ELECTRIQ POWER™

*The Smart Home Battery Solution*


# Parallel Stacking Guide for the Electriq Power AC & DC-Coupled Inverters

*Model Number:*
*EPP-600-1005 (AC)*
*EPP-600-1004 (DC)*

*V. 121120*

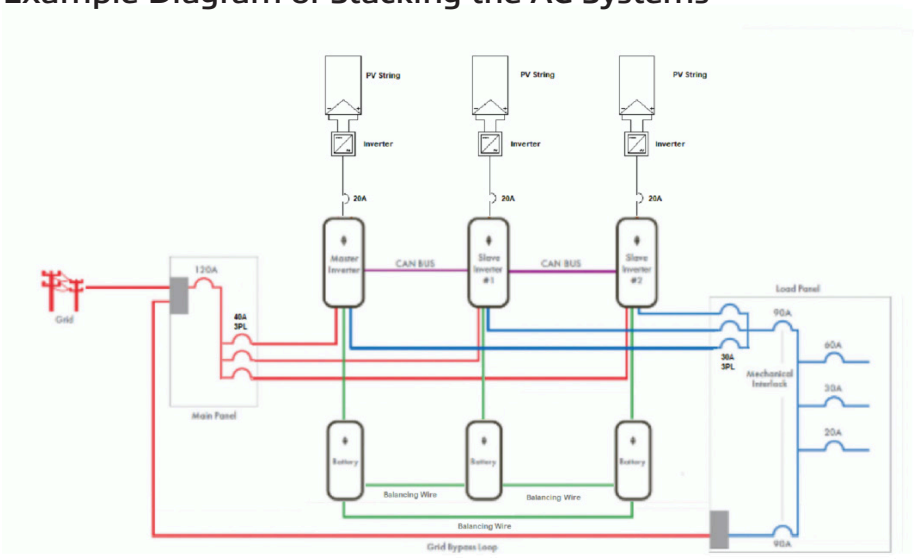
# 1. Introduction

This is an addendum to the Electriq Power AC/DC-Coupled installation manual. Please refer to that document for warnings and basic installation instructions. This addendum defines specific changes for parallel stack operation only.

Note: The output real power (W) is reduced to 90% when system is in parallel.

| | Two AC/DC-Coupled Inverters in parallel | Three AC/DC-Coupled Inverters in parallel |
|---|---|---|
| AC rating output power | 9 kW / 10 kVA | 13.5 kW / 15 kVA |

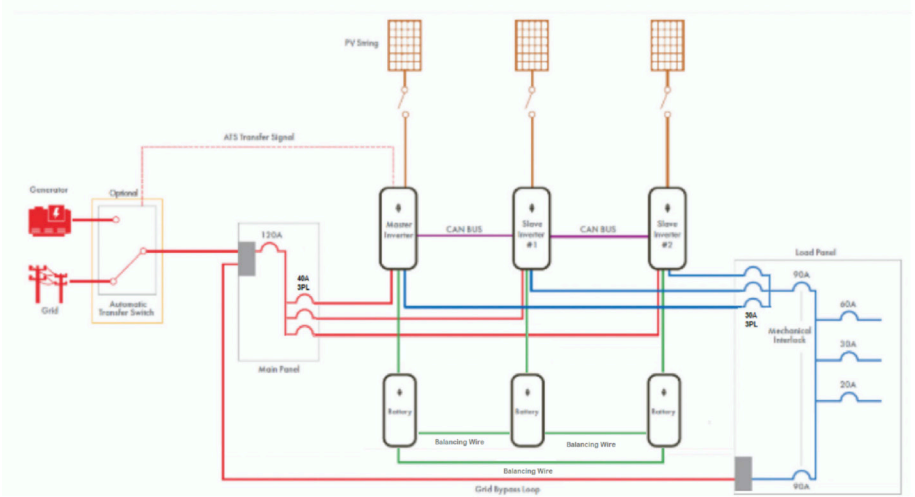
## Example Diagram of Stacking the AC Systems




In parallel system, you will find the following items in the package:

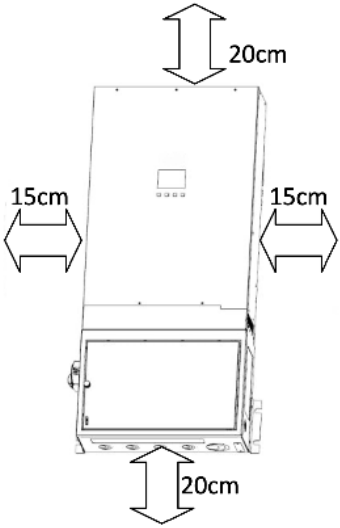
- A parallel communication cable (RJ12 wire).
- Fused 6 AWG battery balancing wires.
- This guide book on parallel installation.

## Example Diagram of Stacking the DC Systems



## 2. Mounting the Inverters

When installing multiple inverters, please follow below instructions on surrounding spacings.




For proper air circulation to dissipate heat, allow a clearance of approximately 6 inches (15 cm) to the side and approximately 8 inches (20 cm) above and below each inverter. Be sure to install each inverter in the same level.

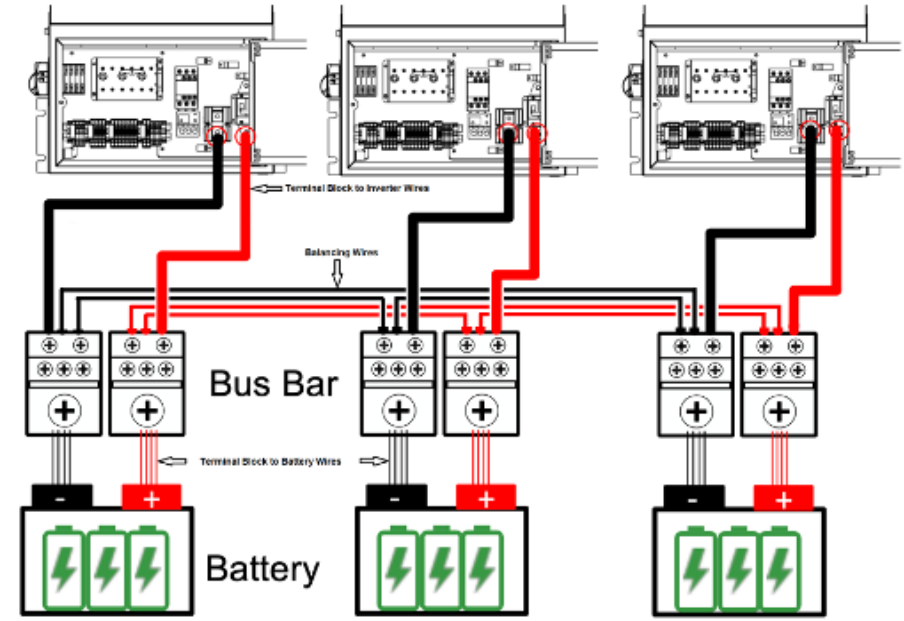
## 3. Battery Connection

**WARNING!** Be sure that all inverters will share the same sets of batteries. The battery power terminal needs be paralleled, when system use multiple battery modules. Electric Power provides all wires for proper battery connection in an accessories box. They are:

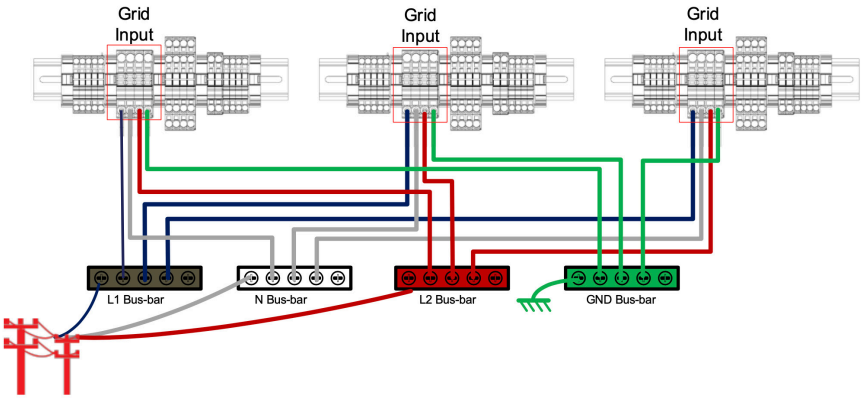
**a)** 6 AWG and 8 AWG terminal block to battery cables.
**b)** 6 ft. 2 AWG terminal block to inverter wires. If longer wires are required use 0 AWG or larger with length equal to +/- 5.0% to carry a maximum load of 150 ADC.
**c)** Fused 6 AWG balancing wire. Provides less than 350 mVDC maximum offset between battery sets.

Note, if battery cabinet has five or six batteries, a 3/0 or 4/0 Polaris Connectors from your local electrical store will be required to connect the battery balancing wires. See image below.

Wiring diagram for three stack parallel system:



## 4. AC Input (Grid) Connection




Note:

a) Connected grid wires (L1 and L2) to 40A breaker in grid tied main.
b) Connect grid neutral conductor to main BUS neutral. DO NOT connect essential load neutral to main BUS neutral

Suggested cable requirement for AC input wires.

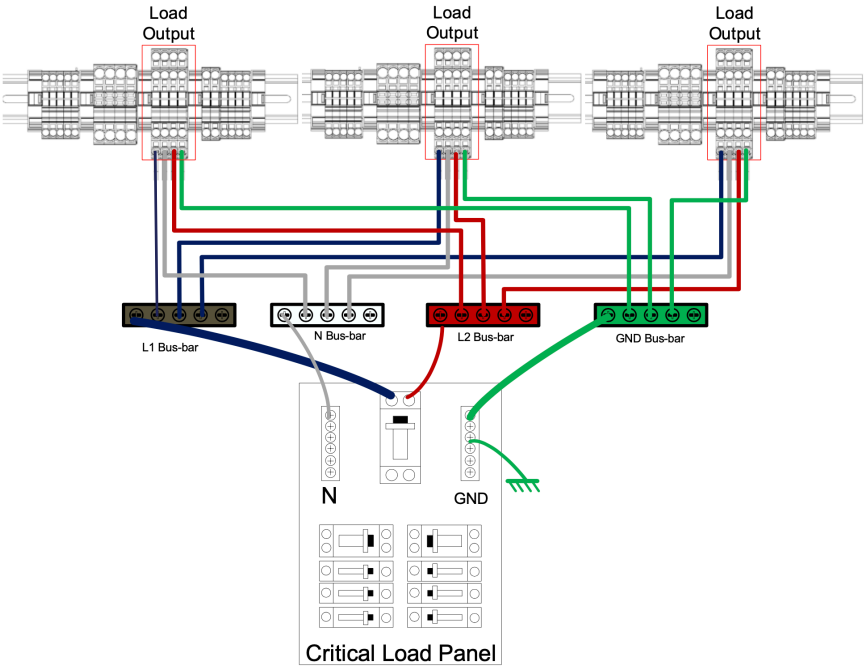
Inverter Grid Input wire requirements:

a) Use wire rate for 40 AAC.
b) All input wire length equal to +/- 5.0%.

NOTE: To keep the parallel inverters balanced be sure the grid wire lengths are as specified above.

## 5. AC Output (Load) Connection

Connect AC output of each inverter together. Refer to below figure for connection of AC output.




NOTE:

a) Connected essential load wires (L1 and L2) to 30A breaker in essential load panel.

b) Connect essential load neutral conductor to essential load panel neutral. DO NOT connect essential load neutral to main BUS neutral.

Suggested cable requirement for AC input wires.

Inverter Grid Input wire requirements:

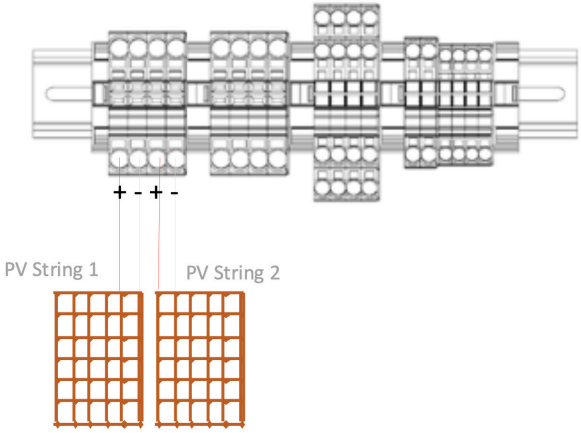
c) Use wire rate for 30 AAC.

d) All essential load output wire length equal to +/- 5.0%.

NOTE: To keep the parallel inverters balanced be sure the essential load wire lengths are as specified above.

## 6. PV Connection

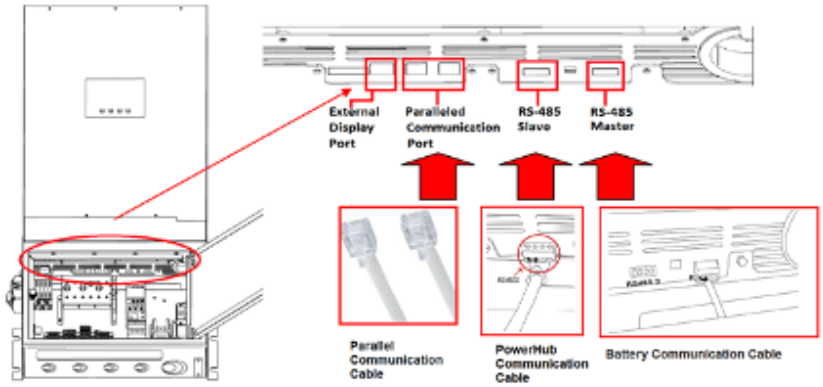
The PV Connections are the same as for a single inverter, shown as below:




NOTE: Please set the PV power rating for each DC-coupled system as close as possible, this ensures more consistent mode operation. **The difference of installed PV power rating between each stacked inverter should be less than 500W.**

## 7. Parallel Communication Cable Connection

An RJ12 cable is used for the Parallel systems to communicate between the inverters. Please follow the examples below to connect to the inverter.



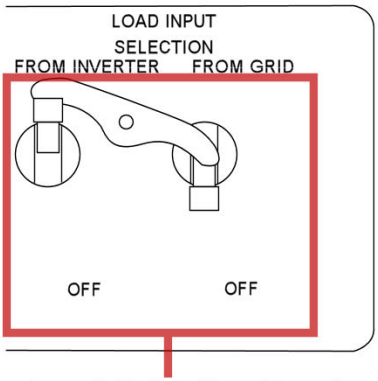

Two inverters in parallel:


Three inverters in parallel:

## 8. Pre-Commissioning (Single Inverter Operation Check)

Verify that each parallel inverter can first operate by itself as a single inverter with no essential load (to prevent overloading) before setting them up for parallel operation. To do this,

1) Turn off the "LOAD INPUT" "FROM INVERTER" middle breaker on all parallel inverters.
2) Only turn on one and check inverter at a time.
3) Disconnect the parallel communication RJ12 cable for the unit under test.
4) Set the inverter "multi-Module" to single.
5) Turn the inverter off then on to reboot the inverter.




**Load Selection Breaker**

For detail on preforming the above steps, reference "System Setting" in **Installation Manual, Service & Users Guide for the AC & DC Coupled** for setting and operating the inverter using the display.

Next in the installation manual preform sections:

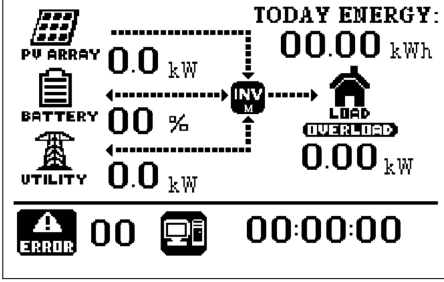
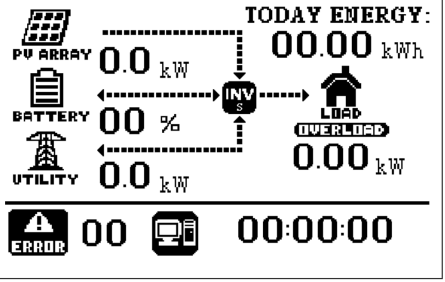
Waking Up the Batteries
Operational Testing

**WARNING**, to prevent damage to the inverter's battery charger, turn battery on/off switch to OFF for 30 seconds then ON to put batteries into standby before each time the inverter battery disconnect circuit breaker is turned ON.

## 9. Commissioning (Parallel Operation)

To operate the system in parallel mode:

1) Only turn on one inverter at a time and put inverter in "Multi-Module" to parallel
2) With the inverters off connect the parallel communication RJ12 cable. See section above for details.
3) With the inverter off turn on the "**LOAD INPUT**" "**FROM INVERTER**" middle breaker on all parallel inverters
4) **Turn on** the parallel inverters. Note first inverter to boot is the MASTER (INV M). See images below for MASTER (INV M) and SLAVE (INV S) icons.

| LCD display of the MASTER inverter | LCD display of the SLAVE inverter |
|---|---|
|  |  |



If there are no fault alarms, the parallel system is ready to commission using the smart phone commission app.

## 10. Specifications of the AC-Coupled System in Parallel

| | 2 inverters in parallel | 3 inverters in parallel |
|---|---|---|
| **SOLAR AC INPUT** | | |
| Maximum Breaker Size on PV Input (per inverter) | 20 A / 20 A | 20 A / 20 A /20 A |

## 11. Specifications of the DC-Coupled System in Parallel

| | 2 inverters in parallel | 3 inverters in parallel |
|---|---|---|
| **SOLAR DC INPUT** | | |
| Maximum Power (Total) | 13 kW | 19.5 kW |
| Maximum Power (Per Channel) | 3250 W | |
| Operation / MPPT Voltage Range | 120 to 500VDC / 250 to 430VDC | |
| Minimum Start Voltage | 150VDC | |
| Number of MPPT channels | 4 channels | 6 channels |
| Maximum Current per MPPT Channel | 13 A | |

## 12. Specifications of the AC/DC-Coupled System in Parallel

| | | |
|---|---|---|
| **AC OUTPUT TO LOAD** | | |
| Power (Continuous) @ 25°C | 9 kW / 10 kVA | 13.5 kW / 15 kVA |
| Overload 40/5/1sec @ 25°C | 11 / 13 / 15 kW | 16.5 / 19.5 / 22.5 kW |
| Rated Output Current | 42A (@120V and 240 V) | 63A (@120V and 240 V) |
| Frequency (Selectable) | 50/60Hz | |
| Voltage | L-N: 120V ± 3%; L-L: 240V ± 3% | |
| Total Harmonic Distortion (THD) | < 5% at rated power | |
| **AC INPUT FROM GRID (GRID SUPPORT)** | | |
| Voltage Limits (Bypass) | L-L: 180 to 280V (240 V nominal) | |
| Frequency Range (Bypass) | 55 to 65 Hz | |
| Automatic Transfer Relay Rating | 70A | 105A |
| Typical Transfer Time | 20ms | |
| **AC OUTPUT TO GRID** | | |
| Current Range (Mode-dependent) | 0 to 48A (@240V) | 0 to 72A (@240V) |
| Voltage Range | L-L: 211 to 264V ± 3.0V | |
| Frequency Range | 59.4 to 60.4Hz ± 0.05Hz | |
| **EFFICIENCY** | | |
| Peak PV to Grid | 96% | |
| CEC weighted PV to Grid | 95.5% | |
| **DC BATTERY CHARGER** | | |
| Maximum Charge Current | 120A | 180A |
| Output Voltage Range | (44 - 52) 48V (Nominal) | |
| Chemistry | INR - NMC - Lithium manganese nickel | |
| Battery Capacity Range | 27 kWh to 67 kWh | 40 kWh to 101 kWh |

| GENERAL SPECIFICATIONS | |
|---|---|
| NEMA/IP Protection Rating | NEMA Type 1 Indoor / IP20 |
| Minimum Starting Temperature (Inverter) | 0 °C |
| Operating Temperature (Battery Charging) | 5 °C to 50 °C |
| Operating Temperature (Battery Discharging) | -10 °C to 50 °C |
| Storage Temperature (Battery) | -20 °C to 20 °C |
| Storage Temperature (Inverter) | -20°C to 55°C |
| Compliances | UL1741SA, UL1973, UL9549, IEEE 1547, FCC Class B |