

# PAG L96e Lithium-Ion Battery

## Instruction Leaflet

### Safety

- 1.1** When used correctly, Lithium-Ion batteries are a rugged, safe, clean and trouble-free method of storing power. However, the user should be aware that incorrect treatment could present a hazard. In the interest of safety, and the protection of our environment, please read and observe the following health and safety information.
- 1.2 GENERAL:** Do not put in fire or mutilate - cells may burst or release toxic material. Do not short-circuit. Do not continue to use the battery if there is any change in the appearance of the casing.
- 1.3 CORROSIVE ELECTROLYTE:** The electrolyte is an alkaline solution, which can cause chemical burns to human tissue if leakage occurs. Wear protective gloves when handling all contaminated materials. In the event of contact with the skin, flood copiously with clean water. If significant amounts of electrolyte are involved, or if any has touched the eyes, seek immediate medical attention.
- 1.4 ACCIDENTAL SHORT-CIRCUITING:** Lithium-Ion cells can deliver power at very high rates. PAG L96e batteries incorporate several levels of internal electrical protection, but severe mechanical abuse could result in damage to the cells, and a short-circuit internal to the battery. Arcing, excessive heat and the liberation of combustible gas could result, with the potential for personal injury or ignition of adjacent flammable materials.
- 1.5 DISPOSAL:** Expired Lithium-Ion batteries should be disposed of in accordance with the appropriate regulations or legislation. PAG Ltd. offers a recycling service for expired PAG batteries, which results in the materials being recovered for re-use.
- WARNING: DO NOT MUTILATE OR INCINERATE BATTERIES.
- Do not dispose of batteries or cells in a charged condition (see 1.4 above).
- Return batteries by prior arrangement to:  
**PAG Ltd. 565 Kingston Road, Raynes Park, London SW20 8SA.**  
Contact: Tel: +44 (0)20 8543 3131 Fax: +44 (0)20 8540 4116  
E-mail: [service@paguk.com](mailto:service@paguk.com)  
Batteries must be in a discharged state, and clearly marked "FOR RECYCLING".
- 1.6 PAG TECHNICAL SALES AND INFORMATION DESK:**  
For further information, contact the PAG Technical Sales and Information Desk (London) on +44 (0)20 8543 3131, PAG USA Technical Sales and Information Desk on 818 760 8265 or your nearest PAG Authorised Service Centre. Alternatively, visit the PAG Web Site at [www.paguk.com](http://www.paguk.com)

### Specification

- 2.1 Description:** PAG L96e Lithium-Ion Professional Broadcast Battery.
- 2.2 Connectors:** Three connector variants are available:
- PAGlok professional battery connector (Model 9310)
  - V-Mount compatible connector (Model 9310V)
  - Gold-Mount (Anton Bauer) compatible connector (Model 9310A)
- 2.3 Display:**  
PAG L96e batteries incorporate a 5 LED state-of-charge indicator, which shows capacity as percentage. On load, a run-time prediction can be indicated in hours and minutes.
- 2.4 Construction:** High-impact polycarbonate injection mouldings, featuring an internal cradle designed to protect the cells from impact damage. The cells have welded interconnections of low-resistance nickel strap. Batteries are sealed and non user-serviceable.

- 2.5 Cells:** Premium grade Lithium-Ion sealed rechargeable cylindrical cells.
- 2.6 Voltage:** 14.8V nominal. 12 cells connected in series/parallel. Each cell has a nominal voltage of 3.7V.
- 2.7 Capacity:** Nominal 6.5 ampere-hours.
- 2.8 Output Current:** Rated maximum continuous output current 8.0 amperes or 100W.
- 2.9 Charge Voltage:** 16.8V.
- 2.10 Protection:**  
The battery incorporates the following safety shutdown systems:
- \* 3 over-current shutdown systems.
  - \* 2 over-voltage shutdown systems.
  - \* 2 under-voltage shutdown systems.
  - \* 2 thermal shutdown systems (including non-resetting thermal fuse).
- All protection circuits within the battery are designed to withstand the leakage of electrolyte. This is achieved by using a special layout and a coating of Parylene, the premier vapour-deposited conformal coating.
- 2.11 Operating Temperature Range:**  
-20°C to +60°C, but optimum discharge efficiency is achieved within the temperature range +10°C to +40°C.
- 2.12 Size & Weight:**
- |                   | Height       | Width       | Depth         | Weight         |
|-------------------|--------------|-------------|---------------|----------------|
| <b>PAGlok</b>     | 130mm (5.1") | 86mm (3.4") | 42mm (1.65")* | 731g (1.61lbs) |
| <b>V-Mount</b>    | 130mm (5.1") | 86mm (3.4") | 47mm (1.85")  | 749g (1.65lbs) |
| <b>Gold-Mount</b> | 130mm (5.1") | 86mm (3.4") | 52mm (2.00")† | 760g (1.67lbs) |
- \*excluding locking claws. † excluding mushroom lugs.

### Care & Maintenance

- 3.1** NOTE: THE BATTERY HAS BEEN DISCHARGED FOR TRANSIT, AND SHOULD BE FULLY CHARGED BEFORE USE.
- 3.2** USE SPECIFIED CHARGERS ONLY (SEE 4.1).
- 3.3** For maximum output use within the temperature range +10°C to +40°C.
- 3.4** Absolute maximum continuous output: 8A or 100W.
- IMPORTANT: the battery will run most medium-consumption broadcast cameras together with a light of up to 35W. However, the high current pulse that occurs when a tungsten-filament light is turned on from cold, may trigger the battery over-current protection. If a tungsten-filament light is required, use a Paglight or Mini Paglight together with a PAG Softstart lamp holder, Model Nos. 9938 or 9017 respectively. A Softstart lamp holder will not be required when using the regulated light socket on a Sony digital camera.
- 3.5** The battery is designed to dissipate heat from the right hand side in normal operation, and will therefore become warm in this area.
- 3.6** For long-term storage, the battery should be initially in the half-charged state. Maintenance charging is not required during long-term storage. Store in a cool, dry place at a temperature between -20°C and +50°C. Long-term storage outside of this temperature range may reduce the battery's life. After extended storage it is advisable to give the battery a top-up charge before use.
- 3.7** The battery is sealed, and contains no user-serviceable components. In order to maintain the quality standard for which you first chose this product, return it to a PAG Dealer or the PAG Service Department for servicing.

# Instructions for Use

## 4.1 Charging

**IMPORTANT: THE BATTERY IS ELECTRONICALLY PROTECTED, AND WILL NOT ACCEPT A CHARGE FROM UNSUITABLE CHARGERS.**

**PAGlok Model:** the battery can ONLY be charged from a PAG ACS charger that is designed to charge PAG Lithium-Ion batteries. A software upgrade may be required for PAGlok chargers manufactured prior to November 2008, to enable them to charge the PAG L96e battery.

**V-Mount Compatible Model:** the battery can be charged from a PAG V-Mount compatible charger, such as the PAGlink PL16 Model 9707, PAGlink Cube Model 9708, PAGlink Micro Charger Model 9710 and PAG Cube Model 9702V. A software upgrade may be required for PAGlok or PAG Snap-on compatible chargers manufactured prior to November 2008, to enable them to charge the V-Mount L96e via the front PP90 sockets, using charge adaptor Model 9617.

**Gold Mount Compatible Model:** the battery can be charged from an Anton Bauer Li-Ion charger or a PAG ACS charger that is designed to charge PAG Li-Ion batteries, e.g. Pulsar, Quasar or AR Series 2 chargers. A software upgrade may be required for PAG chargers manufactured prior to November 2008, to enable them to charge the PAG L96e battery.

READ THE CHARGER HANDBOOK BEFORE ATTEMPTING TO CHARGE THE BATTERY.

## 4.2 Protection Shutdown

**IMPORTANT:** If the battery is discharged at too high a rate, even momentarily, it will disconnect its output. This is a safety feature.

It should be noted that even if the nominal consumption of a camera and light falls within the rating of the battery, high current surges can occur when the recorder or the light is turned on which may be sufficient to exceed the rating and trip the protection circuit.

**IMPORTANT:** A tungsten-filament light draws a high current pulse when it is turned on from cold, and this may trigger the over-current protection. This can be avoided by using a suitable light (refer to Section 3.7 above).

## 4.3 Battery Output Re-set Procedure

If the battery has been shut down by its protection circuit it can be recovered by simply removing it from the load and pressing the display button, provided the battery still retains some charge.

## 4.4 Thermal Protection

When the battery has been discharged at a high rate it will become warm, and it is advisable to let it cool before charging it. The battery may be charged within the temperature range 0°C to +40°C but optimum performance will be in the range +10°C to +40°C.

## 4.5 Capacity Indication



A single button-press displays charge status in terms of percentage. The LEDs light clockwise, from the top right round to the top left.

5 LEDs	=	80 - 100%	remaining
4 LEDs	=	60 - 79%	remaining
3 LEDs	=	40 - 59%	remaining
2 LEDs	=	20 - 39%	remaining
1 LED	=	10 - 19%	remaining
1 LED flashing	=	0 - 10%	remaining

## 4.6 Run-Time Indication:

The display is also capable of indicating an estimate of remaining run-time, on-load.



The second button-press activates the time display. The 'HRS' LED will flash twice.



The number of hours will be indicated by the number of lit LEDs: each LED = 1 hour.



The 'MINS' LED will then flash twice.



The number of minutes will be indicated by the number of lit LEDs: each LED = 10 mins.

PAG L96e batteries maintain an accurate state-of-charge display by tracking cell performance and adjusting the calibration values to compensate for ageing. They do not require a periodic 'service charge' to maintain display accuracy.

## 4.7 In-Viewfinder Battery Status (V-Mount & PAGlok Models only)

Available capacity, as a percentage, can be displayed in the viewfinders of cameras designed to accept this data. Different data standards are used by camera and battery manufacturers; PAG L96e batteries adjust the data output standard automatically to support the following: SMB (Sony), I<sup>2</sup>C (IDX) and analogue 0V to 5V (Anton-Bauer). The L96e can also be programmed to display capacity in the viewfinders of RED cameras. Press the display button twice, holding down on the second press until the top 2 LEDs light. This indicates that the battery is now compatible with the RED data protocol (reversed SMB). When the battery is connected to a camera with a different data protocol it will automatically adjust to communicate with that system. To return to RED compatibility repeat the two-button-press process.

# Guarantee

- Notwithstanding any provision of any agreement the following guarantee is exclusive: PAG Limited guarantees each PAG L96e battery it manufactures to be free of defects in material and workmanship under normal use and service for **2 YEARS** from the date of purchase. This guarantee extends only to the original purchaser. This guarantee shall not apply to fuses or any product or parts which have been subject to misuse, neglect, accident or abnormal conditions of operation.
- In the event of failure of a product covered by this guarantee, PAG Limited will repair and calibrate equipment returned to an authorised Service Facility within the period of the guarantee, provided the guarantor's examination discloses to its satisfaction the product was defective. The guarantor may, at its option, replace the product in lieu of repair. With regard to any equipment returned within this period, said repairs or replacements will be made without charge. If the failure has been caused by misuse, neglect, accident or abnormal conditions of operation, repairs will be billed at a nominal cost. In such a case, an estimate will be submitted before work is started, if requested.
- The foregoing guarantee is in lieu of all other guarantees, express or implied, including but not limited to any implied guarantee or merchantability, fitness or adequacy for any particular purpose or use. PAG Limited shall not be liable for any special, incidental, or consequential damages, whether in contract, tort, or otherwise.