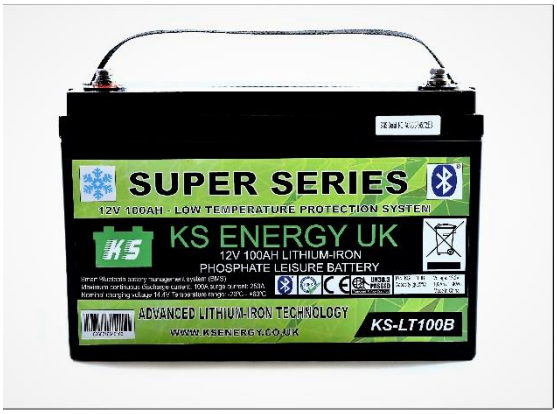
KS ENERGY **SUPER SERIES** Bluetooth

Model KS-LT100B Lithium-iron Phosphate Battery with High Current BMS Featuring Integral Bluetooth Monitor and Low Temperature Charge Protection



Guidance

Only ever use within the parameters of the specification detailed herein. Terminals are M8 threads and 13mm heads. Torque to 90ft/lb-10Nm. It is vital to zero terminal connection resistance since this can cause termination heating which may lead to damage and even pose fire risk. Use only appropriately rated, crimped, and secured ring terminations. Positive should be correctly fused. Batteries may be oriented and secured in any position of orientation. The straps are removable. If in any doubt, always seek qualified assistance.

Continuous current rating

Pay attention to the maximum current rating of the battery and parallel additional batteries accordingly for high demands such large mains inverters or twin axle motor movers. (100A max continuous discharge per battery).

Parallel / Serial battery arrangements

Where batteries are installed in parallel or serial multiples, always ensure batteries are fully charged before attempting to make the parallel (or serial) electrical connection. Providing each battery is identical, there is no limitations to the number of individual batteries that can be paralleled. The limit for serial is limited to 4 batteries maximum, making a 48V bank (52V nominal).

Overload

In case of overload or accidental short circuit, the battery may enter a self-protect mode. Ensure all loads are removed before resetting the battery. A reset is accomplished by applying a normal charge voltage to the terminals and the battery terminal voltage is restored. Note, some self-sensing duel voltage chargers may be unsuitable since they rely on sensing the terminal voltage before the charging process can begin.

Low Temperature Protection

To prevent fatal internal cell damage during use, this battery features an integral temperature monitor that detects if the cells fall below freezing (0^{o}C). Safe temperature charging parameters inherent to all lithium batteries are above 0^{o} C. When this event is triggered the battery will not accept a charge. Normal charging is only resumed when the battery cell temperature rises over zero. This feature is purely automatic and will not affect the normal battery discharge operation which continues to operate safely (to -20^{o}C).

Under Voltage Protection

Should the battery be allowed to become completely discharge to an extent where the terminal voltage falls to around 10V, the battery will enter low voltage protection and shut down. The terminals will automatically disconnect and fall to zero. To reset the battery, a normal charge voltage must be

applied to the terminals. A recharge should be performed as soon as practical, certainly within a few weeks to maintain cell integrity, avoiding possible longer-term discharge and irreversible cell damage.

Bluetooth Integral Monitor

(For more information see: https://www.ksenergy.co.uk/bluetooth-lithium-battery-monitor)

Overview: The feature is available using any Android® or Apple® device with Bluetooth® 4.0. Download the free KS Energy UK app to a compatible device from the Android® or Apple® store. Search for the app "KS ENERGY 1.0" The monitor is a state of charge (SOC) fuel gauge (coulomb counting). The SOC gauge self-calibrates during cyclic use over time by noting the changing impedance, the low voltage cut-off activation point then gauging the total accumulated charge to a factor where the nominal charge voltage is reached and its tail current falls to a few percent of capacity, it can then maintain good accuracy.

Connecting Bluetooth: Turn on Bluetooth on your device. Open the app and accept the privacy requests. Each battery has a unique serial number (as labelled on the battery case). Ensure you are within a few meters of proximity to the battery. To connect, touch the top right-hand Bluetooth symbol, select connect and the batteries serial number. Note only a single battery can be connected to a single device at a time. When the Bluetooth signal is unpaired it goes into hibernation (drawing near zero power). Be aware that Bluetooth is a very low power signal and can be highly directional and susceptible to interference, which can lead to data dropout or sporadic data display. Sealed metal areas, metal foils, other devices and electrical interference can impair such signals.

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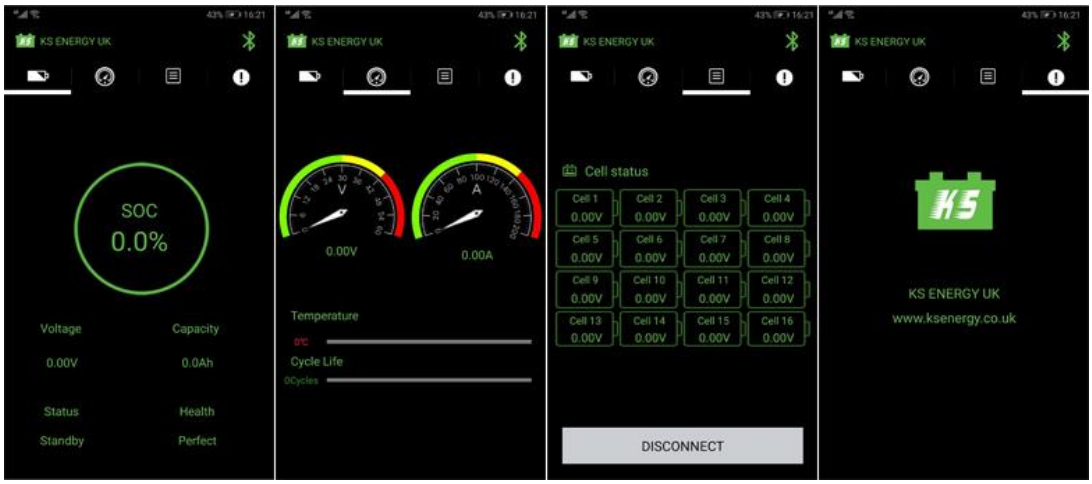


The battery information within the application is essentially self-explanatory and an overview follows: Page 1 displays State of Charge (SOC) as a percentage, the battery Voltage, total Capacity, and the present Status (Charging, Overcharge, Standby or Discharging), and battery health. Swipe left for Page 2 which displays Voltage and Current and via a dial display, cell temperature and total number of charge cycles. Swipe left for Page 3 which displays the cell bank voltages. There are four banks in each 12V battery, (eight in a 24V etc) therefore, four voltage levels are active in this model. It is possible to qualify the correct operation of the BMS's

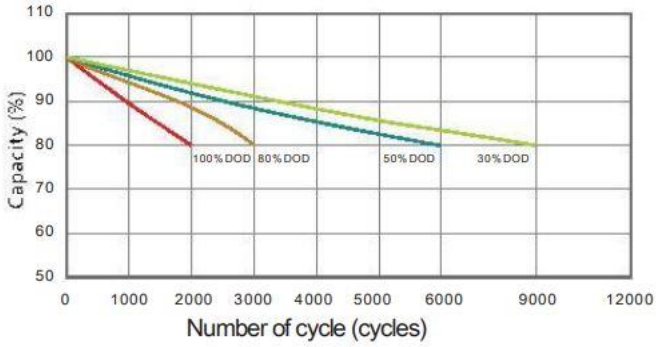
auto balancing. Cells generally drift more towards the end of charging and then rebalancing is performed overtime at rest. Use this page to disconnect the battery from the Bluetooth.

When two or more batteries are paralleled together as a bank, multiplying total capacity, SOC may be monitored by logging into a single battery. Once the batteries have equalised over a few cycles sharing similar impedances, the total battery bank SOC indication becomes valid from a single reading, as will the banks total voltage. Do be aware that the current indication will indicate a factor division according to the number of batteries in parallel. For example, two 120AH batteries connected to make a 240AH bank under a load of 10A would produce a live reading of half (5A), however the SOC and voltage reflects entire bank.

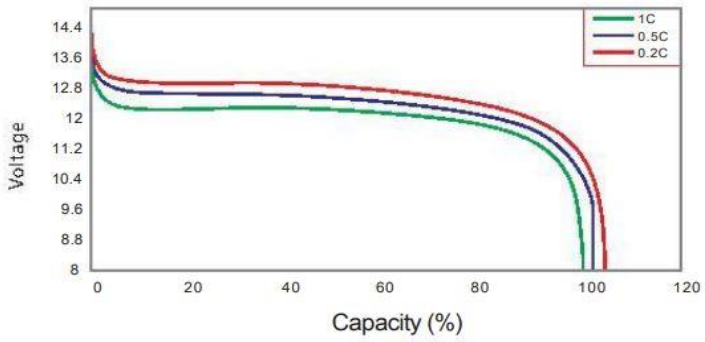
Constant Current Discharge Table (Amperes @ 25ºC)

	1hr	2hr	3hr	5hr	10hr
Cut of voltage 10.8V	100A	50A	33.3A	20A	10A

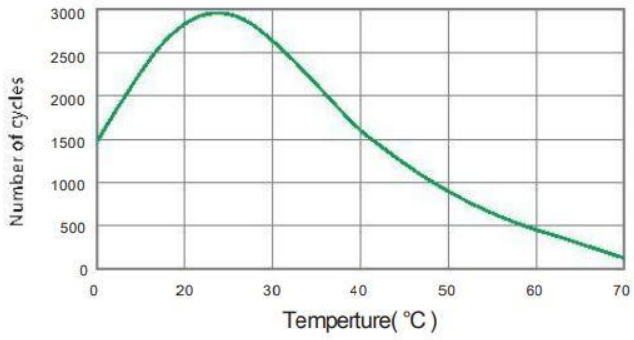
Number Cycles Vs. DOD



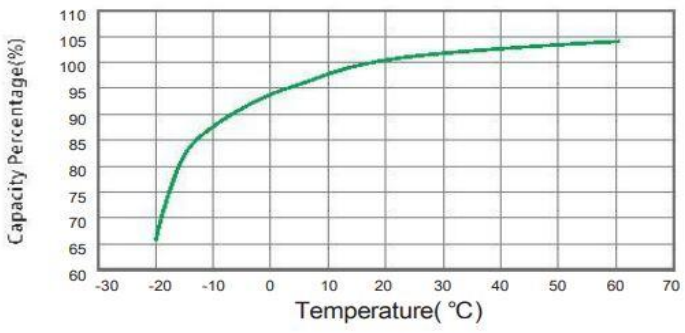
Discharge Performance at 25ºC



Cycle life (1C 100% DOD) Vs. Temperature



Temperature effects on capacity



Specifications- KS-LT100B

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Product number (GTIN): 5060716640100
Type: Lithium-Iron Phosphate (LiFePo4)
Battery voltage nominal: 12.8V, charged at rested: 13.2V
Capacity: 102Ah, 1.305KWh @ 25°C
Maximum continuous discharge current: 100A
Peak surge discharge current: 150A for 15 seconds
Size: (mm ±2) L*W*H 330*170*215, (inch 12.9*6.7*8.5)
Weight: 12.6Kg (27.7lbs)
Max continuous charge current: 100A
Max charge voltage: 14.6V
Recommended charge current <50A
Recommended discharge current: <75A
Recommended Charge voltage 14.4V, Charge type: CC/CV
Recommended low voltage disconnect 11V
Float voltage (when applicable) 13.2V - 13.3V
Operating temperature range: -20°C to +50°C
Storage temperature: -20°C to +30°C
Management: Internal BMS, type: actively balanced
Cells: 3270 cylindrical 3.2V 6000mAh, arrangement: 4S *17P
BMS protection:
Battery Low temperature Charge Protection (charge current disconnects at zero <0°C)
Battery Over Charge Disconnect Protection~(cell bank disconnect >3.80V charge resumes <3.43V)
Battery Over Discharge Protection (Discharge disconnects <9.8V, release 11.8V)
Short Circuit electronic trip: (>320A <250µS)
Over voltage: detect 15.2V <2S, release 14.4V
Over temperature shut down: 65°C, release <55°C
Depth Discharge: 100% Efficiency: 99%
Internal resistance (±3%) : 25mΩ @ 50% SOC 25°C
Self-discharge: 2.5% per month
Maximum recommended dry storage duration: (@55% capacity): 12 months
Terminals: F12 (M8), Terminal torque 90ft/lb – 10Nm
Case material: ABS, Ingress Rating: IP64
Parallel configuration: unlimited, Series: 4 batteries maximum
Life Span: >5000 cycles @80%-30% DOD @0.5C, >2500 cycles DOD 95% @1C
Wireless protocol: Low energy - Bluetooth® 4.0
Compliance: CE Certification for the entire battery (product)
ROHS Certification for the entire battery (product)
UN38.3 Certification for the entire battery (product)
Shipping designation Class 9
Designed in Great Britain by KS Energy Holdings (UK) Limited
Assembled in China