



FORTRESS
POWER

Secure your energy

Lithium Energy Storage Company Presentation

About Fortress Power

Fortress Power and Product Line



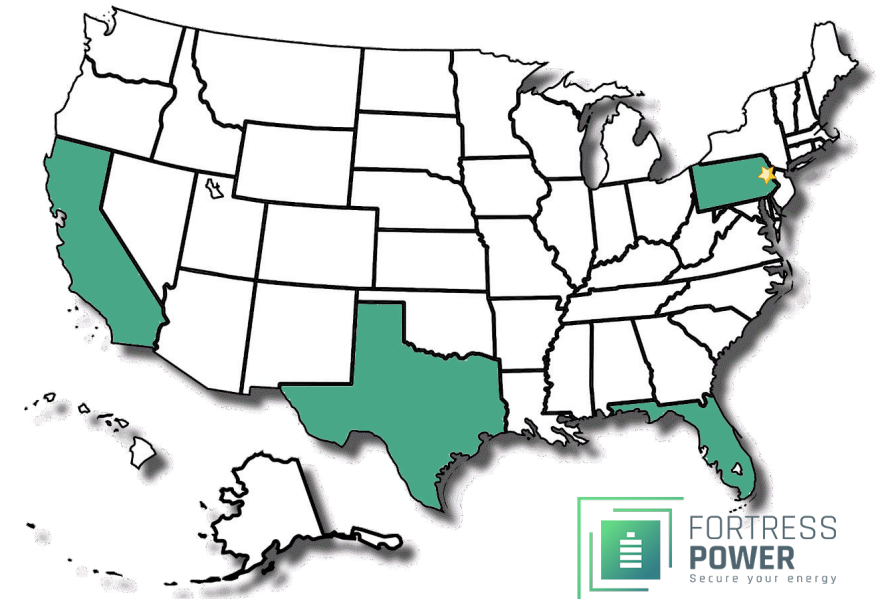
About Fortress Power

U.S. Headquarters

A US Leading Lithium Iron Phosphate battery Manufacturer for both residential and commercial applications



- U.S. Headquarters: Southampton, PA
- 30,000 Sqf Main Facility for R&D, Sales and Logistics
- + 3 Warehouses in CA, TX and FL
- 120+ MWH Installs in US, Canada, Central Caribbean, South America, Europa and Africa
- Primary Lithium Battery Supplier for SEPTA,
- Hydro Quebec & Navajo Tribble Utility
- 200-300% Annual Growth Rate



About Fortress Power

120% support for our distributors and installers

- Hands-on management team
- Personalized Client Relation
- Provide Co-Marketing Support & Free Leads
- Design and Installation Support
- Webinar and training (NABCEP credit)
- Job Shipment at request



About Fortress Power

Our US Distribution Partners



For a complete list of Fortress Power Distribution Partners – Visit <https://www.fortresspower.com/where-to-buy/>

About Fortress Power

Our Financing Partners

 LOANPAL[®]

 **Sungage** Financial
We help you shine.

 MOSAIC

 **LIGHTSTREAM**[®]
A DIVISION OF SUNTRUST BANK

EnerBankUSA[®]
America's home improvement lender of choice

 Sunlight Financial[®]

Fortress Power Products

Relay-based BMS & Prismatic Cells



eVault 18.5

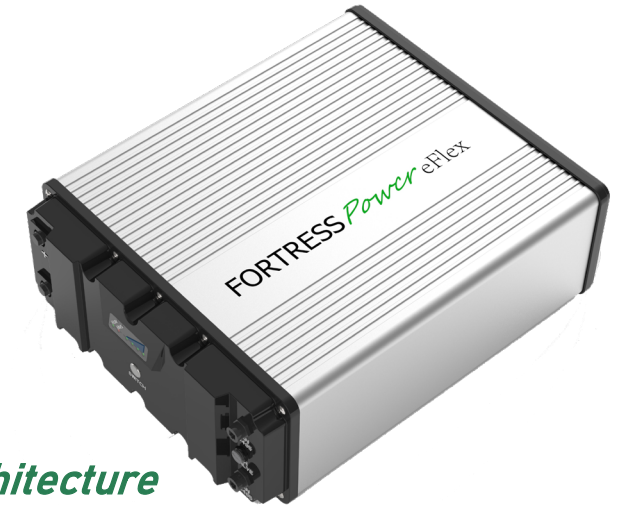
- Scalable up to 220kWh
- Local Monitoring through LCD Display
- Large Storage Capacity for Easy Install
- Easy Install & Sleek Look
- The largest SGIP approved battery
 - ->more rebate \$ (18.432 DC Power & 17.877 AC Power)



eFlex 5.4

Cell-to-Pack Architecture

- IP 65 Aluminum Enclosure (Outdoor Rated)
- Scalable to 80kWh and Flexible Install (Floor, Wall, Shelf Rack)
- Versatile Applications: Renewable, Telecom., Railway, Marine & RV...
- Remote Monitoring, Closed-loop Communication, IoT ready
- Integrated Heat Sink for 5x Thermal Performance



Fortress Power Products

Relay-based BMS & Prismatic Cells



eVault Max 18.5



The Largest Single Residential Battery on the Market!

- More Scalable – Up to 20 Units (Up to 370 kWh)
- Closed Loop with Inverters
- Robust and Intelligent Digital Processor Based BMS (Battery Management System)
- Largest Capacity / Full Home Back-Up
- Optimized Internal Structure Makes for an Easy Installation
- AC/DC Coupling Capable



FlexRack
For eFlex 5.4 batteries

- Includes Integrated Busbars for Easy Stacking
- Easy to Add DIN Rail Thermostat for Cold Climates
- Passive Colling Vent for Warm Climates
- Built on Wheels for Easy Movement & Positioning
- Expandable up to 4 eFlex Units

Fortress Power Products

Technical Specification



	eVault 18.5	eFlex 5.4
Total Energy [KWH]	18.5	5.4
Capacity [AH]	360	105
Battery Voltage [V]	48V Nominal (Actual = 51.2V)	
Max. Charge Current (Continuous) [A]	160	100
Max Discharge Power (Continuous) [KW]	9 (180A)	5 (100A)
Peak Output [KW]	12 (240A)	6.6 (130A)
Parallel Stacking	12	15
LCD Monitoring	Yes	No
Communication	CAN/RS485	CAN/RS485
Breaker/Fuse	250A	125A
Warranty	10 years; 6,000+cycles	

Fortress Power – UL9540 Certified



UL 9540

- Can used in conjunction with any UL 1741-certified inverter(s)
- Required by California, New York, Massachusetts and so on
- This standard addresses the critical safety functions and control systems of stationary Energy Storage Systems (ESS)
- includes environmental, mechanical, electrical and production and manufacturing tests.



Enclosure Comparison

Why aluminum?



Aluminum Enclosure



Saltwater proof



Nice aesthetic

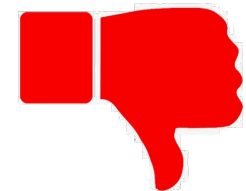
Outdoor install (eFlex 5.4)

Easy & flexible Install

Plastic & Iron Case



Saltwater corrosion



Indoor install only

Time consuming install

Battery Cell Comparison

Why tier 1 Prismatic Cells ?

Prismatic Cells



Pouch Cells



Cylindrical Cells



	Prismatic	Pouch	Cylindrical
Durability	★★★★	★	★★
Power Density	★★	★★★★	★
Thermal Stability	★★★★	★★	★★★★
Longevity	★★★★	★★	★
Simplicity	★★★★	★	★★
Fast charge & discharge	★★★★	★★★★	★★



Battery Management System Comparison

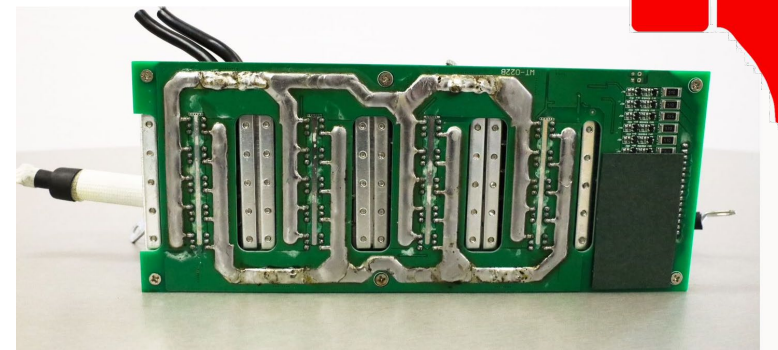
Why build smart embedded computer into the BMS?

Fortress Power
Digital processor based BMS



- Closed Loop Control
- High quality (automotive standard)
- Safe protection with solid-state-relay & fuse
- High input and output power
- Safe response to inverter's inrush current

Competitor's
MOSFET BMS



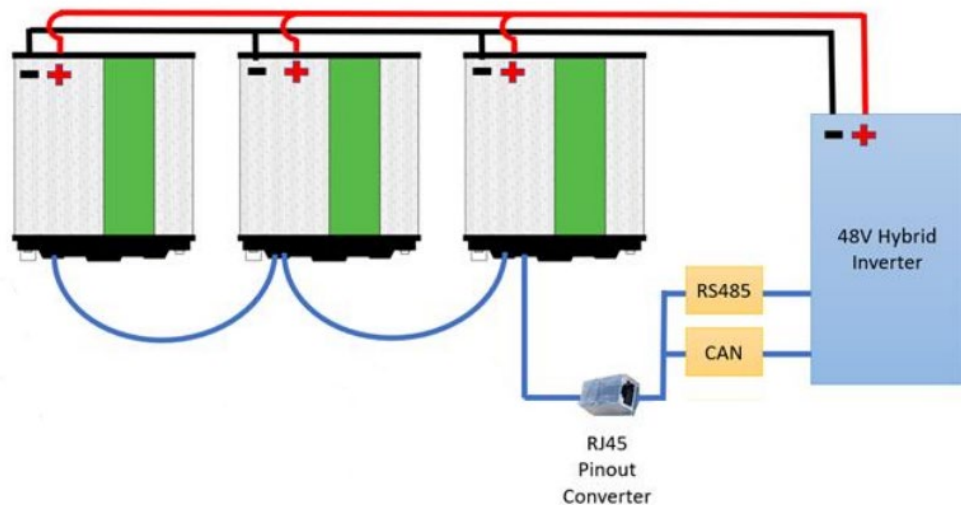
- Closed Loop Control
- Cheap
- Potential thermal runaway with cheap MOSFET
- Low input & output power
- Possibly fail to response to inrush current

Why Closed Loop Control

Dynamic control multiple units with smart BMS



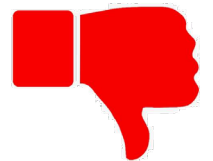
Fortress Power



- Highly scalability with maximum reliability (up-to 220 kWh)
- **Closed-loop** communication with Inverter
- Communication between batteries in parallel
- Internet of Things (IoT) ready



Competitors



- Low scalability & poor reliability
- **Open loop** communication with Inverter
- **No communication** between batteries in parallel
- **Not IoT** ready

Why Closed Loop Control

Closed-loop communication with smart BMS



Closed Loop Control

- BMS reports to inverter
- Dynamic Charge & Discharge control
- Regulate through State of Charge

Batt Setup

Batt	Charge	Discharge	Smart Load	
Shutdown	46.0V	20%	Batt Resistance	25mOhms
Low Batt	47.5V	35%	Batt Charge Efficiency	99.0%
Restart	52.0V	50%		
Batt Empty V	47.0V			

CANCEL OK

Open Loop Control

- BMS **doesn't** report to inverter
- Inverter uses **manual** battery charge & discharge settings
- Regulate through battery voltage

Batt Setup

Batt	Charge	Discharge	Smart Load	
Shutdown	46.0V	20%	Batt Resistance	25mOhms
Low Batt	47.5V	35%	Batt Charge Efficiency	99.0%
Restart	52.0V	50%		
Batt Empty V	47.0V			

CANCEL OK

Why Closed Loop Control

Benefits



Accuracy

- BMS controls Charge and Discharge via SOC (state of charge)
- Dynamic interaction between the battery and Inverter



Improved User Experience

- Plug & Play-> Less Parameter settings
- Remote monitoring & Control



Higher System Performance

- Accuracy control leads to longer battery life span
- More energy output



Compatible Inverters

Compatible with all well-known 48V chargers and hybrid inverters!



Brand	Inverter/Charger Mode	Configuration
Schneider **	Conext XW MPPT charge controller; Conext XW+/XW pro series;	AC or DC coupled
Outback	Skybox, FLEX max charge controller (48V), FLEXpower series (48V); Radian series (48V); FXR(A) and FXR (E) series (48V); GVFX and GVFX series (48V);	AC or DC coupled
Magnum	MS 4448PAE; MS 4048-20B	AC or DC coupled
SMA**	SUNNY ISLAND 4548-US/6048-US; SUNNY ISLAND 3.0M/4.4M/6.0H/8.0H	AC coupled
Sol-Ark**	8 KW & 12 KW Inverter	AC or DC coupled
Victron **	Phoenix VE.Direct Inverter; MultiPlus and Quattro Inverter/Charger; Skylla-TG Charger; General; Color Control or Venus GX	DC coupled
Morning Star	TriStar MPPT 600V; TriStar MPPT; Tristar PWM	DC coupled
Midnite Solar	Solar Classic 150, 200 & 250; Solar Classic 150, 200 & 250-SL	DC coupled

**Closed-loop communication is available

Inverter Partners

Fortress + Schneider



We are Schneider approved battery partner

Inverter Partners

Fortress + SMA



We are SMA approved battery partner

Inverter Partners

Fortress + Sol-Ark



We are Sol-Ark approved battery partner

Inverter Partners

Fortress + Outback



OutBack
Power Systems

We are Outback approved battery partner



Design Guide

Sizing Battery Bank – 4P Rule



Continuous Power: Check System's Maximum Discharging Current

$$\sum_{battery\ bank\ continuous\ rating} \geq \sum_{inverter\ continuous\ rating}$$

&

Surge Power: Check Overcurrent Protection Device (OPD) Ratings

$$\sum_{battery\ bank\ breakers} \geq \sum_{inverter\ DC\ breakers}$$

$$\sum_{battery\ bank\ surge\ rating} \geq \sum_{inverter\ surge\ rating}$$

Total Power: Calculate the required battery bank capacity based on actual loads

$$\frac{\sum_{total\ energy\ needed\ (kwh)}}{\sum_{total\ available\ battery\ capacity\ (kwh)}} \times 100\% \leq 80\%$$

Charger Power: Check Charge Controller + Inverter to Battery Bank charge capacity

$$\sum_{battery\ bank\ max\ charge\ current} \geq \sum_{charge\ controller\ max\ output + inverter}$$



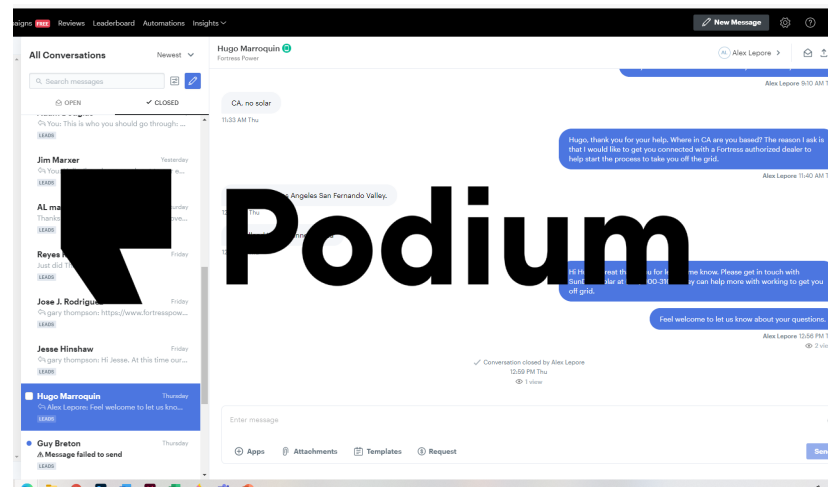
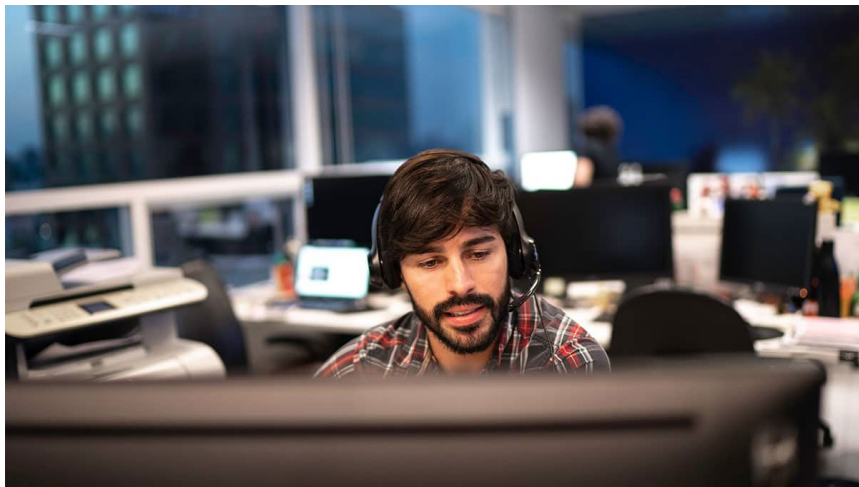
Design Guide

Sizing Table-Minimum Battery Quantity for 6000+ Cycles

	Inverter	eVault 18.5	eFlex 5.4	LFP10	LFP-5K-48V	LFP-5K-24V
		51.2Vnom	51.2Vnom	51.2Vnom	51.2Vnom	25.6Vnom
Schneider Electric	XW Pro 6848	1	3	2	3	—
	XW+ 6848	1	3	2	3	—
	XW+ 5548	1	2	2	2	—
	SW 4048	1	2	1	2	—
	SW 4024	—	—	—	—	—
	SW 2524	—	—	—	—	3
OutBack Power	Radian 8048A	1	3	2	3	—
	Radian 4048A	1	2	1	2	—
	<u>SkyBox SBX 5048</u>	1	2	1	2	—
	VFXR 3648A	1	2	1	2	—
	VFXR 3524A	—	—	—	—	—
	FXR 3048A	1	2	1	2	—
	FXR 2524A	—	—	—	—	3
	FXR 2012A	—	—	—	—	—
Sol-Ark	8K	1	3	2	3	—
	12K	1	3	2	3	—
SMA	Sunny Island 6048	1	3	2	3	—
	Sunny Island 4548	1	2	1	2	—
Magnum / <u>Sensata</u>	MS 4448	1	2	1	2	—
	MS 4048	1	2	1	2	—
	MS 4024	—	—	—	—	—
	MS 2024	—	—	—	—	2

Why choose our team

Personalized support



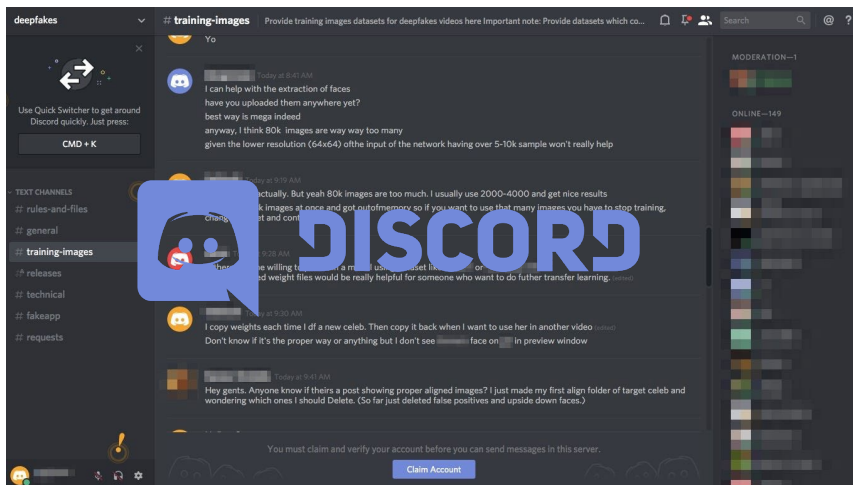
Fortress Power

505 Keystone Rd Suite D, Southampton, PA

4.9 ★★★★★ 30 reviews

“Fortress Power has been fantastic to work with. Their technical team is readily available for installation questions. Their shipping team keeps me informed of the timing of deliveries. The sales department makes sure we know about sale prices, new products, and their terrific discount for veterans. Few companies offer such support at all these levels. A super team to work with!”

- Lori Hunt Practical Preppers LLC



Fortress Power Technical Support team is HERE when YOU need us!

- Podium Chat Feature on our website
- Discord Community for tech support
- Email techsupport@fortresspower.com
- Phone: 877-497-6937

Why choose our team

Resource Center



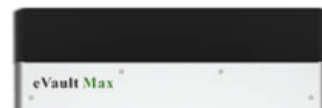
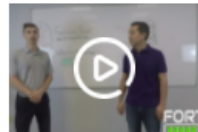
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eVault Max 18.5k LFP Battery



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