



eSMART BG-DU/BG-DU-REG

Power distributor with universal fuel gauge

Version 2.5

Updated : 27/10/2016

The eSMART BG-DU is a compact and lightweight powering box with 8 protected outputs, 3 locking switches and a full featured fuel gauge.

This product was designed for use in large sound bags or small location carts. The power distributor can be connected **to any battery** type (SLA, NI-MH or LI-ION) and the fuel gauge provides all the informations required to monitor the battery's state of charge (voltage, current, power, etc...).

The eSMART BG-DU uses an internal coulomb counter and a calibration routine to measure the battery's true capacity and display its remaining capacity in real time. This power distributor is also fully compatible with our full line of Li-XXwh smart batteries.

- Real time monitoring of the batterie's SOC : remaining capacity (%), run time estimation, battery voltage, power consumption, power and coulomb counter
- 8 switchable outputs using 3 locking switches
- 2.5A polyswitch resetable fuses on each output
- A blinking LED indicates when the battery capacity falls below 10 %
- Compatible with any battery ranging from 6 to 18V (11 to 18V for the BG-DU-REG)
- Hirose locking connectors
- Compact and lightweight : (129g , 85x75x30mm)

Warning

Do not try to repair this product or replace any of its elements if this user manual does not give specific instructions on how to do so. This equipement was built with surface mount components and needs special tooling for repair. The removal of the electronic PCB needs special technical skills.

UNPACKING AND INSPECTION

The eSMART BG-DU powering distribution products are carefully checked for good condition before being shipped from the factory. Despite the protective carton and rugged design, shipping may damage the unit. Check for possible carton damage when unpacking the unit. Please save the carton for return shipment if required. AUDIOROOT does not warrant against damage caused by returning products in other cartons than the original ones or improperly packing the products. If shipping damage is evident, notify the transportation company immediately. Only the consignee can file a claim with the carrier for shipping damage. AUDIOROOT will fully co-operate in such an event. Be sure to save the carton for the shipper to inspect.

UNIT CONNECTIONS AND CONTROLS:



1. Low battery level led indicator
 - At boot time this led blinks a few times during the loading of the fuel gauge's firmware.
 - In normal operation the led will start blinking when the state of charge of the battery falls under 10%
2. OLED display
 - This display shows all the needed information regarding the state of charge of the battery.
3. Battery selection buttons.
 - **In standard mode** these 2 buttons are used to change the battery index number. By pressing simultaneously the 2 buttons the calibration process is engaged for the selected battery. A long push (3 secs) on the "-" button will manually reset the coulomb counter (orange value on the OLED screen). This is very useful when hot-swapping batteries.
 - **In eSMART mode** (i.e with a eSMART Li-xxWh battery connected) these 2 buttons are inoperative.

4. 1st power switch. This switch enables power outputs group #1
5. 2nd power switch. This switch enables power outputs group #2
6. 3rd power switch. This switch enables power outputs group #3
7. Power outputs group #1
8. Power outputs group #2 – On the BG-DU-REG each of these 2 outputs are 12V/12W fully regulated/isolated.
9. Power outputs group #3 – On the BG-DU-REG these 2 outputs are 9V/2A regulated (not isolated).
10. Power input connector

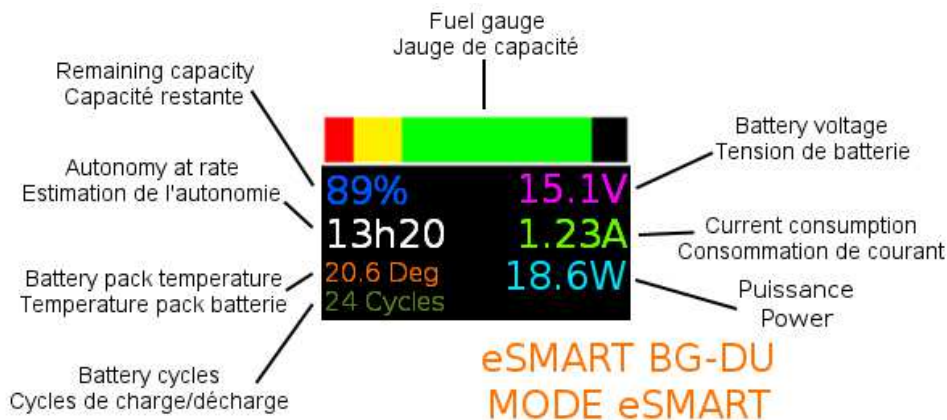


CONNECTOR PINOUT:

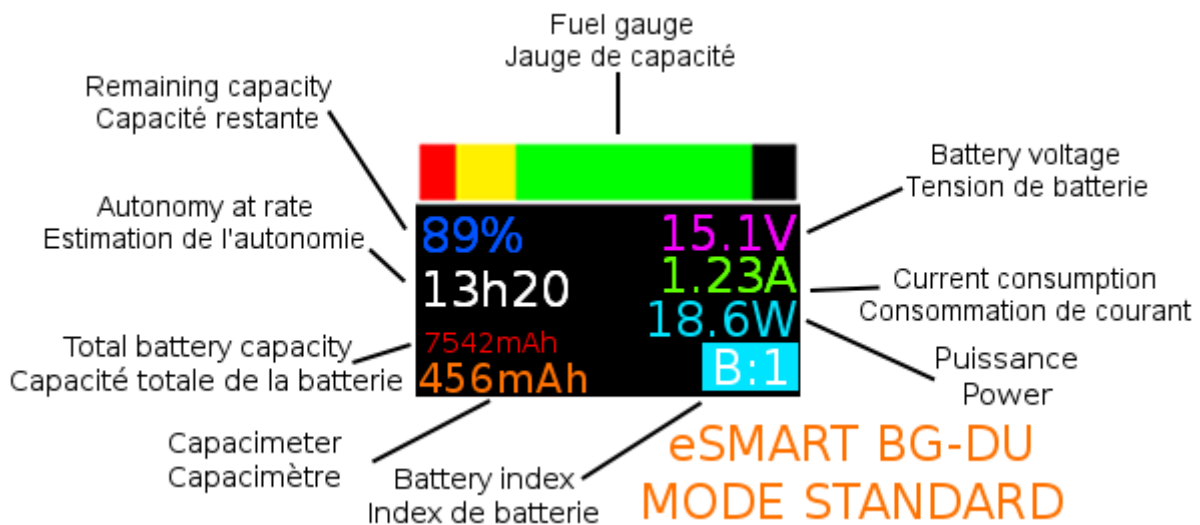
- Power output connectors (groups 1, 2 and 3) :
 - 1 : **DC -**
 - 4 : **DC+**
- Hirose power input connector :
 - 1 : **DC -**
 - 2 : **eSMART DAT**
 - 3 : **eSMART CLK**
 - 4 : **DC+**

FUNCTIONNAL MODES :

- **eSMART MODE** – This mode is automatically selected when an AUDIOROOT eSMART Li-xxWh battery is connected to the eSMART BG-DU. The micro controller communicates with the battery and retrieves all informations regarding its state of charge and displays them on the OLED display like this :



- **Standard mode** – This mode is selected by default when no eSMART Li-xxWh battery was detected on the input connector at boot time. In standard mode the fuel gauge uses its own collected data (current, voltage, etc...) and the learned capacity to display the battery's state of charge and to predict the system's autonomy. The total battery capacity is measured by the fuel gauge when running the **calibration process**. This process must be run manually by the user. The figure below illustrates the OLED screen display arrangement in standard mode.



Total battery capacity : This value indicates the total capacity of the battery that was measured during the calibration process. This value is related to the battery index number. Up to 8 different capacity values can be saved and selected for use.

Capacimeter : The capacimeter shows in mAh the total current that has been drawn by the system since the battery has been connected. The closer this value gets from the total battery capacity the more the battery empties itself. The capacimeter's value is reset a few seconds after the battery is **disconnected** from the fuel gauge. *This value is not reset when the power switches are in the OFF position.* The capacimeter can be manually reset by holding the "-" button for 3 seconds.

Battery Index : This number shows which battery is actually selected. Its value can be changed using the 2 push buttons located on the front panel of the unit.

Calibration process :

Please note : This process is not required when using AUDIOROOT eSMART Li-xxWh batteries. The 2 push buttons of the front panel are inoperative when an eSMART battery is connected to the system.

1. Mark the battery you wish to calibrate with a number ranging from 1 to 8. The battery must be fully charged before starting the calibration process.
2. Plug the battery on the eSMART BG-DU power distributor with a compatible power cable (preferably leave pins 2 and 3 on the Hirose connector unused)
3. Plug all the equipment that will be used in normal operation (for example a portable mixer, a transmitter and 2 receivers).
4. Put all 3 power switches of the eSMART BG-DU in ON position and power on all your equipment.
5. By using the 2 push buttons select the battery index that was chosen in step #1.
6. Initiate the calibration process by pushing the 2 push buttons simultaneously.

The fuel gauge will now be measuring and saving the value of the total current drawn. This process should be ended only when the battery is empty.

In the case of a li-ion or LiFePO4 battery the calibration will stop automatically when the low voltage protection circuit of the battery trips.

When calibrating a battery of another chemistry (SLA or Ni-Mh) the user needs to shutdown the fuel gauge manually when the battery's voltage level gets too low in order to terminate the calibration process correctly (for example the low voltage level of a 6 cell SLA battery is 10.5 Volts : this value can be used to terminate the calibration process of a standard SLA battery).

The fuel gauge is now aware of the battery's total capacity. The user only needs to recall the corresponding battery index number when connecting a fresh battery to monitor its state of charge efficiently and accordingly.

PLEASE NOTE: A battery that has been previously calibrated must always be connected fully charged to the eSMART BG-DU or the state of charge indications will be inaccurate.