

WELCOME!



Hello !
my name is

Avtandil Giorgadze
(Gio)

Solutions Engineer

Three-Phase Using **Fortress Power** Residential Systems

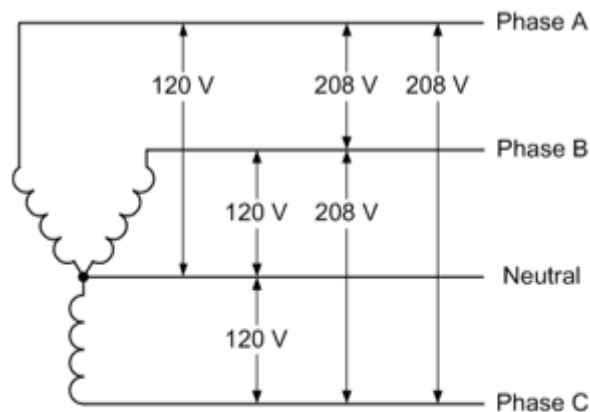
with
Avtandil **G**orgadze and **J**ustin Hoch

Part 2

Implementation of the Concept

Fortress Power Residential Systems work These three

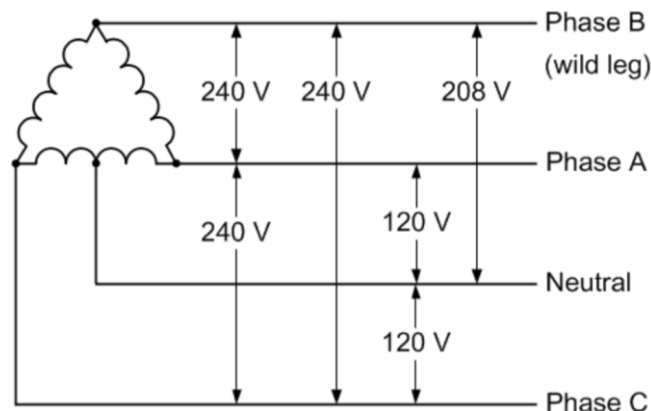
Common Three-Phase Service Types



208/120V Wye/Star



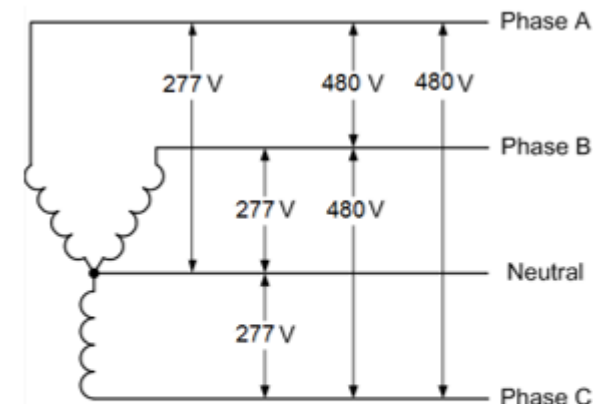
- Peak demand reduction
- Demand management
- Self Consumption
- Time of use
- Energy export
- Whole-site backup
- Partial-site backup



208/120V High/Stinger/wild leg Delta

YES,

To back up a sub panel with 240V or 120 loads connected to phase A neutral and phase C. Essentially this is a split phase, **BACKUP ONLY** application, **NO EXPORT!**



480/277V Wye/Star

YES,

But a transformer must be used, to transform 480Y to 208Y and back.

		Inverter quantity			
		3	6	9	12
Inverter Model	Envy 8K	24kW	48	72kW	96kW
	Envy 10K	30kW	60kW	90kW	120kW
	Envy True12	36kW	72kW	108kW	144kW

Battery Model	eFlex batteries	up to 16 units or 86kWh
	eForce batteries	up to 28 modules or 268kWh
	eVault Max	up to 20 units or 368kWh

		Minimum batteries per inverter *		
		Envy 8K	Envy 10K	Envy True12
Inverter Model	Envy 8K	2 eFlex Maxes	1 eForce	1 eVault Max
	Envy 10K	2 eFlex Maxes	1 eForce	1 eVault Max
	Envy True12	3eFlex Maxes	2 eForces	1 eVault Max

* can be less if the ESS is not used for backup

Does it work with AC-coupled PV or DC-coupled PV?

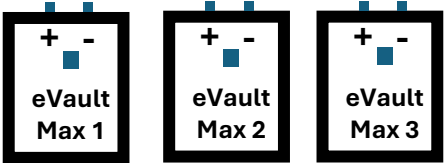
- It can work with EITHER!

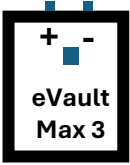
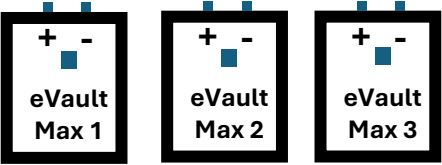
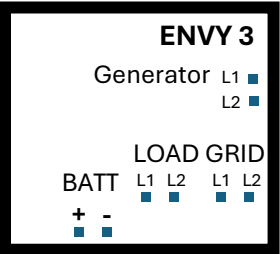
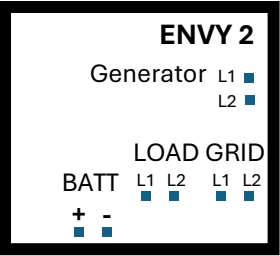
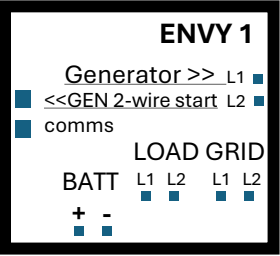
Can it work with a generator?

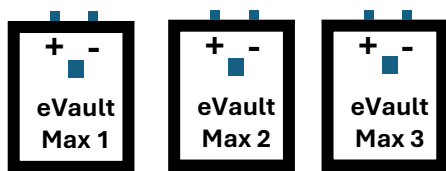
- IT CAN! If the generator delivers 208Y/120V

		Maximum DC-coupled PV Array Size	Maximum AC-coupled PV Input	Maximum Generator Power Input
Inverter	Envy 8K	13kW	10.4kW	10.4kW
	Envy 10K	15kW	10.4kW	10.4kW
	Envy True12	21kW	18.2kW	18.2kW

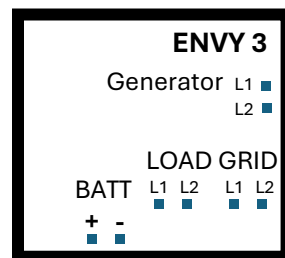
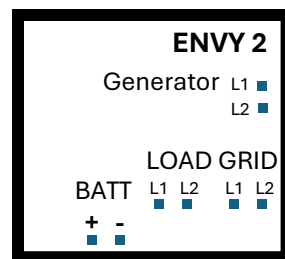
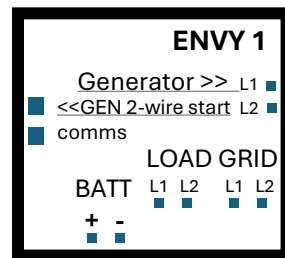
*** Values shown for a single inverter unit**

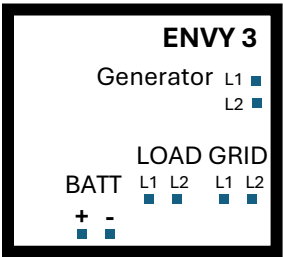


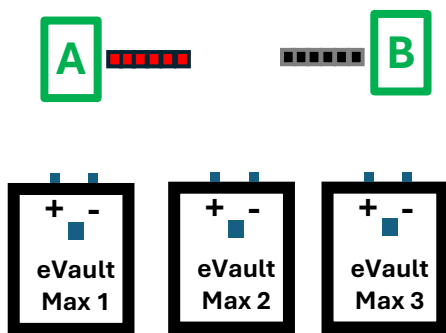




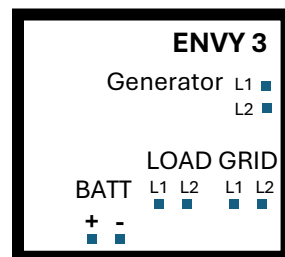
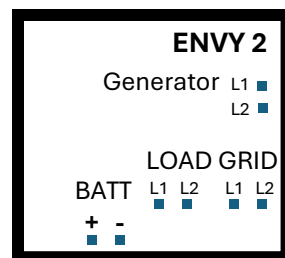
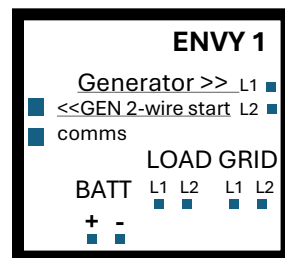
- L1/A
- L2/B
- L3/C
- Comms
- 2-wire start



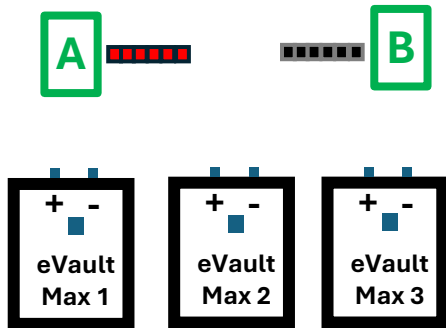




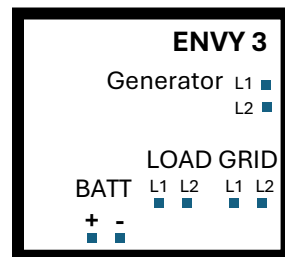
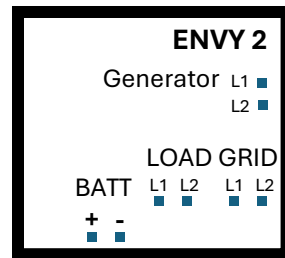
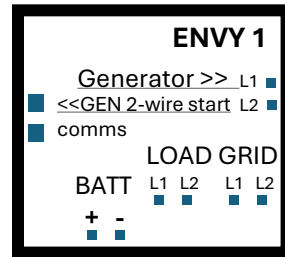
- L1/A
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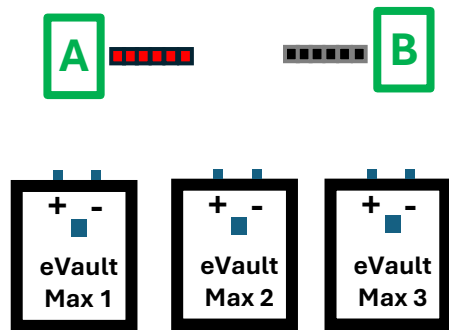
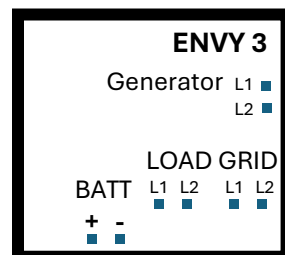
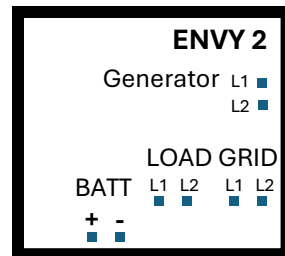
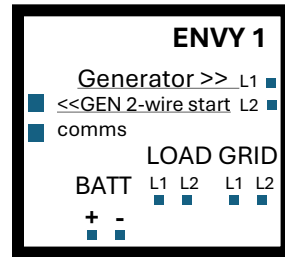
- A. Positive Busbar (1000A)
- B. Negative Busbar (1000A)



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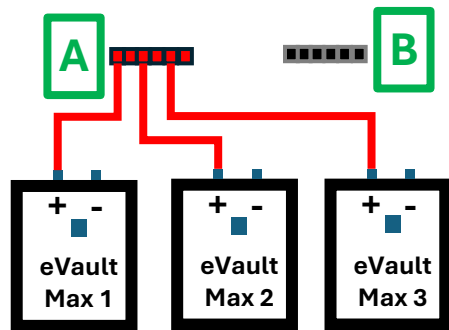
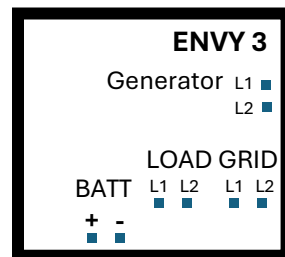
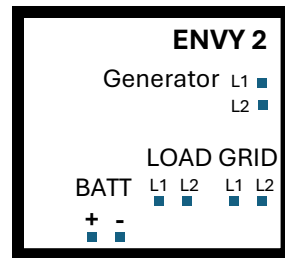
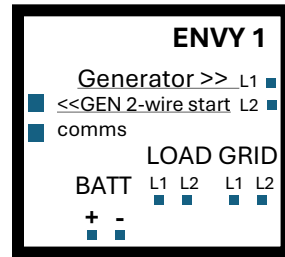
- L1/A
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Why 1000A?

- Three inverters
- up to 250A DC each
- 750A combined input/output current
- Combined input/output current (750A) must be at least 80% of the busbars Ampacity rating.

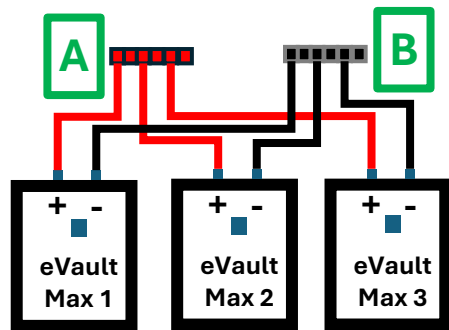
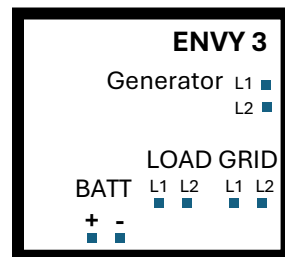
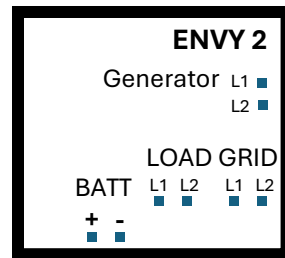
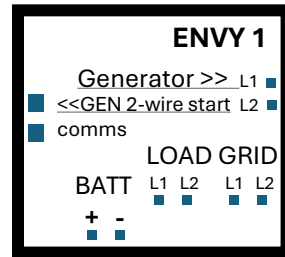
$$750A / 0.8 \text{ (or } 750A \times 1.25) = 937.5A$$

- A. Positive Busbar (1000A)
- B. Negative Busbar (1000A)



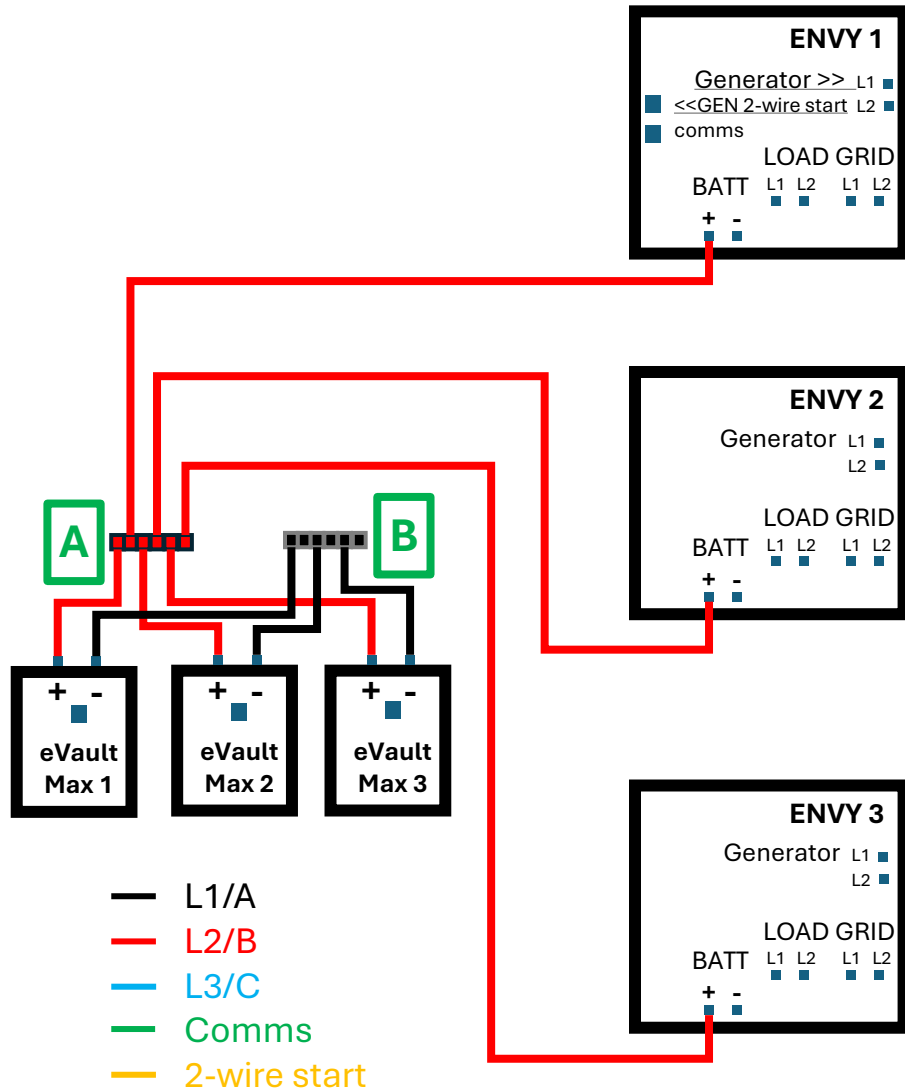
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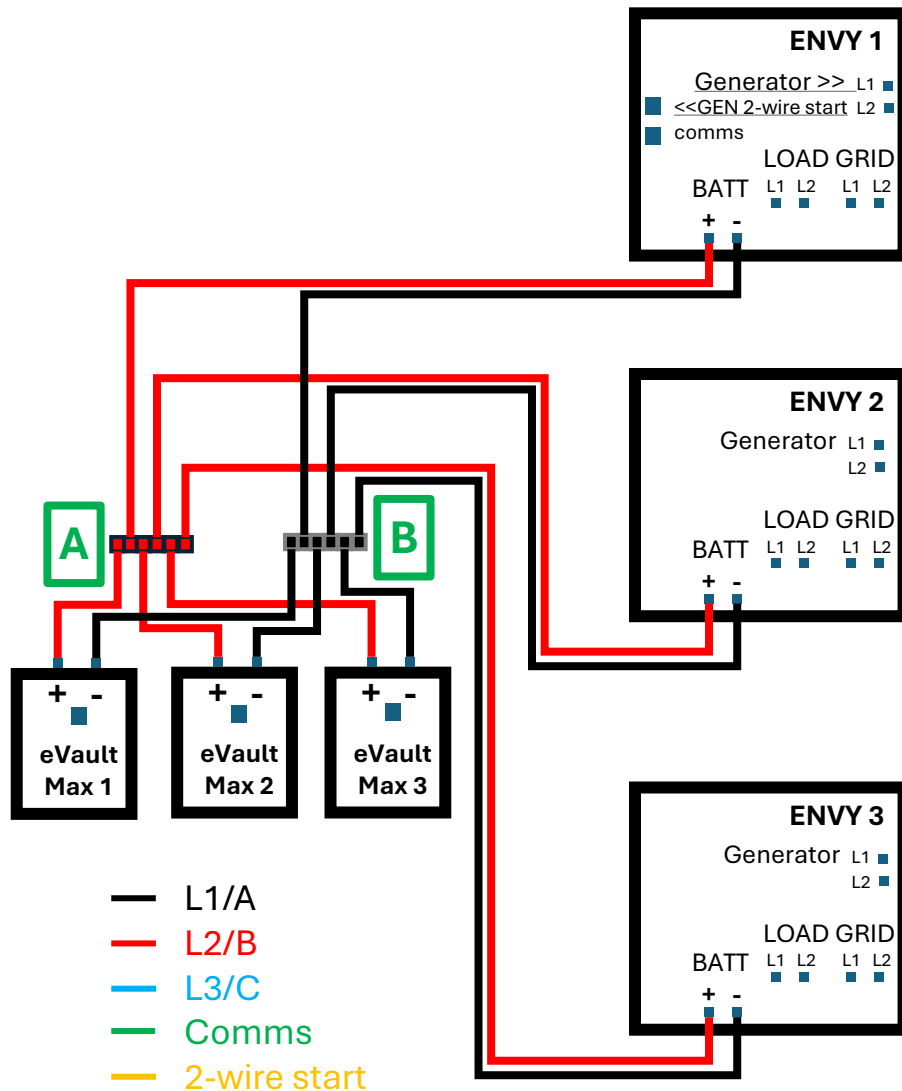


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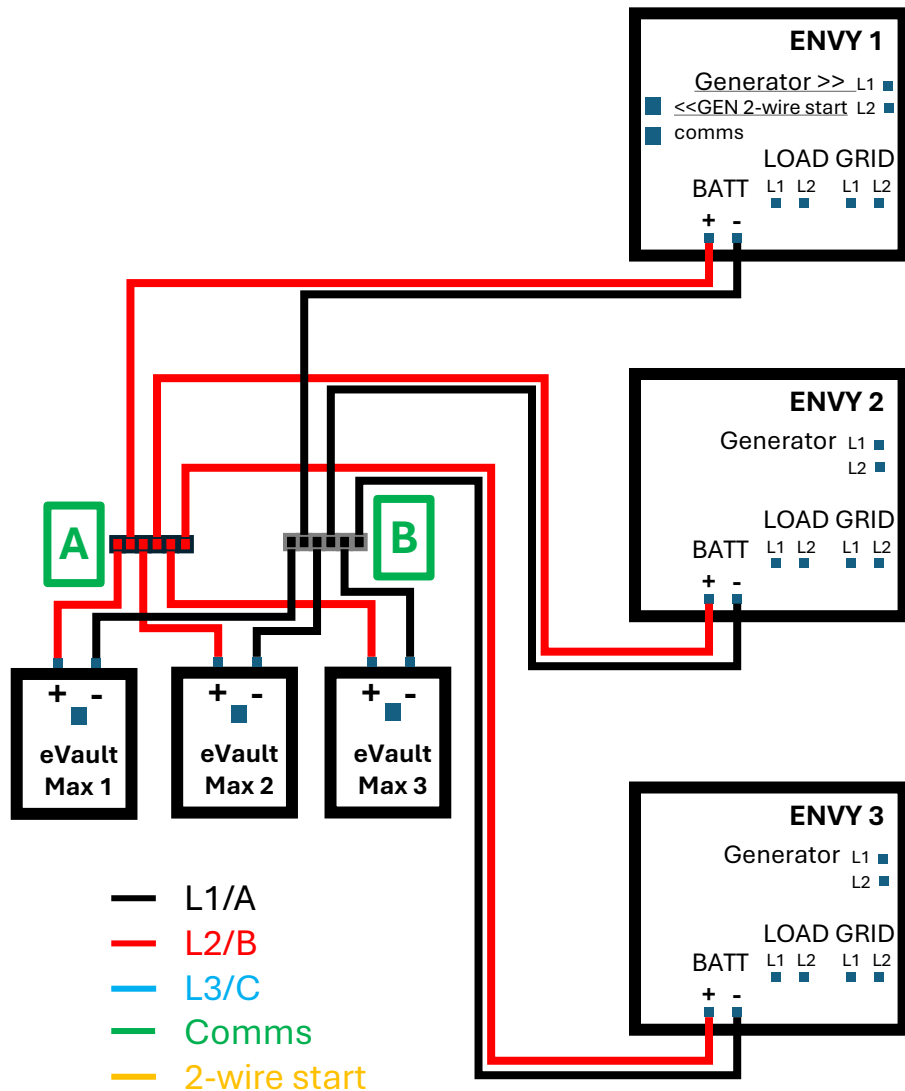


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Minimum quantity of terminals or ports on each busbar must be no less than the total quantity of the inverters and the batteries.

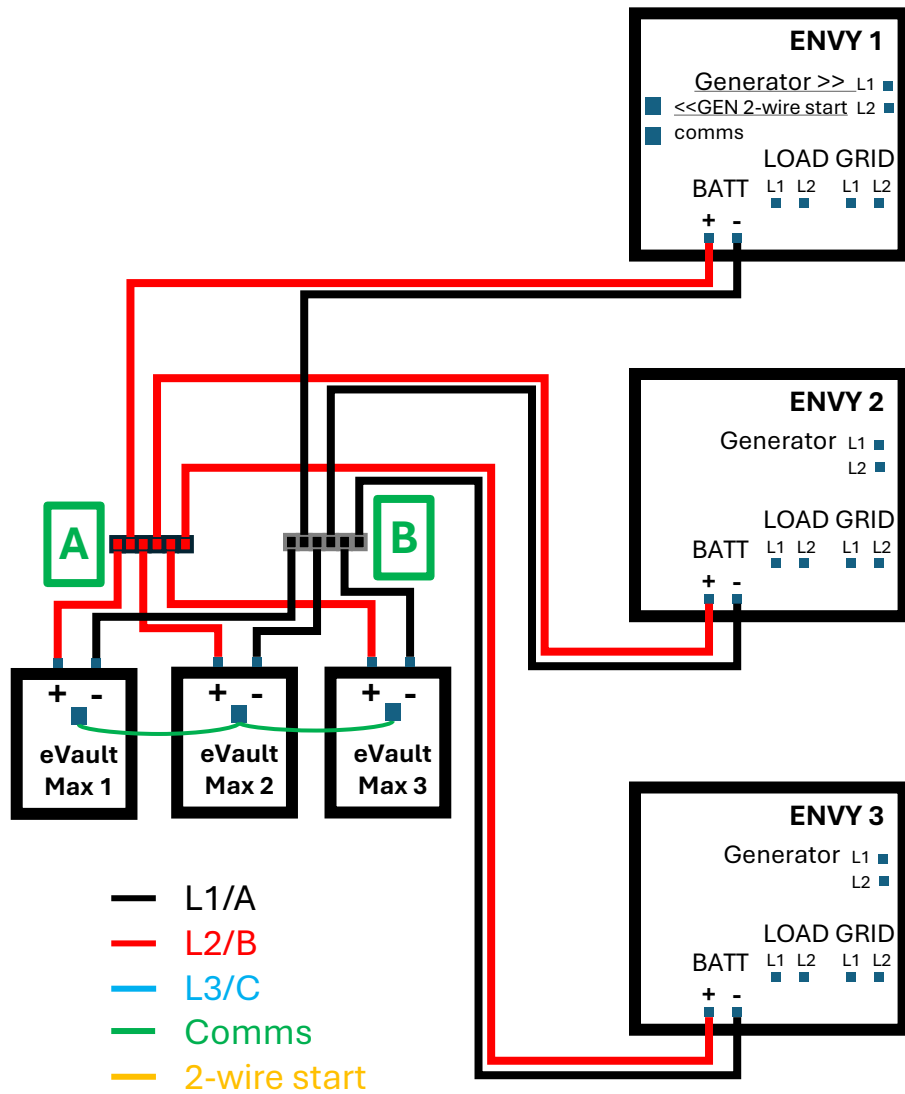
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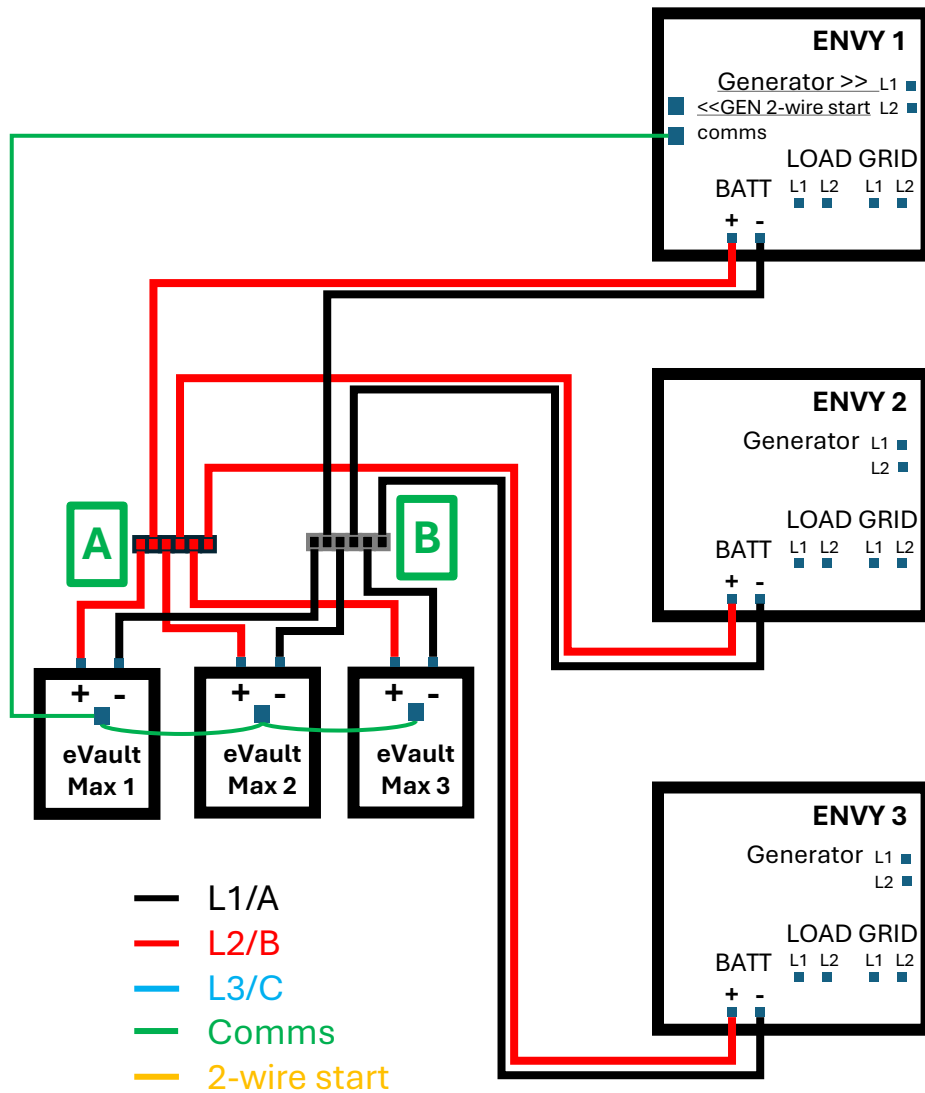
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- Inverter-busbar cable pairs must be identical for each inverter
- battery-busbar cable pairs must be identical for each battery

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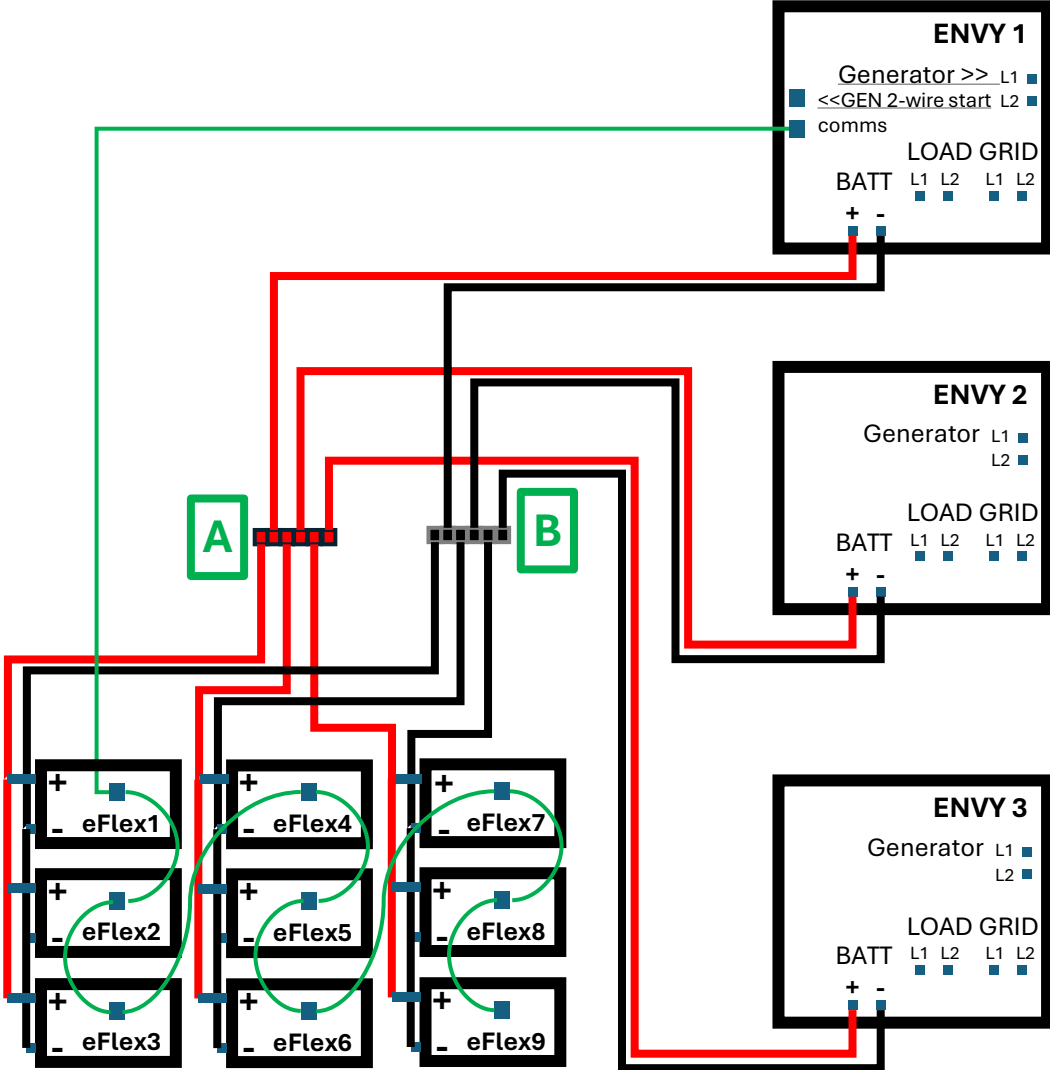
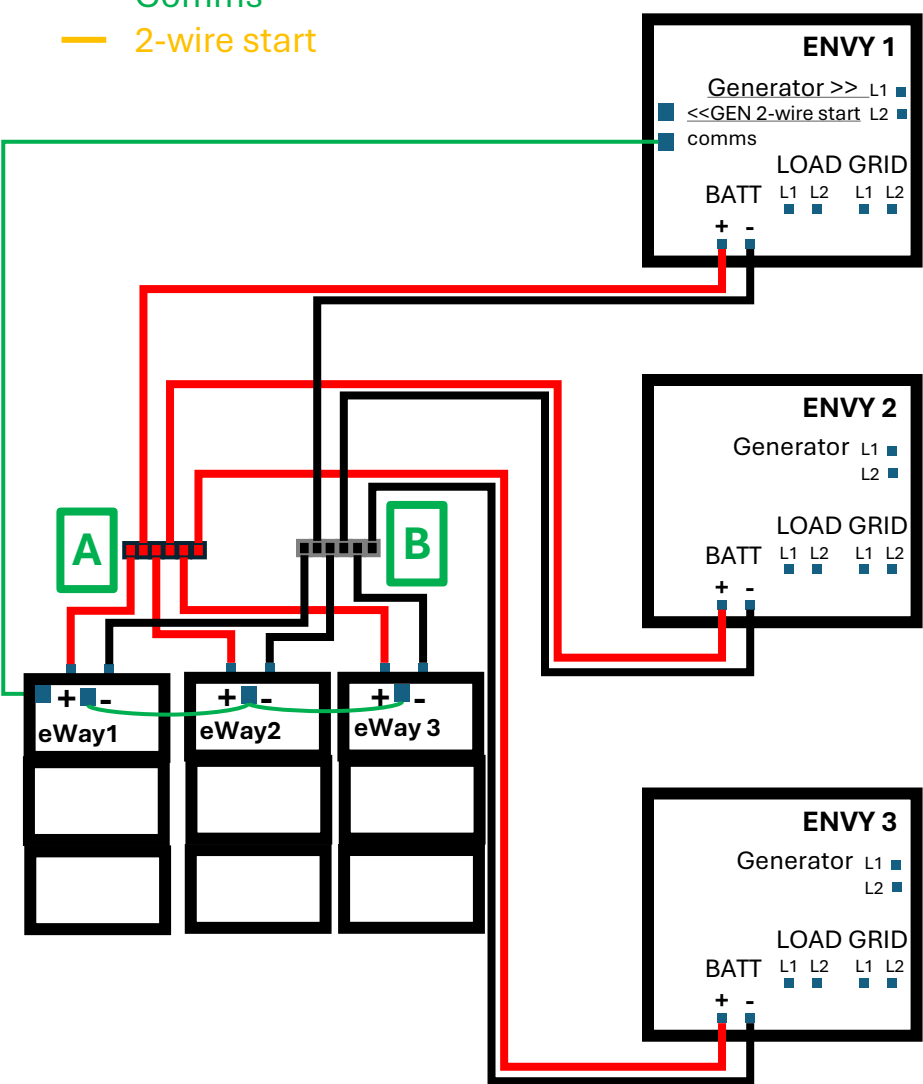
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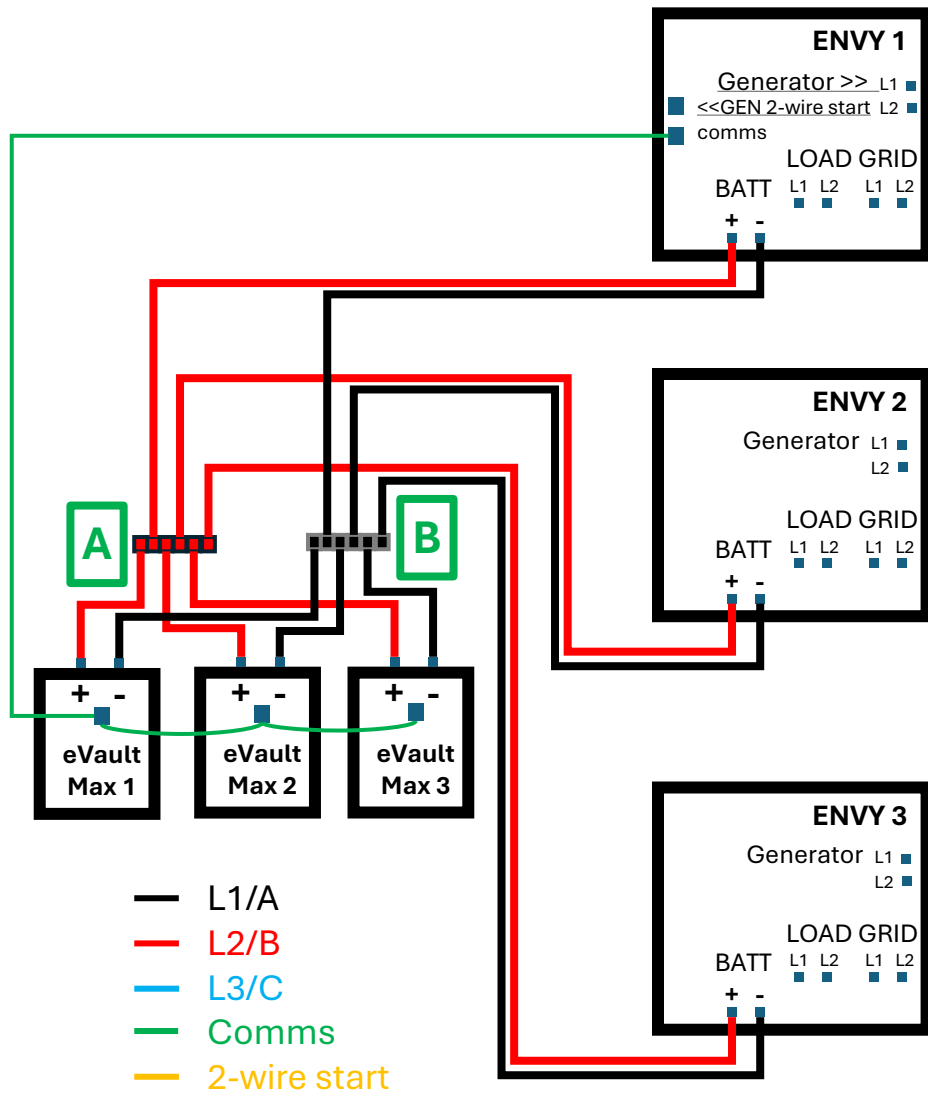
Inverter to Inverter communication is not shown, but is assumed because it must be connected at all times!!!

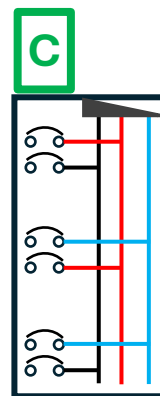
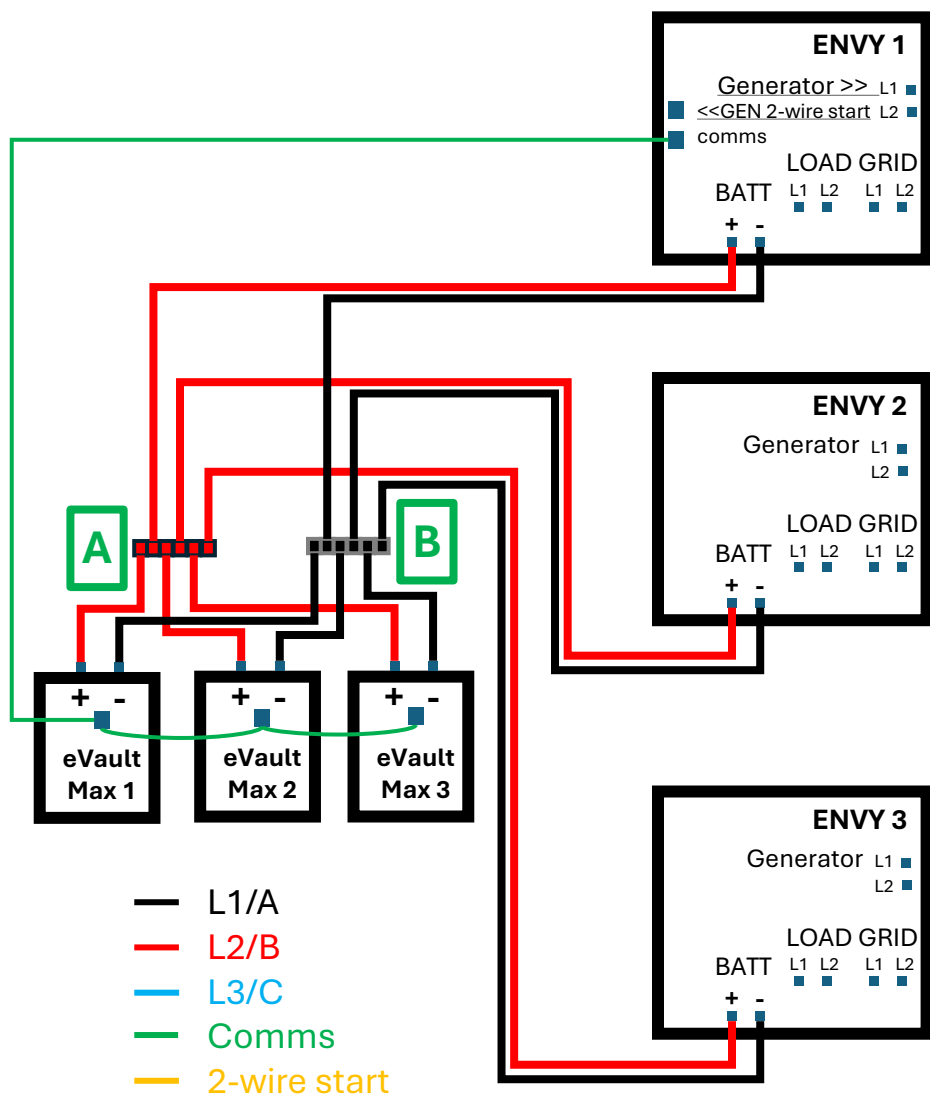
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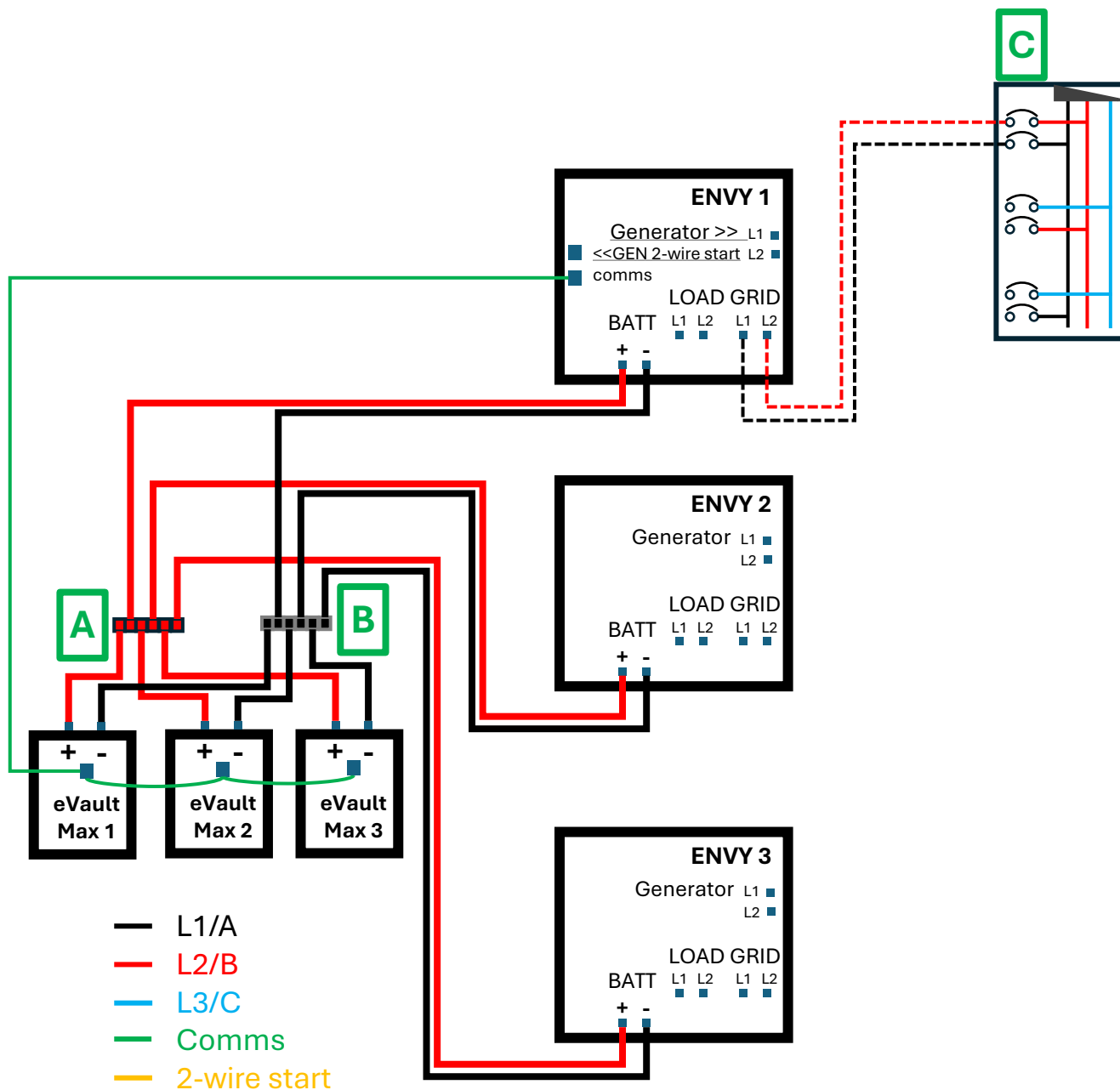
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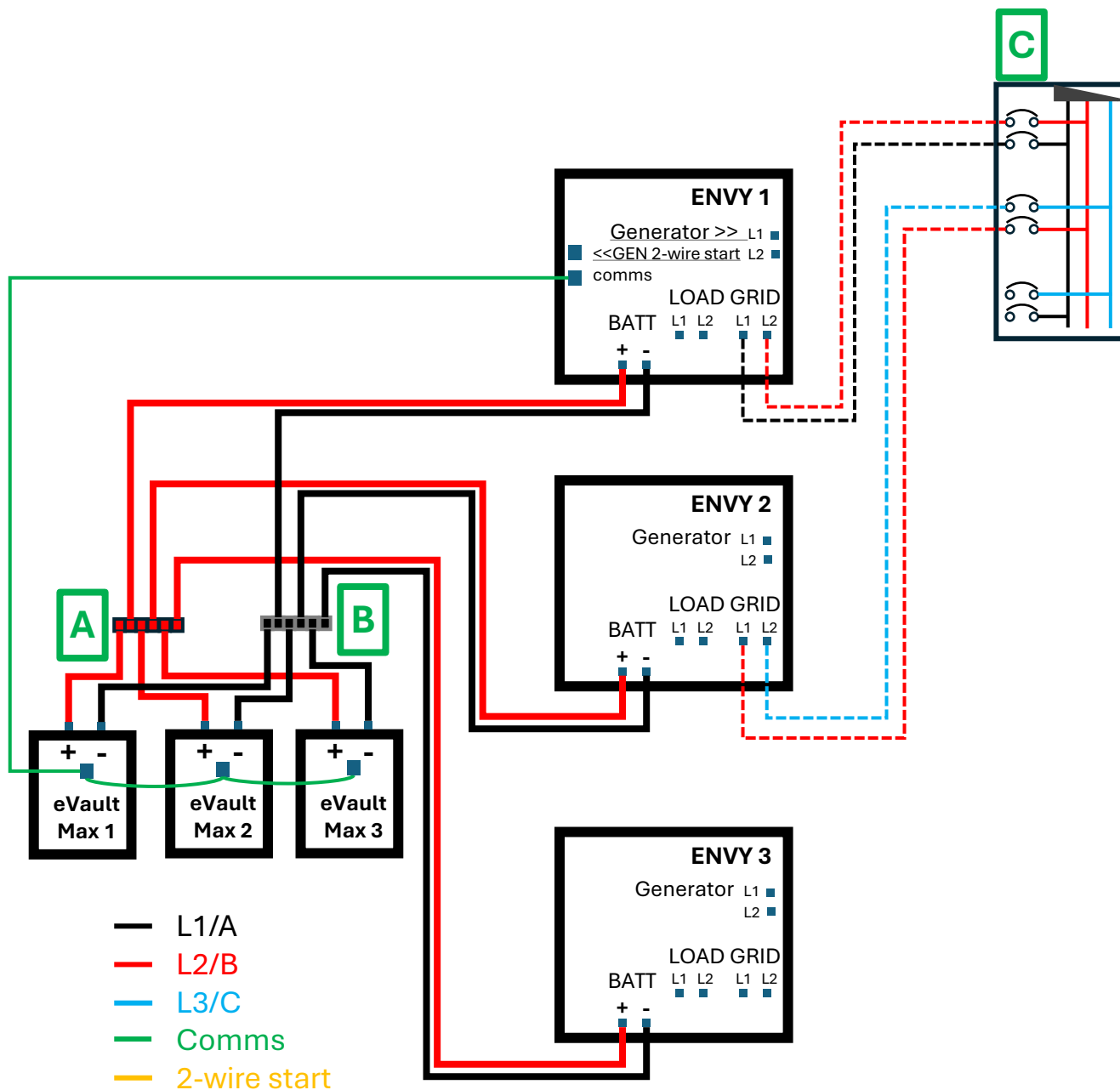


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- C. Grid Splitter Panel

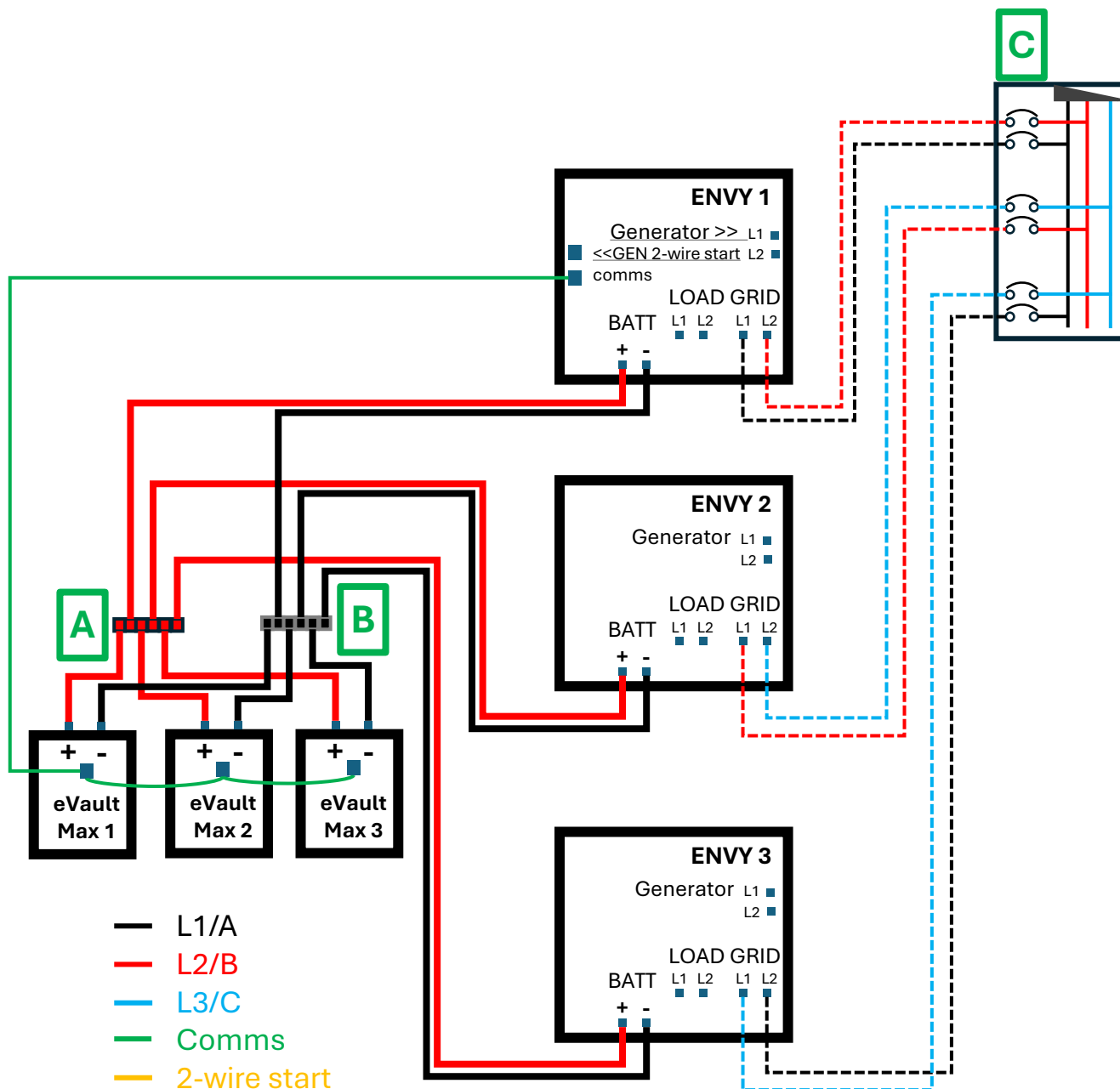
Grid Splitter Panel – Allows for grid-inverter connection via the breakers in it, thus “splitting” the grid between the inverters, hence the name. **Grid Splitter Panel is a mandatory item!**



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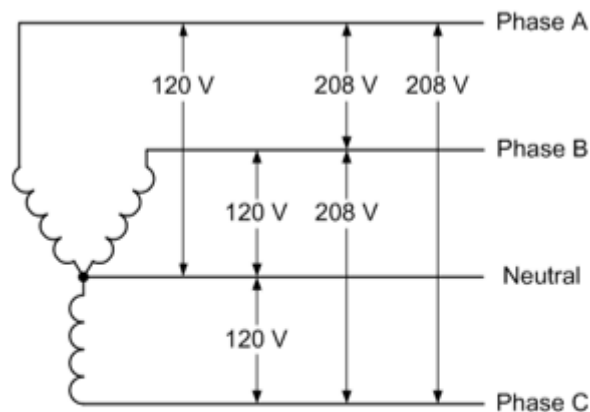
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Fortress Power Residential Systems work These three

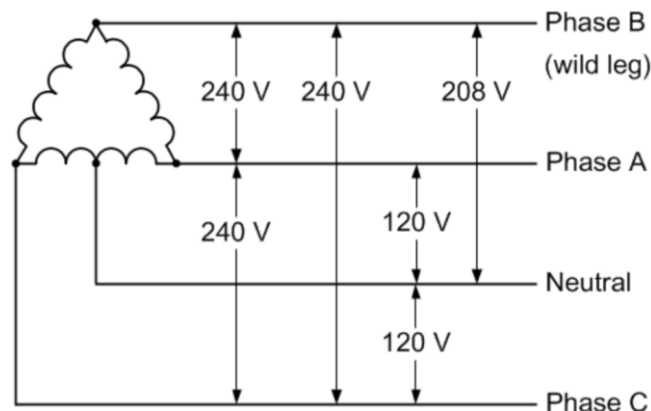
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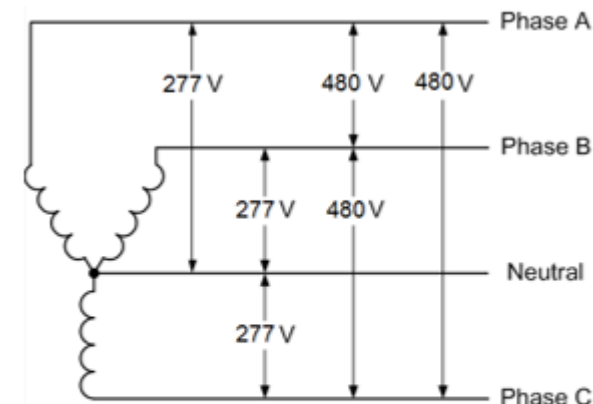
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208/120V High/Stinger/wild leg Delta

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To back up a sub panel with 240V or 120 loads connected to phase A neutral and phase C. Essentially this is a split phase, **BACKUP ONLY** application, **NO EXPORT!**



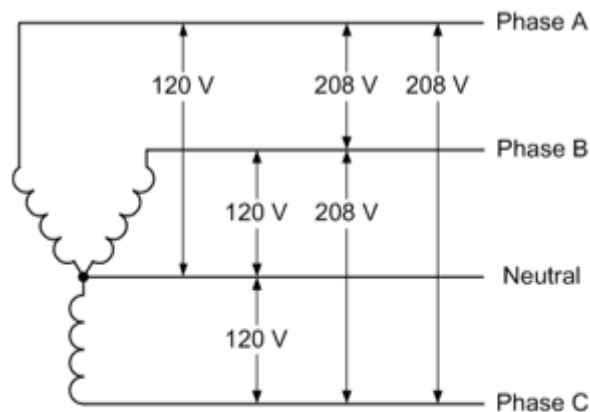
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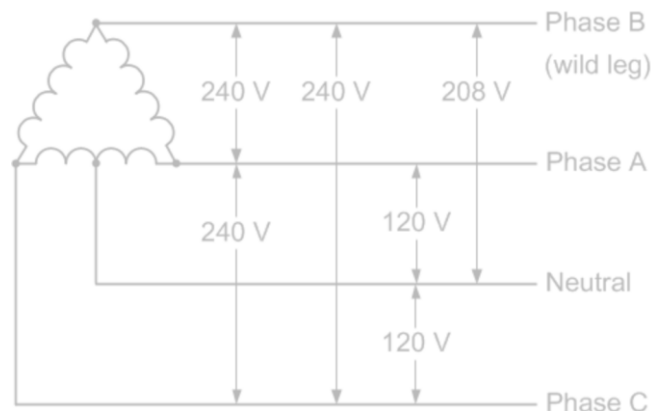
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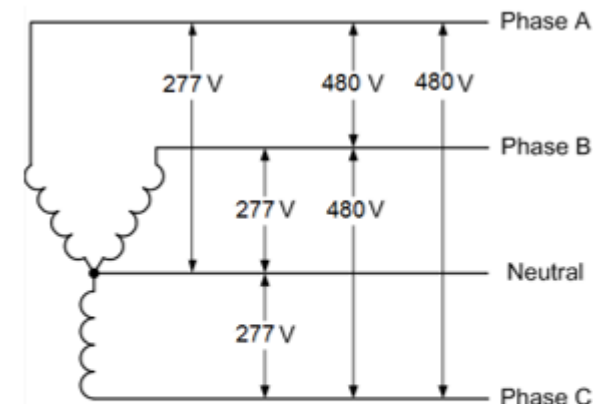
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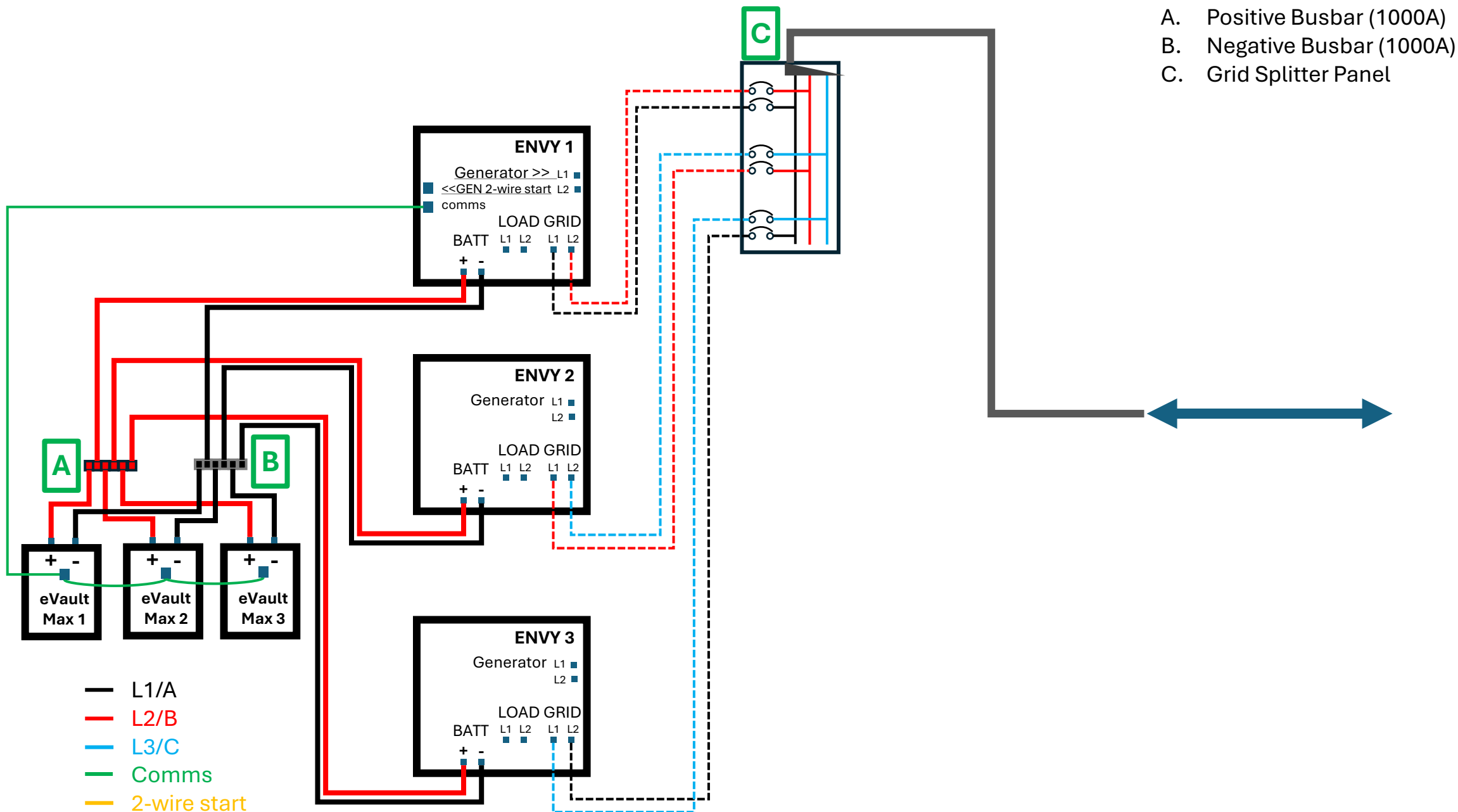
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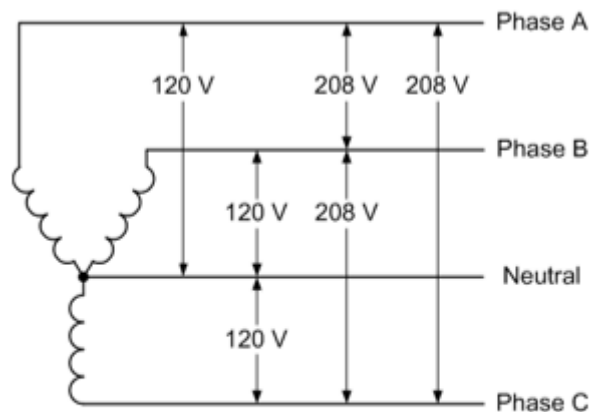
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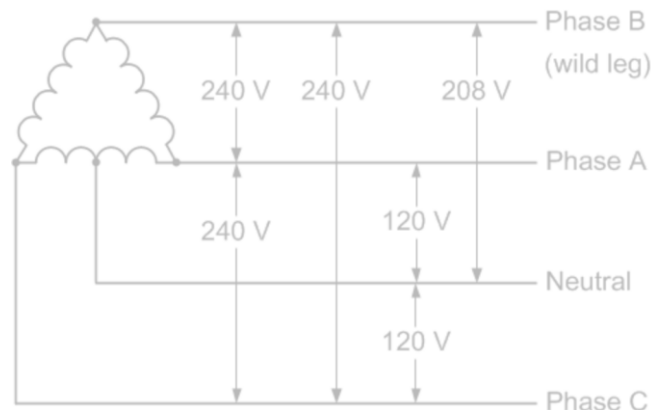
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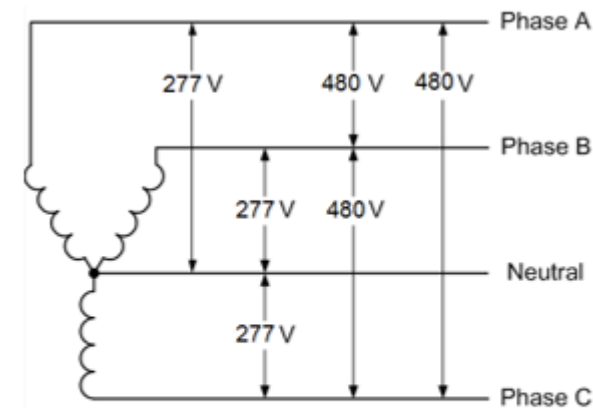
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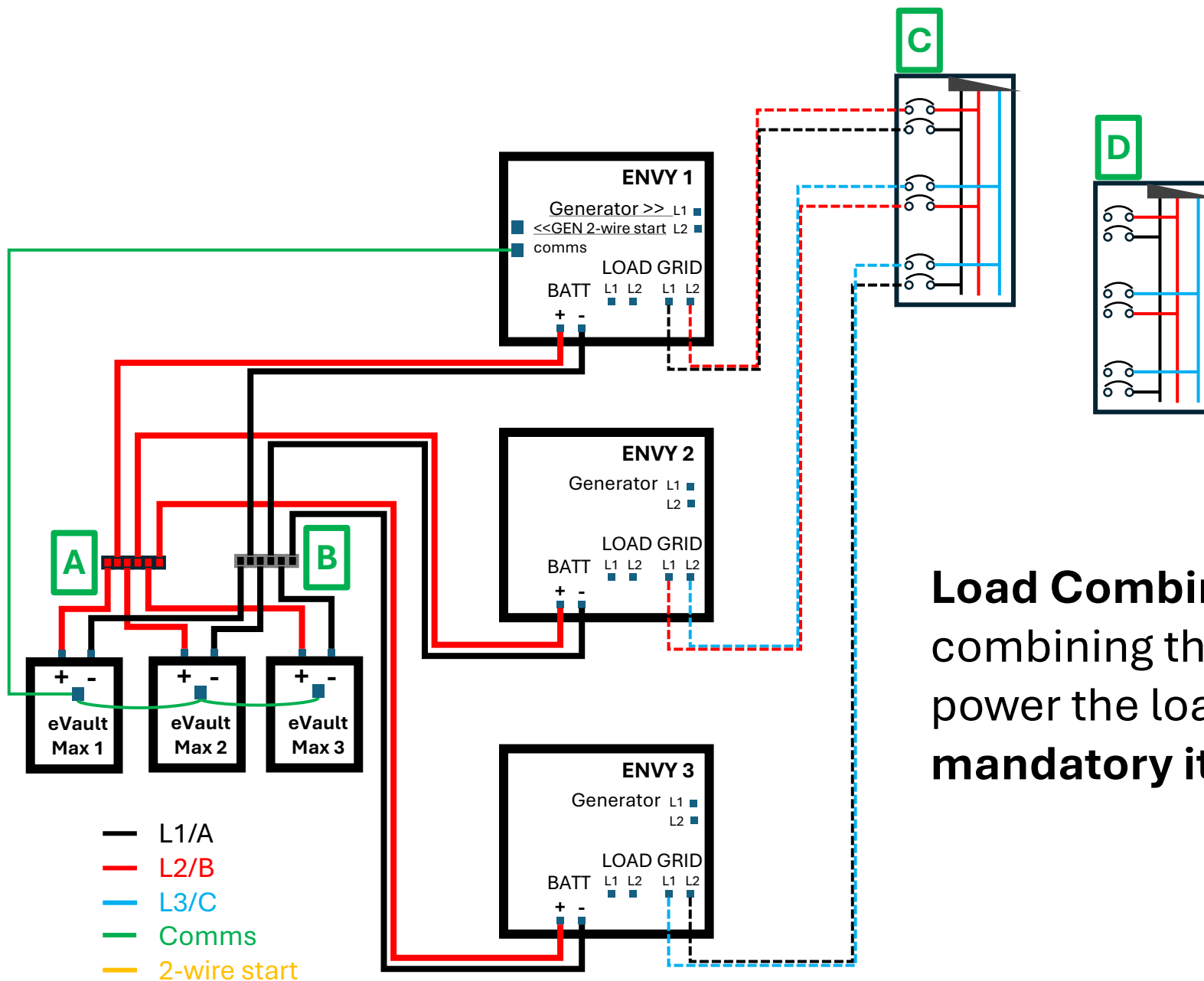
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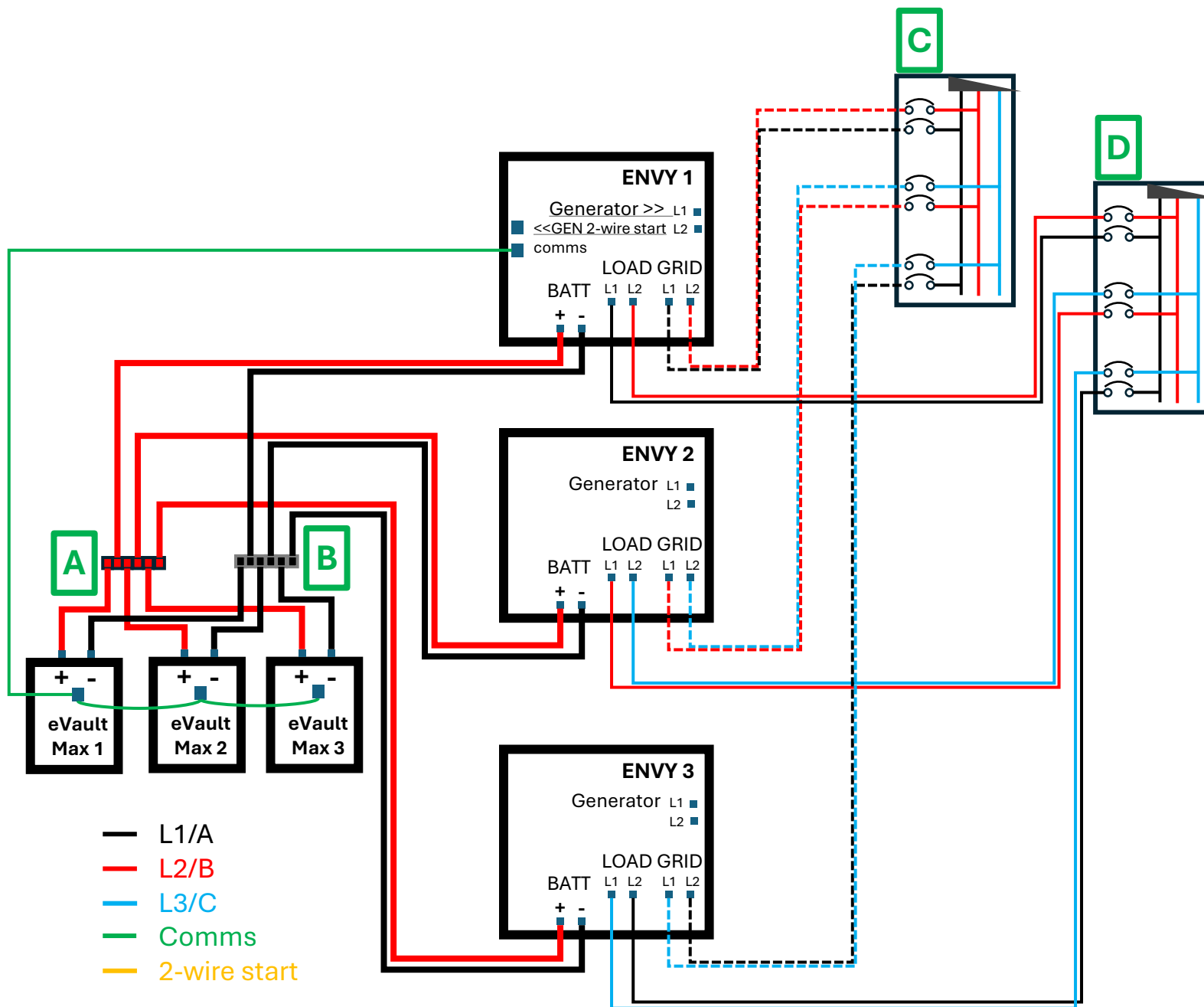
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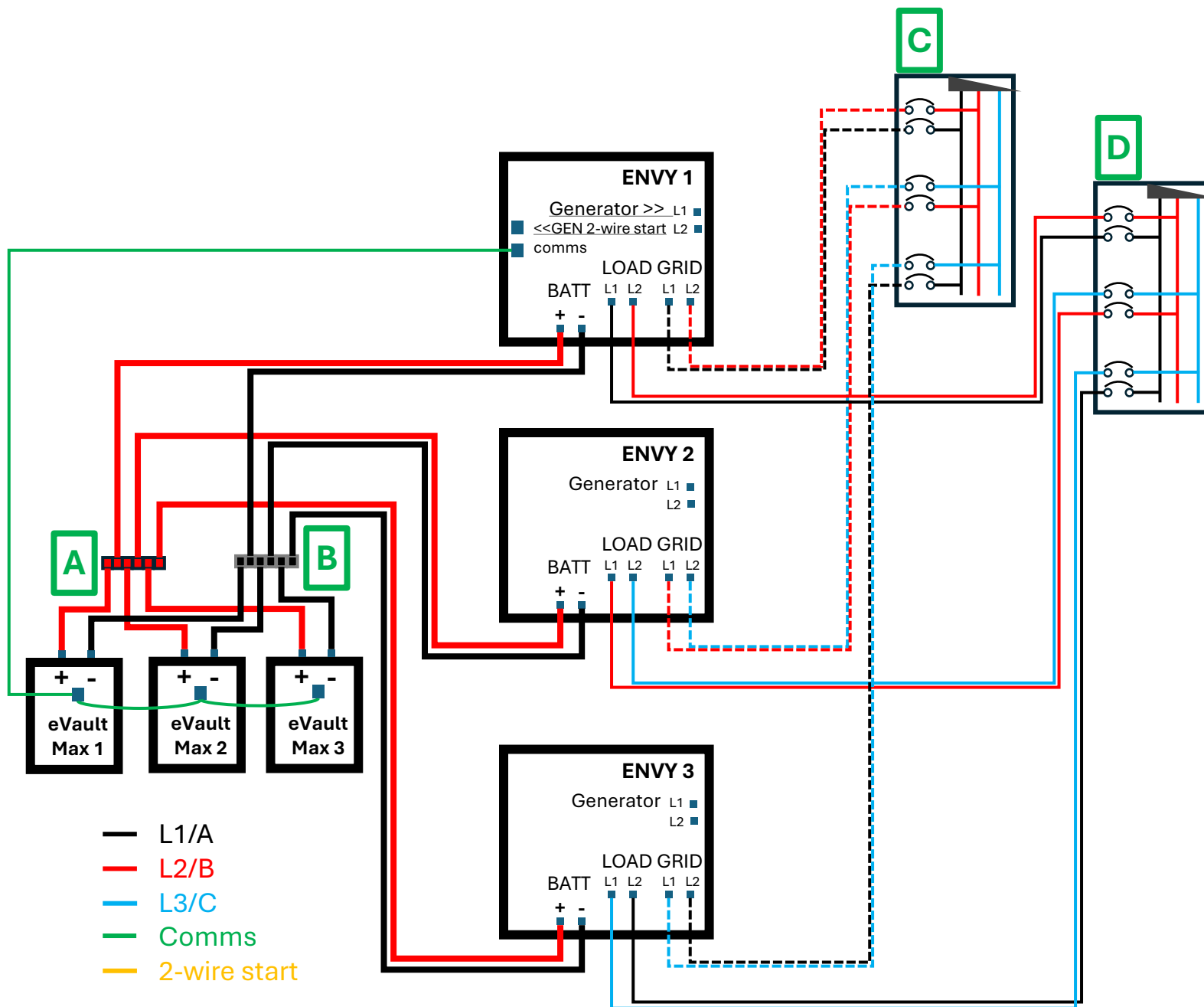


- A. Positive Busbar (1000A)
- B. Negative Busbar (1000A)
- C. Grid Splitter Panel
- D. Load Combiner Panel

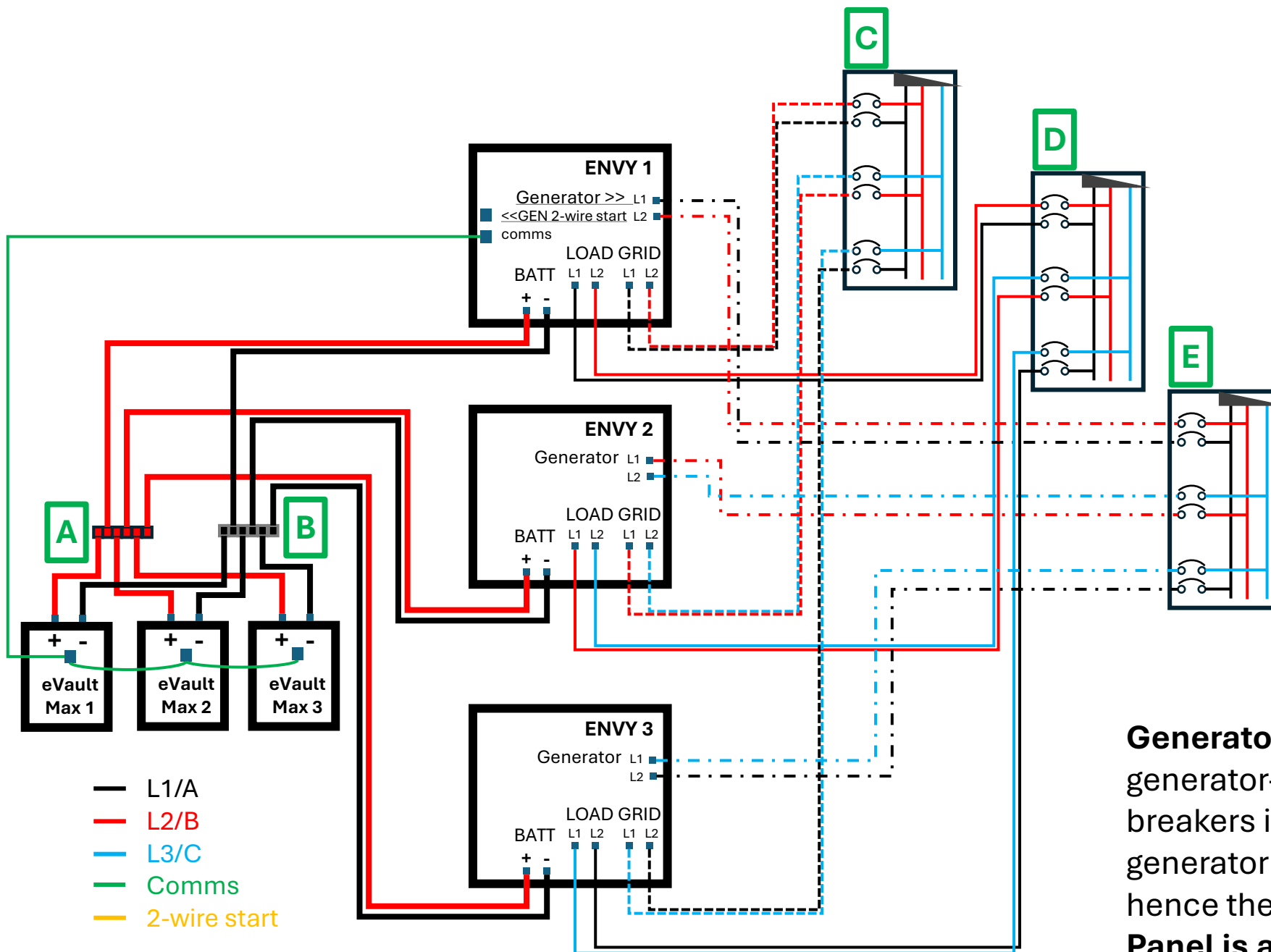
Load Combiner Panel – Allows for combining the output of the inverters to power the loads. **Load Combiner Panel is a mandatory item!**

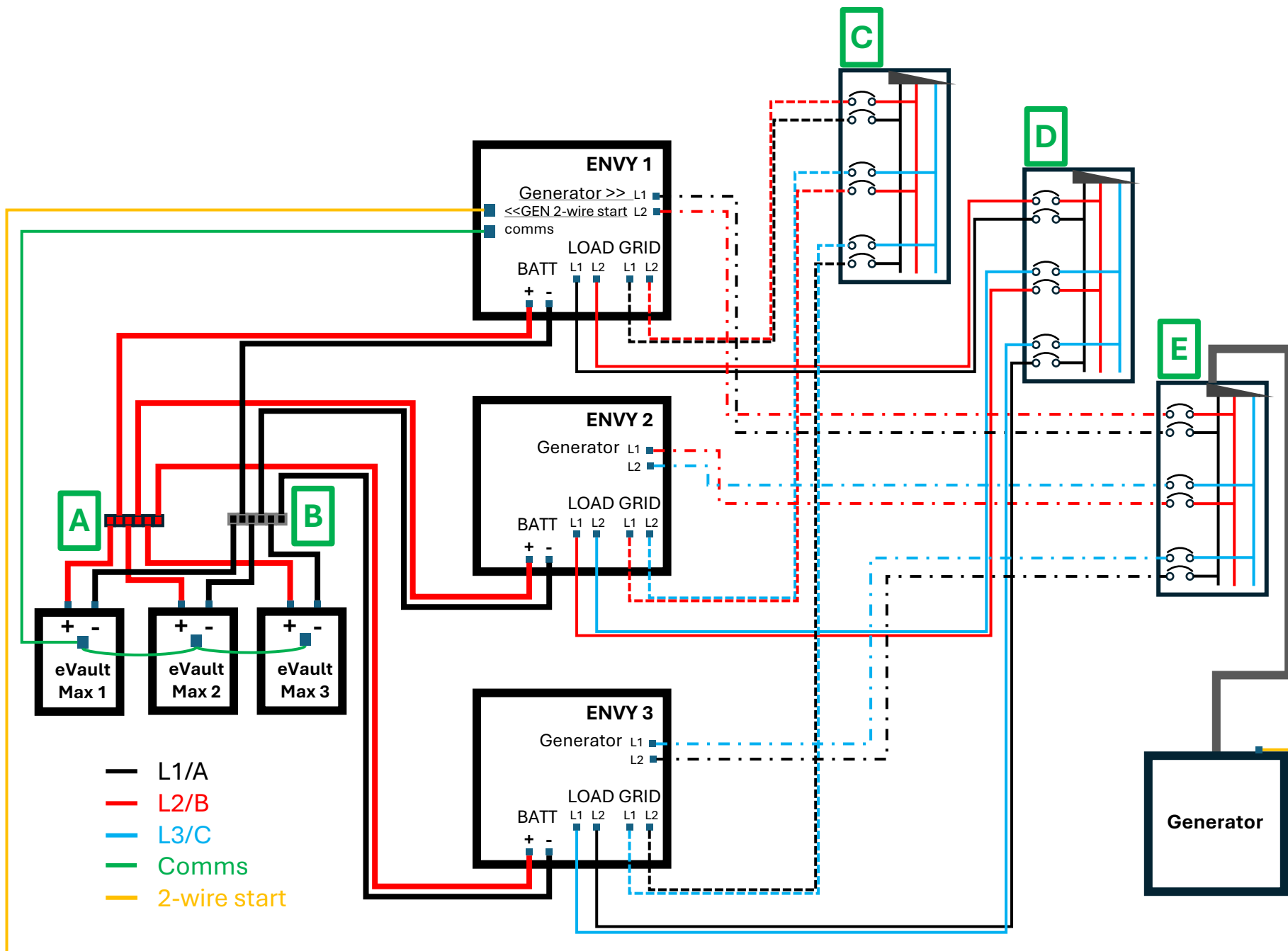


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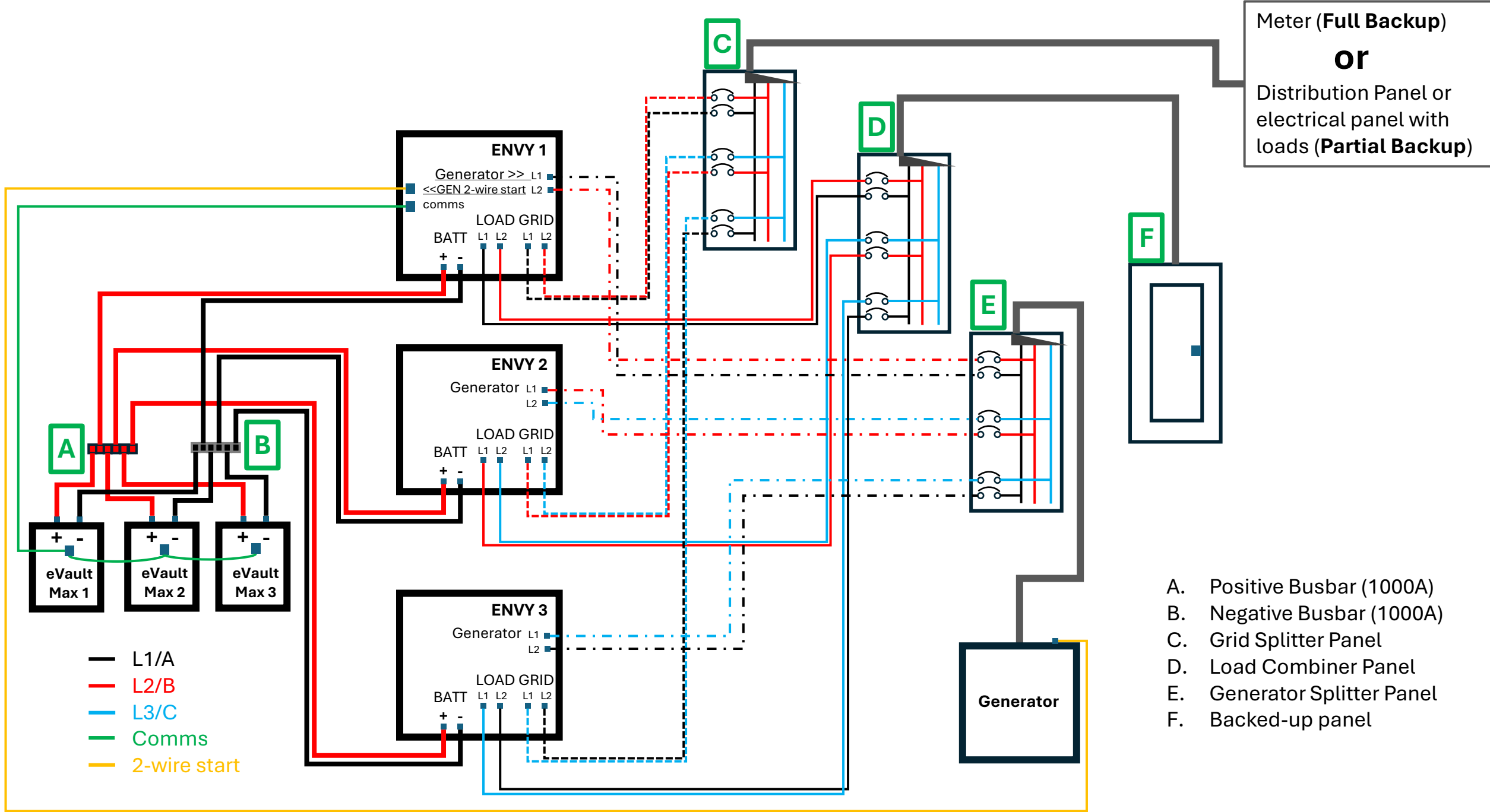


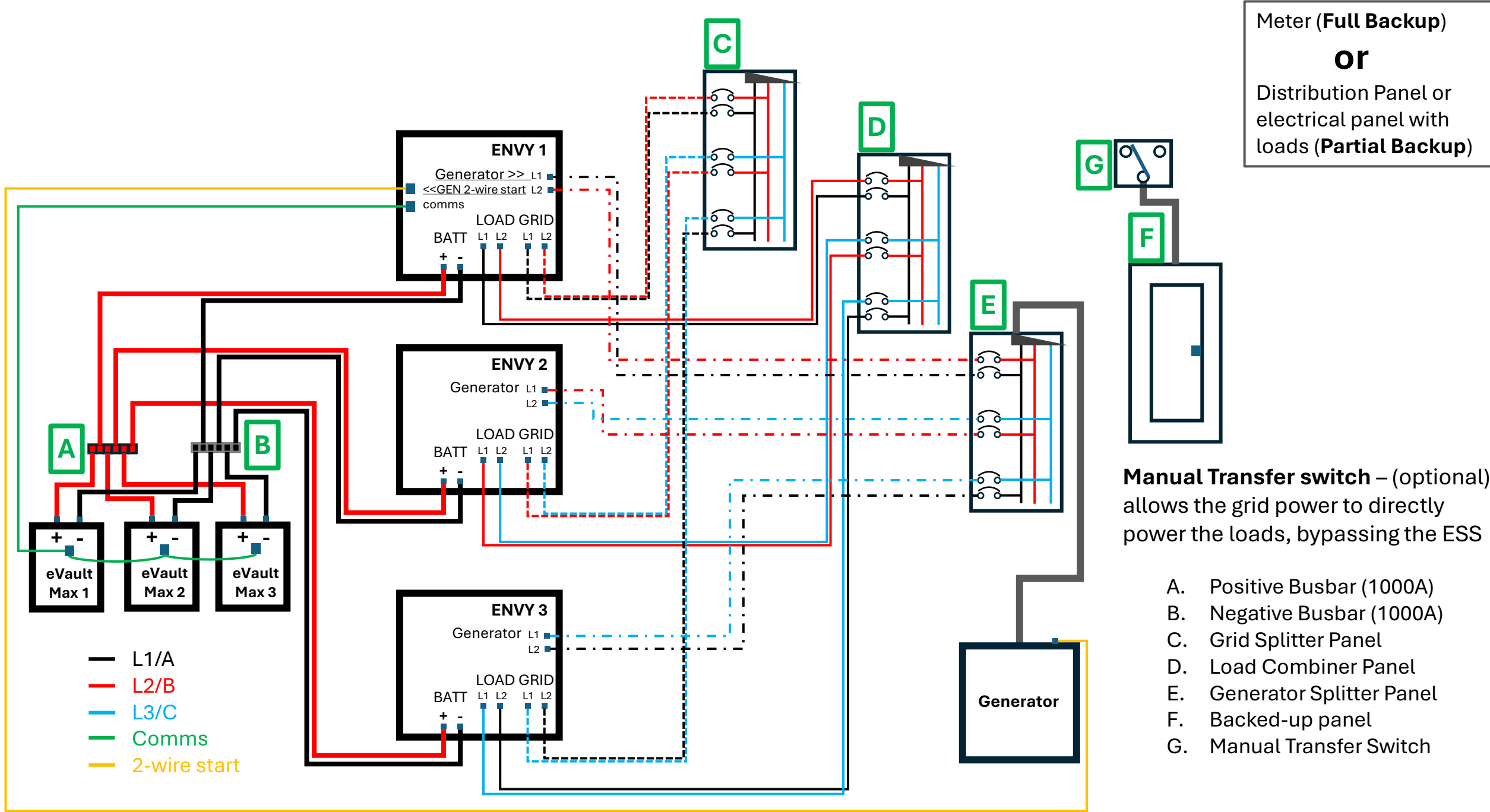
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- A. Positive Busbar (1000A)
- B. Negative Busbar (1000A)
- C. Grid Splitter Panel
- D. Load Combiner Panel
- E. Generator Splitter Panel



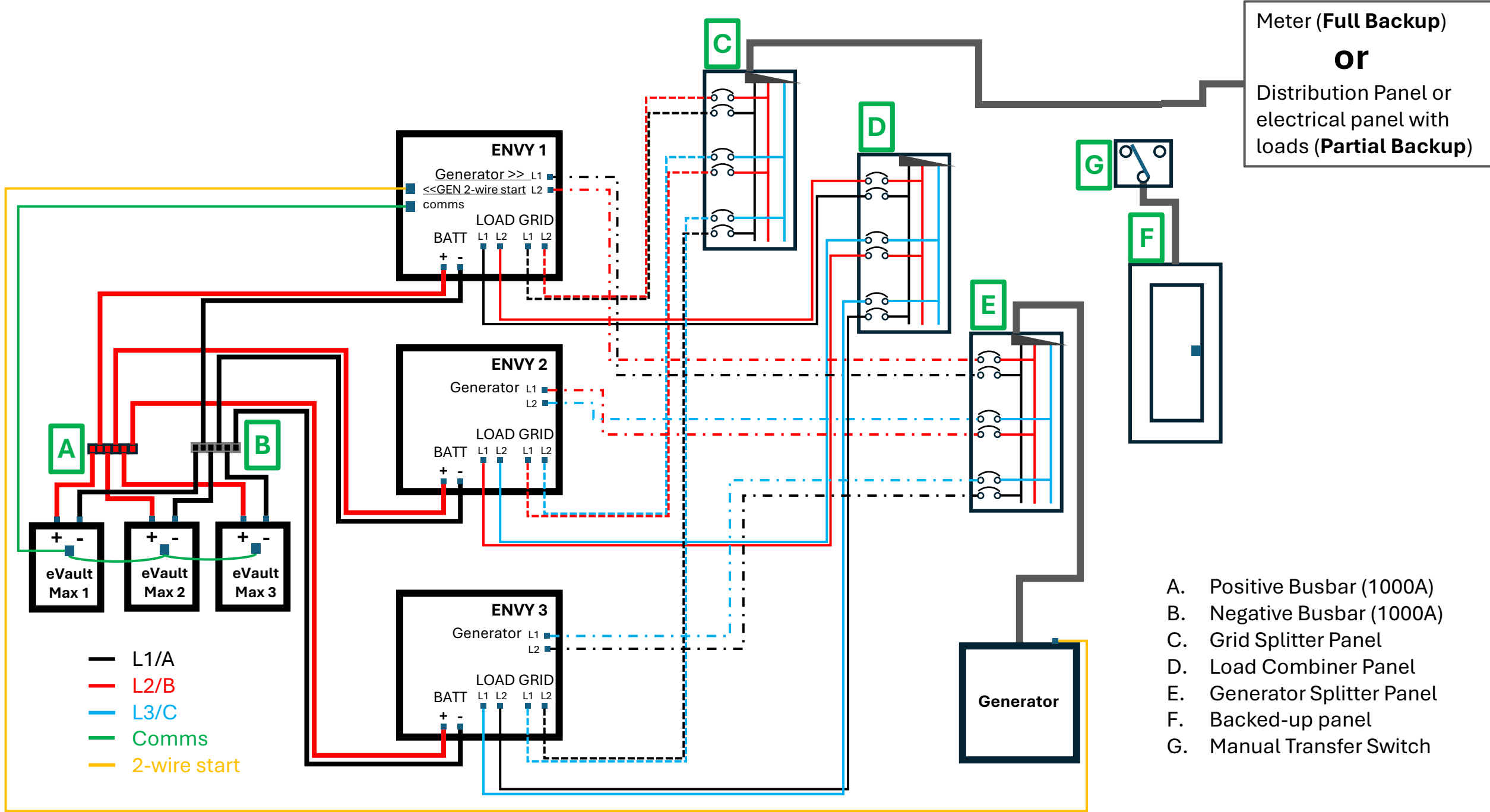


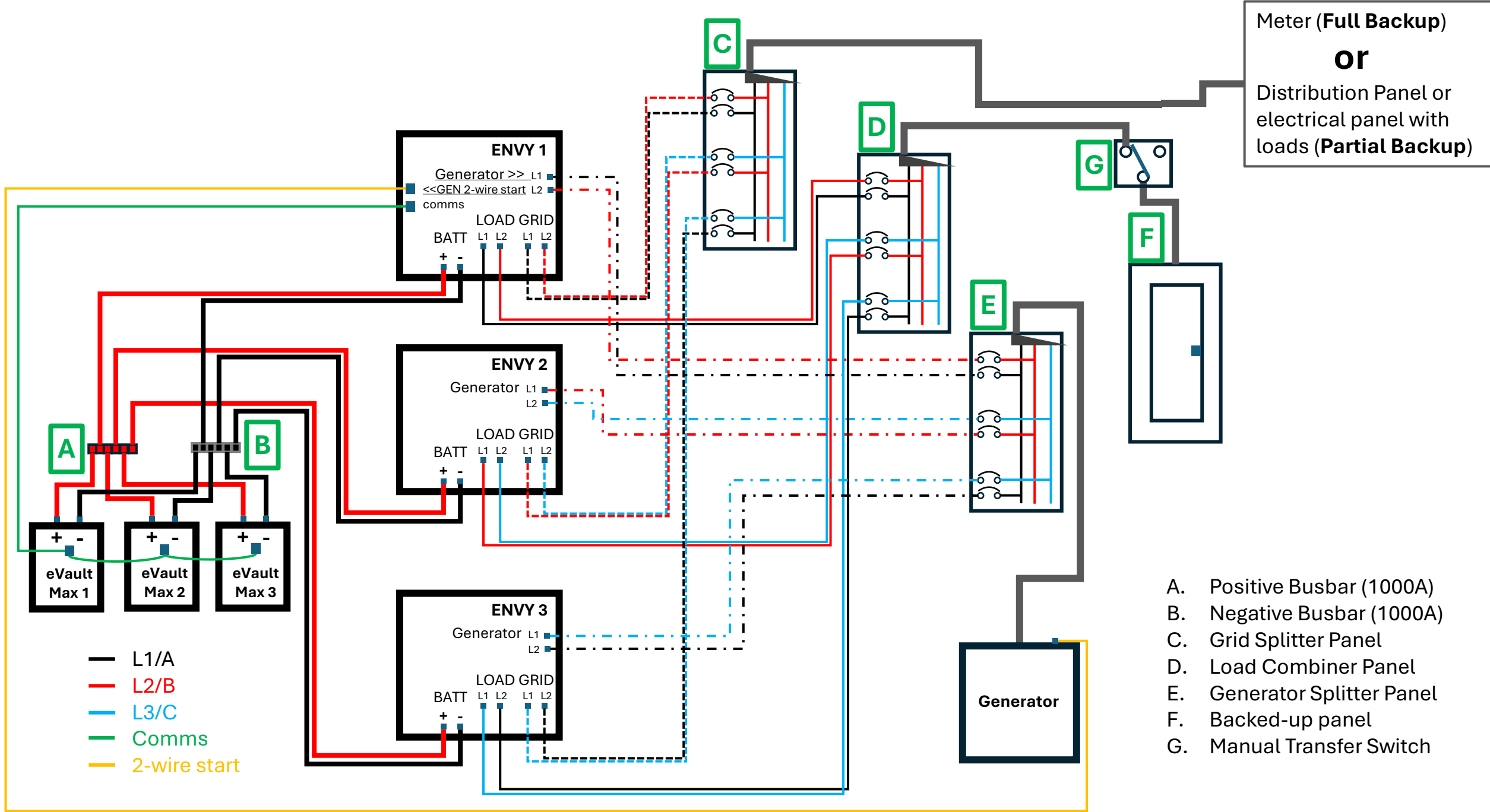
Meter (**Full Backup**)
or
Distribution Panel or
electrical panel with
loads (**Partial Backup**)

Manual Transfer switch – (optional)
allows the grid power to directly
power the loads, bypassing the ESS

- L1/A
- L2/B
- L3/C
- Comms
- 2-wire start

- A. Positive Busbar (1000A)
- B. Negative Busbar (1000A)
- C. Grid Splitter Panel
- D. Load Combiner Panel
- E. Generator Splitter Panel
- F. Backed-up panel
- G. Manual Transfer Switch



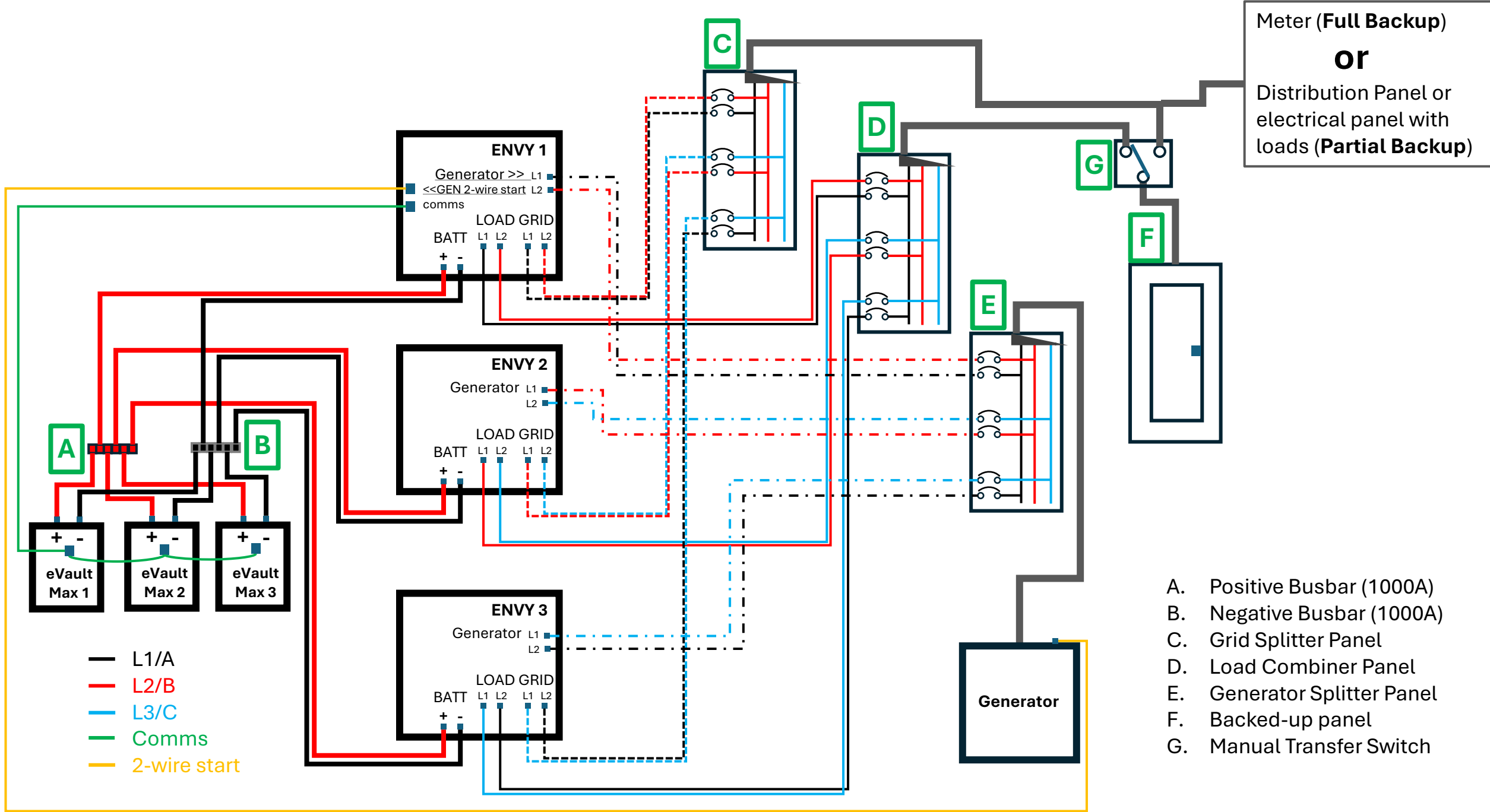


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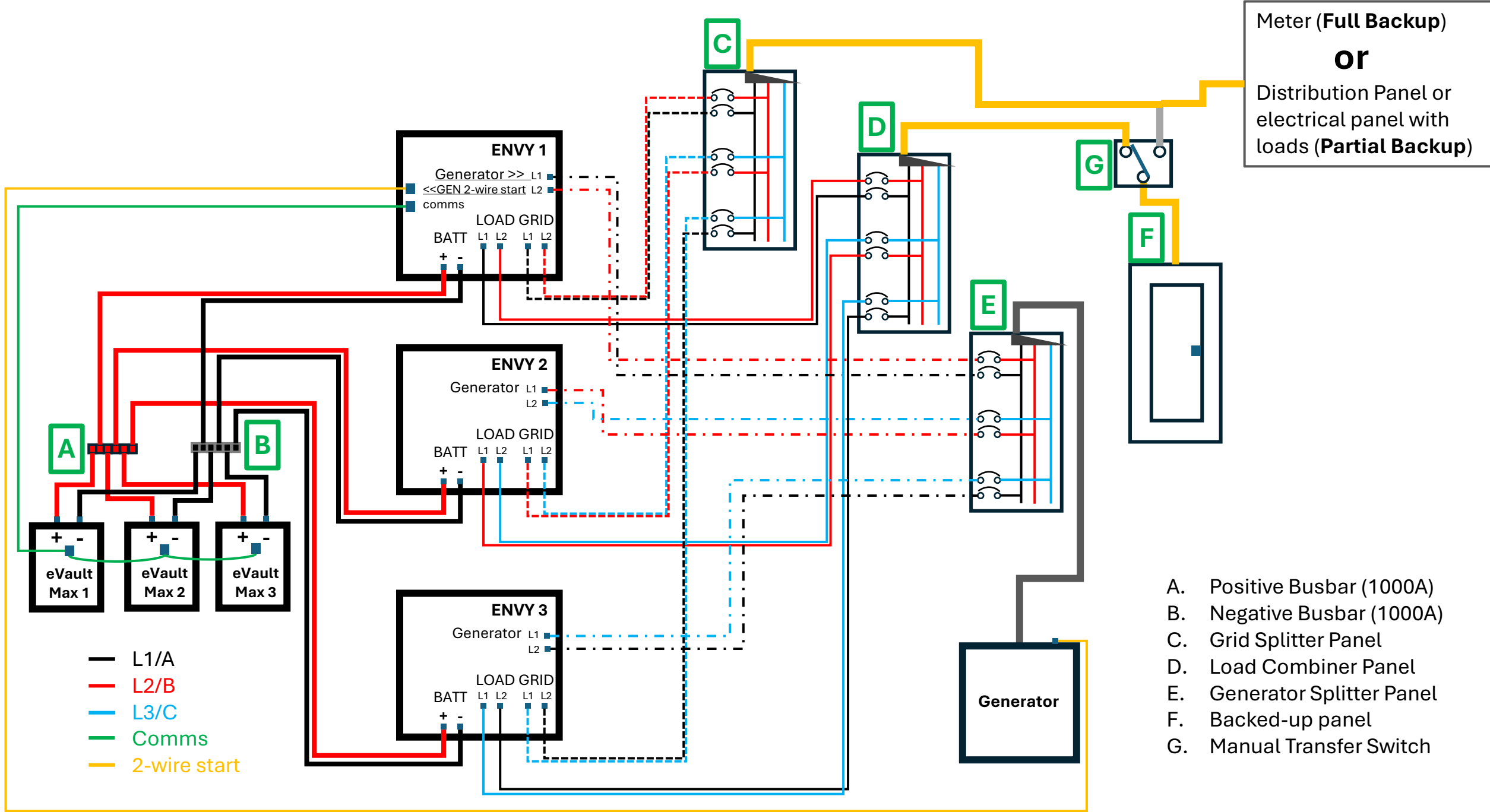
- L1/A
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- G. Manual Transfer Switch

Generator



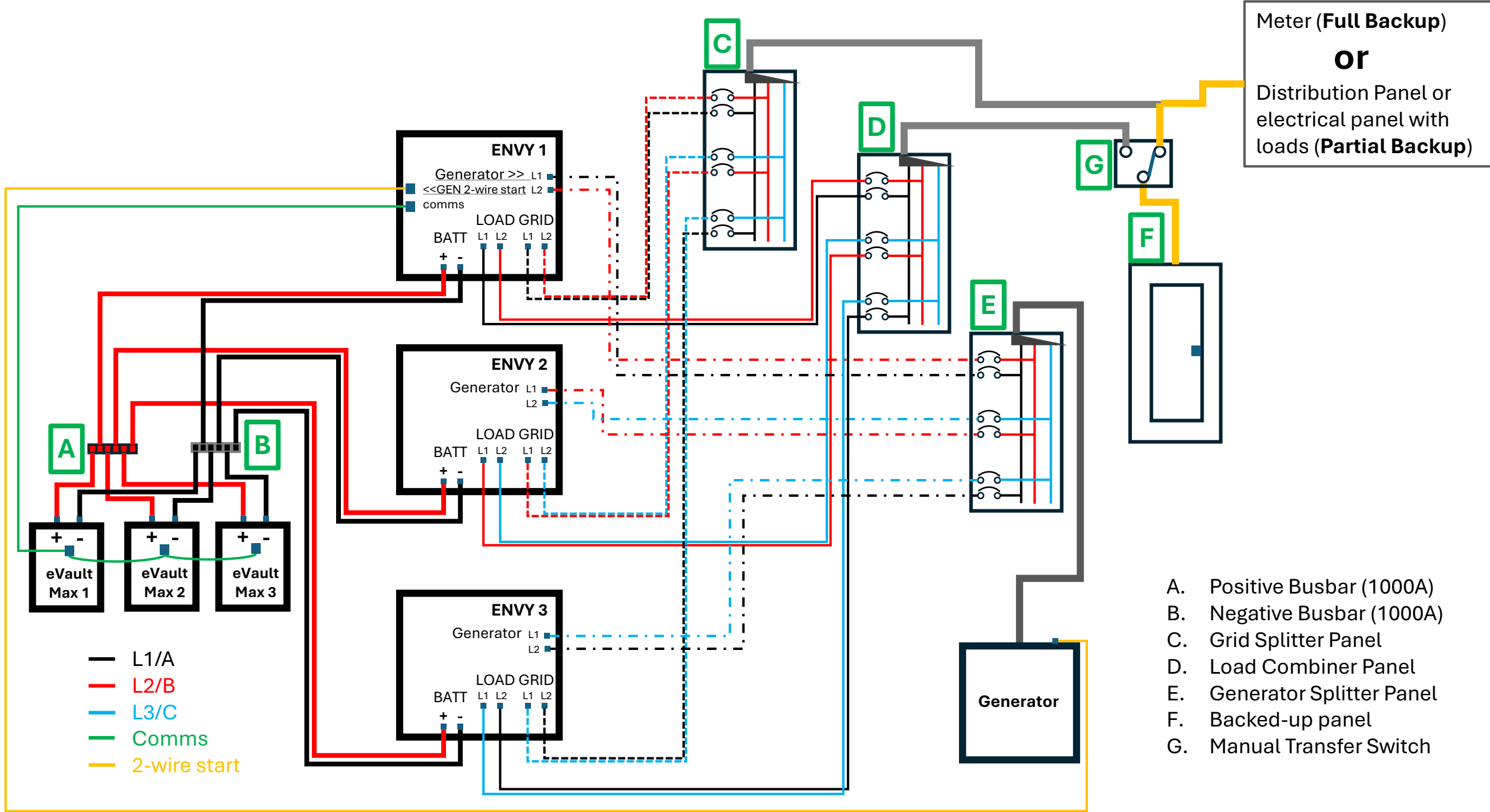
- A. Positive Busbar (1000A)
- B. Negative Busbar (1000A)
- C. Grid Splitter Panel
- D. Load Combiner Panel
- E. Generator Splitter Panel
- F. Backed-up panel
- G. Manual Transfer Switch

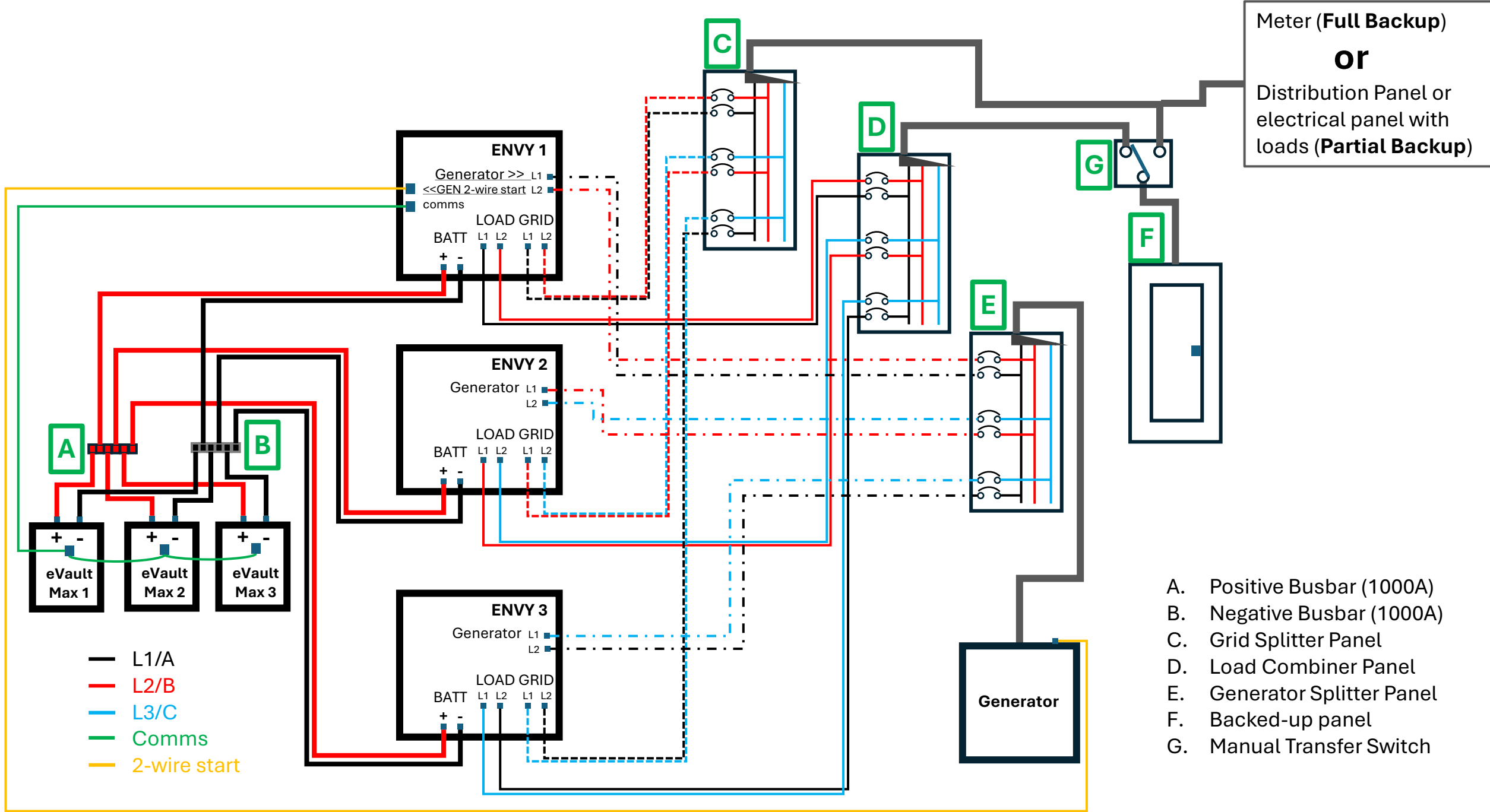


Meter (**Full Backup**)
or
Distribution Panel or
electrical panel with
loads (**Partial Backup**)

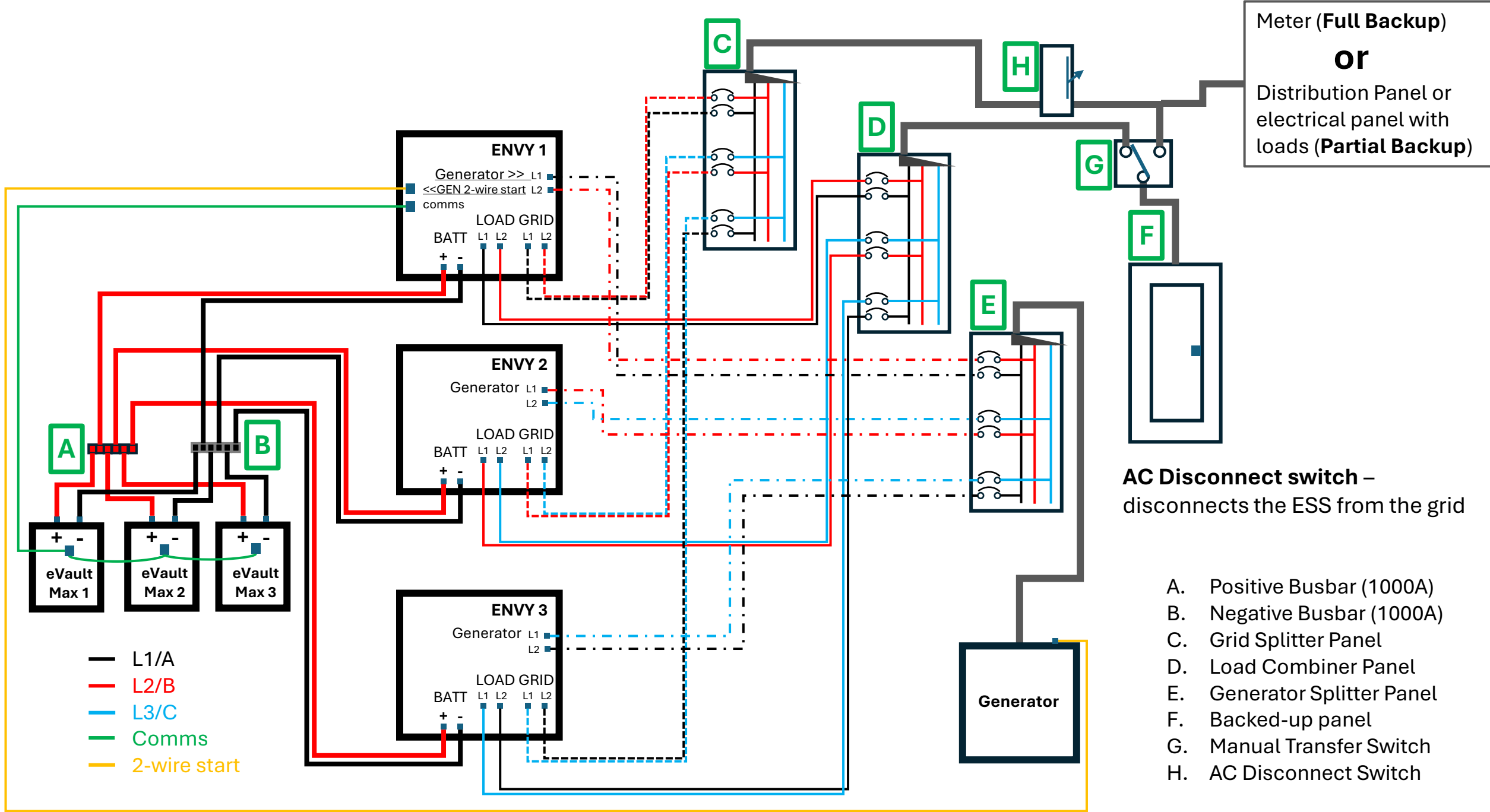
- L1/A
- L2/B
- L3/C
- Comms
- 2-wire start

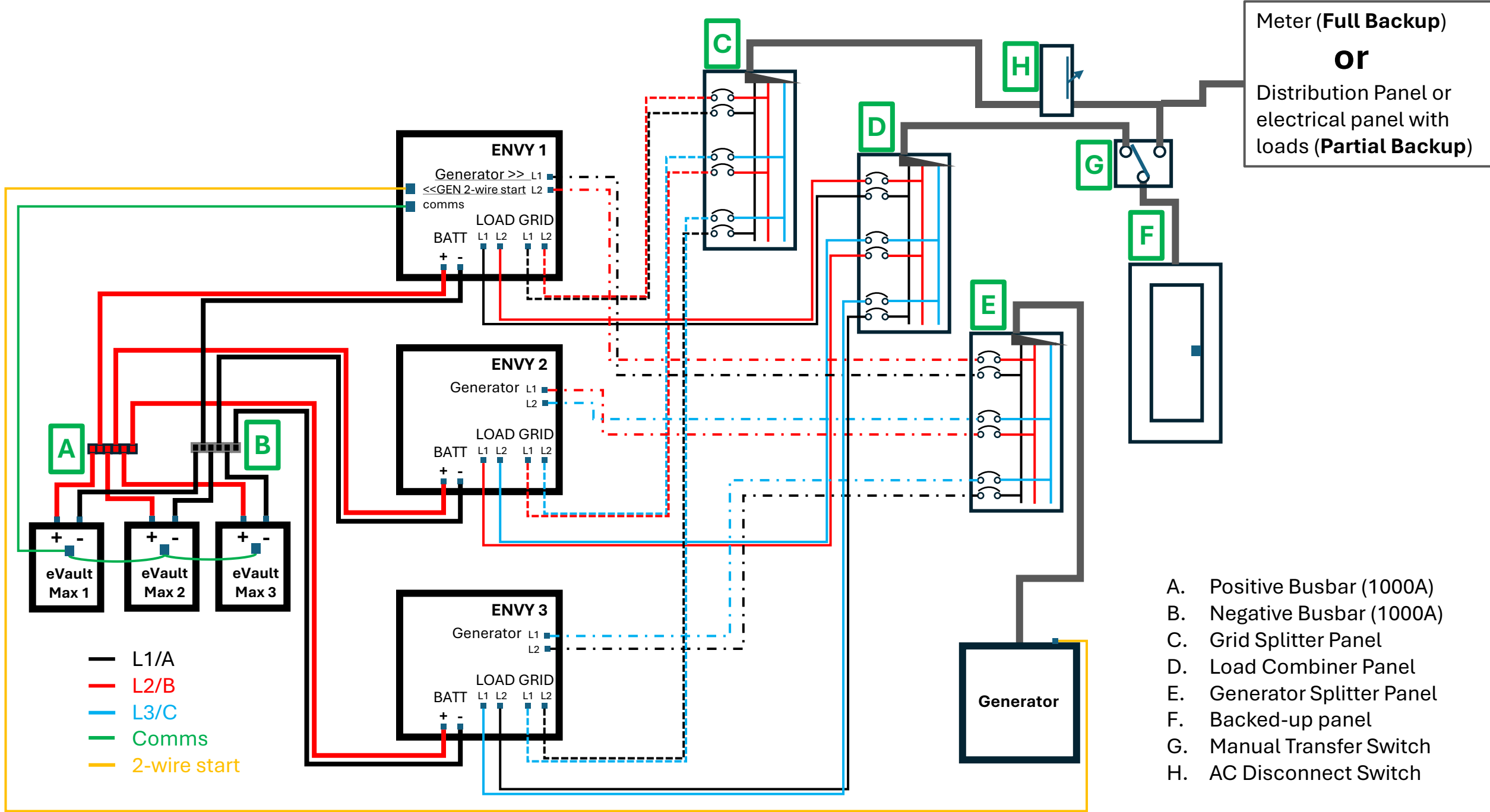
- A. Positive Busbar (1000A)
- B. Negative Busbar (1000A)
- C. Grid Splitter Panel
- D. Load Combiner Panel
- E. Generator Splitter Panel
- F. Backed-up panel
- G. Manual Transfer Switch





- A. Positive Busbar (1000A)
- B. Negative Busbar (1000A)
- C. Grid Splitter Panel
- D. Load Combiner Panel
- E. Generator Splitter Panel
- F. Backed-up panel
- G. Manual Transfer Switch





Meter (**Full Backup**)
or
Distribution Panel or
electrical panel with
loads (**Partial Backup**)

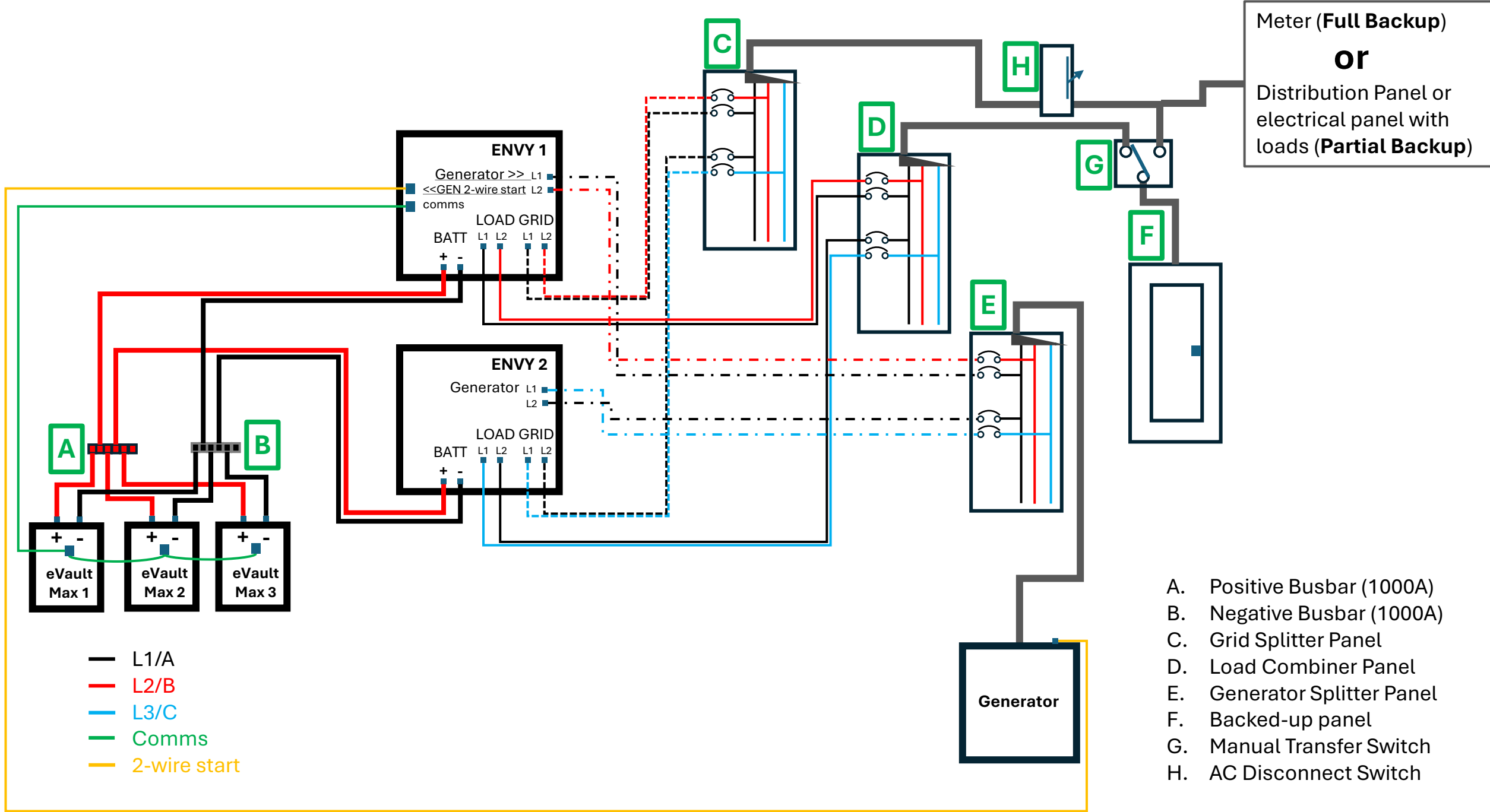
- L1/A
- L2/B
- L3/C
- Comms
- 2-wire start

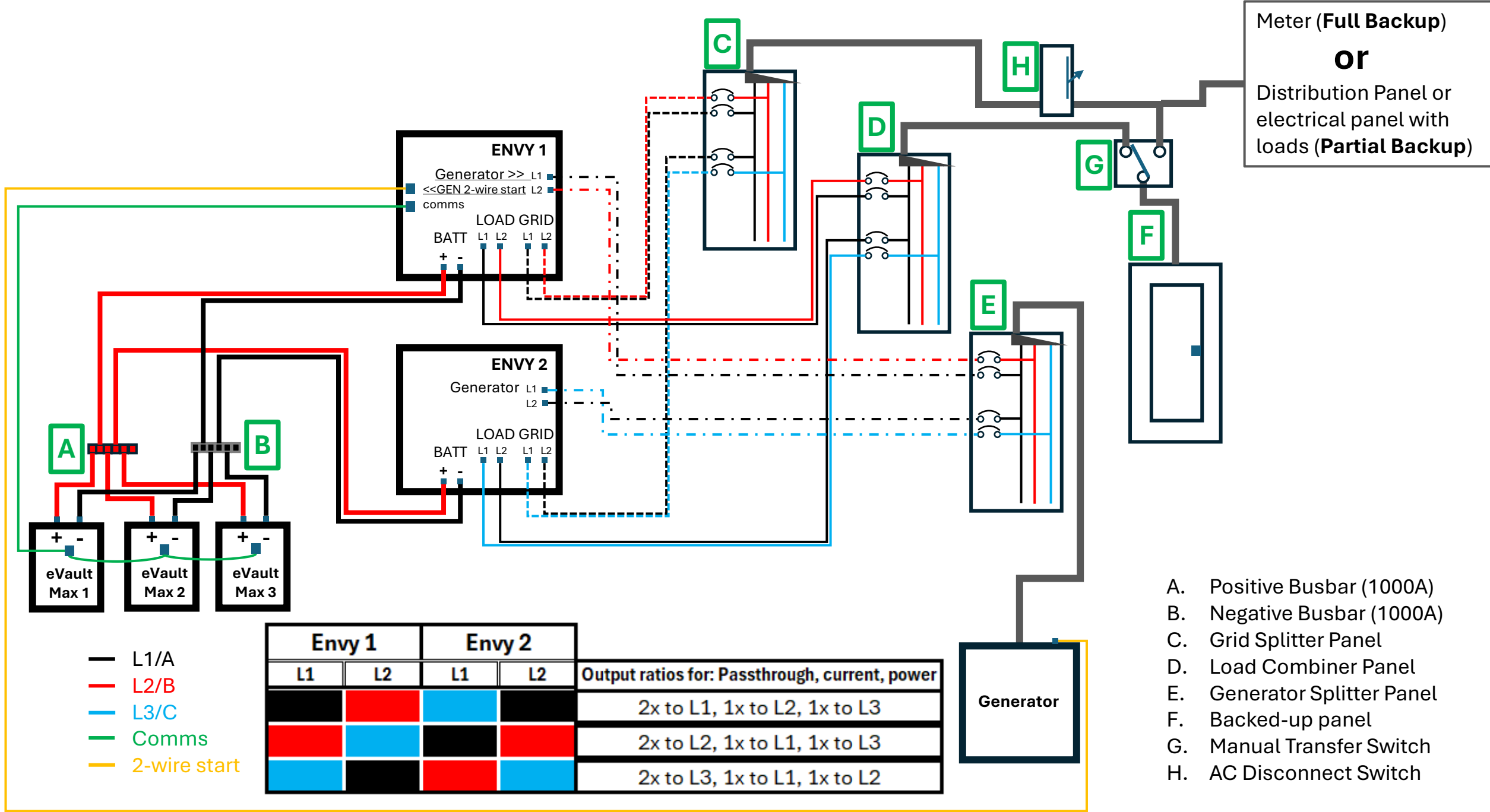
- A. Positive Busbar (1000A)
- B. Negative Busbar (1000A)
- C. Grid Splitter Panel
- D. Load Combiner Panel
- E. Generator Splitter Panel
- F. Backed-up panel
- G. Manual Transfer Switch
- H. AC Disconnect Switch



Bonus!

*208/120V Three-Phase with **2** Envy inverters*





- A. Positive Busbar (1000A)
- B. Negative Busbar (1000A)
- C. Grid Splitter Panel
- D. Load Combiner Panel
- E. Generator Splitter Panel
- F. Backed-up panel
- G. Manual Transfer Switch
- H. AC Disconnect Switch

Thank You!



FORTRESS
POWER