



## eSMART Li-48neo Smart Li-ion Battery eSMART Li-96neo Smart Li-ion Battery

### USER MANUAL

Version 1.0

created : 08/06/2019

Thank you for your purchase of an AUDIOROOT eSMART Li-48neo or Li-96neo battery. We strongly recommend that you read this instruction manual before using your eSMART Li-neo battery! Please keep this manual for future reference.

#### Safety instructions :

For safety reasons, users are responsible for familiarizing themselves with the contents of this manual and all warnings before use.

The cells inside a li-ion battery pack contains flammable items such as organic solvents. If the battery is mishandled, it may cause fire, smoke or an explosion and the battery's functionality will be seriously damaged.

Observe the following precautions:

- Risks of explosion
  - Do not subject the battery pack to strong impacts.
  - Do not crush or puncture the battery pack.
  - Do not dispose of the battery pack in a fire.
- Risks of fire
  - Do not expose the battery pack to temperatures in excess of 60°C.
  - Do not place the battery pack near a heat source, such as a fireplace.
  - Do not expose the battery pack to direct sunlight.
- Risks of damage to the battery module
  - Do not disassemble the battery pack.
  - Do not allow the battery pack to get in contact with liquids.
  - Do not subject the battery module to high pressures.
  - Do not place any objects on top of the battery pack.

A physically damaged battery pack should not be used anymore and disposed of properly.

#### Guideline for optimizing your battery's life :

- You can charge / discharge your battery in any manner with a compatible battery charger. Li-ion batteries are not prone to memory effect. You do not need to fully discharge your battery before recharging it.
- NEVER leave your battery empty for storage. The battery's electronics require a very small amount of current to work and will drain the battery after several months of storage.
- To store your battery charge it to approx. 40 – 60 %. This will provide 4 to 6 months of shelf life. Check the battery's capacity every month. If the battery reaches 20 % recharge it to 40 – 60%.
- The greatest effect on the self-discharge is storage temperature. Higher temperatures

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increase self-discharge. Storage of cells and batteries in non-temperature controlled facilities in hot climates can cause more rapid self discharge hence the storage method plays a role in the shelf life of the product. For optimum shelf life store your batteries in a cool place. You can store your battery in your fridge (3 – 4 deg celsius). We do not recommend storing your batteries in a freezer.

### Fuel gauge accuracy

If you were to observe fuel gauge discrepancy proceed as follows :

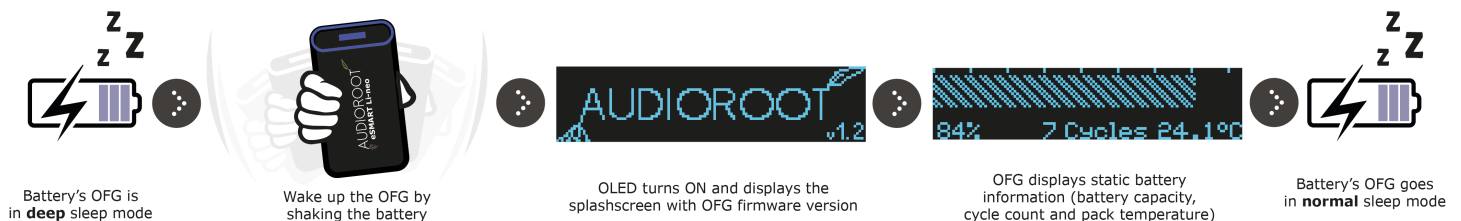
- Fully charge the battery
- Fully discharge the battery by connecting it to your equipment (i.e leave the battery cut off)
- Fully recharge the battery again

Your battery is now recalibrated.

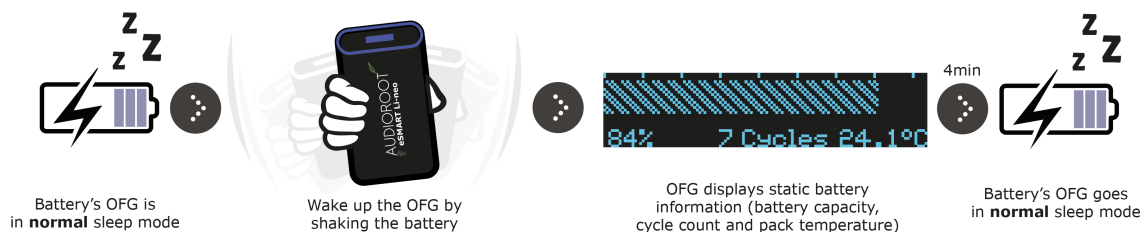
### Embedded OLED fuel gauge (OFG) operation

#### 1. Waking up the OFG from deep sleep :

If the battery has been in idle mode for a period of more than 90 minutes (i.e. no current draw) the OFG will enter deep sleep. The OFG can be woken up by shaking the battery which triggers the internal accelerometer and turns the display on. After 4 minutes the display will turn off again and the OFG will enter normal sleep mode.



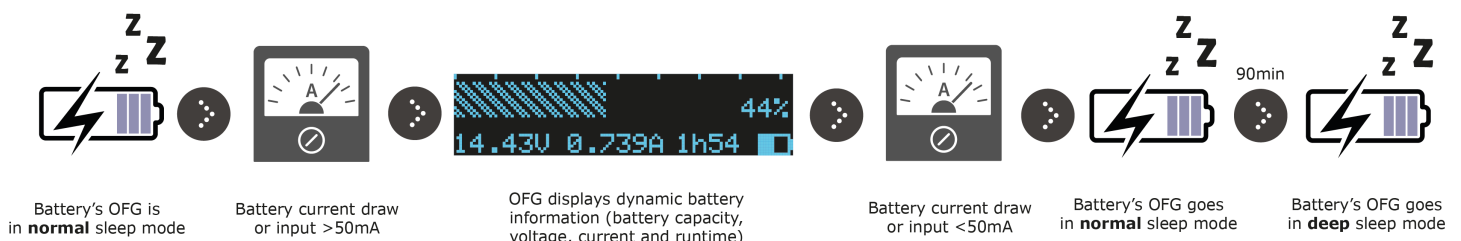
#### 2. Waking up the OFG from normal sleep :



#### 3. OFG dynamic information display :

The battery's OFG will start displaying dynamic SoC (State of Charge) information if the 2 following conditions are met :


1. OFG is in normal sleep mode
2. The battery is connected to a load or charger and the current draw or input is > 50mA .



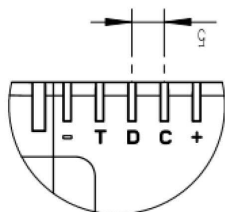
**⚠** The OFG will always remain OFF if the battery is connected to an SMBUS compatible device. When connected to a SMBUS compatible device (for example a DC current distributor, smart charger or digital audio recorder/mixer with SMBUS capabilities) the host is responsible for retrieving battery SoC information and displaying them to the user.

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 The OFG does not need to be woken up for the battery to supply power to the device it's connected to. Power supply capability of the battery is fully independent from the OFG's status/operation. Provided a battery is fully or partially charged (and not in protection mode) it will always supply power to the device it's connected to even if the OFG is in normal or deep sleep mode.

## Connector pinout



Terminal	Legend	Description
1	(+)	Charge / Discharge Positive
2	(C)	SMBus Clock
3	(D)	SMBus Data
4	(T)	300Ω ± 5%
5	(-)	Charge / Discharge Negative

## Air transport / IATA regulations

Here is a short guideline for li-ion battery users :

- It is **prohibited** to carry li-ion batteries in **checked-in baggages** on civil airlines.
- You may carry a « reasonable amount » of li-ion spare batteries in carry on baggages if their nominal wattage per hour is < 100Wh.
- All Audioroot **eSMART Li-xxneo** batteries have a capacity < 100Wh so **you may carry any eSMART Li-xxneo type of batteries in carry on baggages**.

## Warranty and Warranty Exemptions

AUDIOROOT li-ion batteries have a 3 months warranty which covers any manufacturer defect.

AUDIOROOT is not obligated to warrant eSMART Li-neo batteries, if defects are related to damages caused by abuse/neglect, or from the following: - Damage from shipping or corroded terminals- Manufacturer codes tampering or removal - Failure to properly install the battery, in addition to keeping the battery properly charged and maintained - Breakage from collision, fire or freezing—which includes damage from extreme heat or cold, improper storage, water damage, our warranty does not cover spent or worn out batteries or tampering.

- AUDIOROOT will not be liable for any damages that are caused by violations of the precautions in this user manual.
- AUDIOROOT will not be liable for any problems caused by design defects of the application and/or chargers.
- AUDIOROOT will not accept any abnormal batteries that were caused due to any incorrect use.

## Technical characteristics

At T= 25°C, RH=65% +/-20% (unless otherwise specified)

	eSMART Li-neo48wh	eSMART Li-neo96wh
Technology	Lithium-ion	Lithium-ion
Nominal voltage	14.4V	14.4V
Typical capacity	3350mAh	6700mAh
Minimum capacity	3100mAh	6200mAh
Operating voltage	From 10V to 16.8V	From 10V to 16.8V
Standard charging method	Constant current, constant voltage (CC/CV) 1.625A until 16.8V	Constant current, constant voltage (CC/CV) 3.25A until 16.8V
Standard discharging method	Constant current (CC) 0.65A until 10V	Constant current (CC) 1.3A until 10V
Max charge current	3.25A	5.75A
Max continuous discharge current	6.75A	11.75A

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Max charge voltage	16.8V	16.8V
Weight	240g	450g
Dimensions	85.10 x 77.20 x 22.60mm	150.4 x 77.20 x 22.60 mm

- Operation temperature:
  - Charge: 10~45°C
  - Discharge : -20~60°C
- Storage temperature:
  - 1 month: -20~50°C
  - 3 months: -20~40°C
  - 1 year: -20~20°C
- Cell certification: UN 38.3 / IEC 62133
- Battery pack certification: UN 38.3 / EMC / FCC / CB IEC62133 / RoHS / REACH
- Cycle life : The battery will remain at least 70% of its initial capacity after 500 cycles, where-else the battery is used in standard charging and discharging method, including 30 minutes rest after each charge and discharge.
- OLED display information:
  - Battery pack remaining capacity (%)
  - Battery pack voltage (V)
  - Battery pack current draw (A)
  - Battery pack remaining time at rate (HH:MM)
  - Battery pack cycle count
  - Battery pack temperature (°C)
  - Battery pack status (charging or discharging)
- Current threshold to activate the OLED: 50mA (charging or discharging)