

PAG L95 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 plastic 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 L95 batteries incorporate several levels of internal electrical protection, but severe mechanical abuse could result in damage to the cells, and 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.
Tel: +44 (0)20 8543 3131 Fax: +44 (0)20 8540 4116
E-mail: 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

Specification

- 2.1 **Description:** PAG L95 Lithium-Ion Professional Broadcast Battery.
- 2.2 **Connectors:** Three connector variants are available:
 - * PAGlok professional battery connector.
 - * V-Mount compatible connector.
 - * Snap-on compatible.
- 2.3 **Display:** Two display variants are available:
 - * PAG Time Batteries can display capacity in ampere-hours in 0.1Ah increments, and percentage of remaining available capacity in 1% increments. When on-load, a run-time prediction can be displayed in hours and minutes.
 - * PAG Power Circle Batteries incorporate the PAG Power Circle LED state-of-charge indicator which shows capacity as percentage.
- 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 is 7 amperes. (V-Mount batteries 6.5 amperes).
- 2.9 **Variable Charge Voltage:** (NOTE: This feature is not available with V-Mount compatible or Power Circle batteries). The battery can be manually set to control the charge voltage to either 4.1V or 4.2V per cell. This allows the user to make a choice between extended battery cycle life or extended capacity.
- 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:**
Optimum discharge efficiency is achieved within the temperature range +10°C to +40°C.

2.12 Size & Weight:	Height	Width	Depth	Weight
PAGlok	130mm (5.1")	86mm (3.4")	42mm (1.65")*	745g (1.64lb)
V-Mount	130mm (5.1")	86mm (3.4")	47mm (1.85")	745g (1.64lb)
Snap-on	130mm (5.1")	86mm (3.4")	52mm (2.0")	760g (1.67lb)

*excluding locking claws.

Care & Maintenance

- 3.1 For long-term storage, the battery should be initially in the half-charged state.
- 3.2 Maintenance charging is not required during long-term storage.
- 3.3 Store in a cool, dry place at a temperature between -10°C and +40°C. Long-term storage outside of this temperature range may reduce the battery's life.
- 3.4 The battery should be in a fully charged state before use. After extended storage it is advisable to give the battery a top-up charge before use.
- 3.5 Use specified chargers ONLY (see 4.2).
- 3.6 For maximum output, use within the temperature range +10°C to +40°C. Never operate outside of the temperature range -20°C to +45°C.
- 3.7 Absolute maximum continuous output: 85W or 5.5A (V-Mount 6.5A). **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 Paglight M together with a PAG Softstart Lampholder, Model Nos. 9938 or 9017 respectively. A Softstart Lampholder will not be required if the camera is fitted with PAG System RTI (and the 'Softstart' feature is enabled) or when using the regulated light socket on a Sony digital camera.
- 3.8 The battery is designed to dissipate heat from the right hand side in normal operation, and will therefore become warm in this area.
- 3.9 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 **Setting the Variable Charge Voltage**
Note: This feature is not available with V-Mount compatible or Power Circle batteries. The battery can be manually set to control the charge voltage to either 4.1V or 4.2V per cell. This allows the user to make a choice between

extended battery cycle life or extended capacity. **IMPORTANT:** Ensure that the battery display indicates BELOW 50% CAPACITY before changing the charge rate and applying the battery to the charger.

If the full operating capacity of the battery is not required, it may be set to the low charge voltage. This will provide a reduced discharge capacity (approximately 87% of nominal), but an increase in the cycle life. Press the display button in, and hold it for 5 seconds. The 'HI' or 'LO' indication will flash. If the 'HI' indication is flashing, press the button again until 'LO' is flashing, and release the button. The setting will automatically be saved.

If it is wished to use the full capacity of the battery, press the display button in, and hold it for 5 seconds. The 'HI' or 'LO' indication will flash. If the 'LO' indication is flashing, press the button again until 'HI' is flashing, and release the button. The setting will automatically be saved.

4.2 Charging

IMPORTANT: The battery is electronically protected, and will not accept a charge from unsuitable chargers.

PAGlok and Snap-on compatible: the battery can ONLY be charged from a PAG ACS charger that is designed to charge PAG Lithium-Ion batteries.

V-Mount compatible: the battery can be charged from a PAG ACS charger that is designed to charge PAG Lithium-Ion batteries (via charge adaptor Model 9617). Additionally, it can be charged from a Sony charger that is designed to charge Sony V-Mount Lithium-Ion batteries.

READ THE CHARGER HANDBOOK BEFORE ATTEMPTING TO CHARGE THE BATTERY. If an attempt is made to charge the battery from an invalid power source, then the battery will refuse to accept a charge from the correct charger for a period of two minutes.

While being charged on PAG chargers, the state-of-charge meter is inoperative. If the battery display button is pressed during charging, Time Batteries will display scrolling bars, and Power Circle Batteries will cycle the LEDs clockwise to indicate that a capacity reading is unobtainable.

4.3 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).

4.4 Battery Output Re-set Procedure

The battery re-set procedure will depend upon which part of the protection system has been tripped:

The majority of over-current events will be detected by the in-built software systems, in which case the power will be self re-set 10 seconds after the load is removed. This condition can be identified by the fact that the display will show scrolling bars (Time Battery) or the LEDs will cycle clockwise (Power Circle Battery) during the re-set period when the button is pressed.

Under certain conditions the over-current protection system may latch 'off'. This condition can be identified by the fact that the display will fail to operate when the button is pressed. The battery must be re-set 'manually' by applying it to the recovery program on the charger for a few moments (until the charger display indicates 'DONE' or 'LI-ION').

4.5 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. For the best results the battery should be charged within the temperature range +10°C to +40°C. If the battery is either too cold or too hot to be charged safely, charging will be inhibited (accompanied by the appropriate indication from the charger display). In this event the Time Battery display will indicate '°C', and Power Circle batteries will light the two upper LEDs when the display button is pressed. The battery should be left connected to the charger, which will automatically initiate charging as soon as the temperature is within the correct range.

4.6 Capacity Indication

Time Batteries: The battery is able to display a predicted run-time against any given load. Connect the battery to the camera, and turn the camera on. The battery requires a minimum of 5 seconds before it is able to give an accurate run-time prediction. When the display button is pressed, the battery will indicate the predicted run-time under the prevailing conditions.

The hours will be displayed first, followed by the minutes:



The battery is also able to indicate the remaining capacity, expressed either in ampere-hours or percentage. These figures are available even when the battery is not connected to a load. The capacity in ampere-hours will be shown first, and if the button is pressed a second time, the battery will display the capacity as a percentage of maximum:



If the battery is either 100% charged or 0% charged, this is shown by an illuminated bar which indicates 'Full' or 'Empty':



Power Circle Batteries: The battery is able to indicate the state of charge, as a percentage of the maximum, by means of the four LED's. If the battery is 100% charged, then all the LED's will light. When the battery is 0% charged, none of the LED's will light.

Time Batteries and Power Circle Batteries are self-diagnostic. Prior to any cumulative effect developing as permanent damage, the battery will report that it requires a service by pulsing the display (when the display button is pressed) with a 50% on/off duty cycle. A complete charge followed by a full discharge will clear the condition, and the battery will confirm this by again showing the normal display when the button is pressed. If the button is held in continuously, the display will operate for a short period and will then automatically turn off. This ensures that the battery cannot become discharged if the button is accidentally held in, perhaps during transit or storage.

4.7 PAG System RTI

This feature is available on PAGlok Time Batteries only. (Note: early RTI PAGloks will require a software upgrade in order to make this feature available. Refer to your dealer for further information).

In addition to the capacity indication detailed above, the L95 battery forms part of the unique PAG System RTI, the world's first truly accurate battery run-time information system for broadcast cameras.

When used in conjunction with a camera equipped with a System RTI PAGlok, the battery is interrogated by the system, using only the battery positive and negative connections. When the battery is connected the first viewfinder display will be the available capacity in ampere-hours. Upon entering 'Record', the remaining run-time for that battery will be displayed in hours, minutes and seconds, calculated against the current being consumed and updated continually against any change in load.

Warranty

- Notwithstanding any provision of any agreement the following Warranty is exclusive: PAG Limited warrants each PAG L95 battery it manufactures to be free of defects in material and workmanship under normal use and service for **TWO YEARS** from the date of purchase. This warranty extends only to the original purchaser. This warranty 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 warranty, PAG Limited will repair and calibrate equipment returned to an authorised Service Facility within the period of the warranty, provided the warrantor's examination discloses to its satisfaction the product was defective. The warrantor 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 Warranty is in lieu of all other warranties, express or implied, including but not limited to any implied warranty 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.