



**Professional Broadcast Equipment**

**PAG L75**  
Lithium-Ion Time Battery

Model No. 9364

Instruction Manual

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**SECTION 1**

**SPECIFICATION**

- 1.1 **Description:** Model No. 9364 PAG L75 Li-Ion Time Battery.
- 1.2 **Connector:** PAGlok professional battery connector.
- 1.3 **Construction:** The casing for these models consists of 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. The batteries are sealed and non user-serviceable.
- 1.4 **Cells:** Premium grade Lithium-Ion sealed rechargeable cylindrical cells.
- 1.5 **Voltage:** 14.8V nominal. The battery contains 12 cells connected in series/parallel. Each cell has a nominal voltage of 3.7V.
- 1.6 **Capacity:** Nominal 5.1 ampere-hours, with a charge voltage of 4.2V per cell, and discharged at the one-hour rate.
- 1.7 **Charge Time:** The battery may require up to 3 hours to charge from the fully discharged state. Charge time will be less if the battery is partially charged at the start.
- 1.8 **Output Current:** Rated maximum continuous output current is 5.5 amperes.
- 1.9 **Variable Charge Voltage:** 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.
- 1.10 **Capacity Data:** The battery incorporates state-of-the-art low-power microelectronic circuits, giving the user access to the battery state of charge and run-time information.
- 1.11 **Display:** The battery 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.

**1.12 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 a non-resetting thermal fuse).

All protection circuits within the battery are designed to withstand the leakage of electrolyte.

**1.13 Operating Temperature Range:** Optimum discharge efficiency is achieved within the temperature range +10°C to +40°C.

**1.14 Weight:** 685g (1.5lb approx.)

**1.15 Size (H x W x D):** 130 x 86 x 42mm excluding locking claws. (5.1"x 3.4"x 1.65"approx.)

## SECTION 2

### CARE & MAINTENANCE

- 2.1 For long-term storage, the battery should be initially in the half-charged state.
- 2.2 Maintenance charging is not required during long-term storage.
- 2.3 Store in a cool, dry place at a temperature between -10°C and +40°C. Long-term storage at temperatures above +40°C will reduce the battery's life because of deterioration of organic materials such as the gasket and separator.
- 2.4 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.
- 2.5 Use only a PAG charger that has been designed to charge PAG Lithium-Ion batteries.
- 2.6 For maximum output, use within the temperature range: 0°C to +40°C. Never operate outside of the temperature range: -20°C to +45°C.
- 2.7 The battery is designed for an absolute maximum continuous output of up to 85W (with a maximum current of 5.5A).

**IMPORTANT:** Although the PAG L75 has the power to run most medium-consumption broadcast cameras together with a light of up to 35W, the battery over-current protection may be triggered by the high current pulse that occurs when a tungsten-filament light is turned on from cold. If a tungsten-filament light is required, use a Paglight MkII together with a PAG Softstart Lampholder, Model No. 9938. The 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.

- 2.8 The battery is designed to dissipate heat from the right hand side in normal operation, and will therefore become warm in this area.
- 2.9 The battery is sealed, and contains no user-serviceable components. If any attempt is made to open the case, it is probable that the damage will disrupt the digital circuitry, which will then cease to function. 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.

## SECTION 3

### INSTRUCTIONS FOR USE

#### 3.1 SETTING THE VARIABLE CHARGE VOLTAGE

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.

#### 3.2 CHARGING

**IMPORTANT:** This battery can be charged only from a PAG ACS charger that is designed to charge PAG Lithium-Ion batteries. The battery is electronically protected, and will not accept a charge from unsuitable supplies.

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.

#### 3.3 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.

The battery will accept a steady-state consumption of up to 85W (with a maximum current of 5.5A) but if the battery is discharged at too

high a rate (even momentarily) the protection circuit will disconnect the battery output.

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.

The high current pulse that occurs when a tungsten-filament light is turned on from cold may trigger the over-current protection. If a tungsten-filament light is required, use a Paglight MkII together with a PAG Softstart Lampholder, Model No. 9938. The 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.

#### 3.4 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 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').

#### 3.5 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 battery display will indicate '°C' if 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.

### 3.6 CAPACITY INDICATION

The PAG L75 utilises PAG's latest digital technology, and is capable of providing the user with an accurate indication of the remaining capacity whenever required. The electronics within the battery gathers data and processes it on a continuous basis, so that the stored capacity figure is always updated. The battery's microcontroller continually processes the mass of data that is required to make this system really accurate.

It is a fact that batteries perform in different ways under different conditions. The microcontroller is able to make accurate predictions relating to the battery performance. These predictions include the efficiency of energy conversion at varying discharge rates, storage capacity, variations relative to temperature, cell chemistry and plate wear out characteristics over cycle life, as well as self discharge rates relative to time and temperature. Then there are the many destructive, but sometimes reversible effects which batteries are subjected to. All these variations are taken into account by a microcontroller which matches the above data with stored information on detailed characteristics of each cell type.

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.

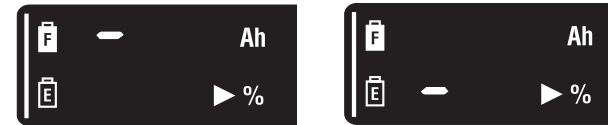


When the display button is pressed, the battery will indicate the predicted run-time under the prevailing conditions, calculated against the current being consumed and updated continually against any change in load.

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'.

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.

The PAG L75 battery is self-diagnostic. Prior to any cumulative effect developing as permanent damage the battery will report that it requires a service by pulsing the capacity 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.

### 3.7 PAG SYSTEM RTI

In addition to the capacity indication detailed above, the PAG L75 battery forms part of the unique PAG System RTI. This is the world's first truly accurate battery run-time information system for all broadcast cameras, regardless of age or manufacturer.

When used in conjunction with a camera equipped with PAG System RTI 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.

Note: early models of PAG System RTI will require a software upgrade (Model 9681) in order to make this feature available. Refer to your dealer for further information.

## SECTION 4

### SAFETY

- 4.1 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.
- 4.2 **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 outwards appearance of the plastic casing.
- 4.3 **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.
- 4.4 **ACCIDENTAL SHORT-CIRCUITING:** Lithium-Ion cells can deliver power at very high rates. PAG L75 batteries incorporate several levels of internal electrical protection, but severe mechanical abuse could result in damage to 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.
- 4.5 **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.
- Do not dispose of batteries or cells in a charged condition (see 4.4).
- Return batteries by prior arrangement to:  
 PAG Limited, 565 Kingston Road, London SW20 8SA.  
 Tel: +44 (0)20 8543 3131. Fax: +44 (0)20 8540 4116.
- Batteries must be in a discharged state, and be clearly marked "FOR RECYCLING".

- 4.6 **PAG TECHNICAL SALES AND INFORMATION:**  
 For further information, contact PAG Technical Sales and Information by telephone on +44 (0)20 8543 3131 or your nearest PAG Authorised Service Centre.

Alternatively, visit the PAG Website at [www.paguk.com](http://www.paguk.com)

## SECTION 5

### WARRANTY

- 5.1 Notwithstanding any provision of any agreement the following Warranty is exclusive: PAG Limited warrants each PAG L75 battery it manufactures to be free of defects in material and workmanship under use and service for eighteen months 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.
- 5.2 In the event of failure of a product covered by this warranty, PAG Ltd. 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.
- 5.3 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.