

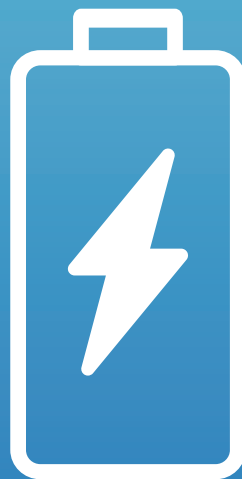


## **GOLD & MODULAR SERIES**

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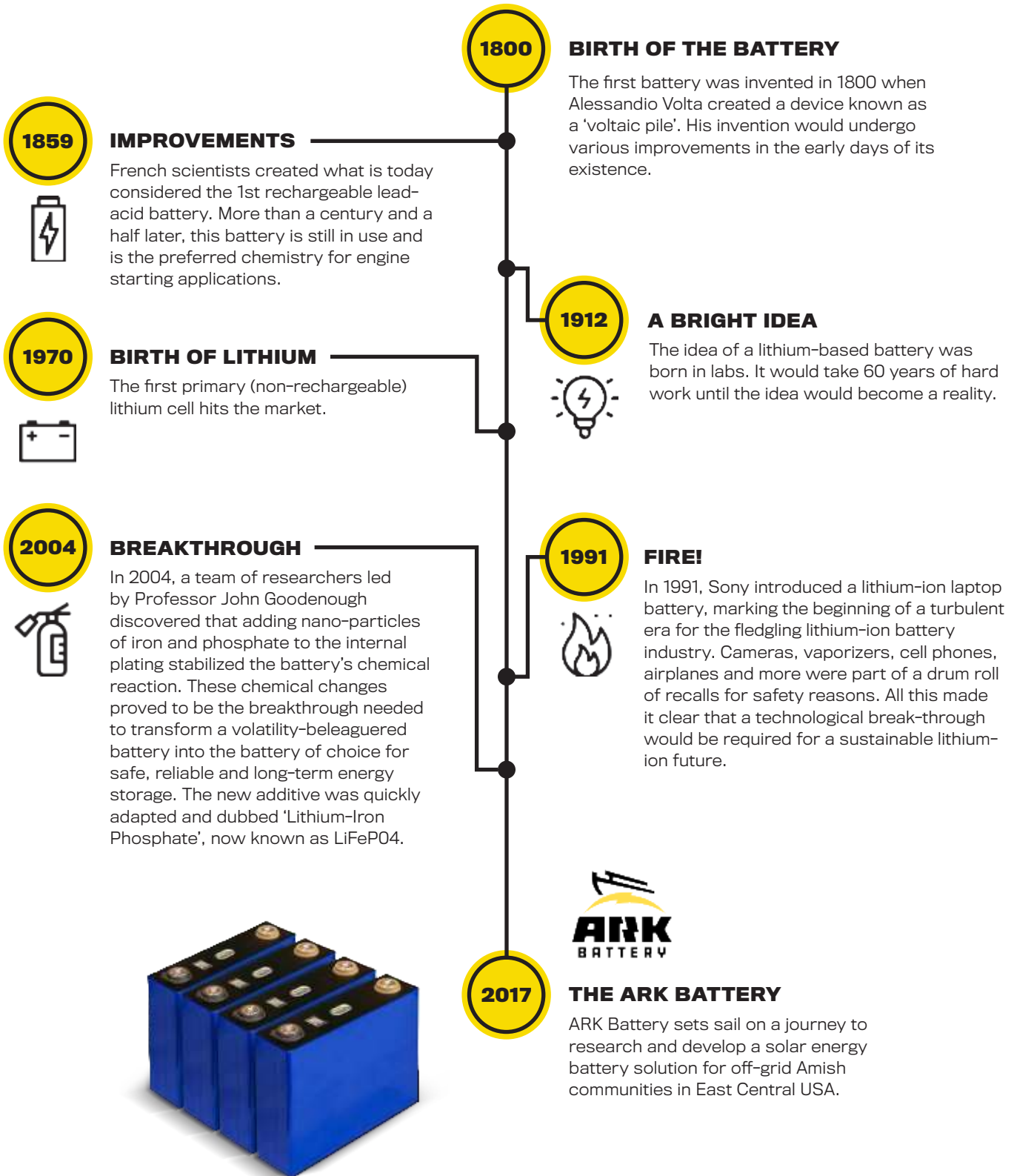
**Lithium Ion (LiFeP04)**

Batteries for solar energy storage.



# LEGENDARY POWER

Batteries are so ubiquitous today that they're almost invisible to us. Yet they are a remarkable invention with a long and storied history and an equally exciting future.





### **WHERE WE COME FROM**

In 2017 ARK Battery embarked on a journey to research and develop a solar energy battery solution for off-grid Amish Communities in East Central USA. As a team of off-grid solar system installers, ARK Battery's founders realized that a dependable, maintenance-free battery was the missing link in making renewable energy systems smooth and reliably autonomous. Little did we know how daunting our task would be!

### **NETWORKING**

Relationships are priceless at ARK Battery and from the start, we have made it our top priority to network with reputable professionals to help us design and build the best LiFePO4 solar battery. Today's battery market features many suppliers that source their batteries from a myriad of suppliers on Alibaba.com or similar websites and slap on their own logo to form their 'battery company'. This leads to potential dangers such as a low-amperage BMS (or no BMS at all), batteries labeled as 'LiFePO4', but containing other, less stable lithium chemistries, 'B' grade cells, bad connections, undersized cables and insufficient balancing. Poorly constructed batteries are a fire-hazard! More than 1,500 factories and corporations offer lithium-related services, but only a few offer the combination of thorough, technical product knowledge, high quality and integrity. ARK Battery has joined forces with these elitists and designed a high performance battery solution that is suitable for rigorous, off-grid cycling and ensures that our customers receive an outstanding product and performance.

### **PRODUCTION**

Most of the components in an ARK Battery are manufactured with automated equipment to ensure consistent, high quality. Each individual cell is relentlessly tested for flaws or material deficiencies. This testing process spans 1-2 months before the cells are considered qualified for the market. In assembly-line fashion, cells are laser-welded together. Tightly secured, the BMS, monitoring device and balancer are installed, cabling and fusing are completed and finally, with the closing of the lid and one last round of testing, the battery is ready for many years of hard work.

### **OUR JOURNEY**

Our journey has taken us on many highs and lows, across oceans and through the school of hard knocks. We have been ripped off, faced dead ends and discovered many battery components that don't work. But ultimately, our journey has enabled us to present to the marketplace a premium, long-lasting and powerful LiFePO4 lithium battery. We do not consider our journey complete and we hope that our next stop will be at your doorstep to present Legendary Power for your energy storage needs.

# WHY ARK BATTERY?

## SUPERIOR USABLE CAPACITY

While we recommend discharging no further than 20% state of charge, ARK Batteries can be safely discharged to 0% with only a small impact on cycle-life. (See page 8)

## FAST CHARGE/DISCHARGE

ARK Batteries can be charged in less than half the time required to charge lead acid batteries. And while rarely applicable for solar applications, a 1C charge and discharge are permitted.

**LIFEPO4  
BATTERIES ARE  
99%  
EFFICIENT**

Most other types of batteries have 10-30% efficiency losses (discharge power available vs charged power)

**5X  
THE LIFE OF  
MOST LEAD-ACID  
BATTERIES**

Our LiFePO4 battery can be discharged down to 20% and still retain 80% of it's original capacity after 5,000 cycles.

**IMPACTIVE  
BALANCING ADDS  
UP TO 30%  
MORE LIFE**



We are the **only** lithium LiFePO4 company in the **USA** to use *impactive balancing*.



## SAFETY

ARK Battery believes in redundant safety. We use only LiFePO4 cells monitored and protected by a BMS (Battery Management System) to shut down the battery in the unlikely event of hazardous voltages or temperatures. There are no exposed terminals as in lead acid batteries.

## STABLE VOLTAGE

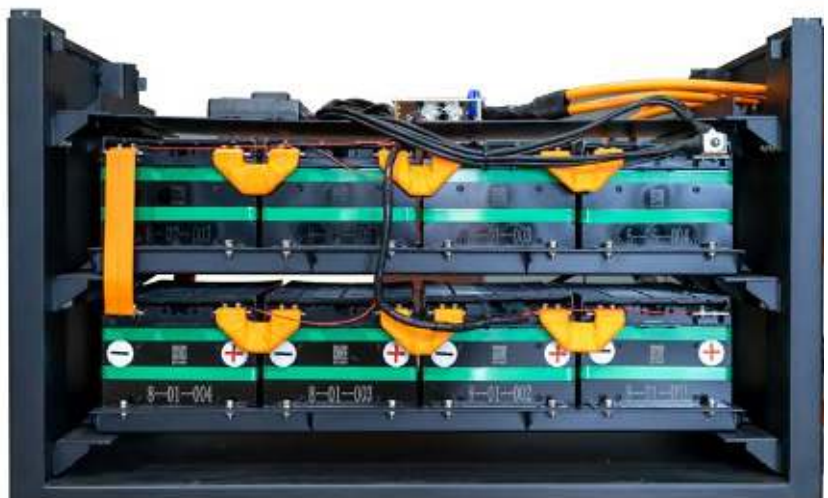
The voltage of an ARK Battery is not subject to the fluctuations seen in most other battery types when under heavy load.

## LIGHT WEIGHT

ARK Batteries weigh only 30% of their lead acid counterparts.

## MAINTENANCE-FREE

ARK Batteries require no maintenance of any kind, such as equalizing or adding water.



# WHAT'S INSIDE?

## SOLID STEEL CASE

Our batteries are enclosed in a heavy-duty protective steel case.

## IMPACTIVE BALANCER

Internal 'Equalizer' extends your battery's cycle life. (See page 5)

## BATTERY MANAGEMENT SYSTEM

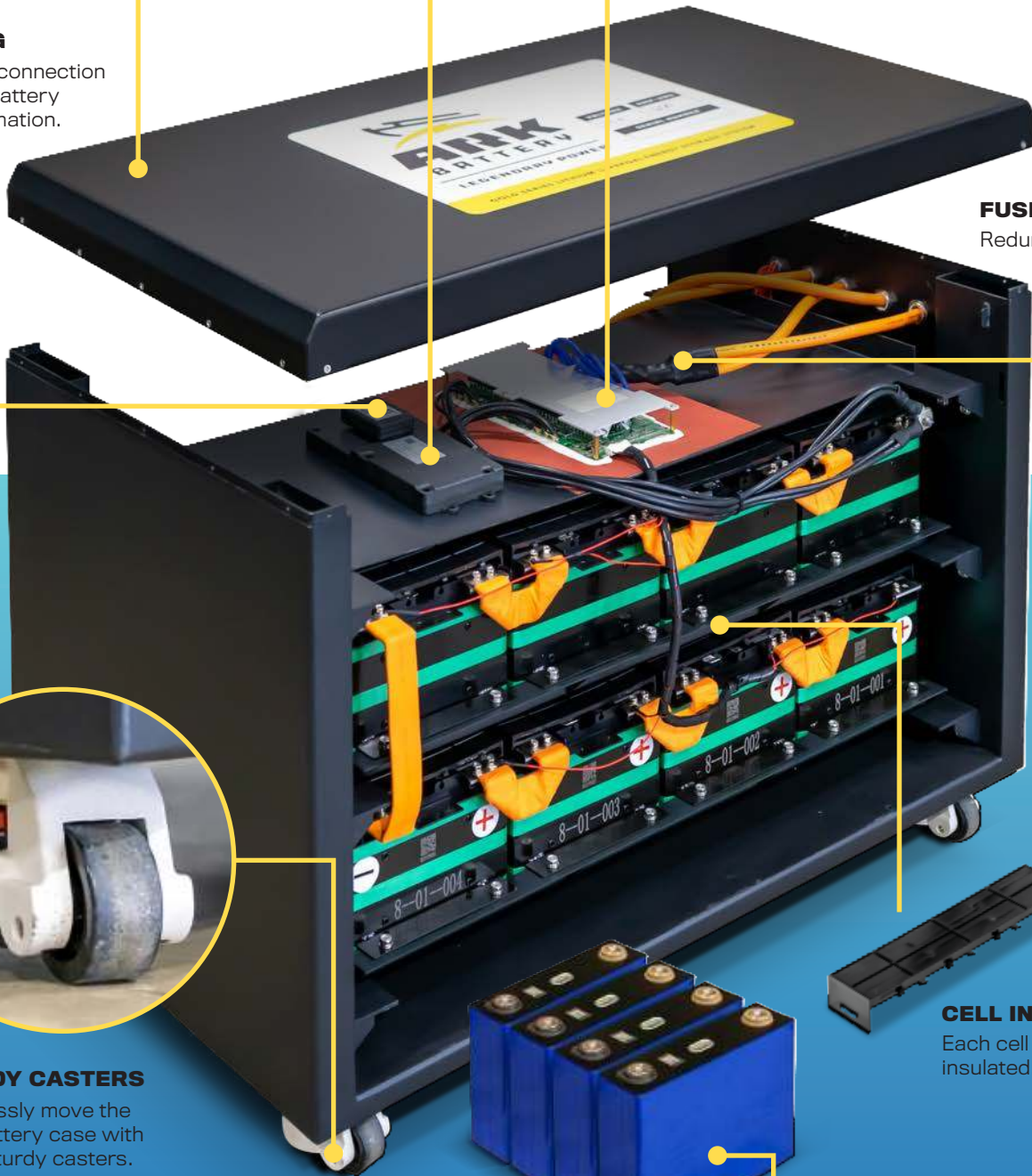
Monitors and protects each cell series.

## BLUETOOTH MONITORING

Easy, wireless connection (with app) for battery technical information. (See page 6)

## FUSE/BREAKER

Redundant protection.



## STURDY CASTERS

Effortlessly move the ARK Battery case with these sturdy casters.



## FUEL GAUGE

Shunt based LCD display for battery state of charge. (Modular Series)

## CELL INSULATOR

Each cell is individually insulated.

## BATTERY CELLS

Aluminum clad 3.2v LiFePO4 cells.

# IMPACTIVE BALANCING

Every ARK Battery is equipped with a special balancing system to ensure that all cells are charged and discharged equally. This serves the same purpose as 'equalizing' does for a lead-acid battery. While LiFePO4 batteries may not be equalized externally, it is critical that all cells within maintain the same voltage. An 'imbalanced' battery will result in nuisance BMS shut-offs, lower capacity and a drastically reduced cycle life.

Most batteries in today's market come with a small balancing system known as passive balancing. In passive balancing, a set of resistors begin to dissipate (burn off) power from any cell that has an individual voltage higher than 3.6V. This dissipation typically occurs at 50-100 ma (5% to 10% of 1 amp). We have found this balancing method to be ineffective to meet the stringent requirements of cell balancing. In short, it is too slow as well as inefficient.

Impactive balancing, used in all ARK Batteries channels extra power from high-volt cells to low-volt cells, and deploys additional dissipative consumption should a cell reach critically high voltage.

## PASSIVE BALANCING

Dissipates a small amount of power (usually  $\frac{1}{10}$  Amp or less) when a cell reaches a critically high level.



## IMPACTIVE BALANCING

Transfers current (power) from highest cells to lowest cells to keep all cells equal.



Impactive balancing kicks in any time that any single cell's voltage varies from the rest of the pack. This can be a higher voltage (top-balancing during charge) or a low cell (bottom balancing, during discharge). A special extra boost is applied if a cell's voltage reaches 3.55V. Balancing is performed at up to 20 times the speed of passive balancing while maintaining a much higher efficiency and adding up to 30% to your battery life.

# EFFICIENCY

Efficiency is the name of the game. Coming from an off-grid way of life, we breathe efficiency. We have designed our batteries to be unbelievably efficient from every possible aspect.

## ■ COST EFFICIENCY

ARK Battery has the lowest cost per lifetime KWH on the market! See page 7 for a comparison of different battery types.

## ■ STORAGE EFFICIENCY

Most batteries have a round trip (charging power vs. available discharge power) of only 80-90%. Power is lost through charging inefficiencies, self-discharge, heat losses and other factors. ARK Batteries are nearly 100% efficient. What you put in, you can draw out!

## ■ CELL TYPE EFFICIENCY

We use prismatic cells in all our batteries to improve over-all efficiency. Our prismatic cell batteries have fewer connections, lower resistance and use less space than cylindrical cell counterparts.

## ■ BALANCING EFFICIENCY

We use a balancing system called impact balancing that channels power back and forth between cells as needed. Traditional balancing systems dissipate (waste) power from cells with the highest voltage.

## ■ SELF-CONSUMPTION EFFICIENCY

Our LiFePO4 chemistry batteries are famous for their slow self-discharge. When fully charged, ARK Batteries have a shelf life of nearly 3 years! All electronic components in our battery have a power-saving shut-down mode to reserve the power for your energy needs.

## ■ SPACE EFFICIENCY

Our space-efficiency rule is simple; "Up instead of out". All of our larger batteries have layered cells to maintain a small battery footprint in your utility room. If your project requires multiple batteries, our heavy-duty steel cased Gold Series batteries can be double and even triple stacked, while our state of the art modular series can be stacked up to 8 high.

## ■ INSTALLATION EFFICIENCY

ARK Batteries are designed by installers for installers. We have implemented features such as casters, Anderson connectors and bluetooth monitoring for an easy and time-effective installation process.

# BLUETOOTH MONITORING

ARK batteries are equipped with a bluetooth communication device with mobile APP software for monitoring and technical troubleshooting purposes.

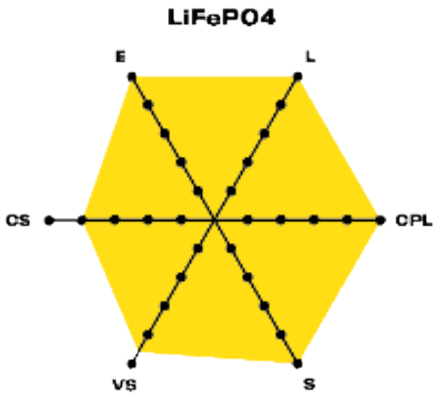
You can easily connect to your ARK Battery with almost any type of phone for real-time battery voltage, individual cell voltage, cell resistance, balancing status and other indicators of your battery's current charged/discharged state and state of health.



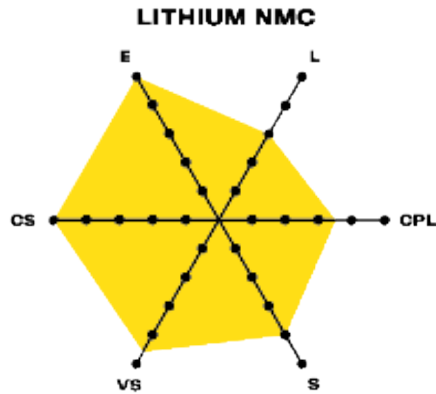
# BATTERY COMPARISONS

This simple, yet thorough comparison of different battery types allows you to see at a glance which battery presents the best value. Comparisons are based on ratings from U.S. Battery, Full River Battery and Systems-Sunlight, respectively.

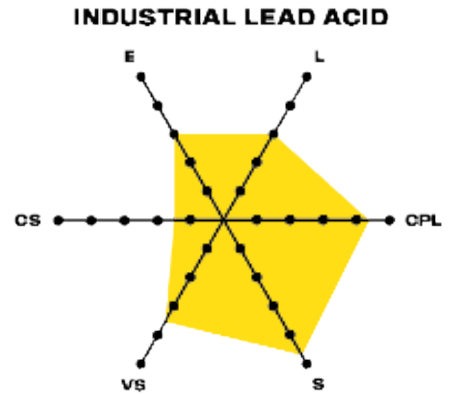
All calculations are based on cycling to 50% capacity retention.



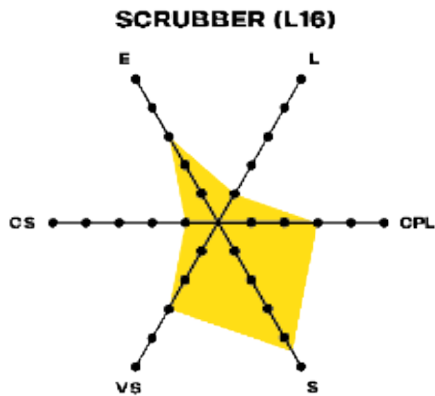
Efficiency **5.0**  
 Longevity **5.0**  
 Cost Per Lifetime KWH **5.0**  
 Safety **5.0**  
 Voltage Stability **4.8**  
 Charge Speed **4.0**



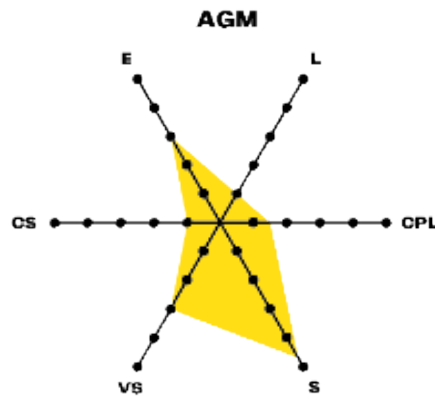
Efficiency **5.0**  
 Longevity **3.0**  
 Cost Per Lifetime KWH **3.5**  
 Safety **4.0**  
 Voltage Stability **4.5**  
 Charge Speed **5.0**



Efficiency **3.0**  
 Longevity **3.0**  
 Cost Per Lifetime KWH **4.3**  
 Safety **4.8**  
 Voltage Stability **3.5**  
 Charge Speed **1.5**



Efficiency **3.0**  
 Longevity **1.0**  
 Cost Per Lifetime KWH **3.0**  
 Safety **4.5**  
 Voltage Stability **3.0**  
 Charge Speed **1.0**

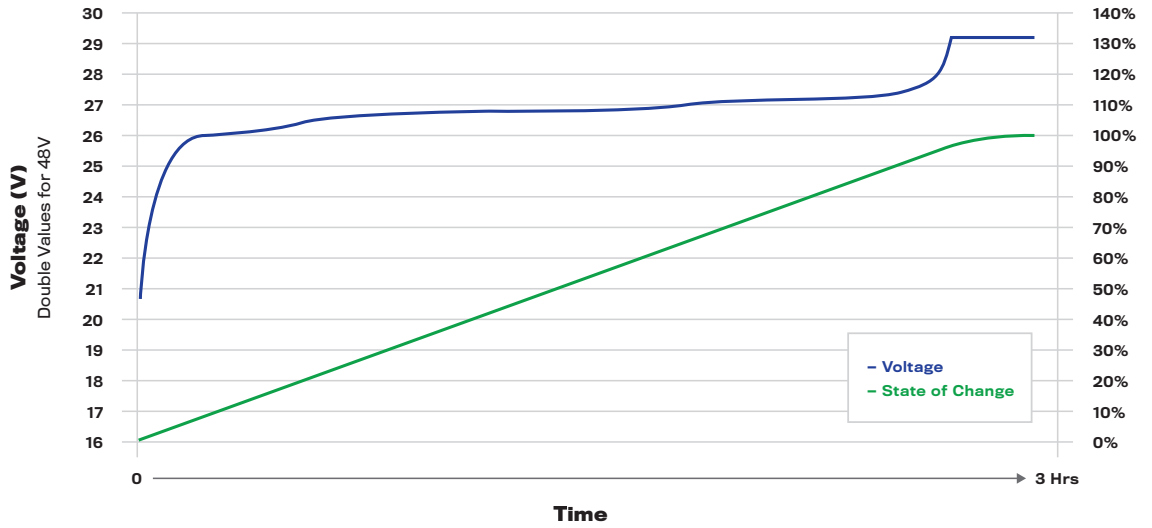


Efficiency **3.0**  
 Longevity **1.0**  
 Cost Per Lifetime KWH **1.5**  
 Safety **4.8**  
 Voltage Stability **3.0**  
 Charge Speed **1.0**

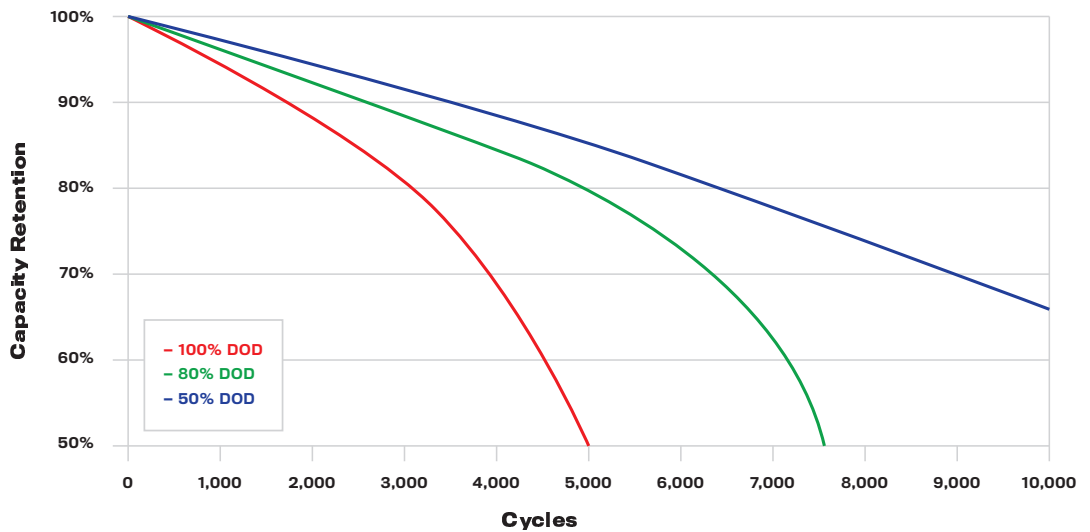


# BATTERY CHARACTERISTICS

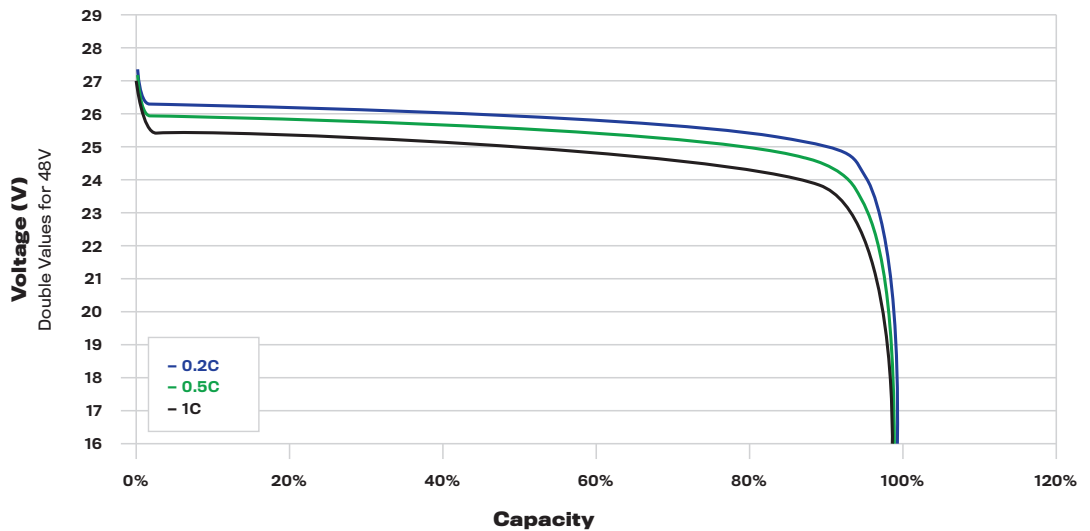
Charge Voltage and State of Charge (SOC)  
Charge 0.33C  
@ 25°C (77°F)



Cycle Life, Depth of Discharge (DOD) and Capacity Retention  
Charge/Discharge 0.5c @ 25°C (77°F)



Discharge Voltage Characteristics at Various Rates  
25°C (77°F)





## THE ARK BATTERY FAMILY

Model #	Nominal Voltage	Actual Voltage 30% SOC	AH	Recommended Charge / Discharge Current	Max Amps Continuous	Surge Amps	BMS Rating (A)
<b>300 - 48</b>	48	51.2	300	150	220	450	220
<b>400 - 12</b>	12	12.8	400	200	250	300	300
<b>200 - 24</b>	24	25.6	200	120	160	200	200
<b>100 - 48</b>	48	51.2	100	75	100	130	150

Model #	Fuse/ Breaker Size (A)	Minimum Temperature	Maximum Temperature	Recommended Absorb Volts	Max Absorb Volts	Float Volts	Absorb Done Amps
<b>300 - 48</b>	400	32°F	120°F	57.2	57.6	54.4	9
<b>400 - 12</b>	250	32°F	120°F	14.3	14.4	13.6	12
<b>200 - 24</b>	160	32°F	120°F	28.6	28.8	27.2	6
<b>100 - 48</b>	120	32°F	120°F	57.2	57.6	54.4	4

Model #	BMS High Volt Cutout	BMS Low Volt Cutout	Recommended Inverter Low Volt Cut Out	Terminal Type	Battery Style	Warranty
<b>300 - 48</b>	59	42	48	Anderson	Gold Series	NEW! Every ARK Battery now comes with a 5 year free replacement warranty.
<b>400 - 12</b>	14.8	10.5	12	Bolt	Modular	
<b>200 - 24</b>	29.5	21	24	Bolt	Modular	
<b>100 - 48</b>	59	42	48	Bolt	Modular	

**All ARK Battery products qualify for ITC tax credits when coupled with solar panels or wind turbines.**

# CASE STUDY

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## Residential Off-Grid Solar System

3,600 sq. ft. & Basement

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4.5 KW Solar

6.8 KW Inverter/Charger

14 KW Backup Generator

2 - ARK 300-48 (30.7 KWH)

### This System Can Power

- Laundry
- Vacuum Cleaner
- Coffee Maker
- 4-Zone Radiant Heat System
- Bosch Mixer
- Lights Throughout
- Fridge
- Electric Bike Charging
- Clothes Iron
- Sewing Machine
- Well Pump
- Freezer
- Water Softener



### System Features

- 2.5 - 3 Days autonomy
- 15 Year life design
- Maintenance free\*
- No hazardous fumes or gases

\*Generator requires oil changes.



Distributed by:

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