




(+27) 861-428-711 
info@livestainable.co.za 
298 Issie Smuts street, Garsfontein 
Pretoria East, 0081



DATASHEET



DOWNLOAD APP

LiNERGY™

LiNERGY™

12.8V LiFePo4 Batteries Flexi Series User & Installation Manual

LFS12.8V-8AH | LFS12.8V-50AH | LFS12.8V-100AH | LFS12.8V-200AH

TABLE OF CONTENTS

INTRODUCTION	5
TYPICAL 3D EXPLOSION	6
SAFETY PRECAUTIONS	6
FEATURES	8
CELL FEATURES	8
BMS DESIGN FEATURES	8
BMS SAFETY FEATURES	8
APPLICATIONS	9
INSTALLATION & USE	9
CONNECTING THE BATTERY	9
CHARGING	10
DISCHARGING	12
SERIES & PARALLEL CONNECTIONS	14
SERIES	14
PARALLEL	16
PACKAGING AND TRANSPORT	17
COMPETITIVE INFORMATION	20
LIMITED LIFETIME WARRANTY	21

INTRODUCTION

This manual is intended to aid an installer or user with the installation, commissioning and operation of the LiNERGY FLEXi (LiFePO₄) 12V General Purpose “lead replacement” batteries.

This manual does not attempt to cover all the details pertaining to the setup of third-party equip-ment in relation to setup and operation with the 12V battery. Assistance is available at the contact details mentioned on the last page to provide direct support where necessary for supported third party brands.

Thank you for choosing the LiNERGY (Lithium Energy) 12.8V Flexi Series range of batteries. You have chosen a product that is good for our planet, great for our people and can be used anywhere your heart lies, home or....

We pride ourselves in knowing that we provide unmatched safety, unwavering reliability and second to none batteries that deliver on life design expectations.

All the internal and external components of our batteries are first life quality. Built with the latest lightweight high energy density prismatic and cylindrical cells.

Built in world leading BMS with industry leading customization options ensures that our battery will suit any of your needs.

With LiNERGY, what you see is not only what you get. You have the freedom of choosing more. Speak with our team to discuss our possible upgrades on the already great offerings.

The LiNERGY FLEXi series are available in most standard sizes to meet most 12V applications. Ranging from 8Ah to 200Ah. All models operate at a nominal voltage of 12,8V, which suits the most com-monly available residential battery inverters and is also matched to vehicle 12V alternators.

TYPICAL 3D EXPLOSION

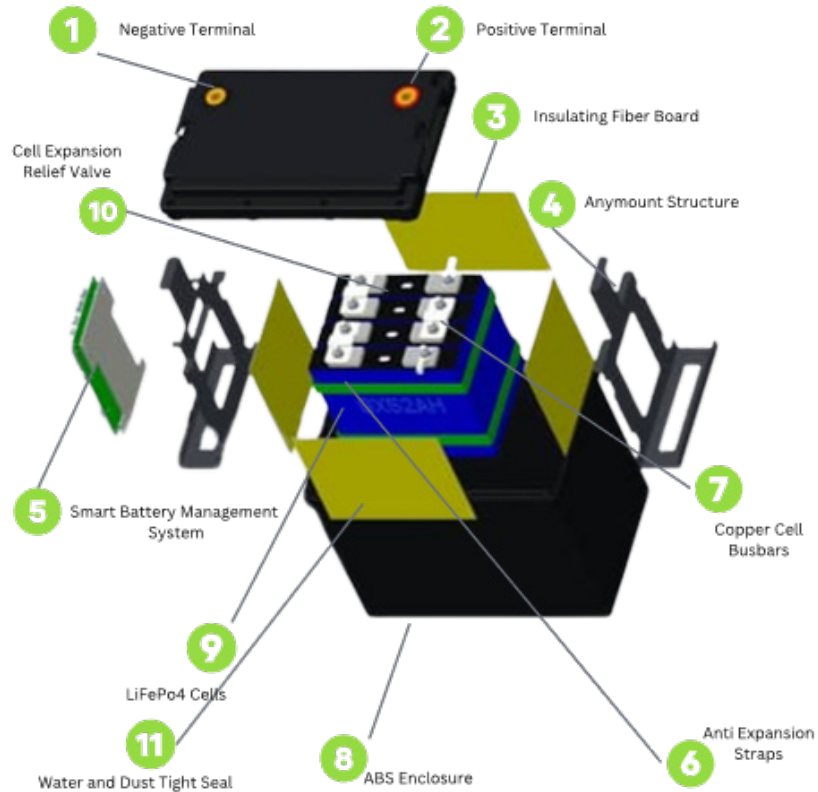


Figure 1.1

SAFETY PRECAUTIONS

It is important and necessary to read the user manual carefully before installing or using the battery(s). Failure to do so or to follow any of the instructions or warnings in this document can result in electrical shock, serious injury, or death, or can damage the battery, potentially rendering it inoperable and voiding your warranty.

ATTENTIONS & WARNINGS

- Upon receiving, please check the battery for any malformation, cracks or corrosion. Do Not use the battery if you find any damage on it.

- Do not disassemble, open or attempt to repair the battery. If you are experiencing errors with the battery, please contact the merchant.
- Do not short circuit the battery terminals, wires connected to it or do any reverse polarity connections.
- Do not use the battery near excessive heat sources, close to gas storage facilities or any ex-plosive atmospheres.
- Do not submerge the battery in water.
- Do not strike the battery with any hard objects.
- Do not use the battery as a workbench. Please refrain from leaving tools and equipment on the battery.
- Do not penetrate the battery enclosure.
- Do not use any damaged cables or connections on the battery.
- Do not allow the battery to freeze and do not charge the battery under 0 degrees Celsius.
- At the end of the design life cycle please dispose of the battery in accordance with local laws and regulations.
- Only use suitable LifePo4 battery chargers.
- Do not carry the battery while wearing loose jewellery.
- Do not use the battery as a step.
- Do not connect this battery in series or parallel with any older batteries and no batteries that are not of the same brand and group numbers.
- Do not use the battery for cranking applications. (To start an engine)
- Do not connect the battery directly to an alternator. (Only use approved DC-DC chargers)
- Keep the battery away from reach of children.
- Do not place the battery in direct sunlight.
- Immediately discontinue use of the battery if, while using, charging or storing the battery, the battery emits an unusual smell, feels hot, changes colour or shape, or appears abnormal in any way.
- Do not place the battery in high pressure areas or chambers.
- Always ensure you are using the correct size cables for your battery.
- Do not use cleaning solvents to clean the battery.
- Do not paint the battery or any part of the battery.
- Do not connect solar panels directly to the battery. Only use approved PWM or MPPT Solar Charge controllers.
- Do not connect the battery directly to any AC power source. Use only approved chargers/inverters or common DC Busbars.
- Do not insert or attach any foreign objects in or on the battery.
- In case of fire, use only dry powder fire extinguishers. Liquid extinguishing methods are pro-hibited.
- The warranty claims are excluded for direct or indirect damage due to items above.

FEATURES

CELL FEATURES

- Extremely high cycle life LiFePo4 cells. Up to 6000 Cycles
- No Maintenance required on the cells.
- Unmatched high and low temperature performance.
- Cells operate safely on a high charge and discharge rate.
- Stable output voltage.
- High energy density = lightweight configurations with great capacity
- Cells do not explode or cause fire when crushed, punctured or drop tested. Unlike NMC, Pol-ymer etc cells.
- Low internal resistance.
- The warranty claims are excluded for direct or indirect damage due to items above.

BMS DESIGN FEATURES

- Solid state design with no internal moving parts.
- Integrated Bluetooth function for easy monitoring and configuration.
- Bluetooth dongle soldered to PCB to decrease loose components.
- Integrated heatsink to dissipate heat quickly.
- Integrated cell balancing function.

BMS SAFETY FEATURES

- Short Circuit Protection
- Overcharge Voltage protection
- Over discharge voltage protection
- Charge over current protection
- Discharge over current protection
- Low temperature charge protection
- Low temperature discharge protection
- High temperature charge protection
- High temperature discharge protection.
- Optional* built in self-fire extinguishing device.

APPLICATIONS

Our LiENERGY FLEXi range are suitable for the following applications:

- Residential or Office backup power solutions
- Auxiliary battery in boats, trailers, RV's, Caravans, Canopies etc.
- Can also be used in an engine bay as an auxiliary battery.
- The smaller 8AH model can be used in Garage motors, Alarm systems, CCTV systems etc.
- Portable power supplies on site or out camping.
- Street lighting applications with solar charging.
- Telephone towers.
- Other small traction applications.

The range can be mounted in any orientation with medium to high vibration toleration. We have carefully designed the internal structure of the components assembly to ensure no moving of parts are possible within the battery case and within reasonable handling.

INSTALLATION & USE

CONNECTING THE BATTERY

The 12.8V FLEXi range is protected internally using solid state electronics. These electronics will not resist extreme operation or abuse outside of the limits given in this document. It is thus important to connect these batteries to suitable equipment. The following points are of primary relevance:

- * The connected equipment must not cause excessive inrush current when connected to the battery – should excessive inrush current (from inverter capacitors for example) be suspected, the DC bus must be pre-charged using a 50-100 Ohm 100W resistor before connecting the battery onto the DC bus
- * The inverter or other load(s) must not be capable of exceeding the current ratings in the specification sheet for discharge and must be set correctly for the maximum charge current, which is possible in most devices. For chargers where it is not possible to limit the charge current the model selected must not be capable of delivering a current higher than the standard charge current given in the specification table.
- * It is imperative that the correct nominal DC voltage is selected on the connected equipment i.e. 12V, 24V, 36V or 48V.
- * Please note: The FLEXi range is not designed for, or capable of, starting internal combustion engines. The cranking current demands are far too high.

CHARGING

LifePo4 batteries charge with a different algorithm and voltage than its AGM, Gel or Lead-Acid counterparts. Therefore, it is recommended to study the datasheet supplied with your battery for important charging voltage scenarios. We recommend the following charging parameters for our 12.8V range.

- * Bulk Voltage: 14.4 – 14.6V
- * Float should be disabled as Lithium batteries don't require this, but if you do not have that option available, please set Float to 13.8V
- * Storage: 13.8V

Do not use any battery charger, always ensure you have lithium compatible charger. Please also always ensure that DE sulfation, reconditioning and equalization is disabled for lithium batteries.

For batteries connected in series, please use the following table as a guideline for charge voltages:

Series	Recommended Charge Voltage	Maximum Range
12V (12.8V)	14.4V	up to 14.6V
24V (25.6V)	28.8V	up to 29.2V
48V (15 Cell) (48V)	54V	up to 54.7V
48V (16 Cell) (51.2V)	57.6V	up to 58.4V

Figure 1.2

Please always ensure that you do not exceed the maximum charge currents as per the datasheet:

GENERAL SPECIFICATIONS					
Option:	12.8V 8Ah	12.8V 50Ah Plus	12.8V 100Ah Plus	12.8V 200Ah Plus	12.8V 200Ah Plus Optional Upgrade
Recommended Bulk Charge Voltage :	14.4V				
Max Bulk Charge Voltage:	14.6V				
Float Voltage:	13.8V (Disable float if possible*)				
Storage Voltage:	13.8V				
Less than 0°C	No Charge Allowed				
0-5°C -- (0.2C)	1.6A	10A	20A	40A	40A
5-15°C -- (0.5C)	4A	25A	50A	100A	100A
15-45°C -- (1C)	8A	60A	120A	200A	200A
45-55°C -- (0.2C)	1.6A	10A	20A	40A	40A
55°C + --	No Charge Allowed				
BMS Overcurrent Charge Protection:	20A-30A	70A	155A	220A	220A
BMS Overvoltage Protection:	14.8V				
BMS Temperature Protection:	Operating Temperature -20°C to 75°C				
Charge Efficiency:	98%				

Figure 1.3

Always confirm the battery charger specifications are suitable for the battery you are charging, and you should always follow the instructions received with your battery charger.

DISCHARGING

It is very important to always use the correct wire thickness for both charge and discharging of your battery. Failure to do so will cause unfavourable internal resistance, unstable currents and may lead to fire.

Please follow the below cable thickness guideline. (Based on a 1m cable length, not considering voltage drop of 3% p/m.

Battery	Max Discharge	Wire Size (sq. mm)	AWG
12.8V 8Ah	15Amps	2.5	14
12.8V 50Ah	60Amps	16	6
12.8V 100Ah	120Amps	25	2
12.8V 200Ah	120Amps	25	2
12.8V 200Ah (Upgraded)	200Amps	70	000

Figure 1.4

We always recommend using appropriate fusing on your battery for at least 10% lower than the max discharge current rating of your battery. This not only ensures that wiring is kept in check but also helps prolong the battery life by not abusing the BMS when excessive accidental discharge occurs.

Battery	Recommended Fuse Size
12.8V 8Ah	10Amps
12.8V 50Ah	50Amps
12.8V 100Ah	100Amps
12.8V 200Ah	100Amps
12.8V 200Ah (Upgraded)	175Amps

Figure 1.5

Please ensure that the negative and positive wires connected to the battery and load/dc busbar are of equal length.

Please always ensure that you not exceed the maximum discharge currents as per the datasheet:

GENERAL SPECIFICATIONS		12.8V 8Ah	12.8V 50Ah Plus	12.8V 100Ah Plus	12.8V 200Ah Plus	12.8V 200Ah Plus Optional Upgrade
Option:						
Low Voltage Cut-Off:		9.2V	9.2V	9.2V	9.2V	9.2V
Low Voltage Recovery:						
Recovery Condition:		Disconnect The Load or Charge	Auto Recover after 32 Seconds	Auto Recover after 32 Seconds	Auto Recover after 32 Seconds	Auto Recover after 32 Seconds
Continuous Discharge Current:		Up to 15A	Up to 50A	Up to 120A	Up to 200A	Up to 200A
BMS Overcurrent Discharge Protection:		30A	70A	155A	220A	220A

Figure 1.6

Battery	Max Discharge in Watts
12.8V 8Ah	198
12.8V 50Ah	792
12.8V 100Ah	1584
12.8V 200Ah	1584
12.8V 200Ah+	2640

Figure 1.7

Please ensure that the negative and positive wires connected to the battery and load/dc busbar are of equal length.

SERIES & PARALLEL CONNECTIONS

Our FLEXi series range are generally intended for use as a standalone system. E.g., where only one battery is used in the system. However, series and parallel connections are allowed.

SERIES

Our batteries are series compatible up to 48V (51.2V). Series Connections can be made in 24V (25.6V), 36V (38.4) and 48V (51.2V). Please follow the table below for connecting batteries in series:

Configuration	Actual Nominal Voltage	Battery Count
24V	25.6	2
36V	38.4	3
48V	51.2	4

Figure 1.8

It is mandatory to connect batteries in series with battery balancers to not void the warranty. Battery balancers will ensure that each battery is always in perfect balance with the rest of the pack. Please see below example diagrams of batteries connected in series with balancers:

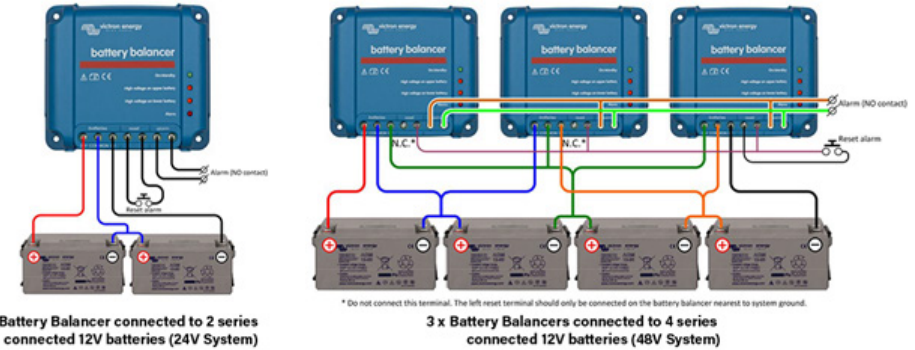


Figure 1.9

Here is a general wiring diagram for connecting the batteries in series:

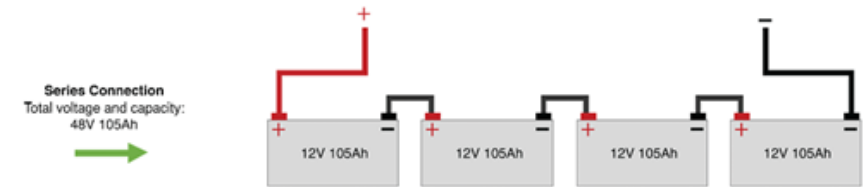


Figure 1.10

The following is essential when connecting batteries in series.

- Before connecting the batteries in series, they need to be balanced. So, each battery must be fully charged to the same voltage. We recommend 14.2V. Ensure that they are charged up to the same voltage on the same day of installation. (This will negate self-consumption of the batteries that could lead to imbalance over extended hours.
- The DC wiring connecting your battery packs should be no shorter than 250mm. This pre-vents heat transfer from one terminal to another.
- All cables should be of equal sq.mm /AWG and the exact same length. (Refer to the charge and discharge cable size table (figure 1.4) for the correct cable thickness)
- When connected in series, the maximum current values provided in the datasheet, should be re-graded to 80% of the provided parameters to cater for series connection dynamics between the batteries. E.g., different battery internal resistance, less than 100% equal cell density etc.

Follow the below guidelines for max charge and discharge values for batteries in series.

Config.	Bulk Charge Voltage	Float Voltage	Max Charge Current	Max Discharge Current
24V	28.8V	27.6	80% Of Rated Current	
36V	43.2V	41.4V		
48V	57.6V	55.2V		

Figure 1.11

PARALLEL

Our batteries are parallel compatible only in the sense to increase usable capacity of the batteries. They are not compatible with increased currents when connecting parallel.

The following is essential when connecting batteries in parallel:

- Each of the batteries need to be the same voltage or within 0.2V before being connected in parallel.
- The total maximum charge/discharge current of the whole pack should not exceed the rated currents provided for a single battery.
- Each battery must have the same group number (batch number) and be of the same capacity
- Each battery must be of a similar age or less than 3 years apart)
- The DC wiring connecting your battery packs should be no shorter than 250mm. This prevents heat transfer from one terminal to another.
- All cables should be of equal sq.mm /AWG and the exact same length. (Refer to the charge and discharge cable size table (figure 1.4) for the correct cable thickness)
- The maximum charge voltage for our 12.8V batteries connected in parallel is 14.4-14.6V.

Here is a general wiring diagram for connecting batteries in parallel:

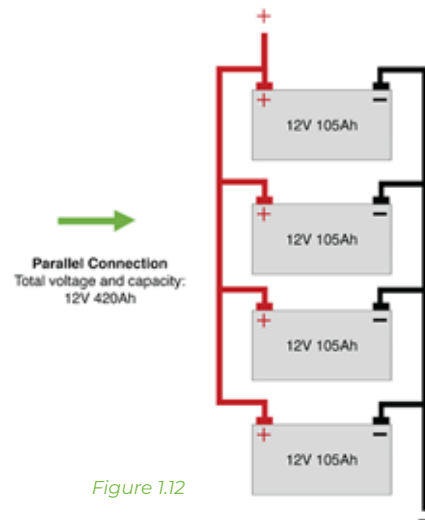


Figure 1.12

PACKAGING AND TRANSPORT

All batteries are adequately packaged in strong UN38 cardboard boxes with thick protective foam all around. We typically ship the battery to your door depending on how you chose to purchase. The batteries are usually shipped at a 20% SOC (State of charge) and therefore require a full recharge before use.

Technical Specifications

GENERAL SPECIFICATIONS					
Option:	12.8V 8Ah	12.8V 50Ah Plus	12.8V 100Ah Plus	12.8V 200Ah Plus	12.8V 200Ah Plus Optional Upgrade
CHARGING					
Recommended Bulk Charge Voltage :	14.4V				
Max Bulk Charge Voltage:	14.6V				
Floab Voltage:	13.8V (Disable float if possible*)				
Storage Voltage: Less than 0°C	13.8V				
0-5°C -- (0.2C)	No Charge Allowed				
5-15°C -- (0.5C)	10A	20A	20A	20A	40A
15-45°C -- (1C)	4A	25A	50A	50A	100A
45-55°C -- (0.2C)	8A	60A	120A	120A	200A
55°C + --	1.6A	10A	20A	20A	40A
BMS Overcurrent Charge Protection:	20A-30A	70A	155A	155A	220A
BMS Overvoltage Protection:	14.8V				
BMS Temperature Protection:	Operating Temperature -20°C to 75°C				
Charge Efficiency:	98%				
DISCHARGING					
Low Voltage Cut-Off:	9.2V				
Low Voltage Recovery:	9.2V Cut-Off Voltage (BMS PROGRAMMABLE TO 8V)				
Recovery Condition:	11.2V				
Continuous Discharge Current:	Auto Recover after 32 Seconds				
BMS Overcurrent Discharge Protection:	Disconnect The Load or Charge Up to 15A	Up to 50A	Up to 120A	Up to 155A	Up to 200A
	30A	70A	155A	155A	220A

Figure 1.131

GENERAL SPECIFICATIONS					
Option:	12.8V 8Ah	12.8V 50Ah Plus	12.8V 100Ah Plus	12.8V 200Ah Plus	12.8V 200Ah Plus Optional Upgrade
FUNCTIONAL SPECIFICATIONS					
Battery Terminals:	T2				
Protection Class:	IP65 Water and Dust Resistant				
Series Compatible:	Yes, up to 4S				
Parallel Compatible:	Yes, up to 4S (All upgraded models)				
Self Discharge:	Yes, up to 4P or 4S4P (Do not increase operational currents)				
Storage Capacity:	3.5% per month				
Recharge cycles:	50%				
Cell Chemistry:	As needed or every 60 days if not in use.				
Cell Form:	LiFePo4				
Cell Structure:	Cylindrical x8	Prismatic x4	Prismatic x4	Prismatic x8	Prismatic x9
Battery Dimensions (L*W*H)	15.1*6.5*9.35cm	26*16.8*21.1cm	33*17.2*21.4cm	52.2*24*21.9cm	52.2*24*21.9cm
Nett Weight:	1Kg	6.5Kg	11.3Kg	21.75Kg	21.75Kg
Cell Balancing Method:	Passive (Pulse Equalization)				
Cell Balancing Current:	250mA				
Cell Balancing Activation Voltage:	15mV Δ				
BMS Short Circuit Protection:	Yes				
BMS General Low Temp Protection:	Yes				
BMS General High Temp Protection:	Yes				
Warranty:	Limited Lifetime Warranty, rated at 80% capacity of the battery cells.				

Figure 1.132

COMPETITIVE INFORMATION

Comparing a 100Ah Battery	GEL	AGM	Lead	LiFePO4
Nominal Voltage	12V	12V	12V	12.8V
Charging Voltage	14	14.6	14.8	14.4-14.6
Life Cycles @ 50% DOD	500-600 cycles	500-600 cycles	500-600 cycles	>6000 cycles
Constant Output Voltage	No	No	No	Yes
BMS	No	No	No	Yes
Mounting Orientation	Any	Any	Limited	Any
Capacity	50Ah	50Ah	50Ah	100Ah
Watt Hours	600 @ 50% DOD	600 @ 50% DOD	600 @ 50% DOD	1280 @ 100%DOD
Parallel Wiring	Yes	Yes	Yes	Yes
Series Wiring	Yes	Yes	Yes	Yes
Recommended DOD	50%	50%	50%	Not applicable

Figure 1.14

LIMITED LIFETIME WARRANTY

The warranty for LiENERGY FLEXi Series is extended to the original purchaser or user and it covers de-fects in materials and workmanship. The warranty is a limited lifetime warranty of the battery cells, rated at 80% of the capacity (100Ah x .8 = 80Ah), meaning when its capacity is down to 80%. Under extreme use (maximum charge and discharge rates) the battery cells expected life cycle is 2000. That means if you use the battery every day and discharge it nearly 100% it would take ap-proximately 5 years to get the battery cells to 80% capacity. What about using it every other day – 20 years; every three days – 30 years and so on. At “normal usage” the expected life cycles will be greater.

Here are some life design expectations:

GUARANTEED DESIGN LIFE @ DOD (DEPTH OF DISCHARGE) 1C DISCHARGE RATE (1C = 100% CURRENT OF STANDARD CAPACITY)	
100% DOD	UP TO 2000 CYCLES @1C 25±2°C 5 YEAR DESIGN LIFE BASED ON 1X CYCLE P/DAY
80% DOD	UP TO 2400 CYCLES @1C 25±2°C 6 YEAR DESIGN LIFE BASED ON 1X CYCLE P/DAY
50% DOD	UP TO 3000 CYCLES @1C 25±2°C 8 YEAR DESIGN LIFE BASED ON 1X CYCLE P/DAY
FORECASTED DESIGN LIFE @ DOD (DEPTH OF DISCHARGE) 0.2C DISCHARGE RATE (0.2C = 20% CURRENT OF STANDARD CAPACITY)	
100% DOD	UP TO 4000 CYCLES @0.2C 25±2°C 10 YEAR DESIGN LIFE BASED ON 1X CYCLE P/DAY
80% DOD	UP TO 4800 CYCLES @0.2C 25±2°C 13 YEAR DESIGN LIFE BASED ON 1X CYCLE P/DAY
50% DOD	UP TO 6000 CYCLES @0.2C 25±2°C 16 YEAR DESIGN LIFE BASED ON 1X CYCLE P/DAY
Please use the design life figures as a guideline only. Actual results may vary depending on charging, discharging, ambi-ent temperatures etc.	

Figure 1.15

For further information related to the warranty, please download the warranty form from the merchant’s website.