Frequently Asked Questions: Lithium Battery Life Versus Warranty   R1

How Long Will My Lithium Ion Battery Last?

-In general, 2000 to 3000 cycles. For most consumers, this translates to 7 to 10 years of service life. The range exists because real-world temperature and calendar aging* affect the life in years.

-All batteries are cycle tested at nominal room temperature.   Operating a battery at higher temperatures will result in a shorter life. *Calendar aging is a factor based on keeping a lithium ion battery at high states of charge for long periods of time during non-use.

-A consumer is wise to realize that a battery is a wear item. Most battery makers create warranties to deny claims based on normal wear.

What Types of Warranties Do Battery Makers Offer?

-Most battery makers offer SUBJECTIVE warranties.   They are a warranty, different from a guarantee of life cycles or benefit of use.   What does this mean?   The power to decide on offering a warranty claim is solely at the "maker's" discretion. The warranty is based strictly based on the consumer shipping the battery back to the original battery seller or re-seller for inspection, and, "hope for the best." The battery seller will examine the battery and make decisions based on observations during inspection. The consumer has no ability to validate the findings.

-The long list of exclusions printed in these "10 Year Warranty" statements are so extensive that the consumer will have little understanding of what is and is not covered under warranty.   All power goes to the "maker."

What Type of Warranty Does Lithionics Battery Offer?

-Our warranty is **OBJECTIVE** because it is both time based **and** usage based, and the consumer is able to monitor usage on the BMS APP.   Our warranty empowers the consumer, not the seller.

-Simply stated, it is a both warranty against manufacturing defects for 5 years, and, a guarantee of amp-hour usage.   What does this mean and how does this benefit the consumer?

-All iron phosphate cells are tested for cycle life via a 100 percent full depth of discharge at room temperature, and will deliver 2000 cycles minimum. EXAMPLE: a 315 amp hour battery X 2000 cycles = 630,000 amp hours of use.   It is similar to an odometer.   Counting individual cycles is not useful and does not protect the consumer.   Therefore, if your APP reports 300,000 amp-hours on the display, you are about half-way through your useful battery "throughput" of power.   If a battery fails at 300,000 amp-hours for a manufacturing defect, then, the consumer knows exactly what his-her prorated credit should be. This is why our warranty is more valuable than other warranties because it has objective values the consumer can see. This is called **TOTAL CONSUMED** on the APP.

-Other factors affecting cycle life: our APP continuously records 2 more key factors that affect total life. These are:

AGING FACTOR TEMP: the amount of time the battery is operated at high temperatures.   The embedded algorithm is a sliding scale that adjusts for actual temperatures.

AGING FACTOR SOC: the amount of time the battery sits at full charge and non-use. All batteries will lose small amount of life if they sit fully charged for long periods of time with no periodic cycling.   The loss has been measured by some researchers to be 3 percent of capacity loss per 6 months of high State of Charge storage.

See page 2 for how the APP monitors the 3 measured conditions listed above.

Contact Lithionics Battery for our actual Warranty Statement document.

Li3-Battery

Battery ID	1
Status Code	000100
Battery SOC	80%
Battery Voltage	13.1V
Battery Current	95.1A
Battery Power	1.2kW
Battery Temperature	80F
BMS Temperature	92F
Remaining Capacity	481.0Ah
Remaining Time	00d 05h 03m
Total Consumed	652Ah
Last Fault Code	000034
Highest Recorded Temp	96F
Lowest Recorded Temp	72F
Firmware Version	8.0.19
Aging Factor Temp	87
Aging Factor SOC	5
Serial Number	ND090820001
CAN Charger Voltage	0.0V
CAN Charger Current	0.0A
CAN Charger Status	0000
CAN Errors	0000
Load Bus Voltage	13.0V
Charge Bus Voltage	13.0V
Temp Sensors Count	1

Protecting the Consumer with a Verifiable Warranty:

The APP records actual usage values to allow the consumer to track battery usage and battery life under their actual operation conditions. It provides the consumer with OBJECTIVE warranty coverage versus SUBJECTIVE warranty coverage by other battery makers or

TOTAL CONSUMED AMP HOURS

HIGHEST AND LOWEST RECORDED TEMPERATURES

AGING FACTOR TEMP

AGING FACTOR SOC