

Fortress Power

Company Presentation

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About Fortress Power

Fortress Power and Product Line



About Fortress Power

U.S. Headquarters

*We manufacture safe Lithium Iron Phosphate battery for both **residential** and **commercial** applications*

- U.S. Headquarters: Southampton, PA
- 30,000 Sqf Main Facility for R&D, Sales and Logistics + 2 Warehouses in CA and FL
- 70+MWH Installs in US, Canada, Central Caribbean, South America, Europa and Africa
- Exclusive Lithium Battery Supplier for SEPTA & Hydro Quebec
- 300% Annual Growth Rate



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.

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

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

 Sunlight Financial[®]



Why Lithium Iron (LFP) Technology?

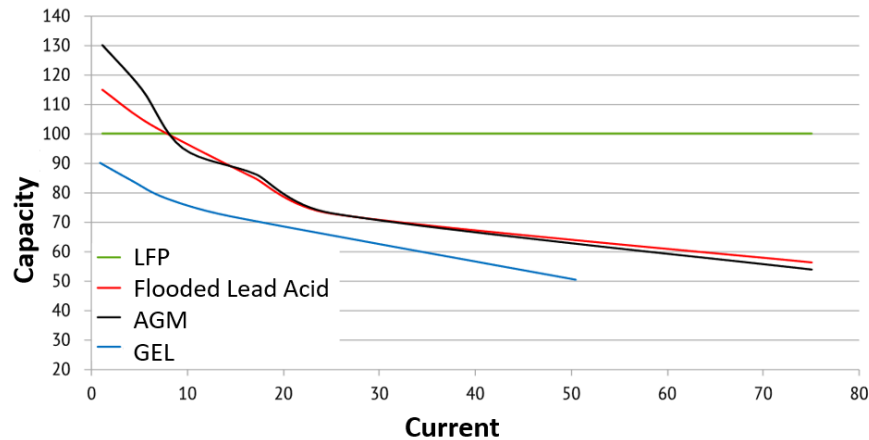
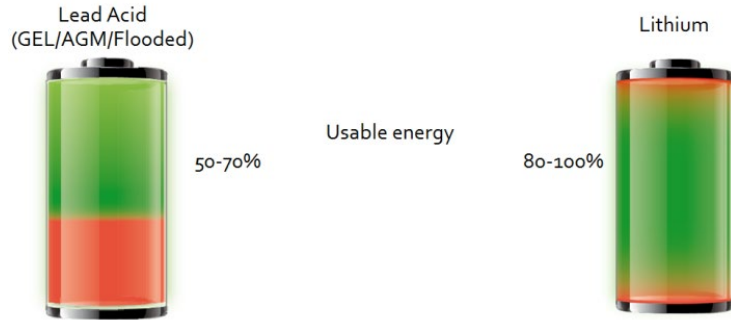
Why Lithium?

(over 90% Global new energy storage installs are paired with Lithium)



- ✓ Long Lifespan
- ✓ Low Energy Cost in Long-term
- ✓ 98% Roundtrip Efficiency
- ✓ Compact and Light-weight
- ✓ No Ventilation needed
- ✓ Zero Maintenance
- ✓ 100% Depth of Discharge
- ✓ Fast Charge/Discharge
- ✓ Consistent Discharge Power

Performance Comparison: Lithium vs Lead Acid



Lead Acid capacity drops significantly when output current increases!

LFP advantages:

- a) LFP Actual Capacity = Nameplate Capacity
- b) Lead Acid allows only 50% DoD, Actual Capacity = 0.5*Nameplate Capacity
- c) Lead Acid Capacity is affected by Discharge Rate, Temperature, and DoD at much higher rates than LFP.

Space Comparison: Lithium is 1/3 size and 1/3 weight of AGM



**Fortress eVault
48V, 360AH (18.5
kWh usable power)**

Why Lithium Iron?

We incorporate the safest technology available into our batteries

	Fortress Power	Tesla, LG Chem, Panasonic	Humless
Chemistry	Lithium Ferro/Iron Phosphate (LFP) or LiFePo4	Lithium Ion or Nickel- Manganese - Cobalt (NMC)	Lithium Polymer or LiPo
Safety	✓	X	X
Eco-friendly	✓	X	X
Thermal Stability	✓	X	X
Life Cycles	6000	< 3000	< 1500
Degradation Rate		LFP < NMC < LiPo	
Energy density		LFP < NMC < LiPo	

NMC = Good for Vehicles with Higher Energy Density; LFP = Best for Stationary Applications

Why Lithium Iron?

Highest Safety



Lithium Iron Phosphate Technology (Fortress Power)



Nickel-Manganese-Cobalt Technology (Tesla)

View [LFP vs. NMC nail test video](#) on YouTube

Why Lithium Iron?

Cost Comparison of various Lithium technologies



	LFP	Lithium Ion	Li-Polymer
Round trip efficiency	98%	95%	95%
Cycle Life @ 80% DOD	6,000	2,800	1,500
Off Grid Years	16.4	6.8	4
Energy Throughput ** in MWh	47	21.5	11.5
Homeowner Cost of 10 kWh	6,900	6,500	4,500
Cost per kWh	0.14	0.30	0.40
Safety	Yes	No	No

Energy Throughput: The total amount of energy a battery can be expected to store and deliver over its lifetime.

Energy Throughput = Nominal capacity x DoD x Efficiency x Cycle Life



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

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 Products

Why use Digital Processors based BMS?

	Competitors MOSFET-based	Fortress Power Battery Management System
Reliability (automotive standard)		✓
Low Cost	✓	
Inrush Current		✓
Fast Charging & Discharging		✓
High Conti. Power input and output		✓
High Capacity Cell Balancing		✓
Dynamic Control between Units in Parallel		✓
Versatile Protocol Communication with external Device		✓
Internet of Thing (IoT) Ready		✓

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 Quatro 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

** we're establishing close-loop communication with those inverters!

Inverter Partners

Fortress + Schneider



We are Schneider approved battery partner



Inverter Partners

Fortress + Sol-Ark



We are Sol-Ark approved
battery partner



Inverter Partners

Fortress + SMA



We are SMA approved battery partner



Inverter Partners

Fortress + Outback

OutBack
Power Systems

We are Outback approved battery partner



Close Loop Communication





Open Loop vs Closed Loop Battery Management

• Open Loop Control

- No BMS communication between inverter and battery
- Inverter uses manual charge settings provided by battery manufacturer (static)
- Li-ion BMS must provide final protection functions

• Closed Loop Control

- BMS communication between inverter and battery
- Inverter regulates charge/discharge according to the BMS (updated dynamically)
- Inverter provides battery protection as dictated by the BMS (de-rating or trip off)

If you have any questions regarding Fortress Power products, please email us at sales@fortresspower.com

If you have any technical questions for our tech-team, please email us at techsupport@fortresspower.com

We are also available by telephone at 877-497-6937

Visit us at www.fortresspower.com for more information

*Thank
you*