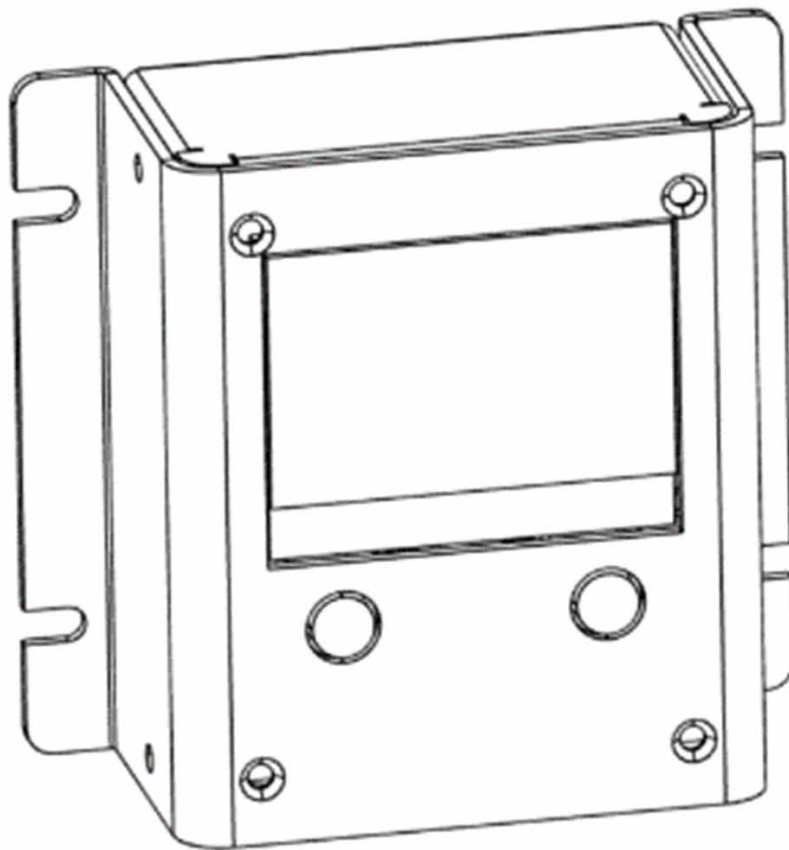




Battery Monitor (12VDC) **USER MANUAL**

AKEP-BM_01
PATENT APPLIED FOR: 2018322693



V1.7

**PLEASE READ AND UNDERSTAND THIS MANUAL
COMPLETELY BEFORE USING THIS PRODUCT.**

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1. SAFETY INFORMATION

Please read the user manual and safety instructions carefully before using the product.

- Avoid all contact with water, rain, snow or spray! Do not use if it is wet as it could potentially result in permanent irreparable damage to the internal electronics. Warranty will be voided if there is damage caused by water.
- For use with 12V Deep Cycle Lead Acid, AGM & Calcium based battery systems only.
- Do not attempt to disassemble the Battery Monitor. Warranty will be voided if any attempt is made to modify, repair or attempt unauthorised access to the electronics.
- This Battery Monitor is not a toy! The Battery Monitor can only be used by children aged from 8yrs and above and persons with reduced physical, sensory or mental capacities or lack of experience and knowledge only if they have been given supervision or instruction concerning the use of the Battery Monitor in a safe way and understand the hazards involved.

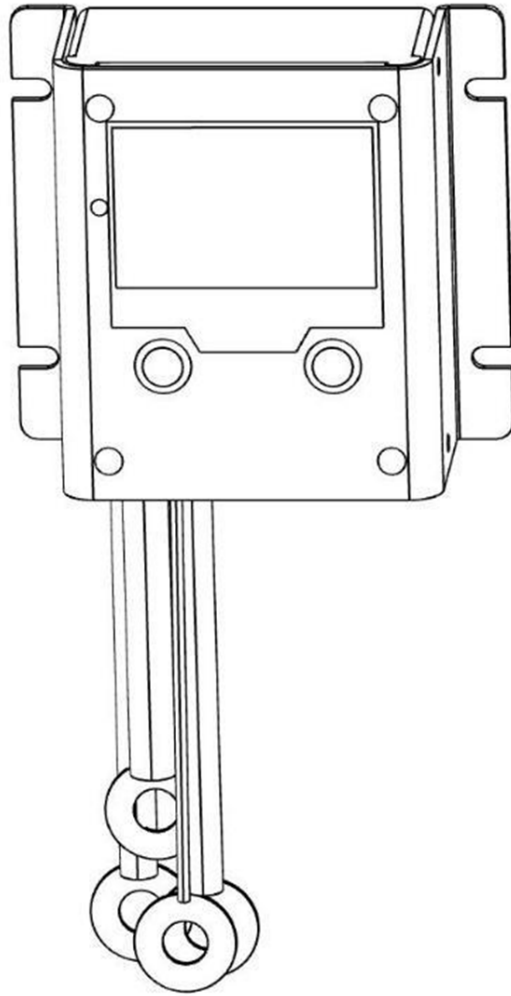
WARNING: Pure and modified sine wave Inverters have their own internal safety shut off electronics. All Inverters should be connected directly to the Battery. Do NOT connect any Inverter through the Battery Monitor as damage may result to the Inverter's internal electronics.

2. TECHNICAL DATA

- User set desired pre-set voltage for automatic disconnect & reconnect (incl. time delay)
- User set desired pre-set current for automatic overload protection shut off - Maximum 100A 12VDC working current
- LCD Battery Monitor – instantaneous Current & Voltage
- LED for status
- Ultra-low standby current draw

Size	9cm x 8cm x 4cm
Operating temperature	-10°C – 60°C
Auto over current shut off	Set by user: 5 –100A
Auto over voltage shut off	Set by user: 14.2 V – 17.2V
Auto low voltage shut off	Set by user: 10.5 V – 12.5V
Auto reconnect voltage	Set by user: 11.0 V – 12.8V
Reverse battery protection	Auxiliary battery connection only
Idle current draw – Auto	~20mA
Idle current draw – Output load shut off	~10mA
Status indicator	Red/green LED
Battery Monitor	LCD screen – instantaneous battery voltage, <i>sum of</i> charging & output current

3. PRODUCT OVERVIEW



4. SETUP INSTRUCTIONS

Step 1: Securely attach the YELLOW cable to the positive Output cable of your DC-DC Charger.

Step 2: Securely attach all positive cables of the loads (powered devices) to the GREEN cable.

Step 3: Ensure all negative cables of the loads (powered devices) are securely attached to the negative terminal post of the Auxiliary battery

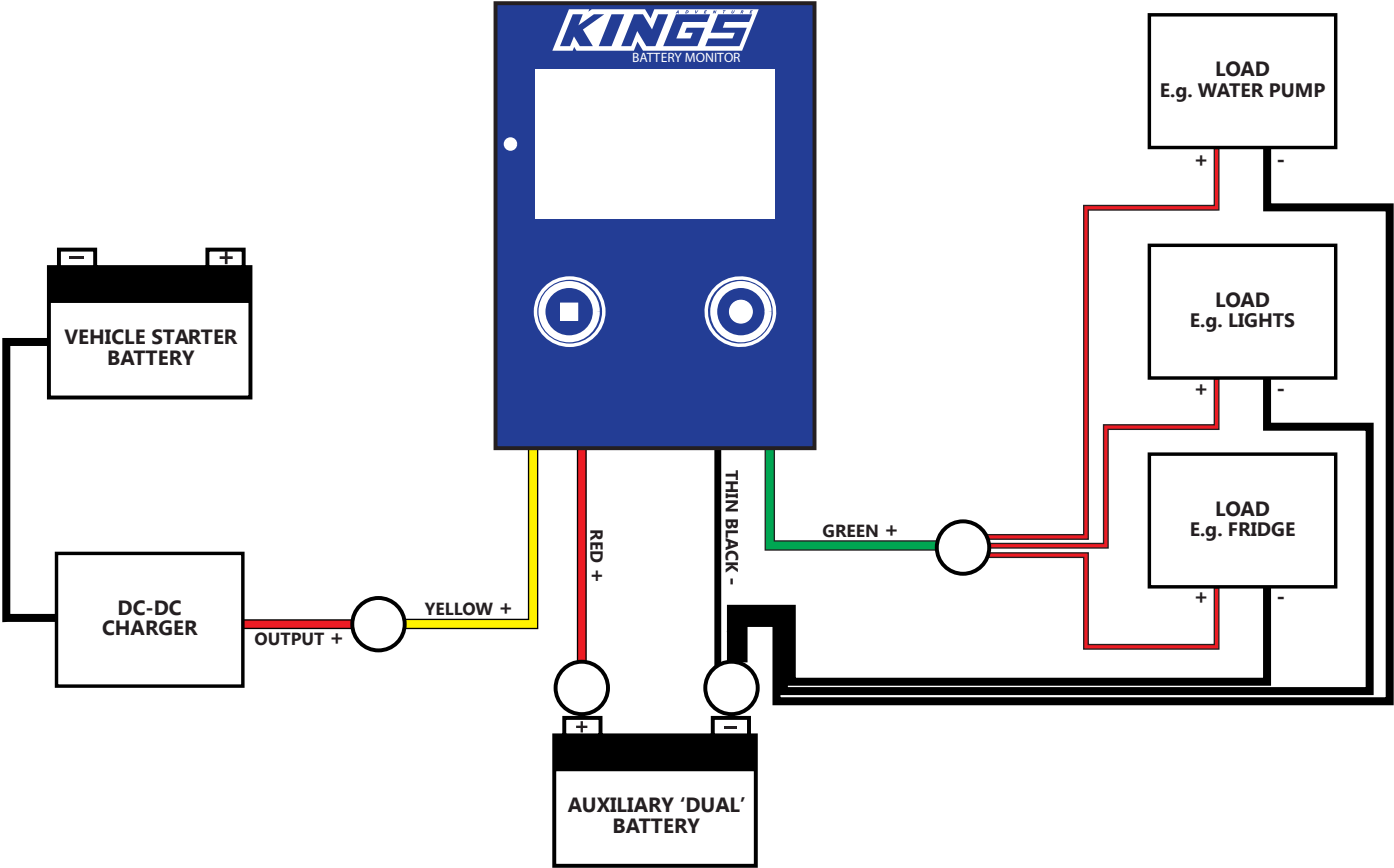
Step 4: Securely attach the thin twin BLACK cable to the negative terminal post of the Auxiliary battery.

Step 5: Securely attach the RED cable to the positive terminal post of the Auxiliary battery.

Step 6: Secure the Battery Monitor to your vehicle.

WARNING: Pure and modified sine wave Inverters have their own internal safety shut off electronics. All Inverters should be connected directly to the Battery. Do NOT connect any Inverter through the Battery Monitor as damage may result to the Inverter's internal electronics.

5. WIRING GUIDE



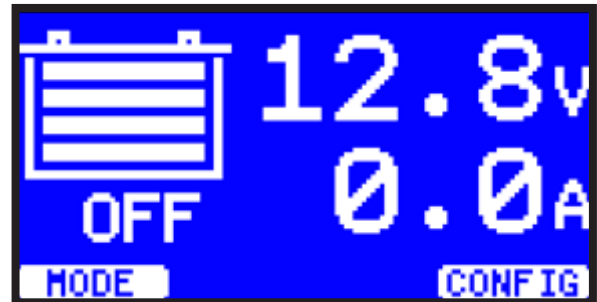
6. OPERATION

There are 2 modes of operation:

1. **AUTO** – with automatic low and high voltage shut off, and over current shut off functions.
2. **OFF** – output load disconnected.

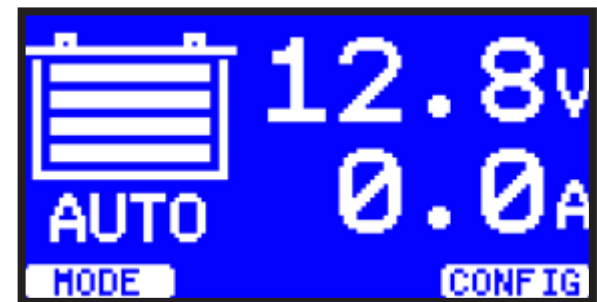
The factory setting is “AUTO” mode.

To set to “OFF” mode - Press and hold the **MODE** button.



The Battery Monitor is now set in the “OFF” mode – the output load has been shut off/ disconnected from the battery.

To set to “AUTO” mode Press and hold the **MODE** button.



The Battery Monitor is now set in the “AUTO” mode – it will monitor the voltage and current and automatically shut off/disconnect the output load from the battery based on the voltage and currents limits.

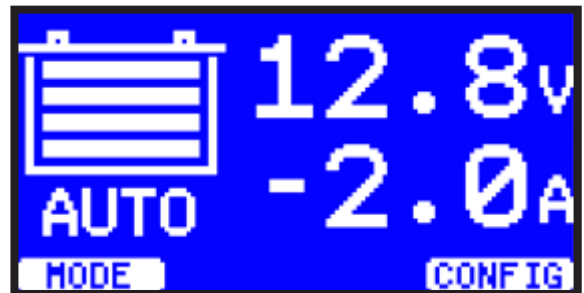
7. UNDERSTANDING THE DISPLAY SCREEN

The Home screen displays the instantaneous Voltage, and the *sum of* charging and discharging Current.

This image shows that the Auxiliary battery is 12.8V, and 25A current is charging the Auxiliary battery.



This image shows that the Auxiliary battery is 12.8V, and 2A current is being discharged from the Auxiliary battery.



By pressing the **MODE** button once, the numeric Voltage value can be changed to Battery %.

NOTE: *this % value is an estimate only. It is recommended to always use the actual voltage value and the battery manufacturer's specifications when determining the state of charge of a battery.*



8. BATTERY MONITOR SETUP

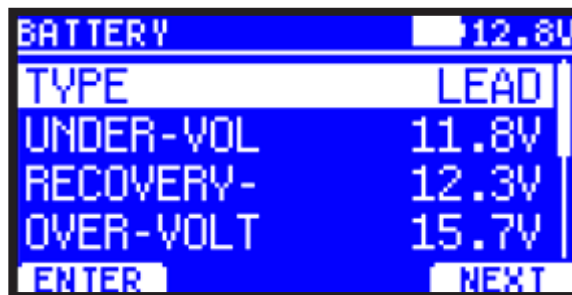
To access the user configurable settings, press the **CONFIG** button.



Press the **NEXT** button to scroll down to highlight the desired item, then press the **ENTER** button to select.

*At any time, to return to the previous menu, press the **NEXT** button to continue scrolling down until you highlight "BACK", then press the **ENTER** button.*

BATTERY



Type: to select battery type – Lead acid, AGM, Calcium.

Under-Voltage: This is the Voltage lower limit that the Battery Monitor will automatically shut off the output load. Factory default setting = 11.8V. Press the **NEXT** button to select your preferred value between 10.5 V – 12.5V. Then press the **ENTER** button to save.

Recovery-Voltage: This is the Voltage that the Battery Monitor will automatically restore power to the output load. Factory default setting = 12.3V. Press the **NEXT** button to select your preferred value between 11.0 V – 12.8V. Then press the **ENTER** button to save.

Over-Voltage: This is the Voltage upper limit that the Battery Monitor will automatically shut off the output load. Press the **NEXT** button to select your preferred value between 14.2 V – 17.2V. Then press the **ENTER** button to save.

Size: Press the **NEXT** button to enter the battery capacity - between 80-360 Ah.

MONITOR



Mode: Select “OFF” or “AUTO” mode.

Current: This is the upper Current limit that the Battery Monitor will automatically shut off the output load. Factory default setting = 100A. Press the **NEXT** button to select your preferred value between 5 – 100 A. Then press the **ENTER** button to save.

Delay: This is the delay in seconds for the under Voltage limit, recovery Voltage value, and over Current limit. The automatic shut off of the output load will occur after the Voltage or Current limit is reached for this delayed period. Factory default setting = 30sec. Press the **NEXT** button to select your preferred value between 0 – 120 sec. Then press the **ENTER** button to save.

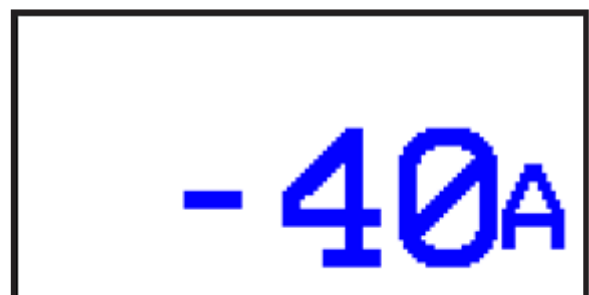
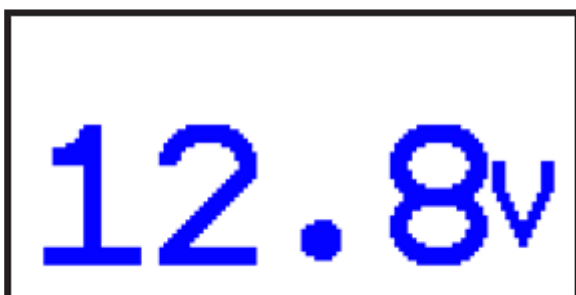
DISPLAY

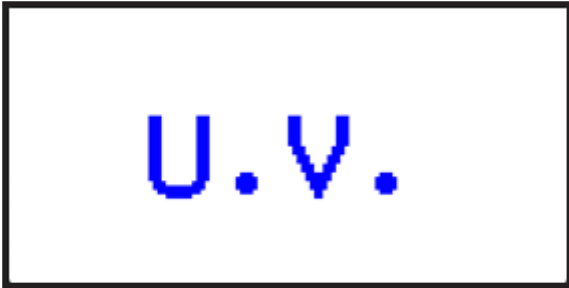


Brightness: To set preferred screen brightness

Contrast: To set preferred screen contrast

Sleep: To set delay in minutes for screen sleep mode. When in “sleep” the Battery Monitor display will automatically scroll between the instantaneous current and voltage values.





Simply press either button to “wake” the Battery Monitor.

SYSTEM



Factory Reset: To restore to factory default settings.

LED STATUS INDICATOR INFORMATION

LED	STATUS
1 green flash	“Auto” mode
2 green flash	“Off” mode
Solid red	System Fault
1 red flash	Auxiliary Battery Under Voltage
2 red flash	Auxiliary Battery Over Voltage
3 red flash	Auxiliary Battery Over Current
4 red flash	System Over Temperature

NOTE: The LED will show **SOLID RED** to indicate an internal System Fault. To reset the Battery Monitor simply remove the thin Black Ground wire from the Auxiliary Battery negative terminal for 5 seconds, then re-attach. If normal operation does not recommence immediately, then the internal electronics are permanently damaged and the Battery Monitor is inoperable.

9. AUTOMATIC SHUT OFF CONDITIONS

UNDER VOLTAGE

When the Battery Monitor reaches the under Voltage pre-set value it will automatically shut off the output load and display the following warning. You can choose to override the shut off if you require immediate power.

WARNING: you run the risk of damaging your battery if you continue to draw power from it. Alternately, allow the Battery Monitor to remain off until it can automatically recover.

The home screen will display "U.V" to indicate the output load is shut off.

The Battery Monitor will automatically restore power to the output loads when the voltage recovers and reaches the pre-set Recovery Voltage value.



OVER VOLTAGE

When the Battery Monitor reaches the upper Voltage pre-set value it will automatically shut off the output load and display the following warning. You can choose to override the shut off if you require immediate power.

WARNING: you run the risk of damaging your battery if you continue to draw power from it.

The home display screen will show this to indicate the output load is shut off.



The Battery Monitor will automatically restore power to the output load when the voltage returns below a factory pre-configured setting: Lead Acid = 14.2V, AGM = 14.6V, Calcium 15.3V.



OVER CURRENT

When the Battery Monitor reaches the over Current pre-set value it will automatically shut off the output load and display the following warning.

This automatic shut off condition requires user involvement to restore power to the system. There is no automatic recovery from over Current shut off.

To reconnect power to the system, ensure that the device that caused the over current condition is not in use or it has been disconnected before pressing OK.

WARNING: you run the risk of damaging your battery, and powered devices if you continue to try and draw power from the battery.



OVER TEMPERATURE

An internal temperature sensor monitors the Battery Monitor. If this temperature is greater than a set threshold it will automatically shut off the output load to prevent damage to the electronics inside. This could happen if the ambient is very high and the system is drawing high current. You can choose to override the shut off if you require immediate power.

WARNING: you run the risk of damaging the Battery Monitor if you override the shut off.

Alternatively, allow the Battery Monitor to remain off until the temperature drops to the pre-set safe limit and it will automatically restore power to the output loads.



12 MONTH LIMITED WARRANTY

WARRANTY PERIOD:

Full 12 month warranty from date of purchase against all manufacturing defects.

WHAT DOES THE WARRANTY COVER?

Under normal usage conditions, this warranty covers:

- a. Any defect in design or manufacture which results in the product failing to perform substantially as described in authorised advertising or literature.
- b. We will either repair or replace the product at our discretion providing that the fault is found to have been caused by a design or manufacturing defect and not misuse or tampering.

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure. The benefits provided to you as the consumer by this warranty are in addition to other rights and remedies available to you under the law.

THE WARRANTY DOES NOT COVER:

- a. Any damage resulting from improper use
 - b. Faulty installation or modification made during installation
 - c. The cost of removing and reinstalling the product
 - d. Travel and /or other expenses due to customer's remote location
 - e. Transport charges and damage in transit. It is your responsibility to deliver and pick up your product, including any costs associated with the postage of your repair or replacement product. If you do freight your product we recommend that you insure against loss or damage.
 - f. Any loss directly or indirectly associated with the product failing to operate.
 - g. Damage caused by mould, insects, animals, misuse, incorrect operation, adverse weather, accidents and fair wear and tear
-

TO MAKE A CLAIM, PLEASE ENSURE YOU RETAIN YOUR SALES RECEIPT OF PURCHASE

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