> </ol>
A2_9	Battery Cell Unbalanced	Voltage on the individual cells of the battery are not within target range of each other.	<ol style="list-style-type: none"> <li>1. Check individual battery cells. If voltage difference is greater than 0.4V, use power supply to charge up low cell(s).</li> <li>2. Reference battery troubleshooting guide for further instructions.</li> </ol>
A2_10	Battery is Reverse Polarity	This happens when battery cables are reversed in polarity on the inverter.	<ol style="list-style-type: none"> <li>1. Install battery cables correctly.</li> <li>2. Power cycle inverter.</li> </ol>
A2_11	BMS Communication Failure	This happens when the BMS in the battery is not communicating with the inverter.	<ol style="list-style-type: none"> <li>1. After commissioning the system, make sure BMS splitter is plugged into the BMS communication port.</li> <li>2. Check wire orientation of BMS cable and re-wire BMS cable if incorrect (reference installation guide)</li> <li>3. Power cycle the inverter.</li> </ol>
A2_12	*Battery Fault	Contact installer.	<ol style="list-style-type: none"> <li>1. Power cycle inverter</li> <li>2. Contact Lion Energy</li> </ol>

## SANCTUARY INSTALLATION GUIDE

Error Code	Name	Description	Solutions
A2_13	Grid Over-Load	This happens when the load exceeds recommended current rating.	<ol style="list-style-type: none"><li>1. Decrease load usage.</li><li>2. Power cycle the inverter.</li></ol>
A2_14	Grid Phase Error	Contact installer.	<ol style="list-style-type: none"><li>1. Power Cycle the inverter.</li><li>2. Contact Lion Energy</li></ol>
A2_15	ARC Fault Detected	Contact installer.	<ol style="list-style-type: none"><li>1. Check Solar wiring to ensure correct connections.</li><li>2. Power Cycle the inverter.</li><li>3. Contact Lion Energy.</li></ol>

If you are unable to clear the fault, restart the system. If the fault still shows, contact Lion Energy for assistance.



# Sanctuary 12kW Energy Storage Inverter



**Shown is the 99990814 13.5kWh Version**

## CAUTION:

Read all instructions before installation, operation and maintenance of the system

Install in a climate controlled environment to maintain a temperature between 32° to 86° F

This Grid Support Interactive Inverter complies with ULSTD. 1741, UL1741 SB, IEEE Std 1547:2018, IEEE Std 1547.1:2020, FCC 15 class-B, UL1699B Arc-Fault Circuit



## SANCTUARY™ ENERGY STORAGE SYSTEM

Model #99990814 – 12K Hybrid Solar Inverter with 13.5kWh Energy Storage

Model #99990815 – 12K Hybrid Solar Inverter with 27.0kWh Energy Storage

Model #99990816 – 12K Hybrid Solar Inverter with 40.5kWh Energy Storage

### Model #50170168 Hybrid Solar Grid Support Interactive Inverter

#### PV Input

Max PV Input	12kW
MPPT Input Voltage	120-500V
Max Input Current	12A*4
Max Short Circuit Current	15A

#### AC Output (On Grid)

Rated Output Power	8kVA
Rated Output Current	33.3A
Grid Voltage	120V/240V Split phase
Grid Frequency (Optional)	60Hz
Power Factor Range	-0.8~+0.8

#### AC Output (EPS)

Rated Output Power	8kVA
Rated Output Current	33.3A
EPS Voltage	120V/240V Split phase
EPS Frequency (Optional)	60Hz

#### Battery

Battery Voltage Range	40V~60V
Max Charging Current	190A
Max Discharging Current	190A

#### System

Ingress Protection	IP65
Dimensions	430*710*220mm
Weight	41Kg
Max Efficiency	97.8%
AC Solar Max	8kW
Grid Passthrough	90A
Voltage Range	40 - 55.6VDC
Capacity	13,875.2Wh
Parallelable Capacity	41,625.6Wh Max
Quantity	3 Max
Charging Temperature Range / Current	32° to 86° F / 150A
Discharging Temperature Range / Current	-4° to 86° F / 160A
Weight	277lbs.
Dimensions	39.75" H x 18.5" W x 10"D
Compliance	UL1973, UL9540, UL9540A



## Lion Sanctuary Energy Storage System

The Lion Sanctuary warranty is for 10 years (can be upgraded to 25 years). The 10 year limited warranty ("Warranty") is against manufacturing defects and workmanship; the battery is rated for 6,000 cycles to 90% depth of discharge. The warranty begins from the date the Sanctuary System is installed.

If the unit needs to be repaired or replaced, follow these steps:

1. Customer contacts the Installer to verify there is an issue with the unit.
2. Installer contacts Lion Energy to discuss the issues and Lion Energy will determine if the unit will be repaired or replaced.
3. Installer repairs the unit or if the unit is to be replaced, Lion Energy will ship the unit to the Installer.
4. Installer replaces the unit and ships the replaced unit to Lion Energy for proper recycling.

The warranty does not include:

- Damage during transportation of equipment.
- Damage caused by incorrect installation or commissioning.
- Damage caused by failure to comply with operation instructions, installation instructions, or maintenance instructions.
- Damage caused by attempts to modify, alter, or repair products.
- Damage caused by incorrect use or operation.
- Damage caused by insufficient ventilation of equipment.
- Damage caused by failure to comply with applicable safety standards or regulations.
- Damage caused by natural disasters or force majeure (such as floods, lightning, over voltage, storms, and fires).
- Any external scratches will not affect the basic operation of the product. Any external scratches, stains or natural mechanical wear does not represent a defect in the product.

## Limitation of Liability

THIS LIMITED WARRANTY IS THE ENTIRE WARRANTY AND ANY OTHER EXPRESSED OR IMPLIED WARRANTIES ARE NOT APPLICABLE. THIS WARRANTY EXCLUDES ANY LIABILITY FOR PRODUCT NOT BEING AVAILABLE FOR USE OR LOST REVENUES OR PROFITS. Lion Energy only warrants the product, not the power service or external electrical equipment or any services provided by another party. This manual provides information, specification, and usage instructions. All statements, information, and suggestions within in this manual do not constitute any express or implied warranty.

## Recycling

Return the Sanctuary System to Lion Energy for proper disposal.

### Notes:

[illegible]



LIONENERGY™



385.375.8191  
Monday - Friday  
9:00 AM - 5:00 PM MST



735 S. Auto Mall Drive Suite 200  
American Fork, Utah  
84003



info@lionenergy.com  
www.lionenergy.com  
@lionenergy