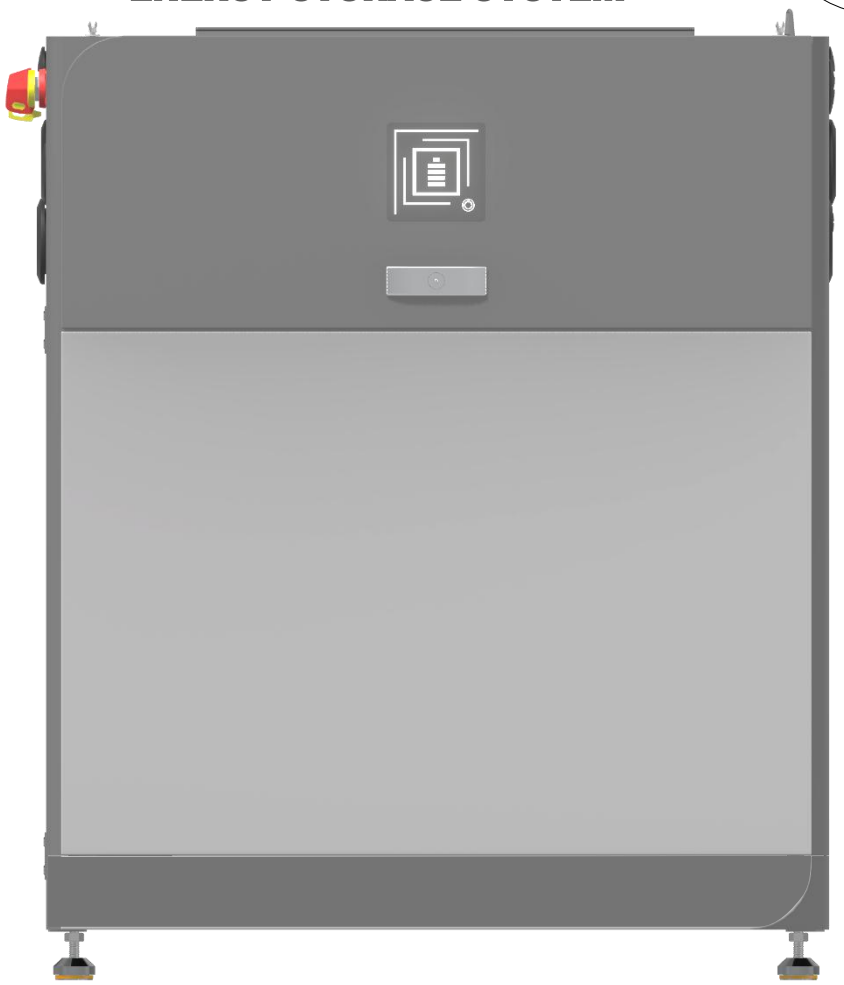
FORTRESS POWER

Secure your energy

eForce

STACKABLE WHOLE-HOME ENERGY STORAGE SYSTEM

Installation Manual



Guardian APP

Updated Documentation

System Design Tool SCAN HERE

***Important**: Verify the system configuration before installing. A proper system design is required for warranty purposes. Improper system configuration will void the warranty.*

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Contents

1. Abbreviations

A = Amperes
AC = Alternating Current
Ah = Amperes hour(s)
AWG = American Wire Gauge
BAT = Battery
BMS = Battery Management System
CAN = Controller Area Network
CC = Constant Current (Bulk)
CCV = Closed Circuit Voltage
°C = Degrees Celsius
CT = Current Transformer
CV = Constant Voltage (Absorption)
DC = Direct Current
ESS = Energy Storage System
EOL = End of Life
°F = Degrees Fahrenheit
HV = High Voltage
HVCO = High Voltage Cut-Off
I/O = Input or Output
ISC = Short Circuit Current
IP-Ingress Protection
in = Inches
lb. = Pounds
LED = Light Emitting Diode
LFCO = Low Voltage Cut-Off
LFP = Lithium Ferro Phosphate
LN1 = AC Line 1
LN2 = AC Line 2
LV = Low Voltage
m = Meters
mA = milliamperes
mV = millivolts
N = Neutral
NEC = National Electric Code
NEMA = The National Electrical Manufacturers Association
NFPA = National Fire Protection Association
NO = Normally Open
NC = Normally Closed
OCV = Open Loop Voltage
OSHA = Occupational Safety and Health Administration
OT = Over Temperature
OV = Over Voltage
PE = Protective Earth (Ground)
PV = Photovoltaic
R = Electrical Resistance (Ohms)
RS485 = Recommended Standard 485
SOC = State of Charge
SOC = State of Health
UT = Under Temperature
UV = Under Voltage
V = Voltage
VAC = Volts Alternating Current
VDC = Volts Direct Current
VPP = Virtual Power Plant
W = Watts (Power)

2. Change Log

VERSION	CHANGE DESCRIPTION
EM-V1.0	
EM-V1.2	1. Include Pinout definition
EM-V1.3	2. Vertical installation with inverter instructions added
EM-V1.4	1. Added dimensions for 2-3 battery vertical installation. 2. Changed eWay to eWay Spacing requirements per UL9540
EM-V1.5	1. Include Envy Front Panel Installation process
EFM-V250218	1. Change file naming convention version.
EFM-V250303	1. Update LED Logic 2. Add unacceptable installation configurations

3. Introduction

3.1 About Fortress Power

Our mission is to provide compact, user-friendly, and affordable energy storage solutions using the latest technology for all homes and businesses. Fortress Power solar energy storage batteries can easily integrate with new and existing PV systems and work with a wide range of existing inverter and charge controller manufacturers for ease in system design.

Contact Information

Corporate Headquarter Address: 2010 Cabot Blvd West, STE L
Langhorne, PA 19047
United States

Website: www.fortresspower.com
Email: sales@fortresspower.com
Phone: US: (877) 497-6937
LATAM: (215) 710-8960

3.2 Warranty Support

Unless otherwise submitting a Fortress warranty through the Guardian hub, please submit your eForce 9.6 warranty here:
https://fortresspower.com/warranty
Beyond this product manual, you may also find our inverter guides useful to system installation and commissioning:
https://support.fortresspower.com/portal/en/kb/inverter-guides

Beyond that, please find additional resources within our Support Portal
https://support.fortresspower.com/portal/en/kb

- Create a support ticket.
- Product Manuals
- Firmware Updates
- Warranty Submittal
- System Design
- Application Notes
- Scheduled Meetings
- Accessories

4. eForce Introduction

The **eForce 48VDC Battery** is an advanced energy storage solution designed to cater to both residential and commercial energy needs. This battery is manufactured by Fortress Power, known for its innovative approach to providing reliable and efficient energy storage solutions.

The eForce battery is available in various configurations, including 9.6 kWh, 19.2 kWh, and 28.8 kWh options and scalable to 153kWh, making it a solution that can be tailored to different energy requirements. The nominal voltage of the battery is 48V and can operate within a voltage range of 39V to 54V, offering flexibility in various applications.

Technology and Features:

Cell Type: The eForce battery uses Top Tier Grade A Prismatic LFP (Lithium Iron Phosphate) cells, which are known for their safety, long life, and stability.

Scalability: The battery system can be expanded by adding multiple units in parallel, with a maximum of 16 units, depending on the configuration. This makes it suitable for large-scale energy storage needs.

Communication: It supports RS485, Wi-Fi, and CAN communication protocols, enabling integration with various energy management systems and monitoring tools.

IP65

Ingress Protection: With an IP65 rating, the eForce battery is highly resistant to dust and water, making it suitable for both indoor and outdoor installations.

Included Heating Elements: Integrated heaters, ensuring optimal performance and longevity in colder climates. These heaters maintain the battery's internal temperature within an optimal range, preventing performance degradation caused by low temperatures. This feature is especially valuable during winter months, ensuring consistent energy storage and reliable power supply even in extreme weather conditions.

Mounting Options: The battery has versatile mounting options, including ground-mount, floor-standing, and wall-mounted configurations (wall mounting accessories are sold separately).

Benefits and Applications

The eForce 48VDC battery is designed to provide numerous benefits across various applications:

1. **Energy Independence and Off-Grid:** It allows homeowners and businesses to store excess energy generated from renewable sources like solar panels, reducing reliance on the grid and providing energy independence.
2. **Backup Power:** The battery provides a reliable source of backup power during grid outages, ensuring continuous operation of essential systems.
3. **Peak Shaving:** By storing energy during off-peak hours and discharging during peak demand, the eForce battery helps in reducing electricity costs and increasing your return of investment.
4. **Grid Export, Net Metering and VPP:** Allow the eForce to discharge/charge energy to and from the grid during high demand hours and getting credit/money on your energy bill allowing savings and bankability.
5. **Safety and Longevity:** With a cycle life of 8000 cycles at 70% End of Life (EOL), and a 10-year warranty the eForce battery offers long-term reliability, providing peace of mind.

5. Product Specifications and System Design

5.1 Datasheet

5.2 System Sizing

Please refer to our sizing guide and warranty letter for appropriate sizes between various inverter models and the eForce. https://support.fortresspower.com/portal/en/kb/articles/minimum-battery-sizing . **Under no circumstance should you install an inverter with charging capacity greater than 195A per eForce, even if you intend to limit the charge or discharge capacity of the inverter either manually or digitally.**

INVERTER	EFORCE 9.6 OPEN-LOOP	EFORCE 9.6 CLOSED-LOOP
FORTRESS POWER ENVY 8KW	1	1
FORTRESS POWER ENVY 10KW	2	2
FORTRESS POWER ENVY 12KW	2	2
SCHNEIDER ELECTRIC XW PRO 6848	1	1
SCHNEIDER ELECTRIC XW+ 6848	1	n/a
SCHNEIDER ELECTRIC XW+ 5548	1	n/a
SCHNEIDER ELECTRIC SW 4048	1	n/a
OUTBACK POWER RADIAN 8048A	1	n/a
OUTBACK POWER RADIAN 4048A	1	n/a
OUTBACK POWER VFXR 3648A	1	–
OUTBACK POWER FXR 3048A	1	n/a
SOL-ARK 5K	1	1
SOL-ARK 8K	1	1
SOL-ARK 12K	1	2
SOL-ARK 15K	2	2
STUDER INNOTEC AJ 400-48	1	1
STUDER INNOTEC AJ 700-48	1	1
STUDER INNOTEC XTS 1400-48	1	1
STUDER INNOTEC XTS 2600-48	1	1
STUDER INNOTEC XTS 4000-48	1	1
STUDER INNOTEC XTS 6000-48	2	2
STUDER INNOTEC XTS 8000-48	2	2
MAGNUM / SENSATA MS 4448	1	–
MAGNUM / SENSATA MS 4048	1	–
VICTRON ENERGY QUATTRO 48/3000/35	1	1
VICTRON ENERGY QUATTRO 48/5000/70	1	1
VICTRON ENERGY QUATTRO 48/10000/140	2	2
VICTRON ENERGY QUATTRO 48/15000/200	2	2

6. Safety

6.1 Symbols

Symbol	Meaning	Symbol	Meaning
	Caution! Failure to observe the warning messages may result in injury.		Read operator's manual carefully before performing any operation on the devices.
	Risk of electrical shock, fire, or Damage		Read operator's manual.
	Explosive material		Electrical Ground (connector)
	Battery charging		No smoking or open flame
	Heavy object		No children allowed.
	Do not connect positive and negative terminals in reverse.		Important instructional note
	Components of the product can be recycled.		
	This symbol indicates that a lithium-ion (Li-ion) battery is inside the product and should be disposed of or recycled properly.		
	This symbol indicates that the product shall not be disposed of as household waste, and should be delivered to a designated collection facility for recycling. Proper disposal and recycling can help protect the environment. For more information about the disposal and recycling of this product, contact your local community, disposal service, or dealer.		

Symboles d'avertissement

Symbole	Signification	Symbole	Signification
	Attention ! Le non-respect des messages d'avertissement peut entraîner des blessures.		Lisez attentivement le manuel de l'opérateur avant d'effectuer toute opération sur les appareils.
	Risque de choc électrique		Lisez le manuel de l'opérateur.
	Matières explosives		Mise à la terre électrique (connecteur)
	Charge de la batterie		Ne pas fumer ou flamme nue
	Objet lourd		Aucun enfant n'est autorisé.
	Ne connectez pas les terminaux positifs et négatifs à l'envers.		
	Les composants du produit peuvent être recyclés.		
	Ce symbole indique qu'une batterie lithium-ion (Li-ion) se trouve à l'intérieur du produit et doit être éliminée ou recyclée correctement.		
	Ce symbole indique que le produit ne doit pas être éliminé en tant que déchets ménagers et qu'il doit être livré à une installation de collecte désignée pour être recyclé. Une élimination et un recyclage appropriés peuvent aider à protéger l'environnement. Pour plus d'informations sur l'élimination et le recyclage de ce produit, contactez votre communauté locale, votre service d'élimination ou votre revendeur.		

6.2 Safety Precautions and Instructions

Damage to the product may lead to a leakage of electrolyte or flammable gas. During installation of the battery, the utility grid and solar input must be disconnected from the Battery Pack wiring. Wiring must be carried out by qualified personnel. The battery pack contains no user serviceable parts. High voltage or current is present in the device. The electronics inside the Battery Pack are vulnerable to electrostatic discharge. Observe the following precautions:

Risks of explosion

Do not subject the battery pack to strong impacts.
Do not crush or puncture the battery pack.
Do not dispose of the battery pack in a fire.

Risks of fire

Do not expose the battery pack to temperatures more than 140°F (60°C).
Do not place the battery pack near a heat source such as a fireplace or open flame
Do not expose the battery pack to direct sunlight.
Do not allow the battery connectors to touch conductive objects.

Risks of electric shock

Do not disassemble the battery pack.
Do not touch the battery pack with wet hands.
Do not expose the battery pack to moisture or liquids.
Keep the battery pack away from children and animals.

Risks of damage to the battery pack

Do not allow the battery pack to come in contact with liquids.
Do not subject the battery pack to high pressures.
Do not place any objects on top of the battery pack.

 **IMPORTANT NOTE:** Circuit Breakers, Disconnects and Fuses should be employed throughout the energy storage system and generation installation to isolate effectively and protect all components against faults, short circuits, polarity reversals or failure of any component in the installation.
Fuses, breakers, wiring ratings and values should be determined by established standards and evaluated by certified electricians, licensed installers, and regional code authorities. The eForce 9.6 kWh B a t t e r y Management System (BMS) alone will not protect the batteries from these extreme electrical events. Failure to adhere to proper installation protocol will void the warranty.

 **CAUTION!** Verify polarity at all connections with a digital voltmeter before energizing the system. Reverse polarity at the battery terminals will void the warranty and destroy the batteries. **Do not short circuit the batteries.**
Most batteries pose some risk of shock or sparking during the installation and initial wiring and connection process. Wearing insulated gloves, clothing and footwear and using electrically insulated tools are required when working with the eForce 9.6kWh. Cover or remove jewelry or conductive objects (metal bracelets, rings, belt buckles, metal snaps, zippers, etc.) when working with any electrical or mechanical device. Cover or restrain long hair and loose clothing when working with any electrical or mechanical device. CAUTION! Do not disassemble or modify the battery. If the battery housing is damaged, do not touch the exposed contents.

6.3 Temperature Considerations

CAUTION! Do not attempt to charge the battery below -4 degrees F (-20 degrees C). Attempts to charge below these temperatures can adversely affect State of Health (SOH) and cycle life and will void the warranty; never charge battery if it is frozen; never charge a visibly damaged battery. Charging the battery near freezing should only be done with a low amperage external charger or closed-loop communication inverter unless the battery bank is heated. There is no need to heat the batteries above 50F.

Do not charge the battery when the ambient temperature is freezing or below. Discharge current at sub-freezing temperatures should also be significantly reduced.

CAUTION! Do Not Operate Fortress Lithium Batteries where average internal battery temperature exceed 30 °C / 86 °F over the life of the battery.

Recommended operating parameters of charger/Inverters For 3,000 Cycles:

- Internal battery temperature range: 32 F to 120 F (0 °C to 49°C) without close-loop communication.
- Bulk voltage and absorb voltage should be set to 52.5V if no battery-inverter communication is available.

Recommended operating parameters of charger/Inverters For 8,000+ Cycles:

- Operating temperature range: 50°F to 110°F (0°C to 60°C) per Fortress Power recommend charge and discharge inverter configuration.

6.4 Transportation and Handling

- Do not knock, drop, puncture, or crush the battery.
- Do not expose battery to flames, incinerate or direct sunlight.
- Do not open the battery case or disassemble the battery.
- Do not lift battery by the terminal cables.
- Do not vibrate the battery.
- Do not expose the battery to water or other fluids.
- Do not expose battery to open flame.
- Do not place the product nearby highly flammable materials, it may lead to fire or explosion in case of accident, Store at cool and dry place.
- Do not store in greenhouses and storage areas for hay, straw, chaff, animal feed, fertilizers, vegetables, or fruit products.
- Store the product on a flat surface; A ventilated area is strongly recommended for handling the product.
- Store the product out of reach of children and animals.
- Store the product where there is minimal dust and dirt in the area; do not transport battery upside down or with the terminals towards the ground.
- Batteries must be discharged to 30% state of charge or 48V resting voltage before transporting.

6.5 Response To Emergency Situations

- The battery pack consists of multiple batteries and a sophisticated Battery Management System that is designed to prevent hazards resulting from failures. However, Fortress Power cannot guarantee their absolute safety.

Leaking Batteries:

- If the battery pack leaks electrolyte, avoid contact with the leaking liquid or gas. If a person is exposed to the leaked substance, perform the actions described below immediately.
- Inhalation: Evacuate the contaminated area and seek medical attention.
- Contact with eyes: Rinse eyes with flowing water for 15 minutes and seek medical attention.
- Contact with skin: Wash the affected area thoroughly with soap and water and seek medical attention.
- Ingestion: Induce vomiting, and seek medical attention
- Fire

- In case of fire, make sure that an extinguisher is available near the battery pack. If possible, move the battery pack to a safe area before it catches fire.

Note: Fire extinguisher

- Water, carbon dioxide, dry chemical powder and foam are the most effective means to extinguish a Lithium Ferrous Phosphate (LFP) battery fire.
- Use an ABC Fire extinguisher, if the fire is not from battery and has not spread to it yet.

6.6 Storage

Store batteries away from direct sunlight and in locations with temperatures ranging between 0°C and 35°C (32°F to 95°F) to avoid exposure to high temperatures.

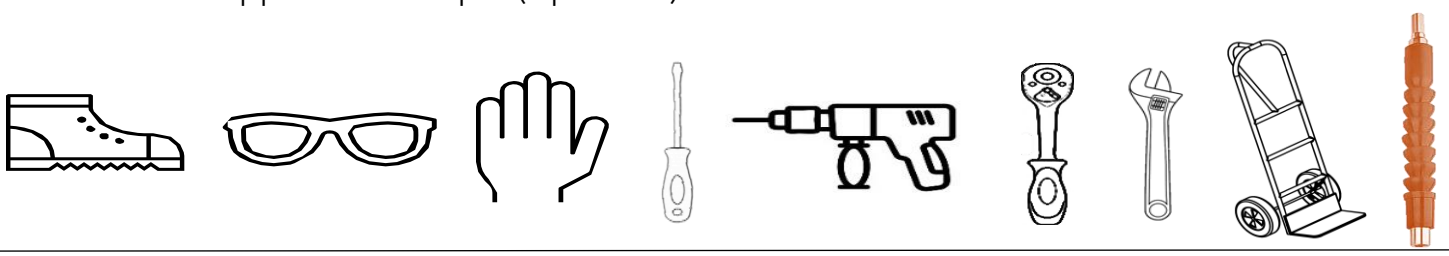
- Turn off the battery during long-term storage to reduce the self-discharge rate, which is about 1% when the SOC is above 20%.
- Maintain a Relative Humidity (RH) level between 5% and 95% in a dry and clean indoor environment. Prevent contact with corrosive materials and keep away from fire and heat sources.
- For storage durations exceeding one month, ensure the battery's State of Charge (SOC) is maintained between 30% to 50%. It is crucial to charge and discharge the battery every six months to maintain health.
- Regularly check the battery every 3 months to ensure the SOC remains above 20% (greater than 46V). If it falls below this level, charge the battery up to 47V before returning it to storage.
- When placing systems into storage, set the SOC to 30~50% and periodically verify that it does not drop below 20%.

If you expect the battery to be left unattended for extended periods, set a higher battery cutoff voltage as a precaution. This is particularly important if the power supply is critical, and the charging sources (like solar panels) may be obstructed by snow or dust. In such scenarios, installing a backup generator with an AutoStart feature is advisable. Note that the inverter and battery management system may impose a minor load on the battery, potentially depleting it over long durations without any charging sources. Following these guidelines will help ensure your battery's longevity and reliability, even during extended storage periods.

6.7 Tools & Materials

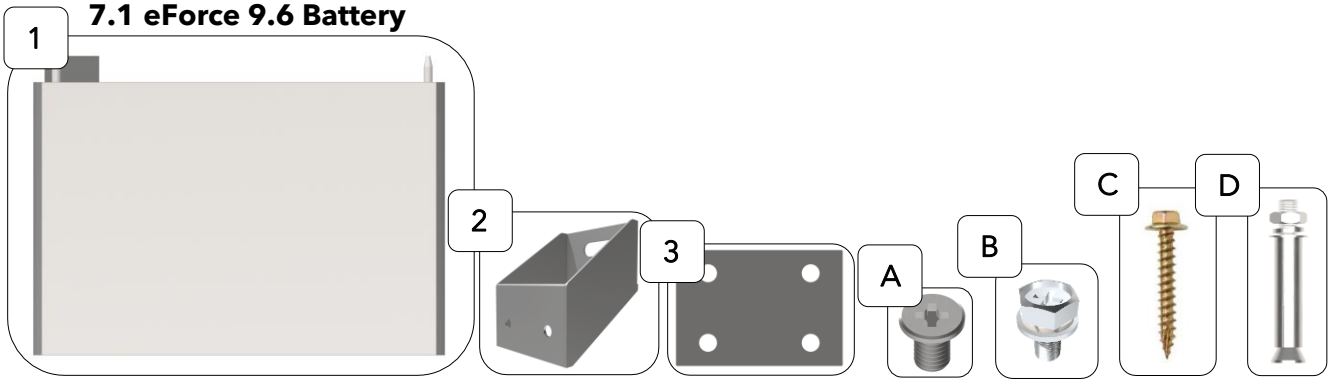
The following tools and materials are required and are not included:

- OSHA approved personal protective equipment, Safety Shoes, Safety Glasses, Insulated Gloves, and Weightlifting Belt.
- Bendable Screwdriver extension
- Metric hex socket set
- Metric wrench set
- Phillip and Flat Head Screwdriver Set.
- Power Drill and wood or and concrete drill bit set
- Hand Truck (Optional)
- Positive and negative battery cables, we recommend copper cable starting at 3/0 for runs of less than 10ft. Please refer to your adopted version of the National Electric Code or Local Authority Having Jurisdiction for more guidance (not included).
- UL Battery Cable & Positive and Negative Terminal lugs. Note that the **eWay** ring terminal hole size is 3/8ths or larger.
- Wire Stripper and Crimper (Up to 4/0)

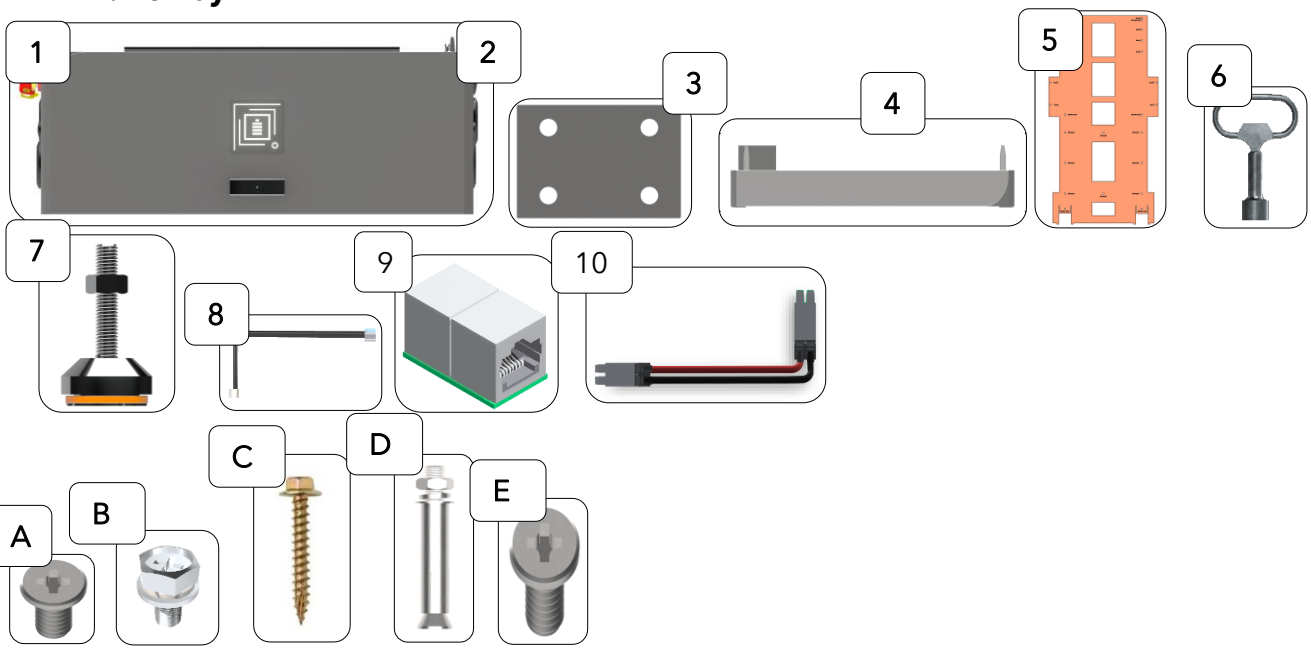


7. Unboxing Check List

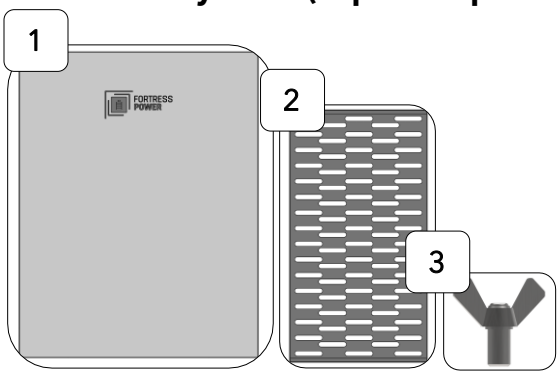
7.1 eForce 9.6 Battery



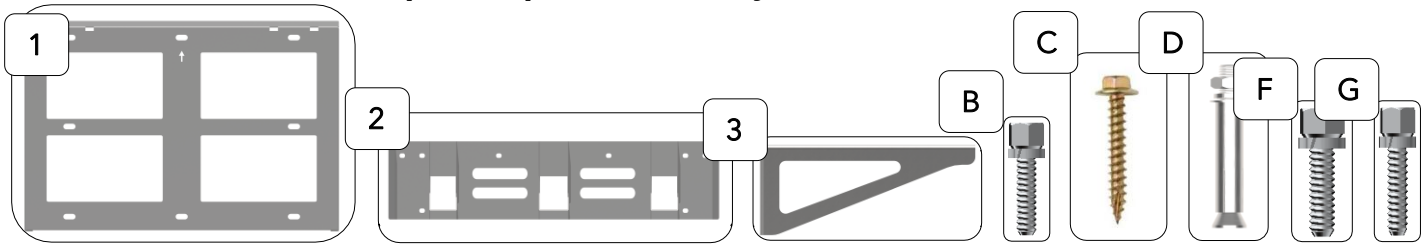
7.2 eWay



7.3 Envy Panel (Separate optional accessory)



7.4Wall Mount Kit (Separate optional accessory kit)



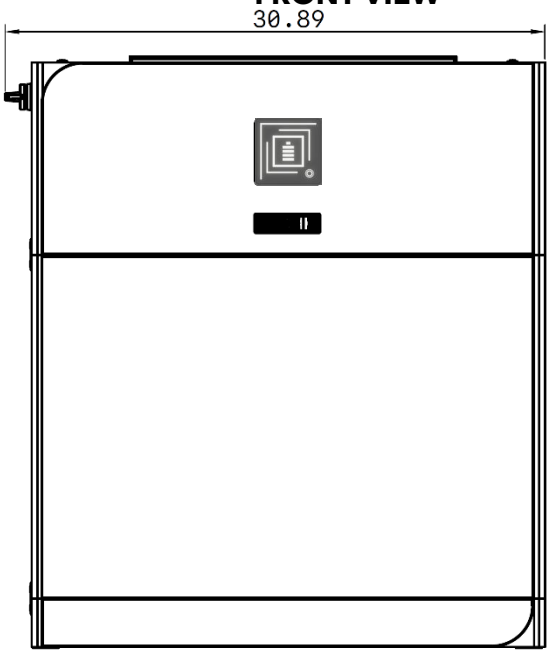
PART	DESCRIPTION	QTY
eForce 9.6kWh Battery		
1	eForce 9.6kWh Battery	1
2	Wall fitted bracket	2
3	Battery side brace	2
A	M5*6 Cross flat bolt	8
B	5*12mm Hex socket bolt	4+1 extra
C	M8*60mm screws	2
D	M6*60mm expansion bolts	2
eForce eWay		
1	eForce eWay	1
2	Battery side brace	2
3	Base	1
4	Wall mounting/fitted template	1
5	eWay key	1
6	Base legs	4
7	RJ45 BAT- BAT COM Cable, BAT-PCS COM cable(10ft)	1 each
8	Comm Terminator Coupler	1
9	Paralleling Relay Cable (10ft.)	1
A	M5*6 Cross Flat bolt	8
B	5*12mm Hex socket bolt	4 +1extra
C	M8*60mm screws	2
D	M6*60mm expansion bolts	2
E	M6*14mm Hex socket bolt for Grounding	1
Envy Panel		
1	Envy Front Panel	1
2	Hanging Panel	1
3	Butterfly M5X8 screws	2
Optional Wall Mounting Kit		
1	Wall Rack	1
2	Wall Hanging Panel	2
3	Shelf Bracket	2
B	5*12mm Cross Point Hexagon bolt	16
C	M8*60mm screws	12
D	M6*60mm expansion bolts	12
F	8*20mm Cross Point Hex bolt	4
G	5*20mm Cross Point Hex bolt	2

8. Battery Specifications

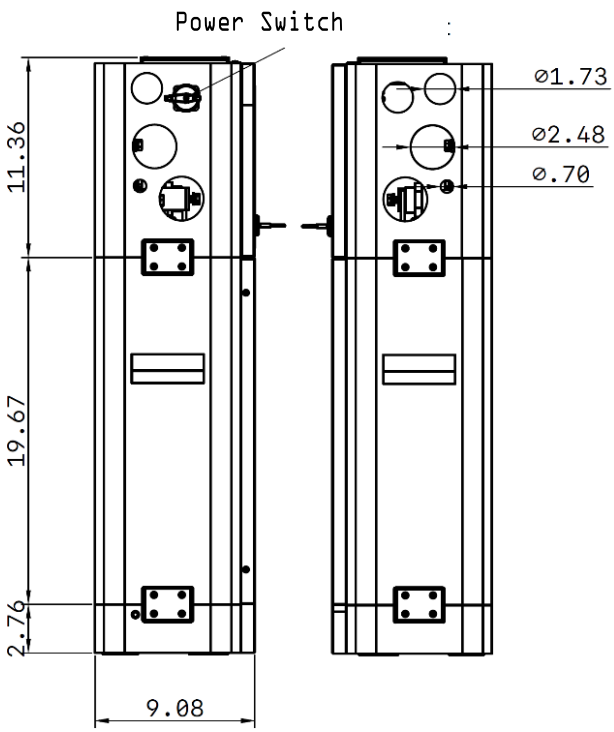
8.1 Dimensions and Definitions

8.1.1 eForce 9.6 kWh Battery

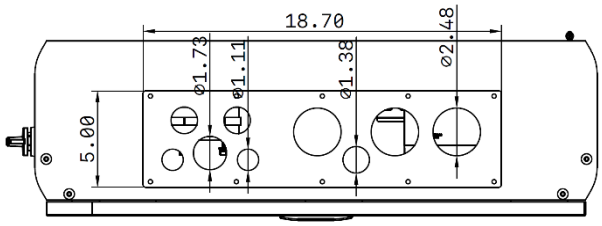
FRONT VIEW



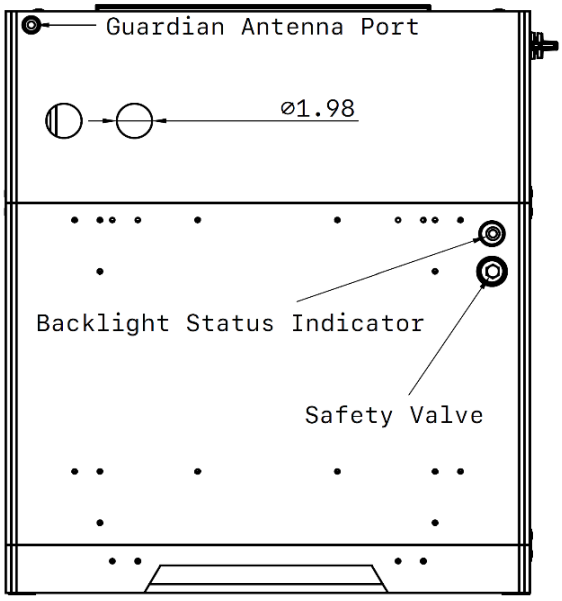
LEFT VIEW **RIGHT VIEW**



TOP VIEW



BACK VIEW



All dimensions are depicted in inches.

Power Switch

Allows user to power on the eForce and at the same time provide a safe means of disconnecting the battery from a 48V HYBRID inverter and disabling battery voltage output. Lockout hole measures 0.24".

E-Stop Feature

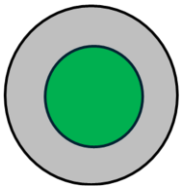
When paired with the Envy True 12kW/10kW/8kW it allows the option of providing complete ESS disconnection when enabling Rapid Shut Down (RSD) allowing first responders to safely mitigate any hazardous event within the property.

Guardian Antenna Port

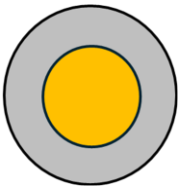
Allows user to extend the Guardian WIFI capability. Use the antenna included with the Guardian.

Backlight Status Indicator

Serves to indicate Normal battery operation or a Fault.

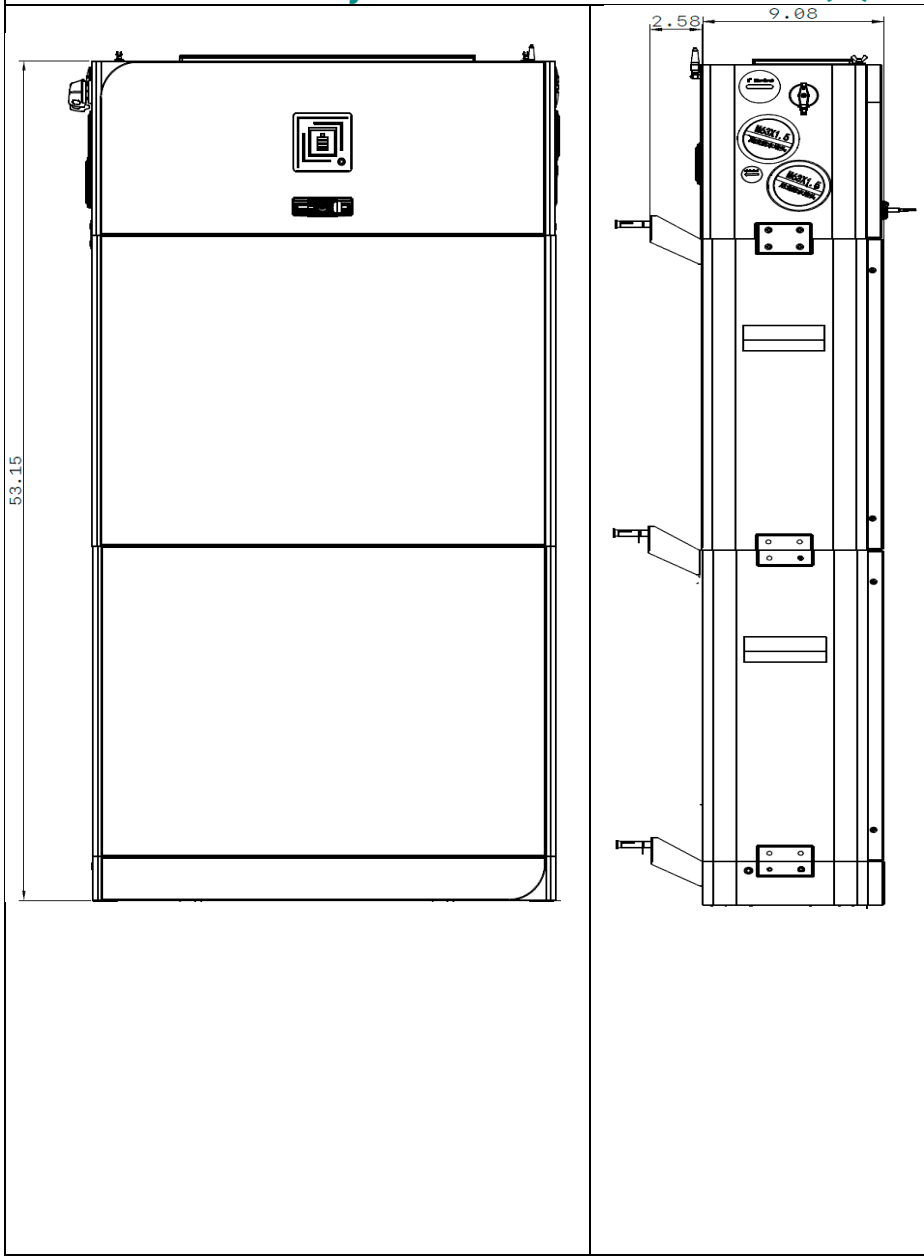


Normal Status

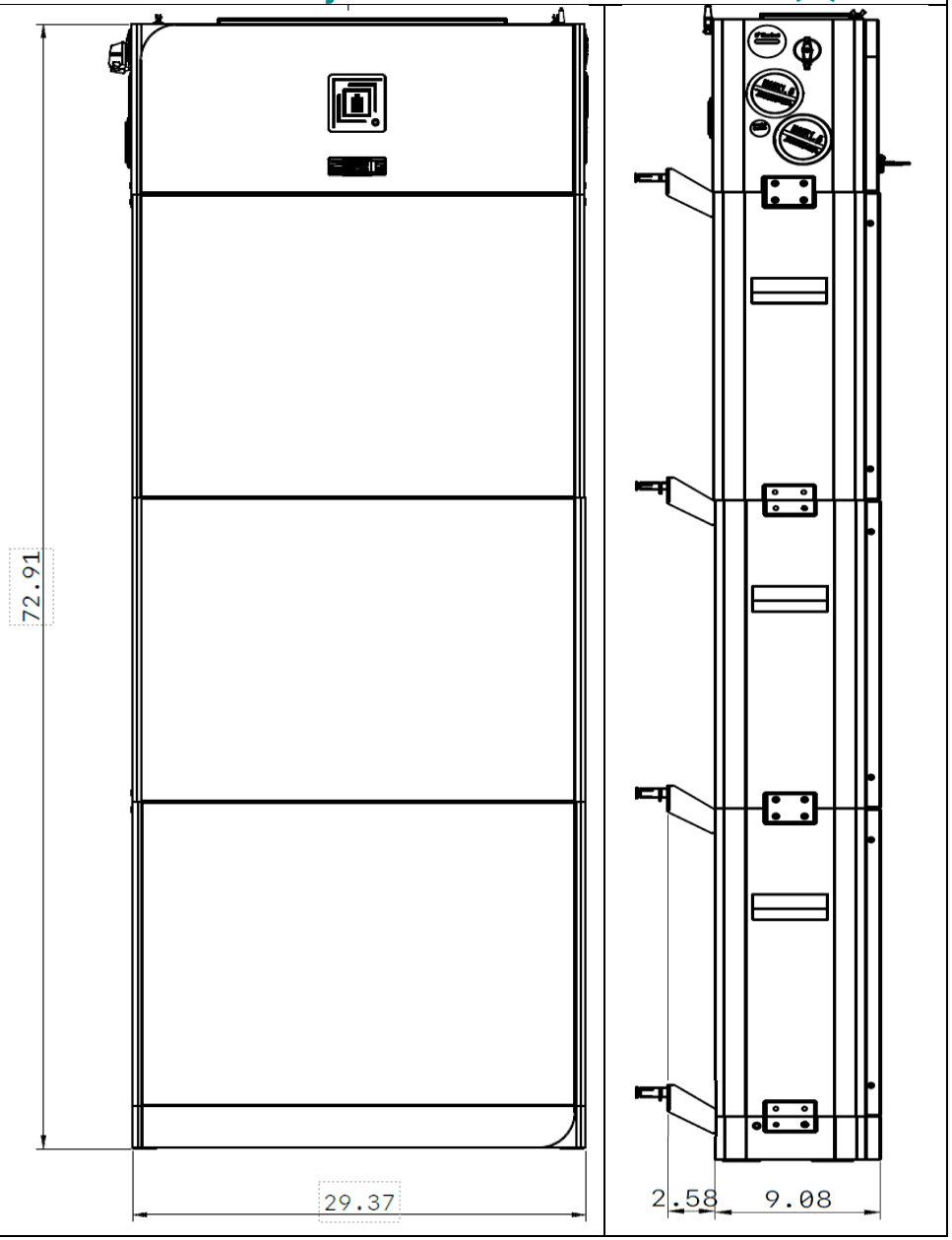


Fault Status

8.1.2 2 Battery Floor Fixed Vertical Installation (in)

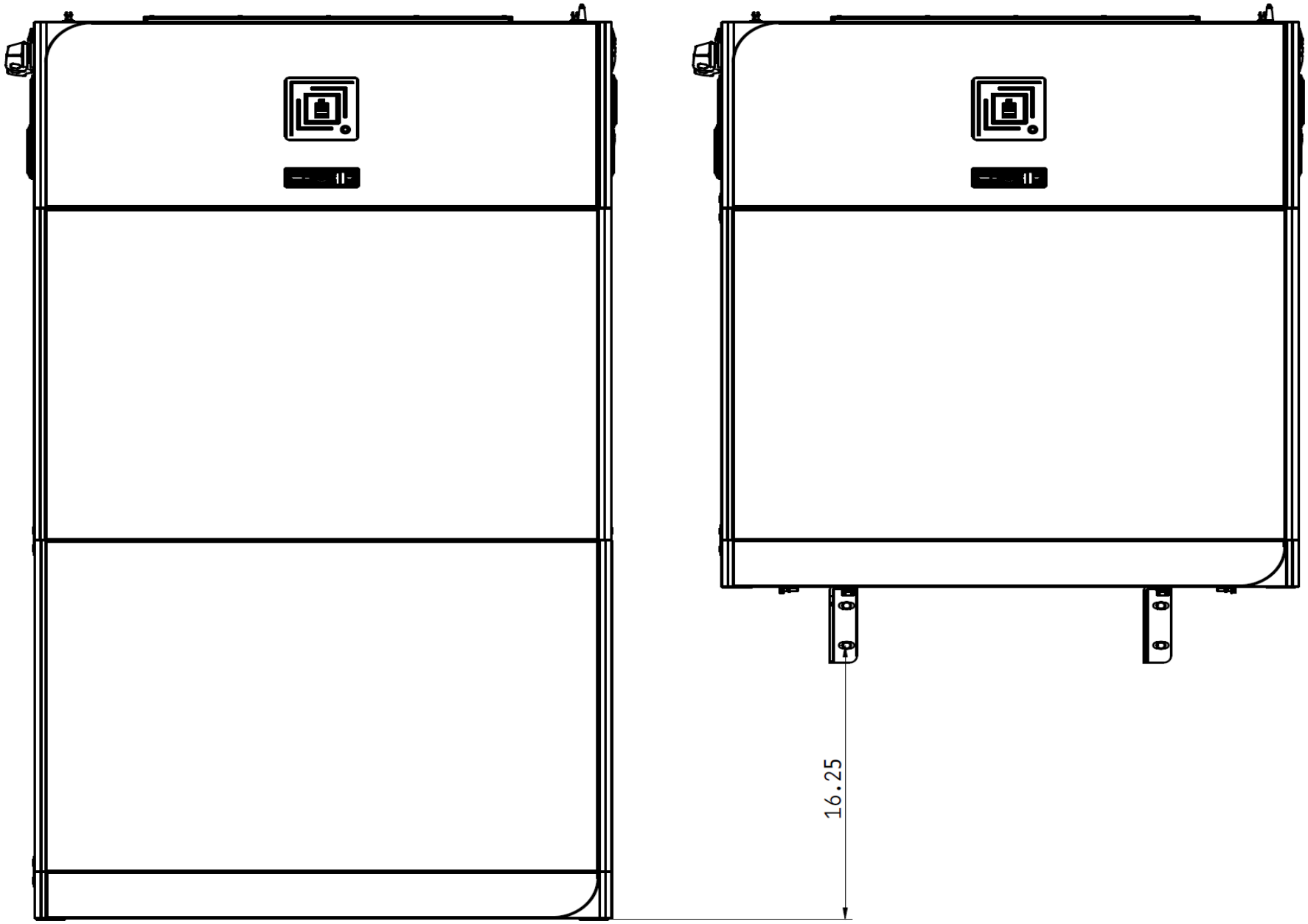


8.1.3 3 Battery Floor Fixed Vertical Installation (in)



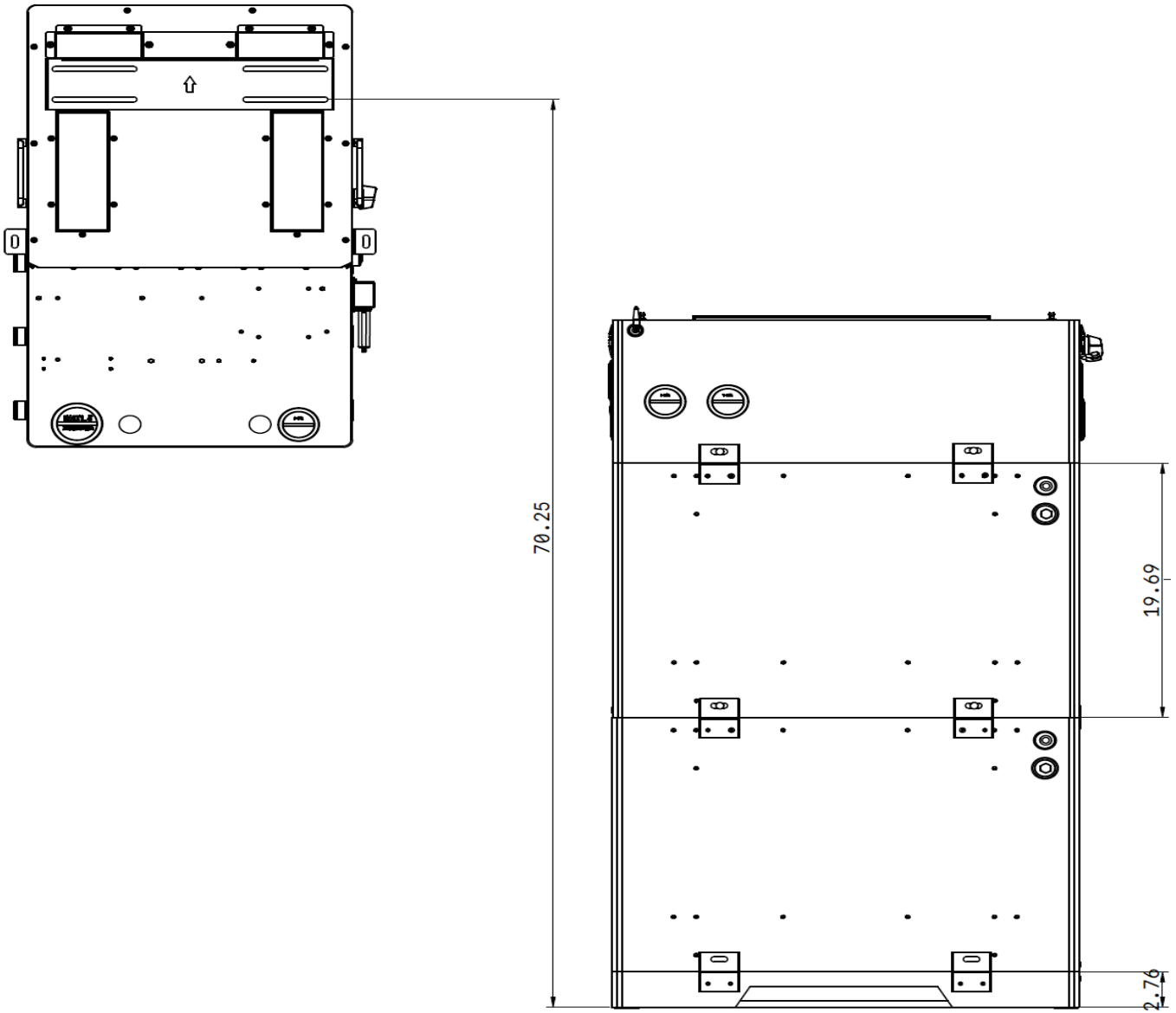
8.1.4 2 Battery Floor Fixed and 1 Battery Wall Mounted Configuration (in).

Please refer to the eForce Wall Mounting kit manual.



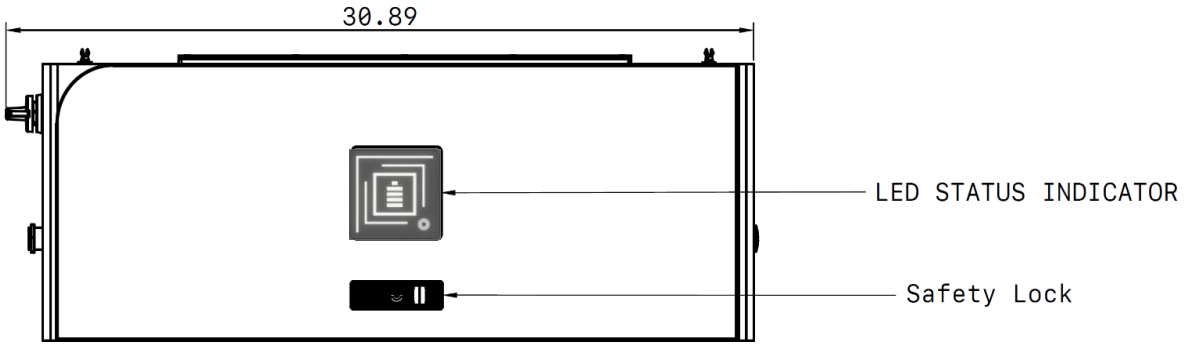
8.1.5 eForce Battery with Envy on the Side Configuration (in)

Use the image below to make sure the side knockout holes of the Envy align with the eWay knockout Holes
Please note that the hole of the **eWay** is designed for **2-inch conduit**. The knockout hole on the sides of the **Envy** is **1½ in.**

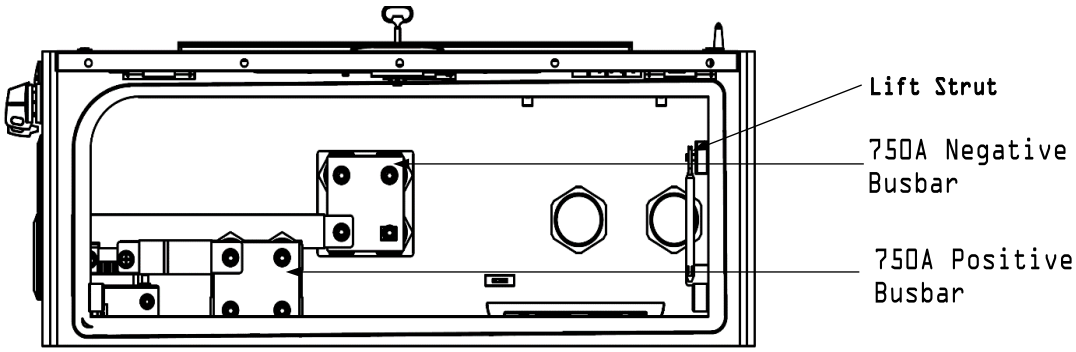


8.1.6 eWay

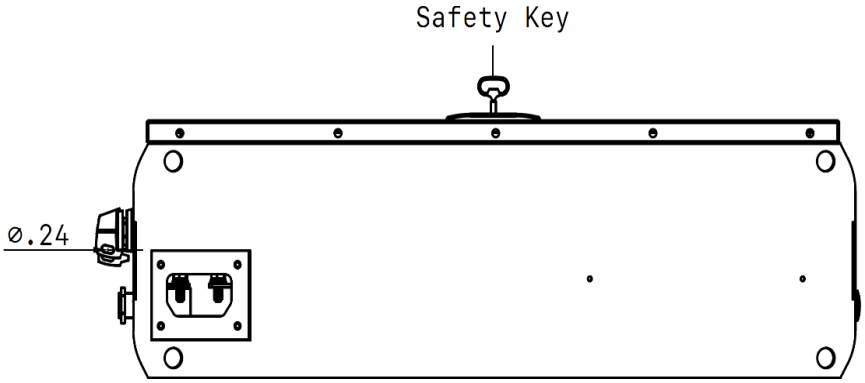
Front View with Closed Cover



Front View with Opened Cover (Removable with flat-head screwdriver)



Bottom View

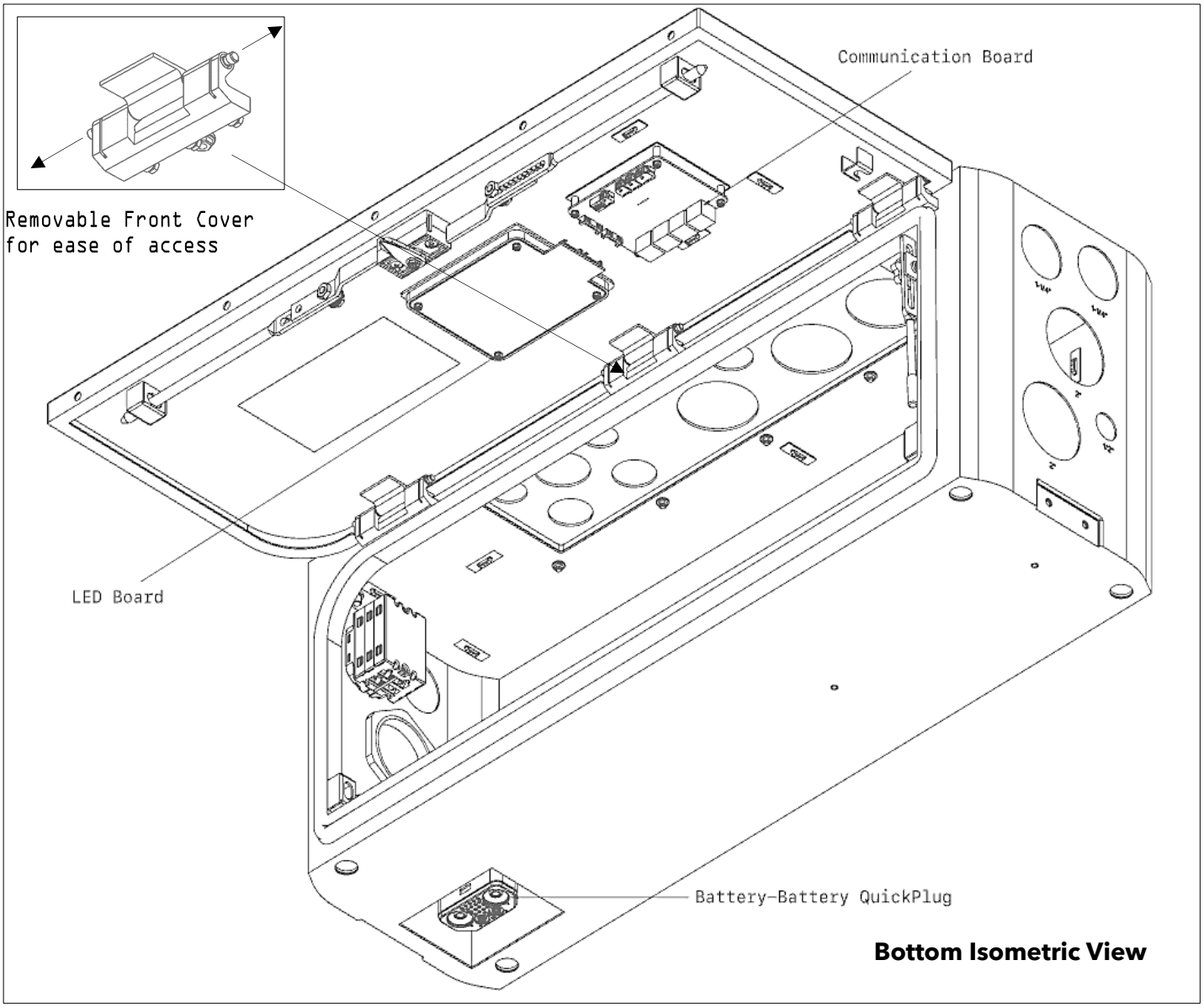


8.1.7 Conduit & Cable Requirements

KNOCKOUT HOLE SIZE (IN.)	REQUIRED CONDUIT MEASUREMENT (IN)
0.70	½
1.73	1 ¼
1.98	1 ½
2.48	2

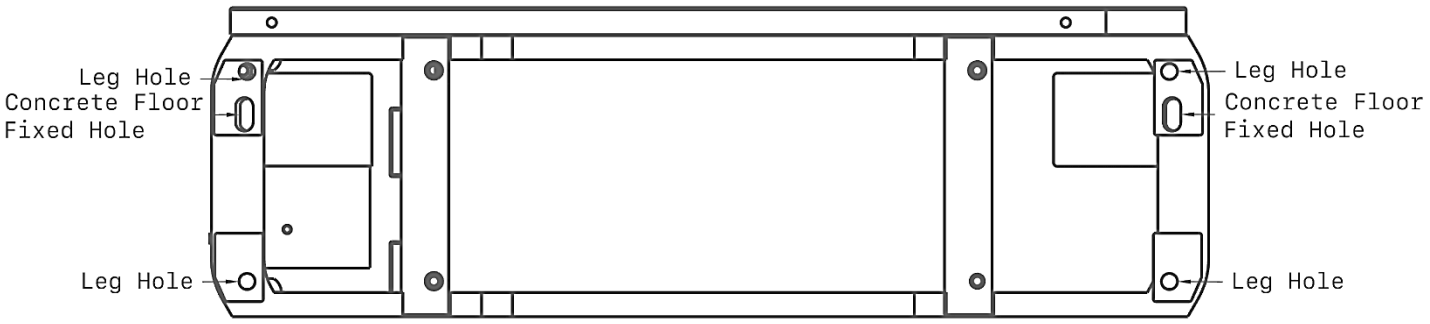
CABLE REQUIREMENTS

INVERTER	Cable Size	Voltage	Qty	eWay Busbar Torque Specifications
ENVY 12kW	Up to 4/0	600	1 pair per eWay	6.2lbf-ft (8.5Nm)
ENVY 10kW	Up to 3/0	600	1 pair per eWay	6.2lbf-ft (8.5Nm)
ENVY 8kW	Up to 3/0	600	1 pair per eWay	6.2lbf-ft (8.5Nm)
EWAY -EWAY	Up to 4/0	600	1-2 pair per eWay	7.37-8.85lbf-ft (10~12) Nm



Bottom Isometric View

8.1.8 Base



Bottom View

8.1.9 LED Status Definition

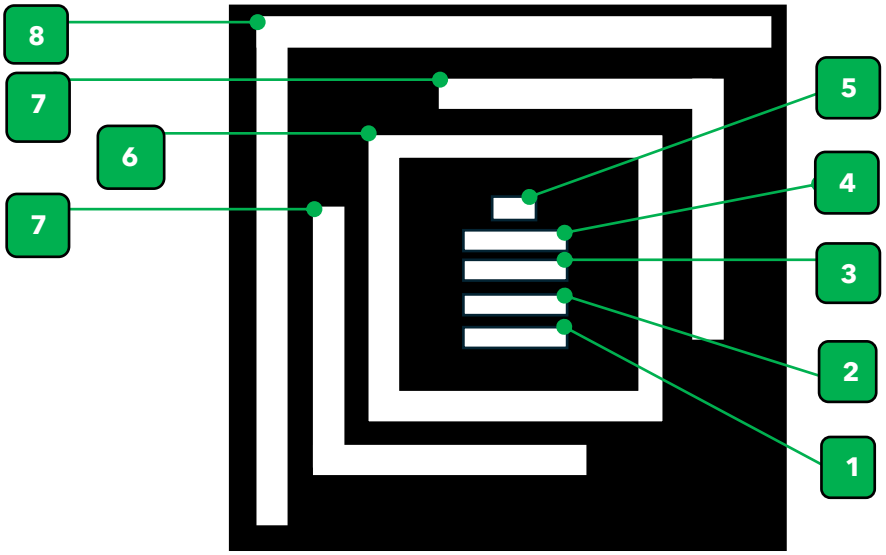


Table Legend

○	Solid
☼	Quick Flash
☼	Slow Flash

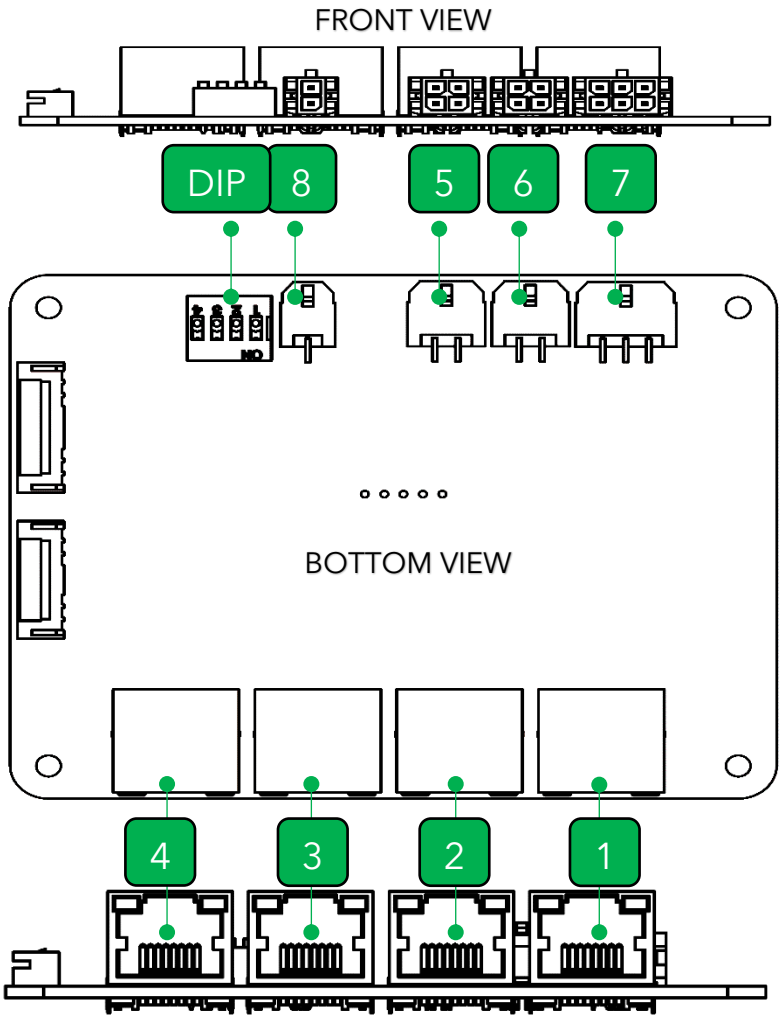
OPERATING STATUS	PROTECTION/ ALARM/ NORMAL	SOC%	LED5	LED4	LED3	LED2	LED1	LED6	LED7	LED8
POWER ON			Boot in 5S							
CHARGING		>95	○	○	○	○	○			○
		75~95	off	☼	○	○	○			○
		50~75	off	off	☼	○	○			○
		25~50	off	off	off	☼	○			○
		0~25	off	off	off	off	☼			○
		0	off	off	off	off	off			○
DISCHARGING		>95	○	○	○	○	○			○
		75~95	off	☼	○	○	○			○
		50~75	off	off	☼	○	○			○
		25~50	off	off	off	☼	○			○
		0~25	off	off	off	off	☼			○
		0	off	off	off	off	off			○
CHARGE	Alarm									○
	normal									○
	Overcharge protection									○
	Over-temperature, under-temperature, over-current protection									☼
DISCHARGE	Alarm									○
	normal									○
	Over-temperature, under-temperature, over-current protection									☼
FAULT	Over-discharge protection, acquisition failure (temperature or voltage), short circuit, reverse polarity protection									off
ADDRESSING AND COMMUNICATION	succeed							○	○	
	fail							off	off	

The corresponding SOC percentage is illuminated

8.1.10 Communication Board

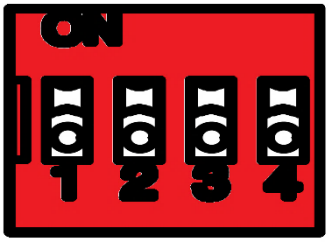
8.1.10.1 Port Definition

AREA	DESCRIPTION
1	Battery-Battery communication port
2	Guardian/Gateway RJ45 connection port
3	Internal BMS Connection
4	Battery-Inverter communication Port
5-6	Battery-Battery Relay Parallel Port (Common)
7	Power Source
8	Guardian Power Source (Cable Included)
9	DIP switch for Inverter Protocol Selection



8.1.10.2 Inverter Communication Protocol

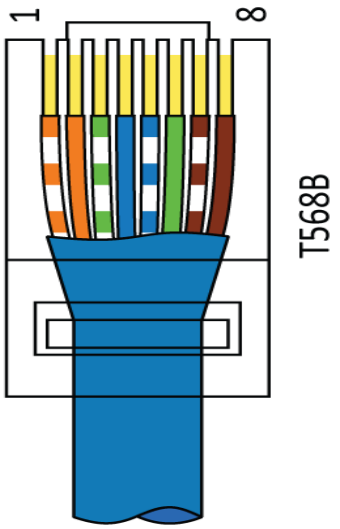
The eForce eWay has built-in DIP switches that allow users to manually select Inverter Protocol. When paralleling multiple batteries using the eWay, only set the Primary Battery DIP switches in an ON position according to inverter protocol. Failure to do so may cause abnormal behavior.



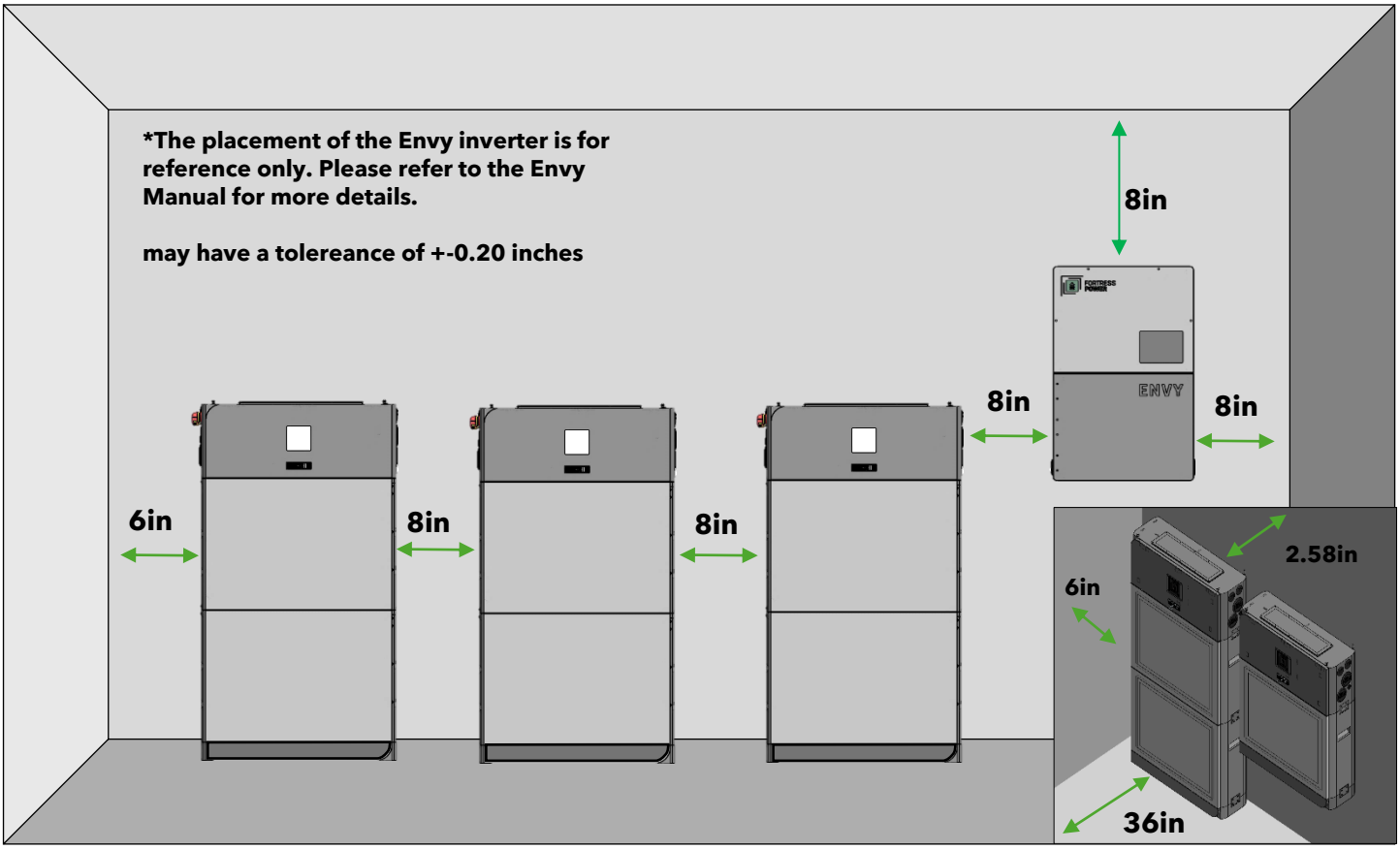
	DIP#1	DIP#2	DIP#3	DIP#4
FORTRESS POWER-485	**0**	**0**	**0**	**0**
FORTRESS POWER-CAN	1	1	1	0
SOL-ARK-CAN	1	0	0	0
SCHNEIDER-CAN	0	1	0	0
SCHNEIDER-485	1	1	0	0
SMA-CAN	0	0	1	0
VICTRON-CAN	1	0	1	0
GROWATT-CAN	0	1	1	0
APSYSTEMS CAN	1	1	1	0

8.1.10.3 8 Pin RJ45 Pinout Definition

PIN	COLOR (B FORMAT0	ASSIGNMENT	FUNCTION
1	White-Orange	Can1_H	BAT-BAT communication
2	Orange	Can1_L	
3	White-Green	Can2_G	n/a
4	Blue	Can2_H	PCS CAN communication
5	White-Blue	Can2_L	
6	Green	RS485G1	n/a
7	White-Brown	RS485A1	PCS 485 Communication
8	Brown	RS485B1	

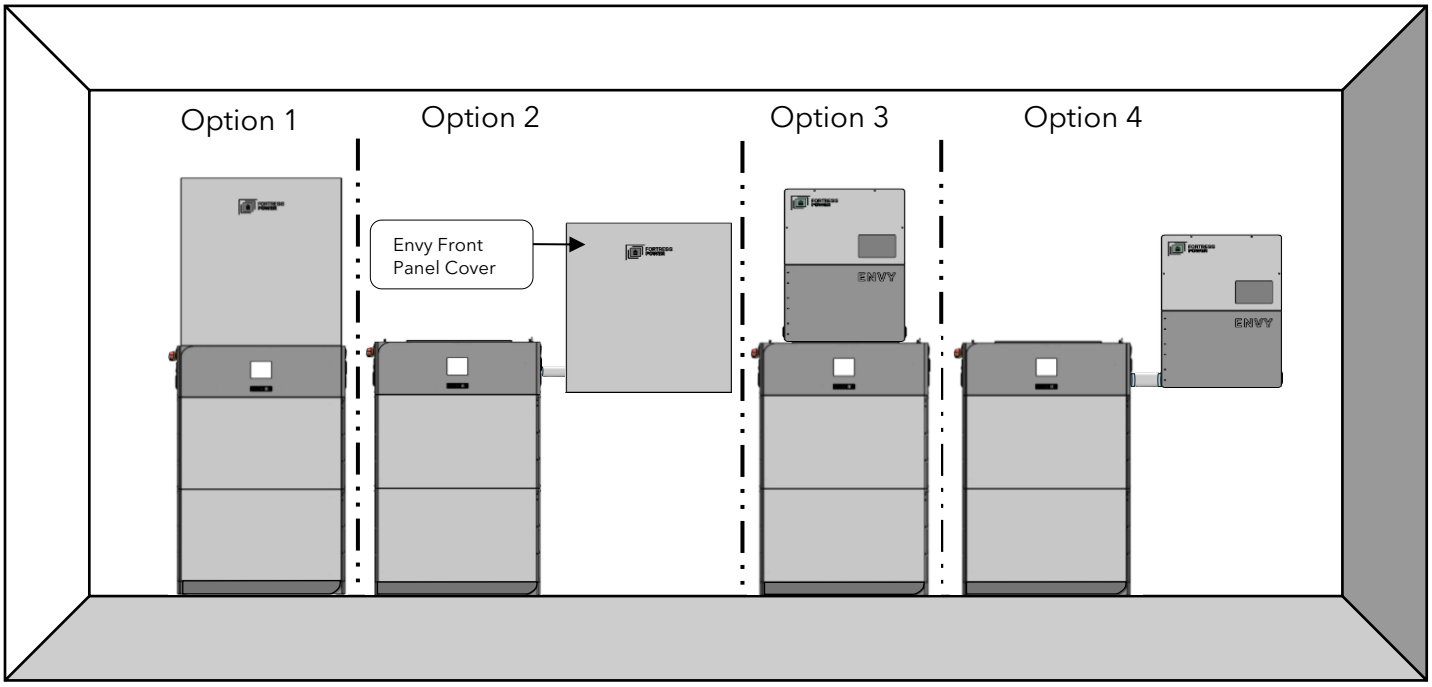


9. Minimum Spacing Requirement

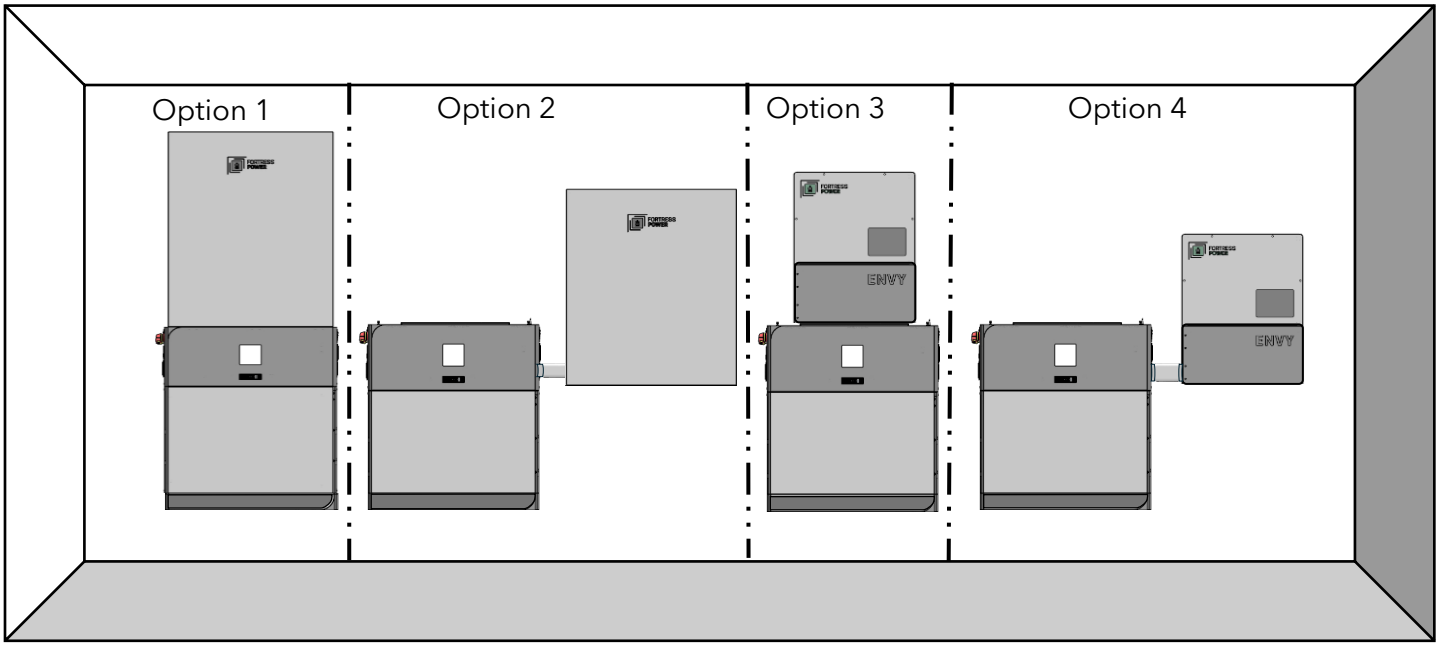


9.1 Acceptable but not limited Installation Configurations

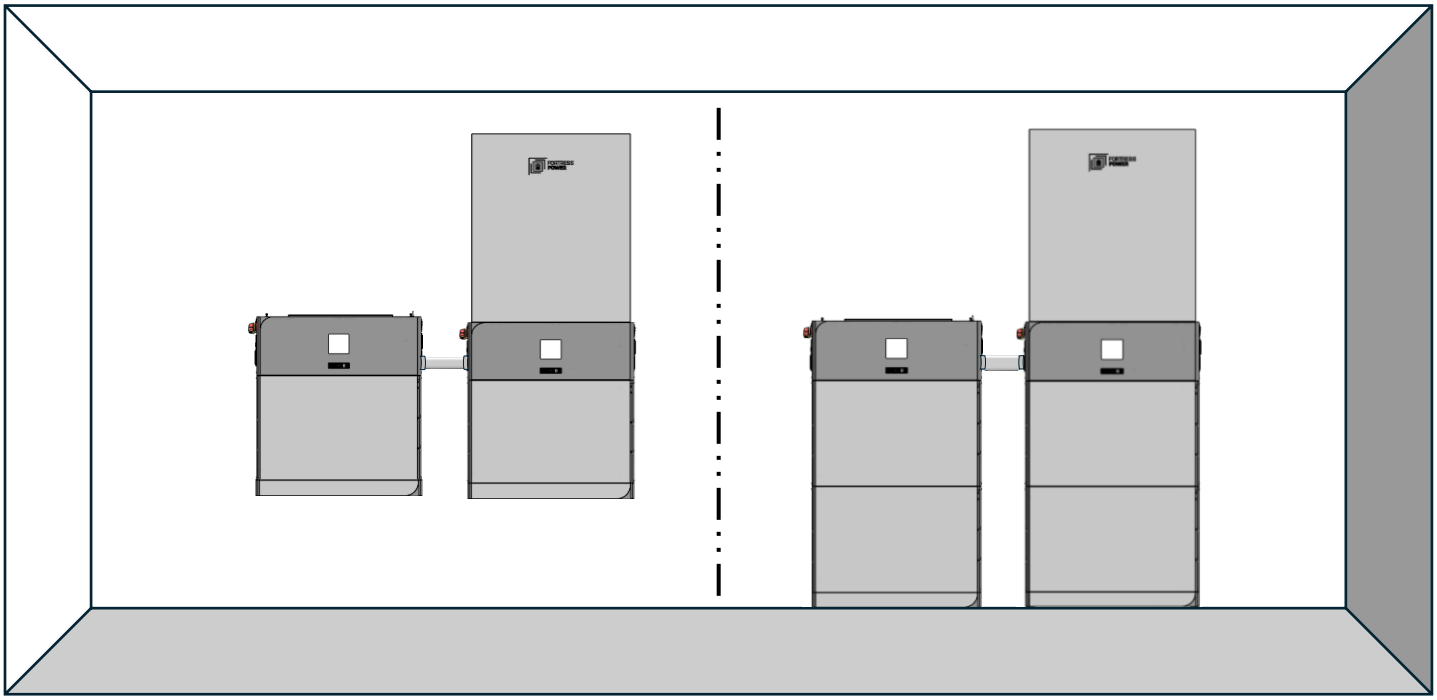
Ground Mounted, Floor Standing, or Wall Hanged (Separate Accessory Floor Mounted



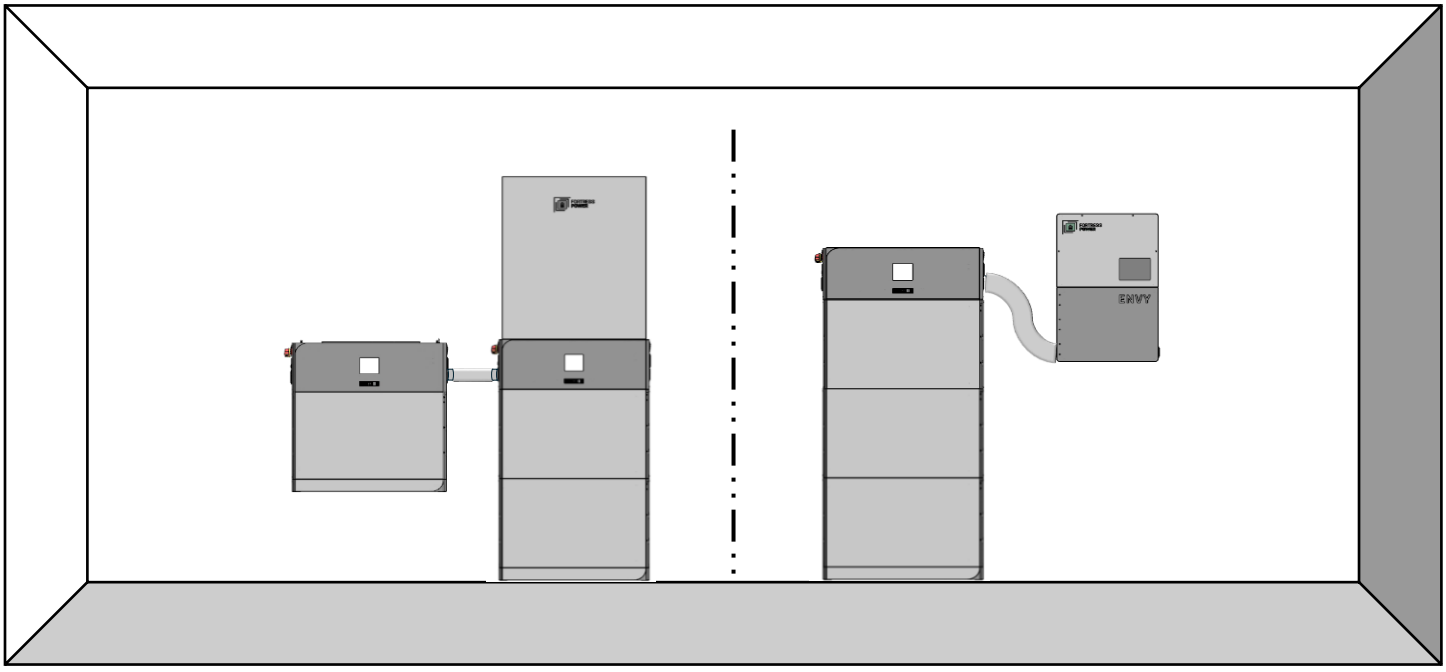
Wall mounted (With Separate Accessory)



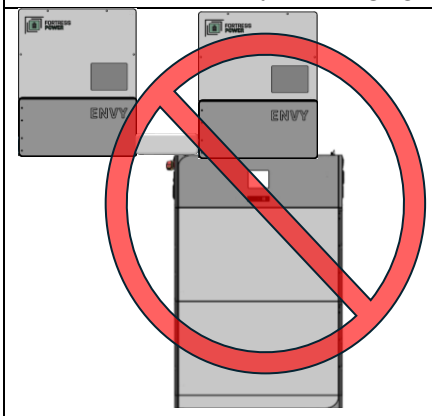
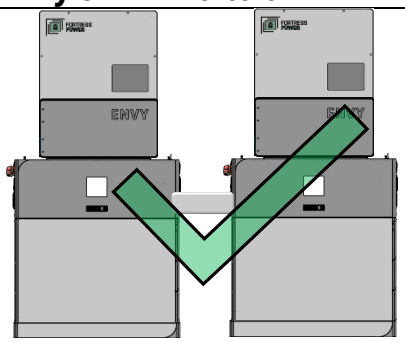
Warning! Make sure that the wall is structurally sound and that it may hold a heavy load. Failure to do so may result in injury or death.



This configuration includes the option of bolting the eForce Base to a concrete slab or installing the included legs on the bottom. Optionally you may hang the eForce on the wall. Note: Make sure the Power Switch does not surpass 6’7” per NEC Code.

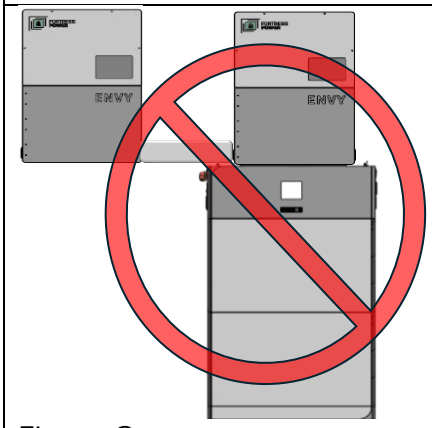
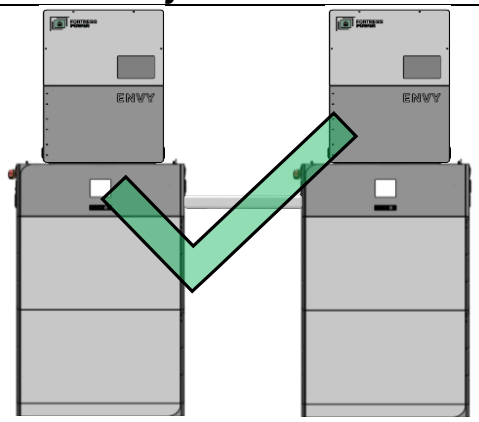


9.2Unacceptable and configurations

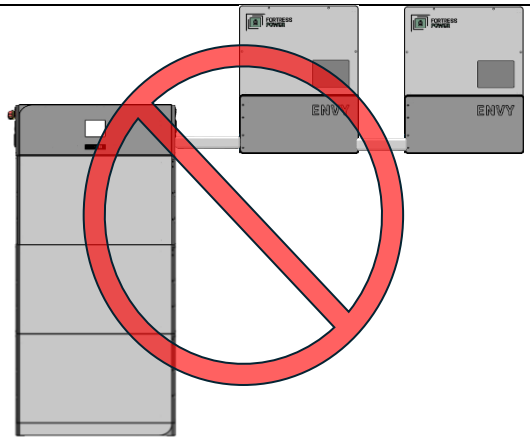
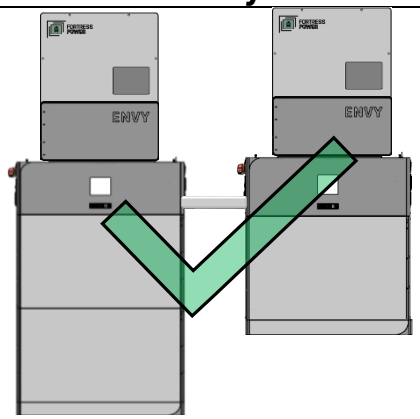
<table>
<tr><th colspan="2">19.2kWH eForce with 2 Envy 8kW Inverters</th><th>Notes</th></tr>
<tr><td> 
Figure A</td><td> 
Figure B</td><td>eForce amperage when vertically stacked is 250A continuous.

Single eForce 9.6kWh batteries have a maximum of 195A continuous

Each Envy 8k maximum continuous output is 167A

Parallel the internal busbar on each eWay with two pairs of 3/0-4/0 cable</td></tr>
<tr><th colspan="3">eForce with 2 Envy 12kW Inverters</th></tr>
<tr><td> 
Figure C</td><td> 
Figure D</td><td>eForce amperage when vertically stacked is 250A continuous.

Single eForce 9.6kWh batteries have a maximum of 195A continuous

Figure C shows battery system is undersized due to the output of both</td></tr>
<tr><th colspan="3">28.8kWH eForce with 2 Envy 8kW Inverters</th></tr>
<tr><td> 
Figure E</td><td> 
Figure F</td><td>eForce amperage when vertically stacked is 250A continuous.

Single eForce 9.6kWh batteries have a maximum of 195A continuous

Each Envy 12k maximum continuous output is 250A

Parallel the internal busbar on each eWay with two pairs of 3/0-4/0 cable</td></tr>
</table>

10. Installation

10.1 Preinstallation

1. **Select the Mounting Location:**

- Ensure the surface where the mounting base will be installed is clean, dry, and level.
- Measure and mark the mounting points according to the dimensions of the base.
- *The eForce 9.6 should not be installed in direct exposure to the sun.*

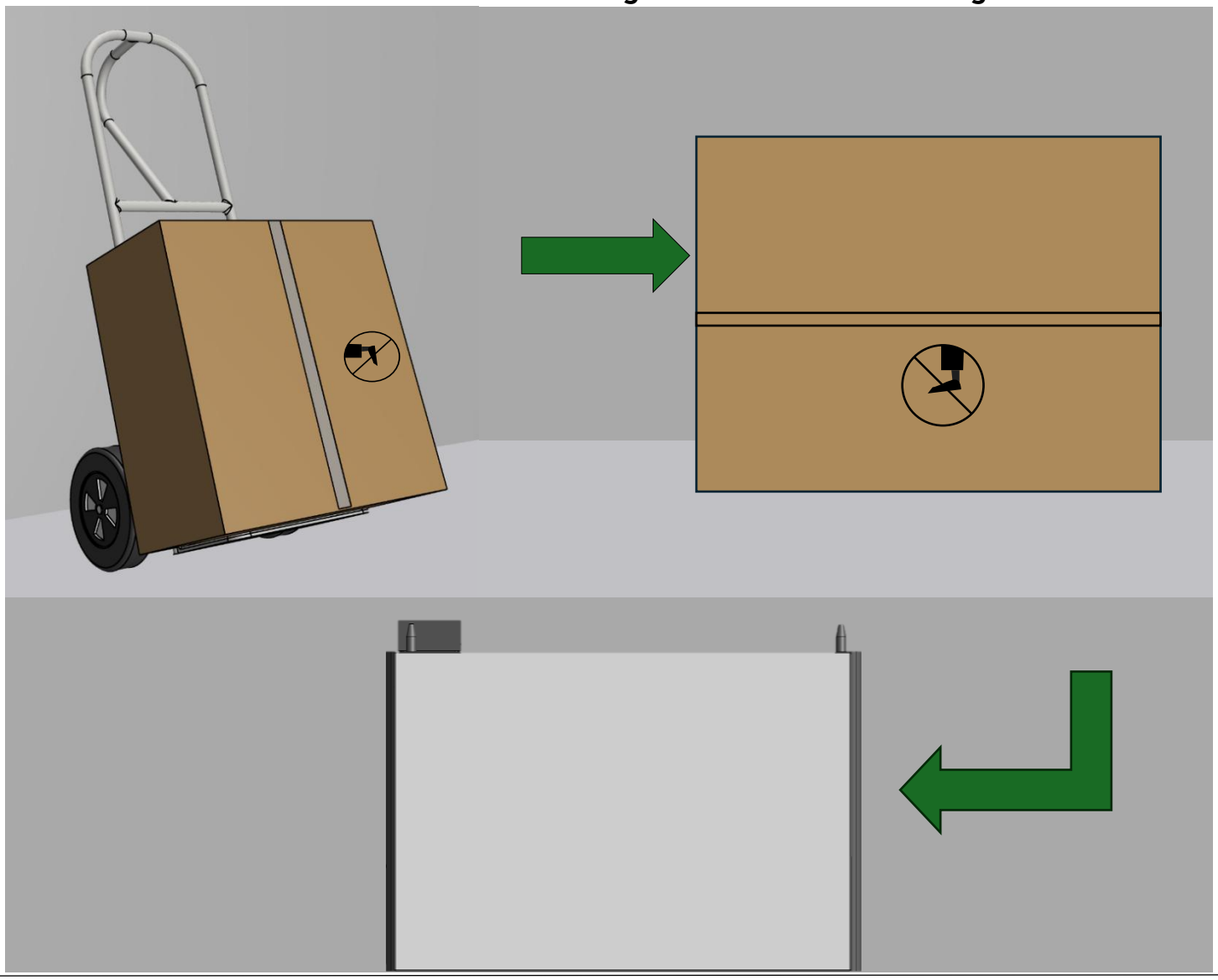
2. **Safety Considerations:**

- Wear safety glasses and gloves during installation to protect against debris and sharp edges.
- Ensure the installation area is free from obstructions and that there is adequate lighting.
- Clear the area where the battery module will be installed.

3. **Weight Considerations**
   Follow OSHA standards when installing this battery.

- Each battery module weighs 216lbs.
- The eWay weighs 33lbs.
- Ensure the floor is level and capable of supporting the weight of the battery.
- Ensure that two or more people lift the battery modules together to prevent injury.

We highly recommend using a hand truck or other machinery to move batteries from the transport vehicle to the installation site. Rotate the box 90degrees as described in the image below.



10.2 Mechanical Installation

10.2.1 Floor Standing installation.

Danger Floor must be flat. This configuration is not allowed on rough and/or highly uneven surfaces. If so, consider the following Options:

1. Resurfacing the floor
2. Install the system with wall mounted configuration.
3. Install the system with floor anchored (surface may be slightly uneven as long as the eForce is its leveled and the floor can withstand weight).

This procedure should help guide you in installing the template onto the base with the adjustable legs.

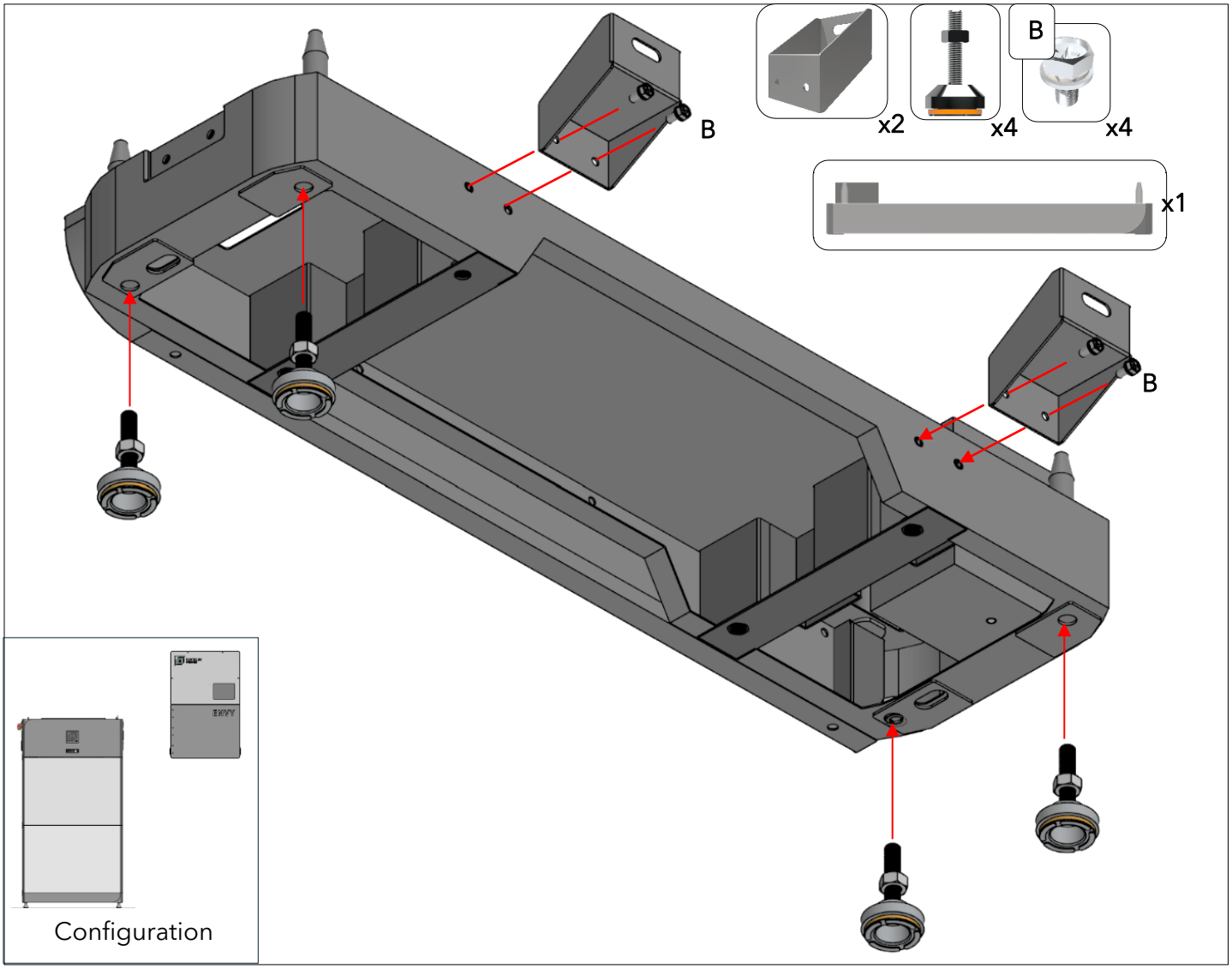
1. **Clean Area**

- Clean Area and remove any debris, tools from the floor in the installation area.
- Ensure the installation area is well lit and free from obstructions.

2. **Attach the Brackets**

- Use the provided hardware to attach the brackets to the mounting base.
- Align and screw the two wall fitted brackets to the designated positions on the mounting base.
- Tighten the hardware slightly to hold the brackets in place, allowing for minor adjustments.

3. **Install the Base Legs**



Configuration

- Align each base leg with its designated mounting point on the base.
- Screw the legs into the mounting slots **and make sure they are all the way in.** Tighten the connection points using a wrench, ensuring that the legs are firmly attached to the base.

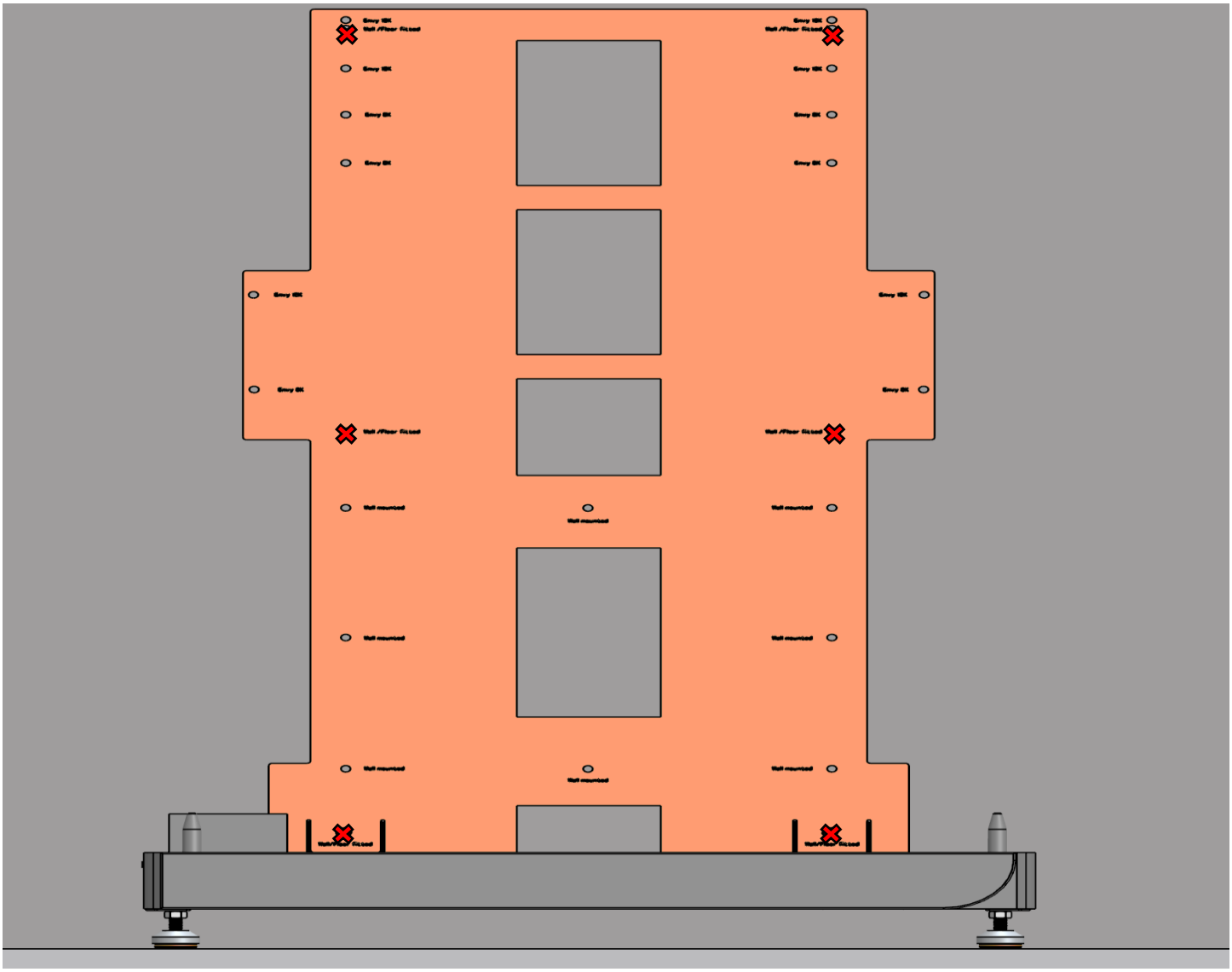
4. Adjust the Legs:

- Check that the base is level and adjust the legs if necessary to achieve proper alignment.

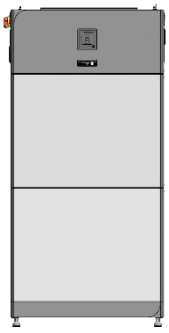
⚠**Warning. Failure to do this procedure may result in battery installation misalignment and improper battery to battery connection.**

5. Align the Template

- Position the mounting template (orange plate) onto the base.
- Using a marking tool, mark the locations of the mounting holes on the wall or surface where the template will be installed. These are indicated by the holes labeled "Wall/Fitted" on the template.
- The template should be centered on the base and aligned with the pre-drilled holes or mounting points.
- Use a level to ensure that the template is properly aligned vertically and horizontally.
- Make minor adjustments to the position of the template as necessary.

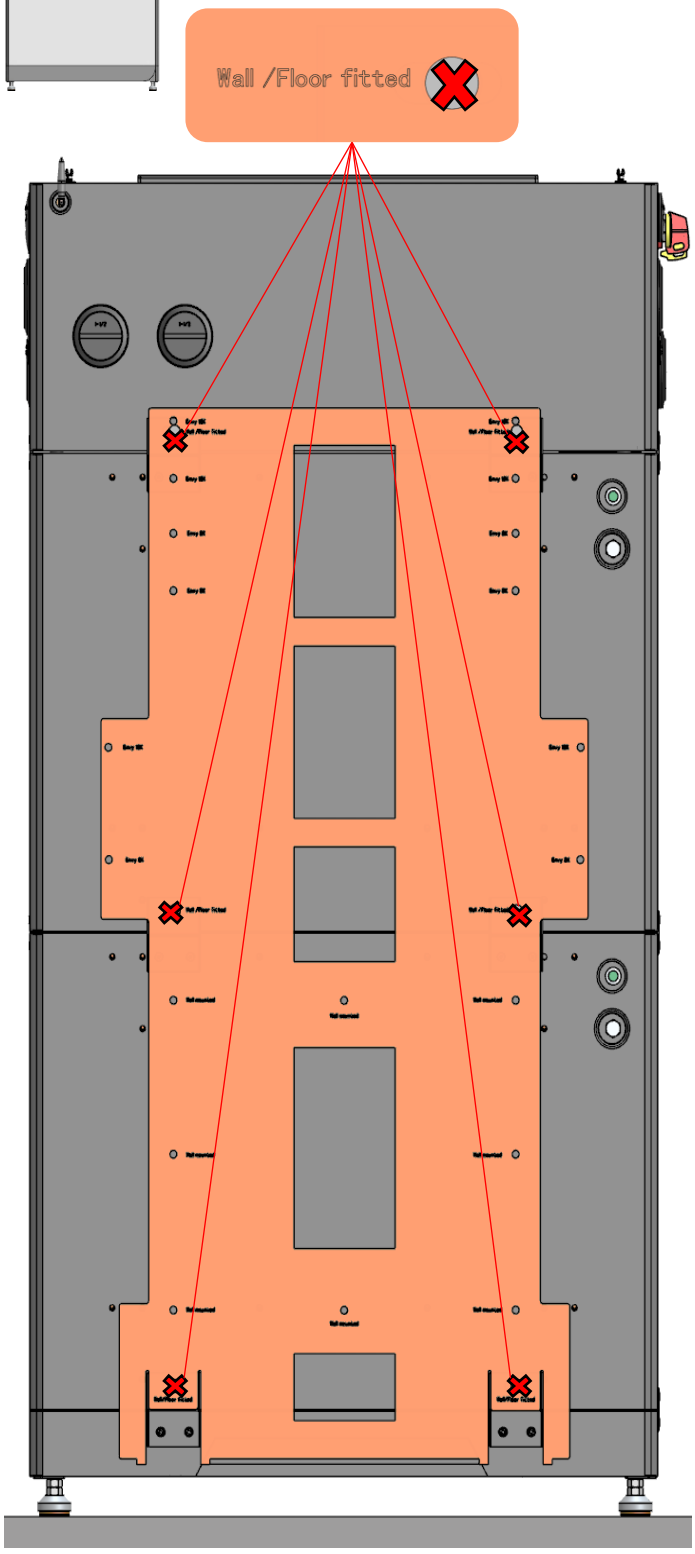


You May use the one of the following configurations below

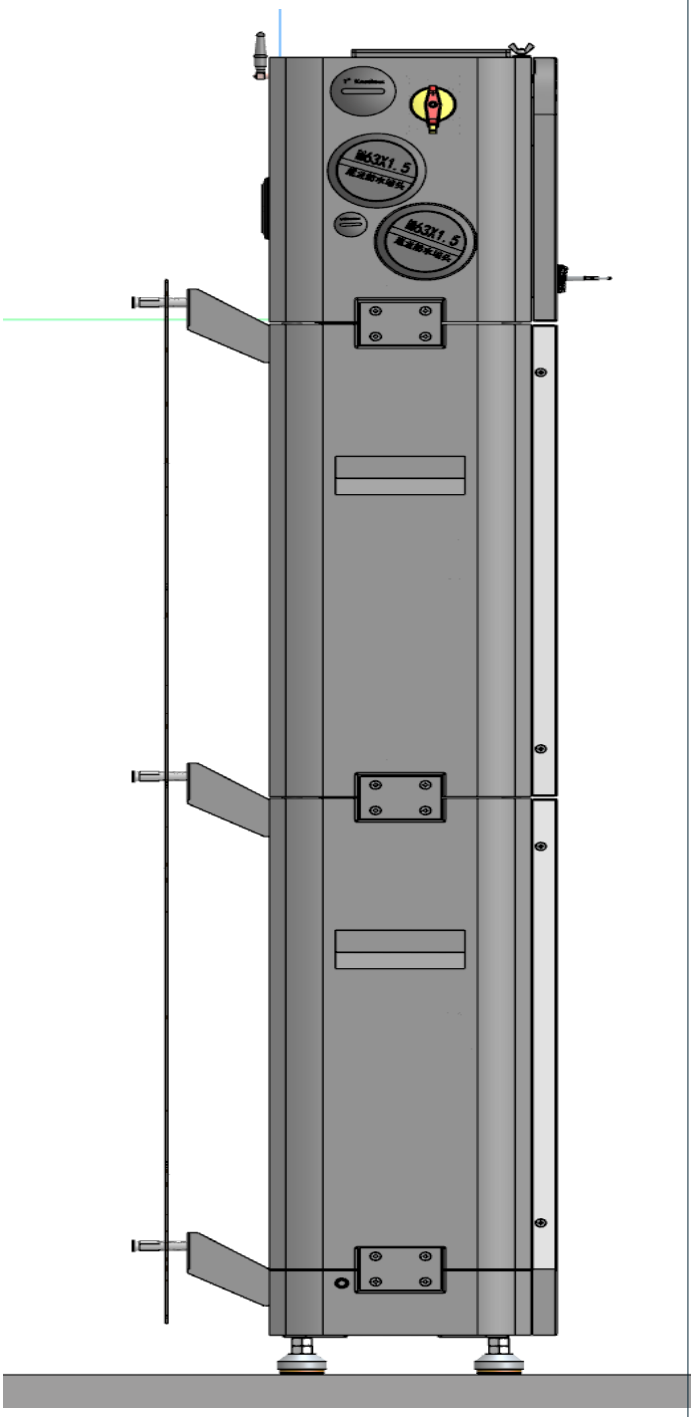


Two Battery Installation

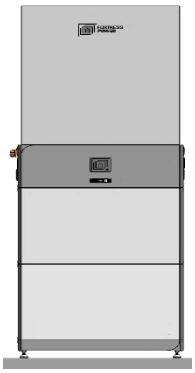
Once the base has been assembled, proceed in marking the holes using the inculuded cardboard template. Make sure the carboard is laying completely flat against the wall.



Back View



Side View

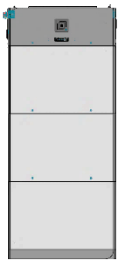


Two Battery Installation with Envy on top

Once the base has been assembled, proceed in marking the holes using the inculuded cardboard intallation template. Make sure the carboard is laying completely flat against the wall and leveled.

1. Mark all the Wall/Floor Fitted Holes
2. Using the same carboard installation template, raise the template upwards and postion into the last Wall/floor fitted. Continue marking according to inverter size.

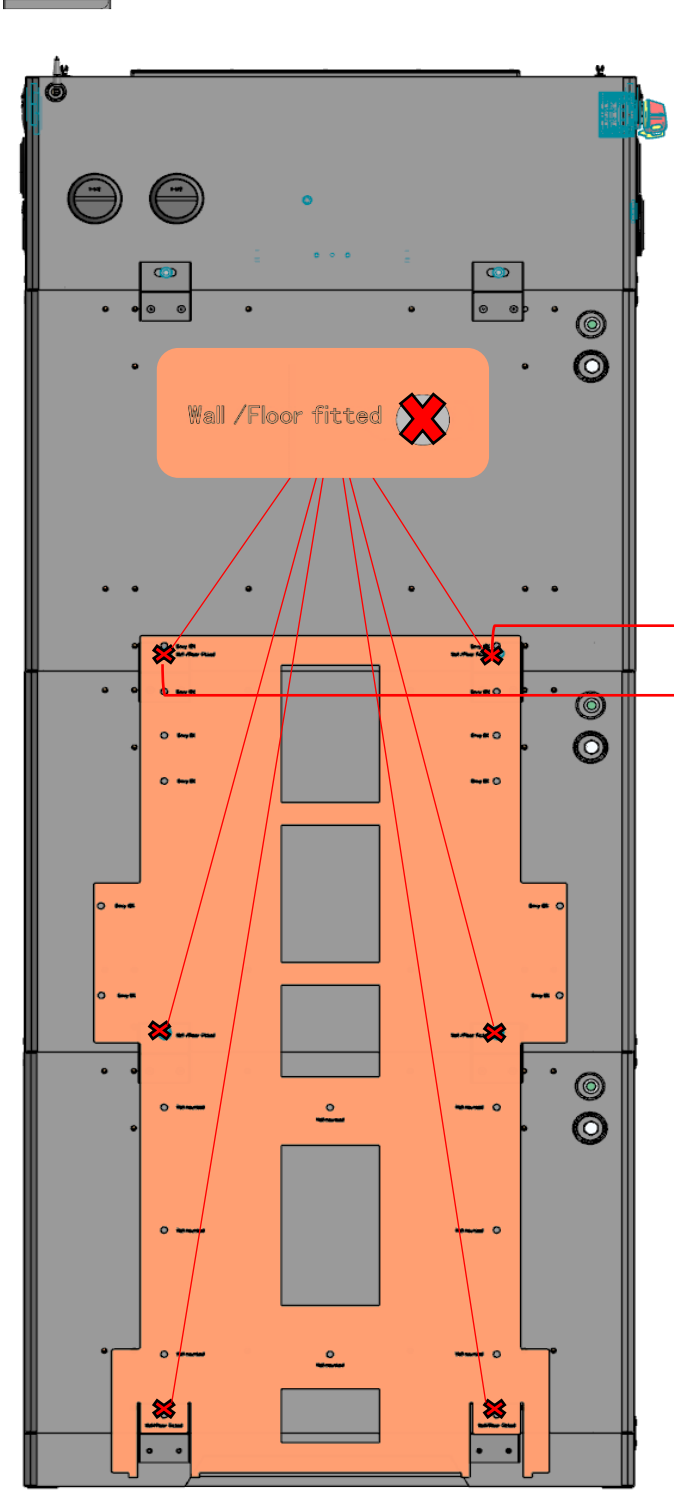
Back View **Side View**

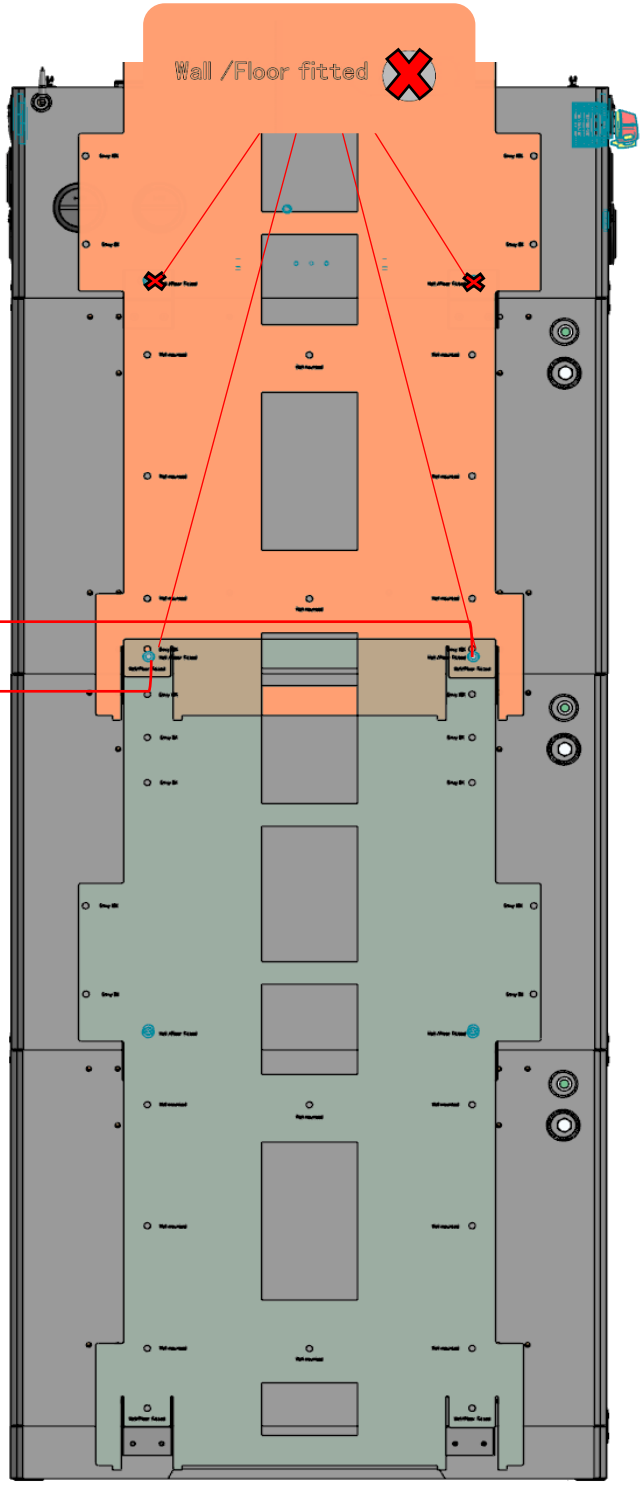


Three Battery Installation

Once the base has been assembled, proceed in marking the holes using the inculuded cardboard intallation template. Make sure the carboard is laying completely flat against the wall and leveled.

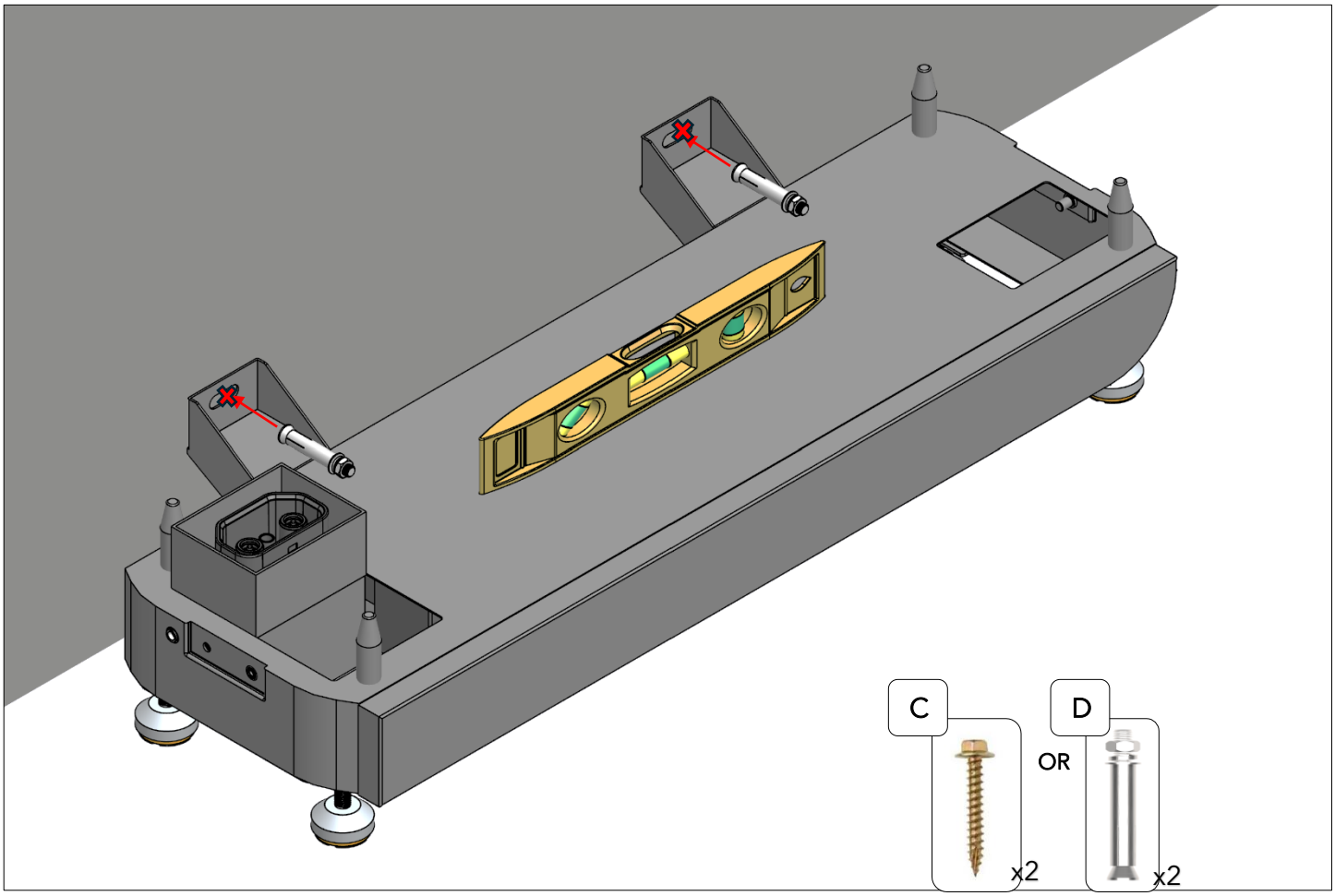
1. Mark all the Wall/Floor Fitted Holes
2. Using the same carboard installation template, raise the template upwards and postion into the last Wall/floor fitted. **Do not Install more than 3 batteries vertically.**





6. **Mark the Mounting Points and Drill Holes**

Use a drill to create the necessary holes at the marked locations.



7. **Fixing the base to the wall**

- Position the mounting base (with attached legs) at the desired location against the wall.
- Identify with an **X** the spot in which the mounting holes must be drilled.
- Remove the base and drill holes. If mounting on a concrete surface, use a drill with a masonry bit to create holes for anchors.
- Insert the bolts through the mounting holes in the base and into the surface (anchors, if used).
- Fully tighten all connections on the brackets, base, and legs to ensure everything is securely attached.
- Check that there is no movement or wobble in the assembly. If there is, check connections.

The battery modules weigh more than 50 pounds, use mechanical lifting equipment or team lift to reduce the risk of injury.

- Ensure all workers involved in the installation are wearing appropriate PPE.

8. **Align the Brackets:**

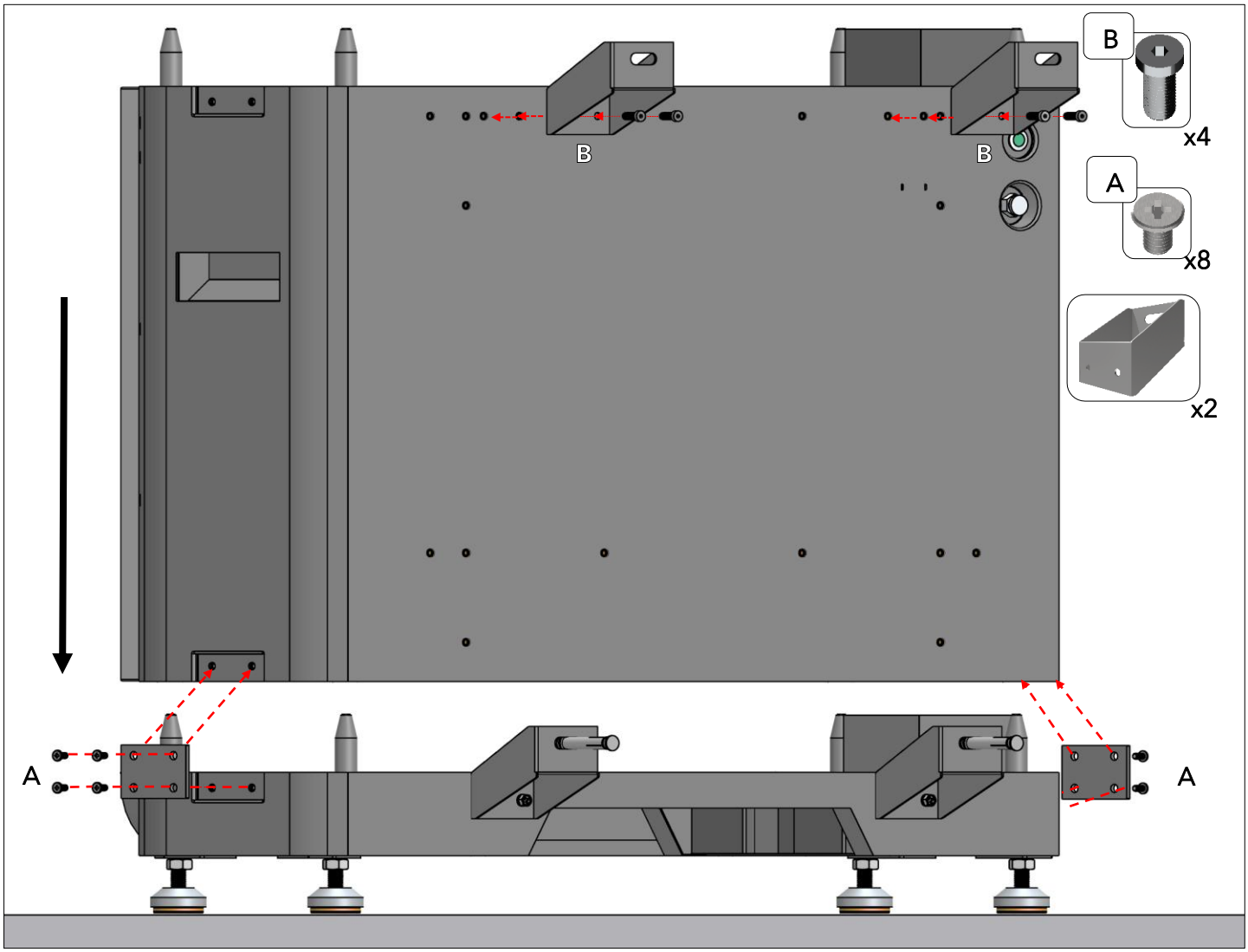
- Attach the brackets to the back of the battery module as shown in the image. These brackets will stabilize the battery module against the wall.
- Ensure the brackets are aligned and correctly positioned on the module.

9. **Lift the Battery Module:**

- Using proper lifting techniques and equipment, carefully lift the battery module. Ensure that all personnel involved are coordinated to avoid injury or damage.
- Carefully lower the battery module onto the floor-mounting feet. Ensure that the module is properly seated on the feet, with all weight evenly distributed.
- Align the battery module so that the bottom Amphenol connectors plug in directly to the connector at the base.

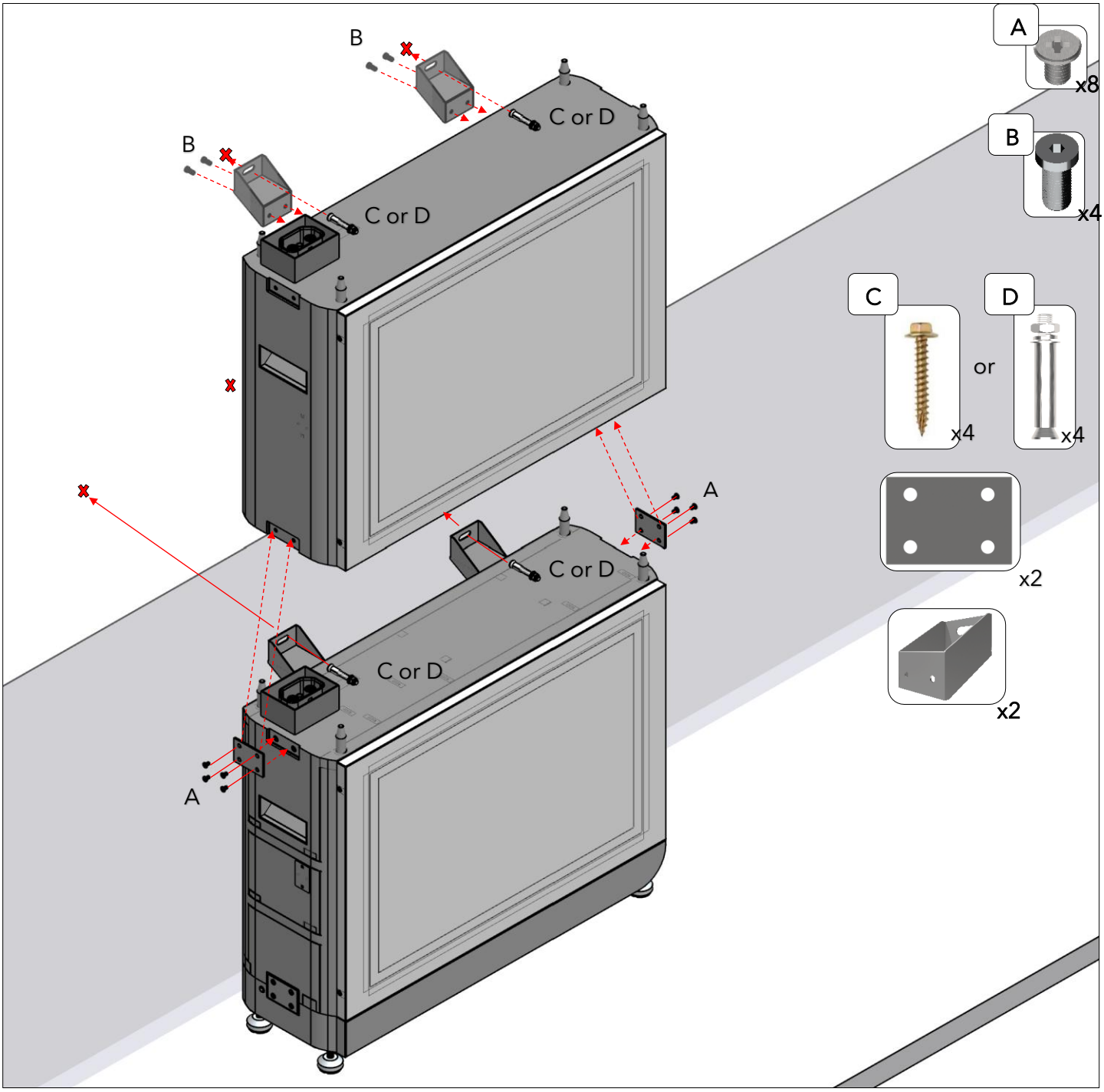
10. Secure the battery

- Screw the side plates. **Do not use impact tools during this procedure. Doing so may cause damage to the screw or screw hole.**



- Secure the brackets to the wall with the corresponding hole using the provided screws and/or anchors. Ensure the battery module is stabilized and cannot tip or shift.

11. Repeat steps 8-10 when installing 1 or 2 additional batteries (Maximum of 3 batteries for vertical stacking). Use lifting equipment when installing 3 batteries to allow the 3rd. battery to be lifted/hoisted.

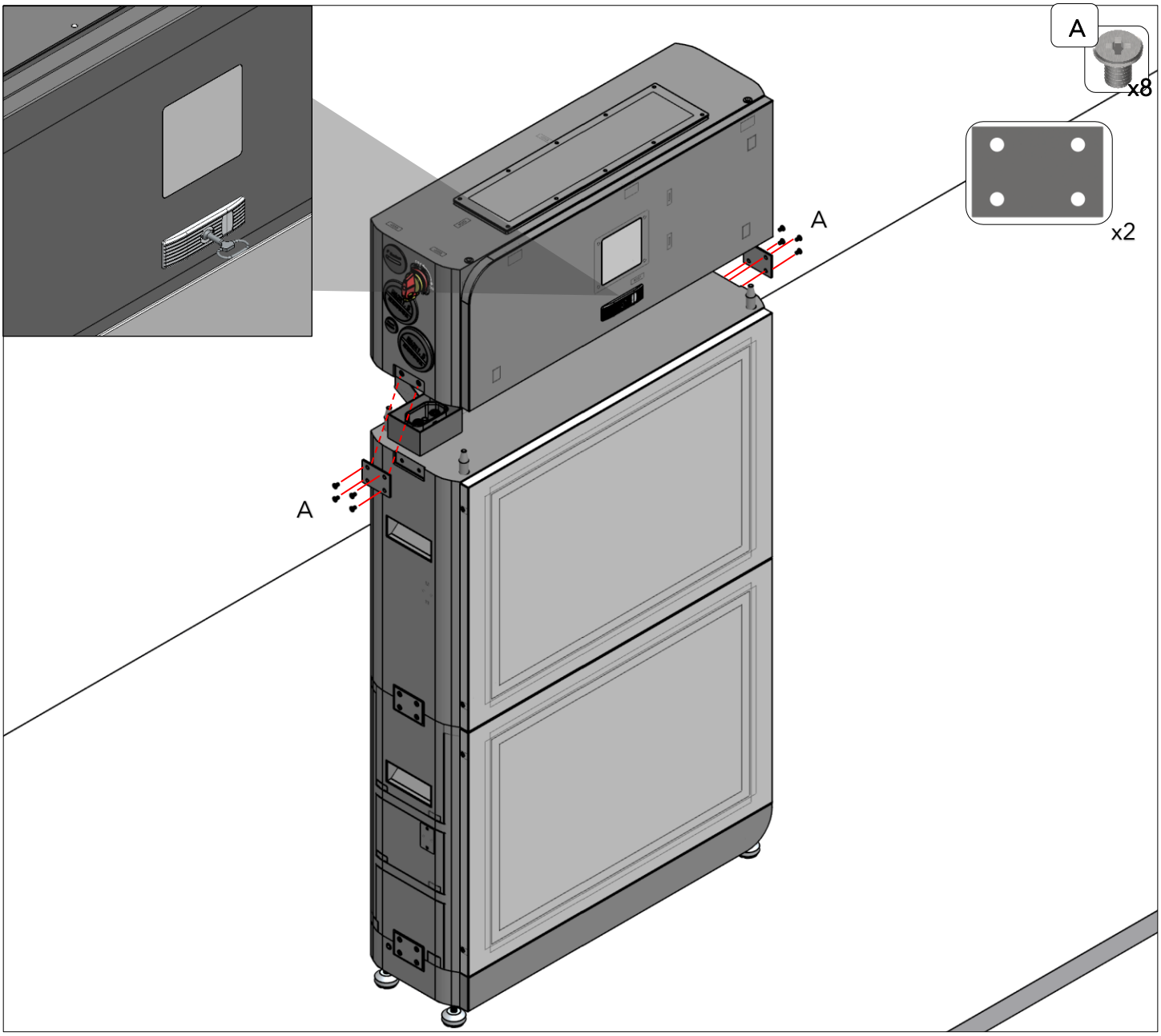


12. eWay Installation

- Mount the eWay on top of the battery and secure with side braces as seen in the image below.

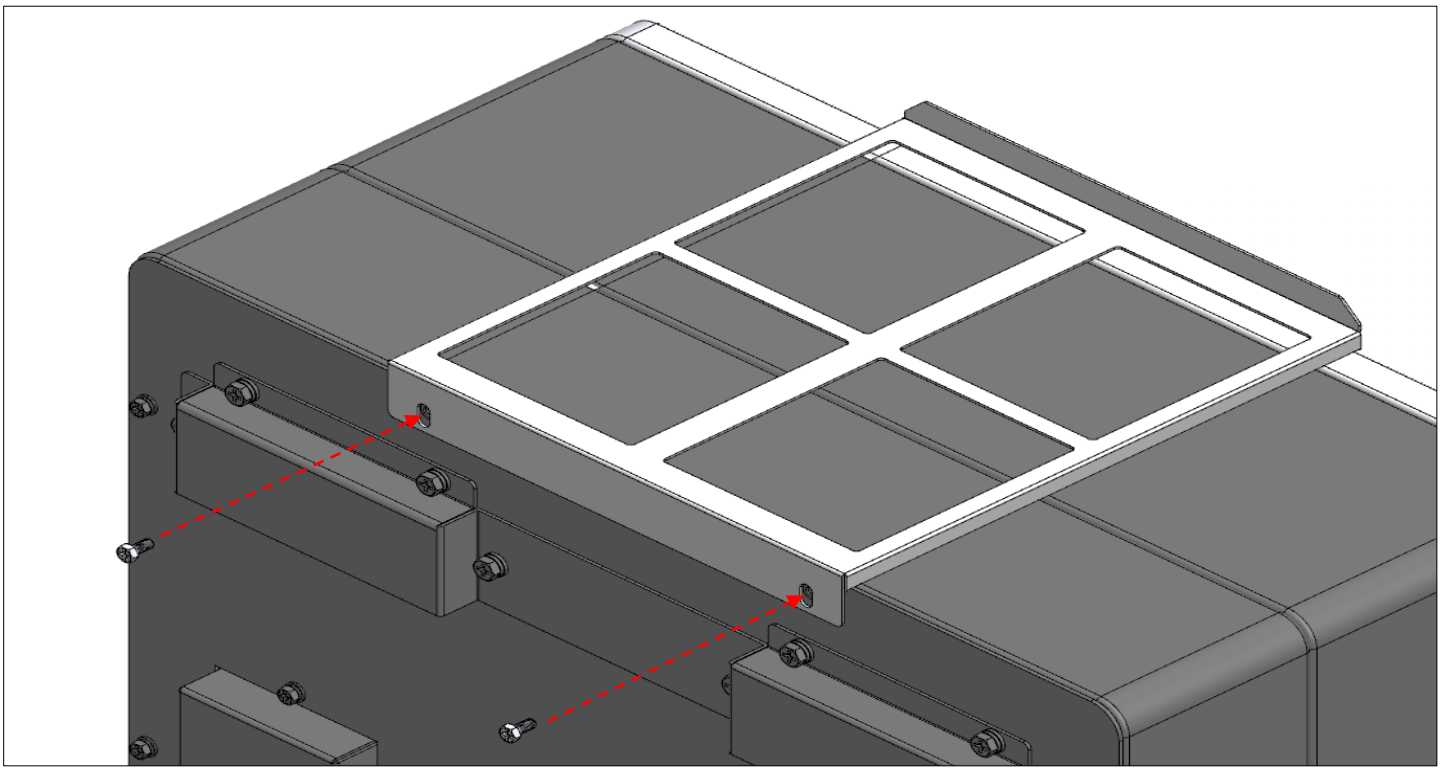
10.3 Electrical Installation

- Using the included key, insert it into the **eWay** keyhole to unlock it.

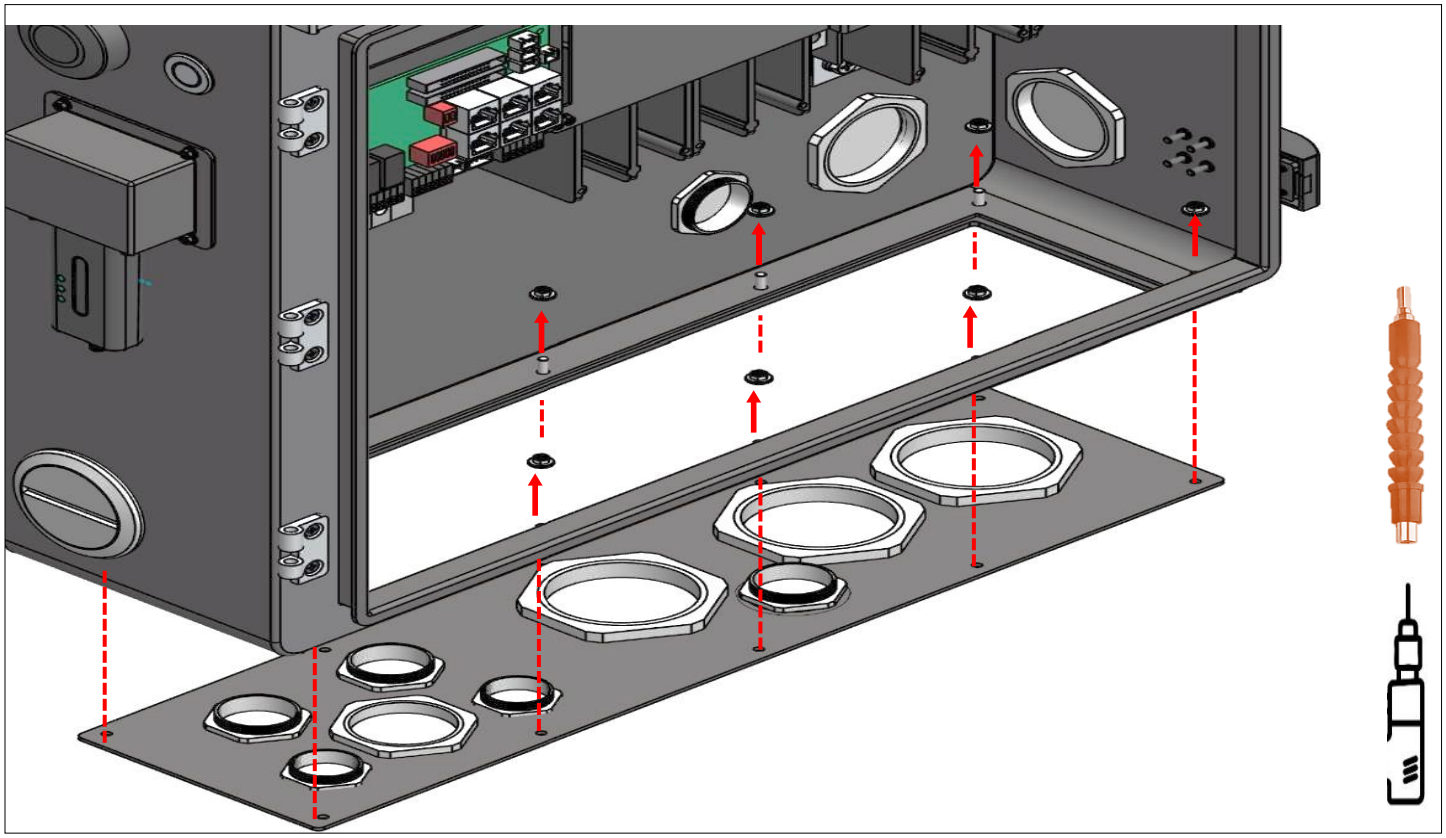


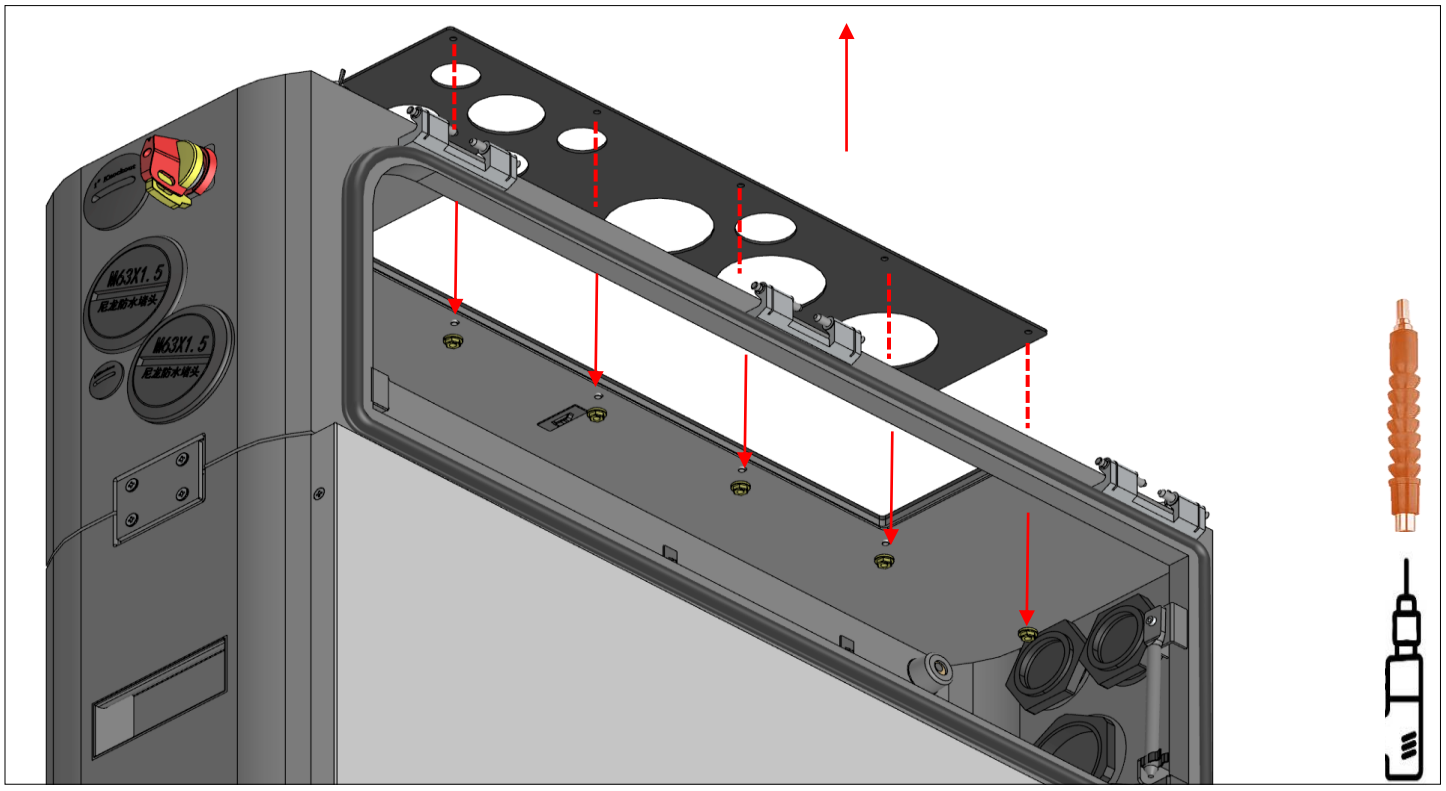
Install Envy Front Panel (optional accessory)

Remove the two top back screws attached to the Envy and install the Envy Front Panel Bracket.



Battery Installation with Envy on top

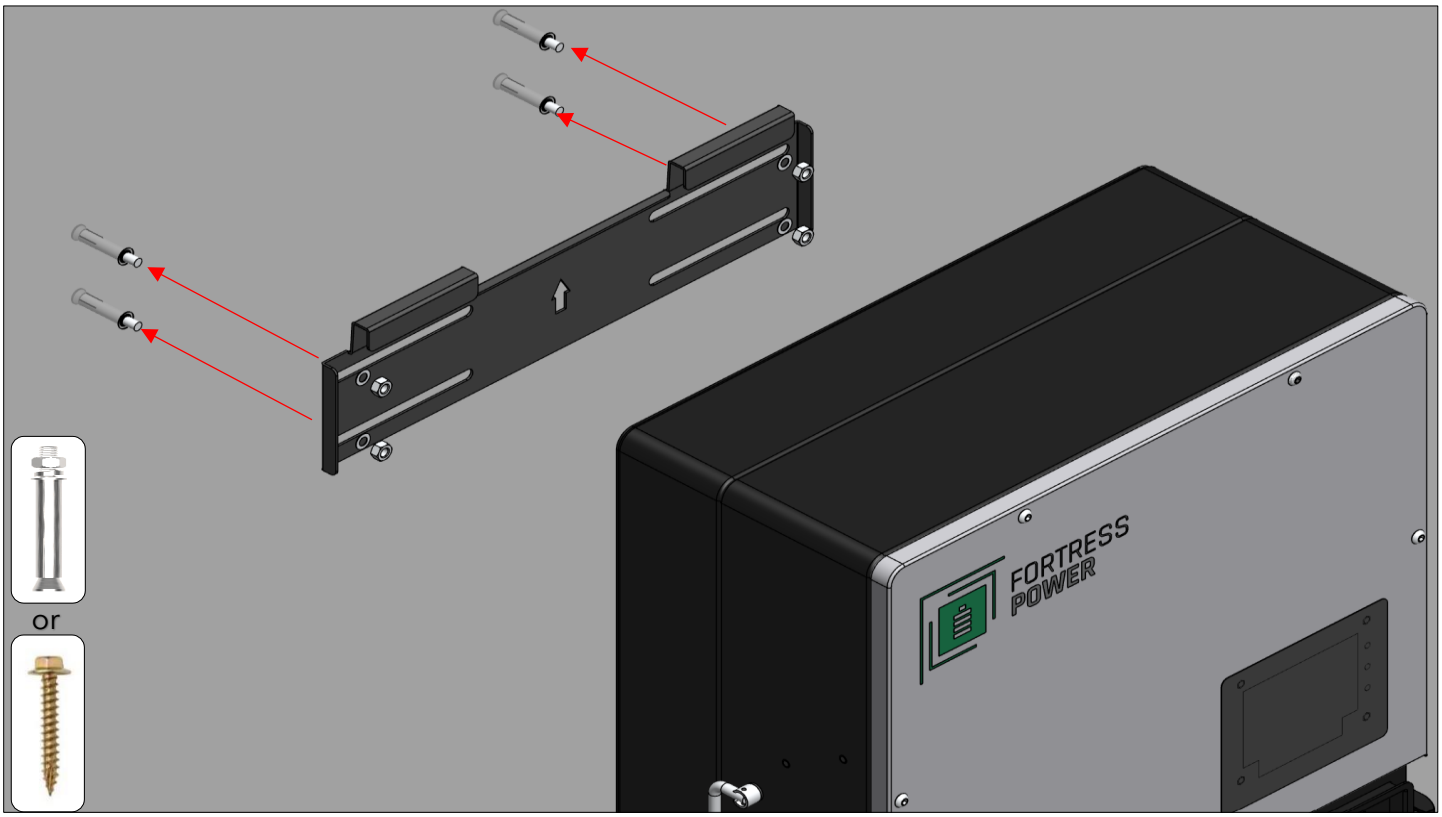




Remove the bottom of the inverter with the bendable screwdriver extension along with the included Rubber gasket. Remove the Top Cover of the eWay with the bendable screwdriver extension. **Do not remove the rubber gasket, otherwise the system will have water ingress.**

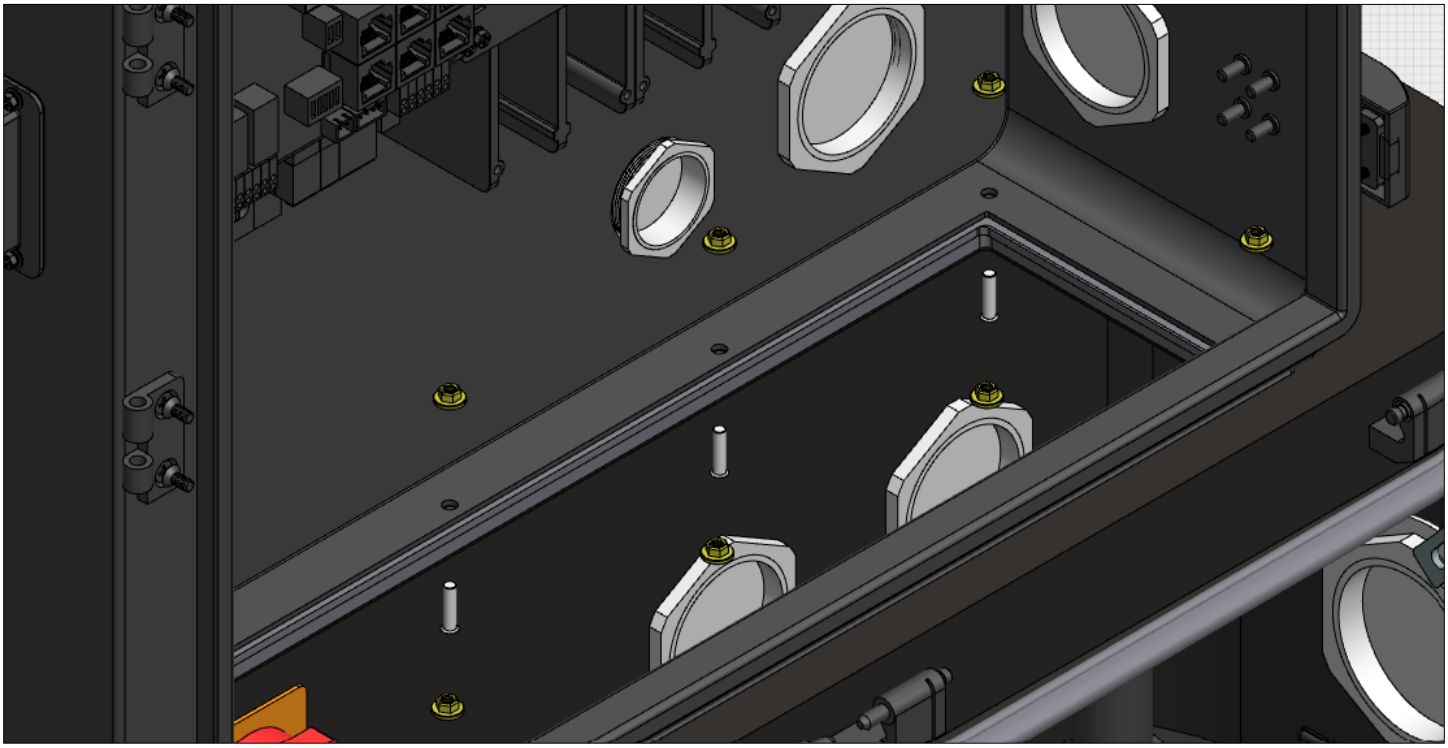
Install the Envy Inverter

Secure the wall bracket into the wall and install the inverter.

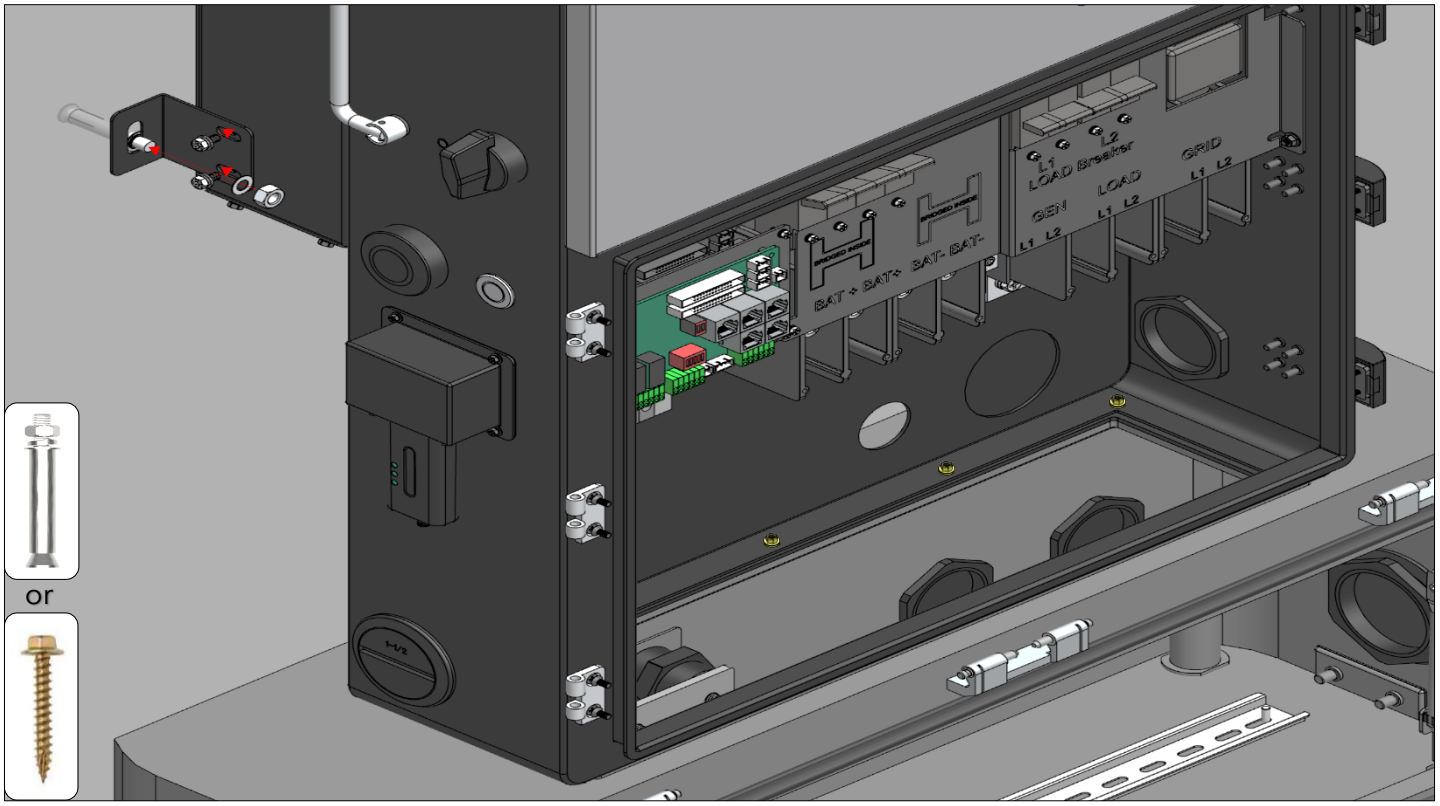


Make sure the inverter is properly aligned with the bottom rubber gasket.

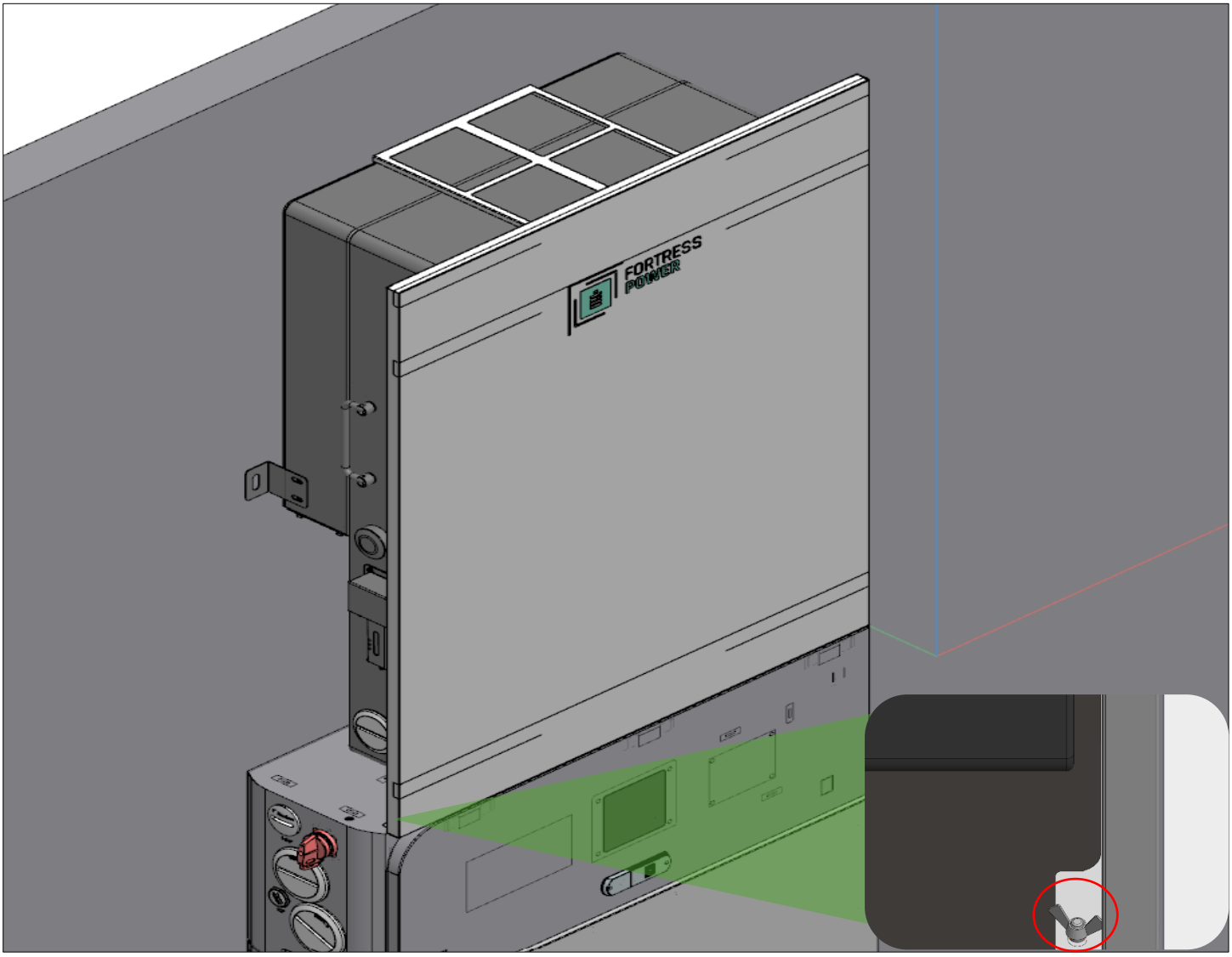
Secure the inverter bottom with top of eWay.



Secure the inverter with the side brackets.

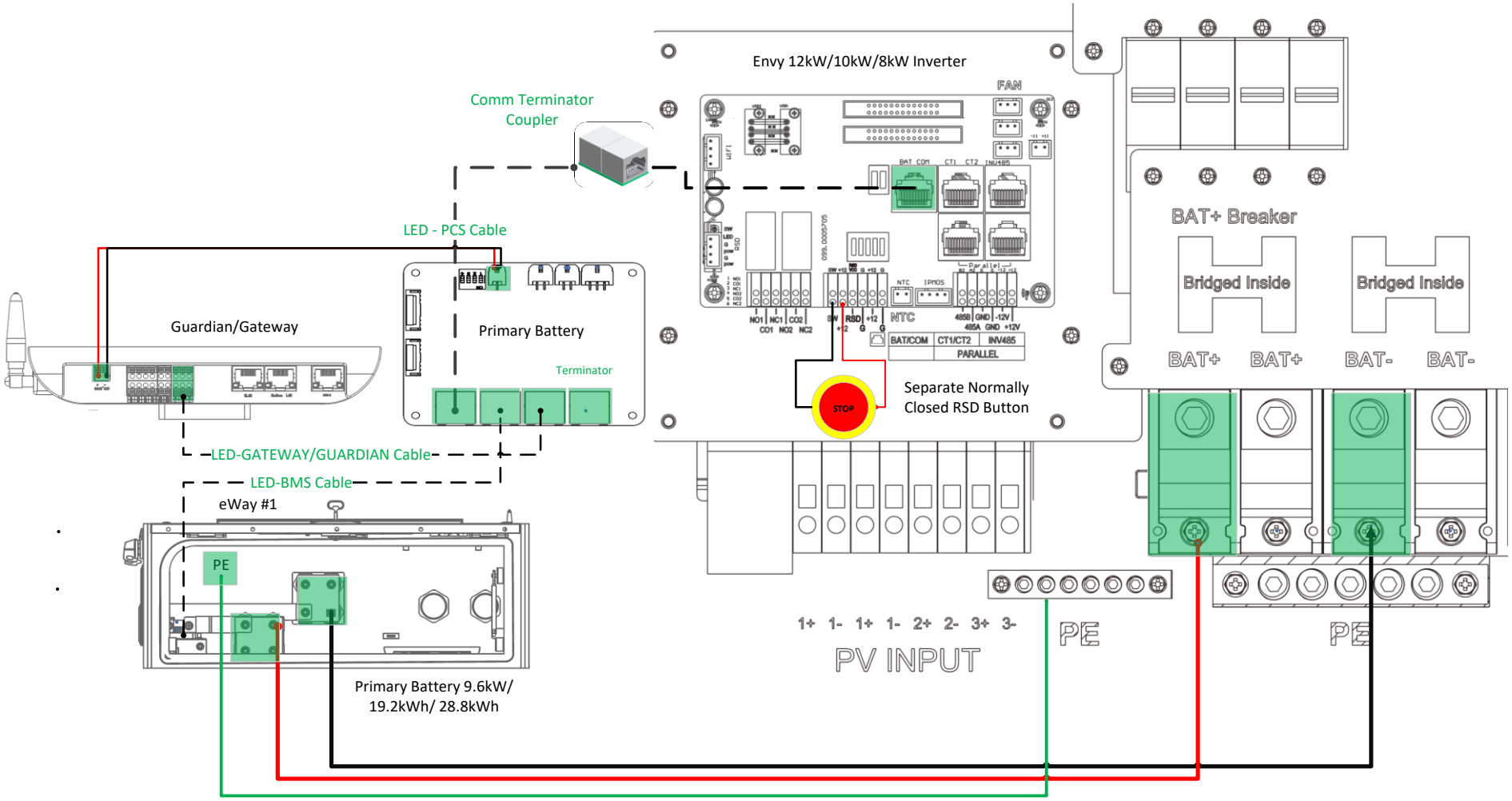


Finalize installing the Envy Front Panel **AFTER finishing commissioning the system.**



10.3.1 Connection Overview

One eForce Battery and Envy Inverter Electrical Connection Overview



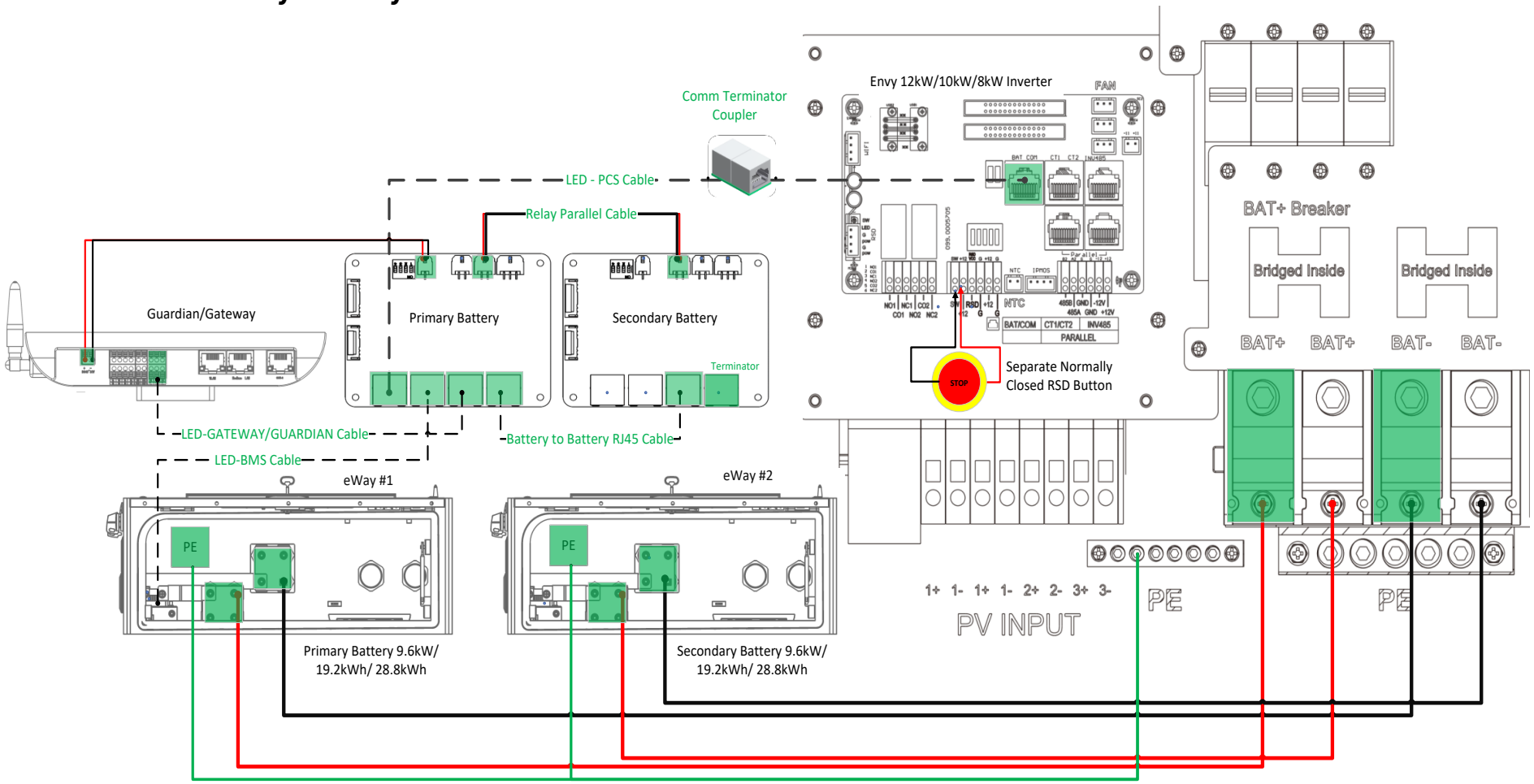
When operating with one eWay, keep the terminator plug placed in its original position. Plug one side of the **BAT-PCS cable** into the **RJ45 ports of the Communication board** and the other side to the **Comm Terminator Coupler**. Then, plug the battery -pcs cable included with the inverter packaging. Plug one side into the coupler and the other side into the inverter **BAT COM port.**

RSD features include complete system shut off by disconnecting the batteries voltage output, Disabling PV Voltage, and Load Output per NEC 2023 Code. To achieve this, Follow the connections in the above image.

Legend

- Positive
- Negative
- Protective Earth
- Communication
- Required Area

Two or more eForce Battery and Envy Inverter Electrical Connection Overview

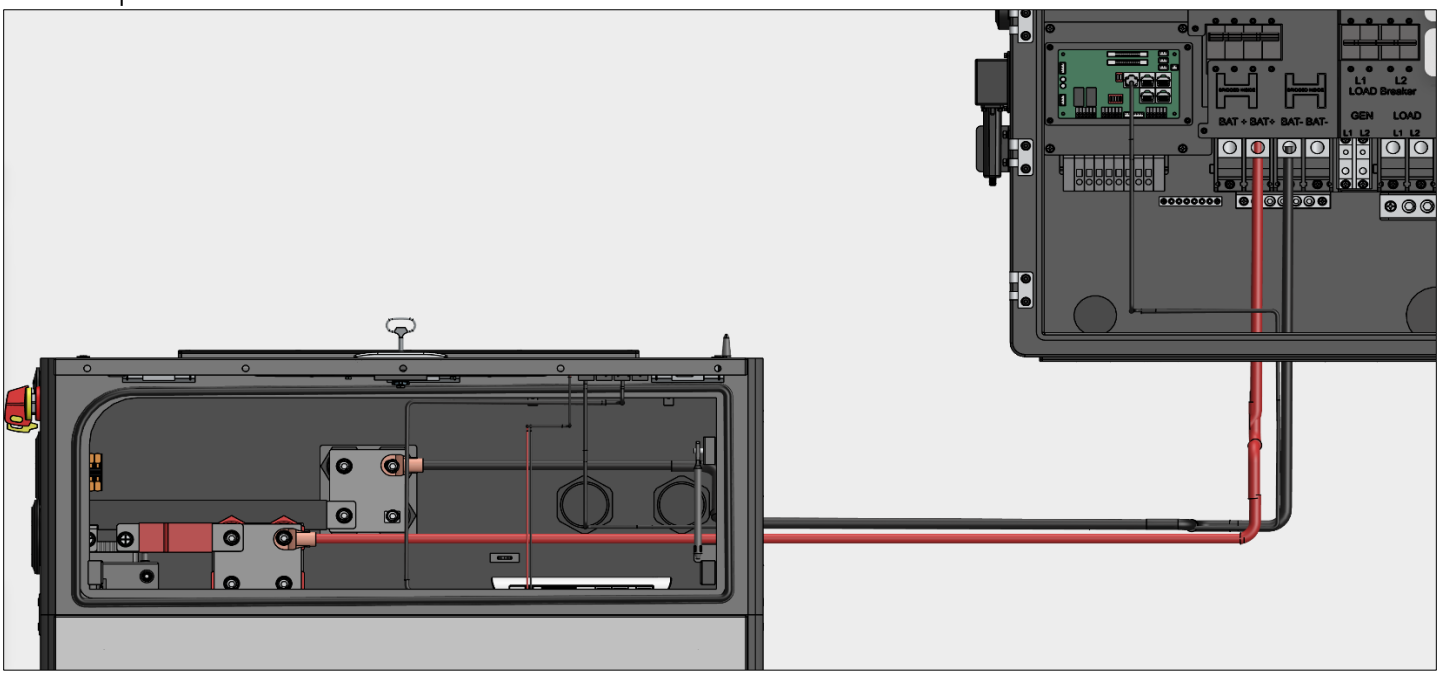


Remove the terminator from the first eWay and place battery to battery communication. Make sure that the secondary eWay keeps the terminator connected in its original port. Connect the Battery -Battery RJ45 Cables in daisy chain sequence starting with the first battery to the last. Place the Resistive RJ45 plug into the terminator Port of the last secondary battery following chronological sequence starting with the Primary Battery. Plug the Relay Parallel Cable from battery to battery. For More details of parameter settings with the eForce, please refer to the Fortress Power Envy 12kW/10kW/8kW Manual.

Legend

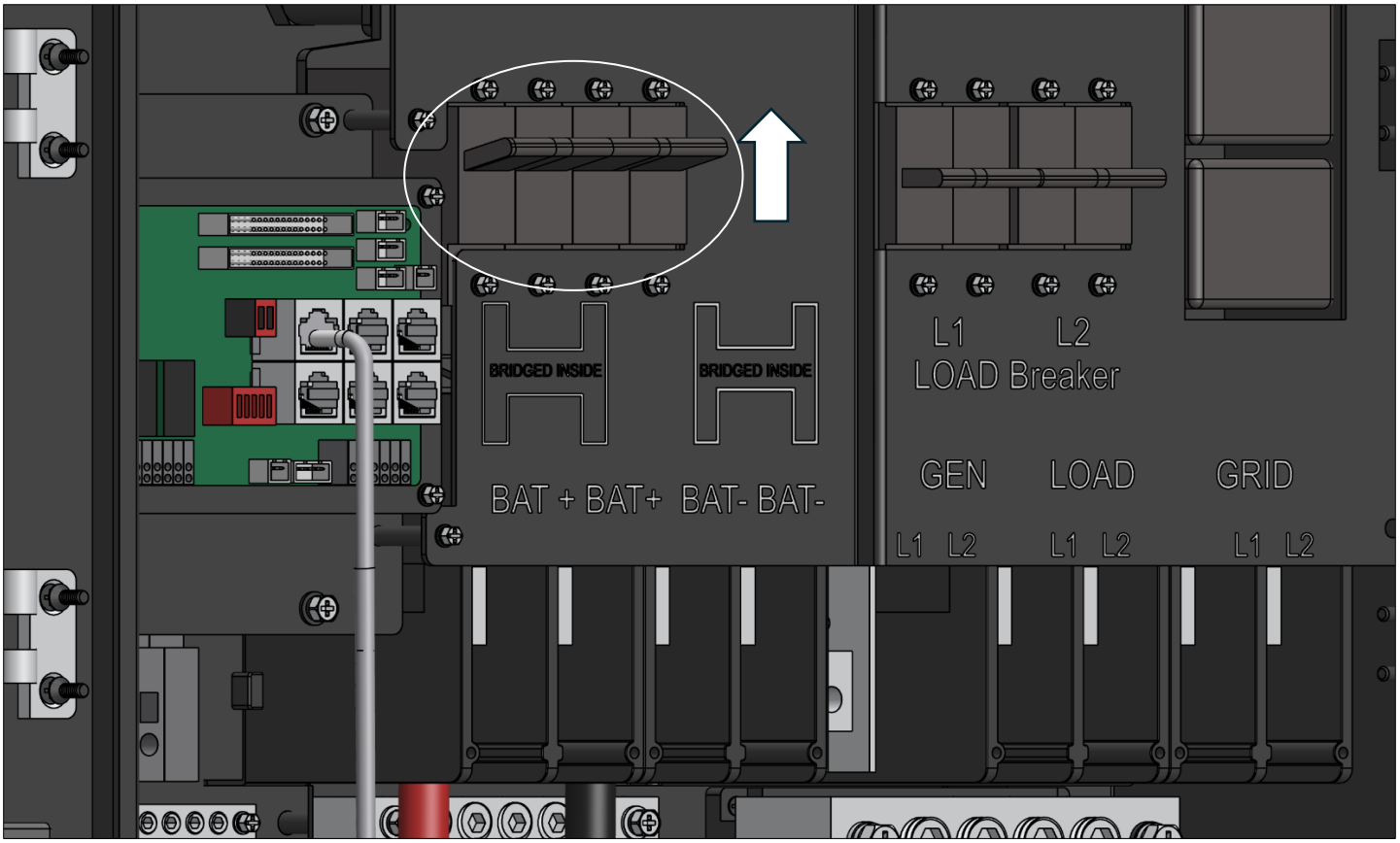
- Positive
- Negative
- Protective Earth
- Communication
- Required Area

The Guardian Connections are already connected. You use the 120V AC-DC plug for resiliency, but it is not required.

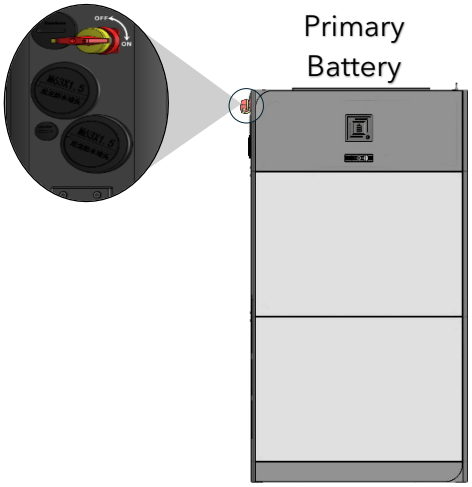


11. Commissioning

1. For Commissioning batteries where multiple eWay are in parallel, please go to the "Commissioning in Parallel" section.
2. Turn the battery breaker inside the inverter. See below.



3. Turn the battery power switch on as shown in the image below. The battery will make a clicking sound which means that the internal contactors have energized the battery. Verify by applying a voltmeter at the eWay internal busbar.

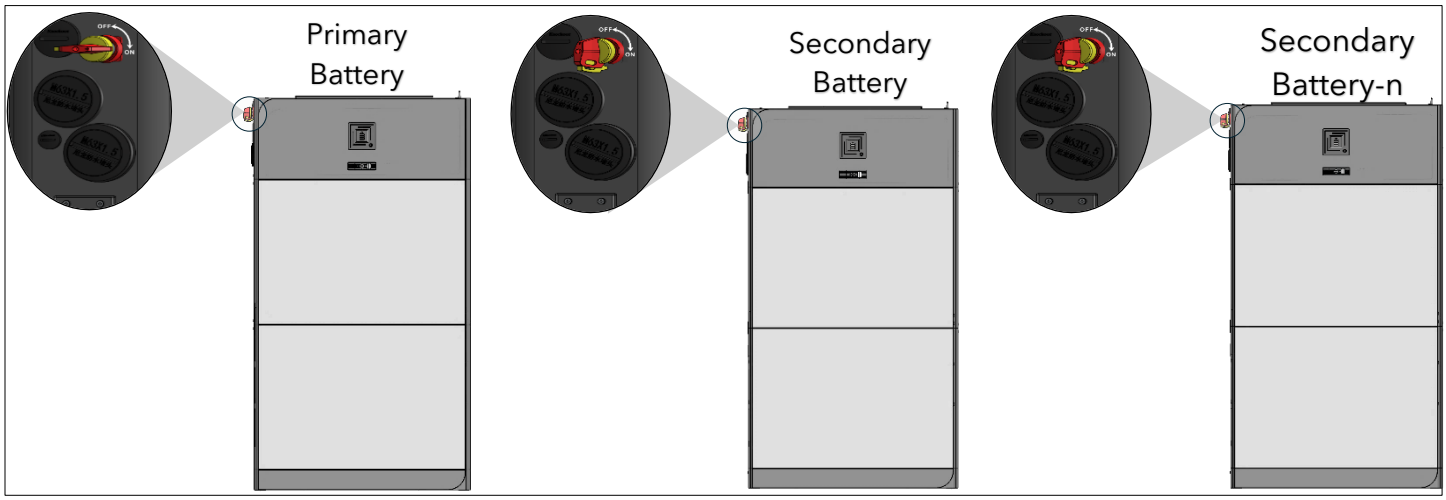


4. Make sure that the Guardian is powered on and follow the Quick Start Guide starting with step 6.
5. Scan the QRCODE on cover page of the manual to download the Guardian APP.

11.1 Commissioning multiple eForce 9.6kWh batteries in parallel

For a maximum battery bank size of 153.6kWH, up to 16 eForce 9.6 batteries can be connected in parallel. All wires should be an appropriate gauge and constructed to manage the loads that will be placed upon them. A qualified installer should understand this and must adhere to industry standards and published electrical guidelines. The storage capacity and total permissible charging and discharging amperage are increased by the parallel arrangement. The overall voltage is not changed. Instead, the available amperage from the system is increased with each additional parallel battery.
Please follow this procedure to commission eForce 9.6 batteries in parallel:

1. Double Check if battery-battery communication cable is connected and secured.
2. Turn all DC Breakers ON (Hybrid Inverter, Charger Controllers)
3. Turn on the first battery's Power Switch (the first battery is the one communicating with inverters). **Do not turn on the switch of the other batteries.** If all cables are correctly connected, LED will commence booting sequence, and the other batteries will engage by making a clicking sound.



4. Measure Voltage inside the eWay busbar to confirm.
5. For inverter-specific settings, visit https://www.fortresspower.com/support for the most recent integration manual for each specific inverter brand.

12. Settings

12.1 Voltage and Amperage Settings

IMPORTANT The Hybrid Inverters need to be digitally programmed to comply with correct amperage and voltage stated elsewhere in this guide. Special communication cables may need to be field made. If using battery-inverter communication, please consult our inverter guides: https://www.fortresspower.com/inverter-guides

- Do not use unqualified equipment for charging and discharging, please follow the correct instructions for use.
- Do not discharge the battery when the battery is depleted.
- Do not charge or discharge batteries that are hot, deformed, or leaking.
- The output cable length of the battery should be less than 10 meters long.
- Do not mix different batteries. Different manufacturers, chemistry, models, and lifespans cannot be paralleled.

12.2 System Commissioning

Final installation and operation guidelines will be dictated by your Local Ahj and Installer based on the specifics of your installation and any code requirements that apply to your region. Fortress Power technicians and sales staff are available to provide any additional information on the Fortress Lithium Batteries as needed. Please be aware of the potential electrical hazards before interacting with any and all electrical or mechanical devices. Please take all necessary safety precautions in your projects and installations.

Charging Voltage:

Without battery-inverter communication, eForce 9.6kWh batteries should be charged at 51.5V.

Low cut-off voltage:

The eForce 9.6kWh battery is below a 20% state-of-charge when its resting voltage is below 46V. In order to keep the inverter and battery system powered up while waiting for a charge, this is the recommended low battery cut-off voltage. The eForce 9.6kWh has a safety feature that will cut around this voltage level if necessary. If you regularly deep discharge the eForce 9.6kWh down to 42V, please increase your battery size or upgrade your inverter to maintain warranty compliance.

Charging and Discharging Amperage

The eForce 9.6kWh can safely operate at 195A per battery, but its maximum rating is not intended for long duration use. Unless otherwise specified through our inverter guides, set the charge and discharge rates of the eForce 9.6kWh at 100A to comply with the 10-year warranty. Any grid sellback or demand management function should also be limited to 100A per eForce.

Precaution should be taken when adding charging sources which are not controlled by a single inverter or control system (Ex. using different manufacturer's DC charge controllers and inverters, solar inverters, EV chargers etc.) to ensure the total system charges or discharges the battery within its specification. Controllers do not charge the battery concurrently, when and if their combined charge current totals are greater than the charge current of the combined battery bank.

12.3 Charging Notes

If the following scenarios occur, the battery must be charged before use, otherwise the battery damage caused is not covered by the warranty:

- The battery has not been powered on
- The battery has been turned off for a long period during transportation or storage.

- The battery has been deeply discharged and reached under-voltage protection status.
- The battery has been aggressively recharged during deep discharge conditions through bypassing the BMS.
- The battery has been recharged during freezing condition through bypassing the BMS.
- Bypassing the BMS is not allowed without logging a support ticket with Fortress Technical Support at https://support.fortresspower.com

12.4 Discharging Notes

- Do not regularly discharge battery below 46V, 20% SoC. This capacity should be reserved for power outages and idling the load until a charging source can be applied.
- Do not discharge battery at rates greater than maximum continuous current.

Parameter set up guide for Charger/Inverter

Unless explicitly stated in Fortress Power inverter guides or contrary to the above charging amperages and voltages, charge controller and inverter settings must be programmed per the manufacturer's recommendations. Consult the manufacturer's manuals and/or access technical support. To achieve extended life cycles and to comply with the Warranty, the following guidelines should be followed:

12.5 Understanding Charge Stage

1. Bulk Charge: Charge at Constant Current (CC) to Bulk/Absorb Voltage.

2. Absorption Charge: Maintain Constant Bulk/Absorb Voltage (CV). Note - if the battery is not reaching 100% capacity, it is allowable to adjust this voltage from 51.5V to 51.6V. Any higher charging voltage may void product warranty.
3. Unless otherwise stated in a Fortress Power inverter guide, keep float voltages at 51V or less to maintain warranty compliance. While most end users will want to enable a float mode of operation if available to keep batteries at 100%, it is healthier for the battery only to use the bulk/absorb cycle - which allows the batteries to exercise daily. This provides an ideal cycle life

12.6 Heating Element Operation

TEMPERATURE	HEATING ELEMENT STATUS (125W)	CHARGE/DISCHARGE STATUS
≤ -4°F (-20°C)	OFF	OFF/OFF
-4°F (-20°C) <TMIN≤32° F(0°C)	ON	OFF/ON
32°F(0°C) <TMIN≤41°F(5°C),	ON (Stop Heating @ Tmin>50°F (10 °C)	ON/ON
TMIN>41°F(5°C)	OFF	ON/ON/
VMIN<45V OR SOC<20%	OFF	ON/ON

The integrated heaters are energy-efficient, activating only when necessary, to preserve battery life and enhance overall system efficiency.

12.7 Decommissioning

At the End of Cycle Life retained capacity is equivalent to 70% Year 1 Capacity. eForce 9.6kWh contains scrap material useful to recycling. Dispose of the battery at a local recycling center or ship back to Fortress Power. Transport end-of-life batteries at 30% state-of-charge.

Key Points Summary

1. Each Fortress Lithium Battery contains circuitry that protects the Lithium Ferro Phosphate cells from overcharging, over-discharging, and excessive load amperage. If the values specified are exceeded, the battery will enter a protective shut down state. In some cases, this may result in the need to reinitialize an inverter charger or other pieces of equipment in the installation. In other cases, the inverter's system settings may be saved within the inverter memory storage and will not need to be

reset. This is not an absolute standard but is common among most inverter chargers. Check your inverter manufacturer specifications.

2. Although each Fortress Lithium Battery contains circuitry that protects the Lithium Ferro Phosphate cells from overcharging, over-discharging and excessive load amperage, Fortress Lithium Batteries must always be installed with a charge controller and appropriate settings to protect the batteries from open PV and other high voltage sources. Fortress Lithium Batteries alone will not protect from extreme electrical phenomena.
3. GRID TIED SYSTEMS: Once the Fortress Lithium Battery has been installed, turn on the entire system to test. Once testing has been completed, please disconnect the batteries from the load center until your local Utility Inspector is ready to turn on the entire system. The charge controllers and inverter monitoring systems can drain the Fortress Lithium Batteries over an extended period when the entire system is not fully operational due to the electrical draw of the system components.
4. OFF GRID SYSTEMS: Do not connect the Fortress Lithium Batteries until the entire system is ready to turn on and is fully operational.
5. See Inverter and Charge Controller Settings on the Fortress Power website for recommended settings at https://www.fortresspower.com/resources/.

13. Contact Information

FORTRESS POWER
Secure your energy

For Technical Support Please Contact us at
Tech-Support Contact Information

Useful Links

- Phone:

Tech Support (877) 497-6937
Tech Support (Spanish) (215) 710-8960

- Support Tickets: https://www.fortresspower.com/support/
- Warranty Submittal: https://www.fortresspower.com/warranty/

Updated Documentation

System Design Tool
SCAN HERE