



PAGlok Batteries

Instruction Manual

CONTENTS

SECTION	PAGE
1 SPECIFICATION	2
2 CARE & MAINTENANCE	4
3 INSTRUCTIONS FOR USE	5
4 SAFETY	9
5 WARRANTY	10

SECTION 1

SPECIFICATION

1.1 Description:

This Instruction Manual covers the following PAGlok Batteries:

9375	PAGlok NMH100 Time Battery/RTI	13.2V	7.5Ah	Ni-MH
9370	PAGlok NMH100 SuperPack	13.2V	7.5Ah	Ni-MH
9354	PAGlok 5.0 Digital System RTI	13.2V	5.0Ah	Ni-Cd
9357	PAGlok 5.0 Digital SuperPack	13.2V	5.0Ah	Ni-Cd
9329	PAGlok 5.0 SuperPack	12.0V	5.0Ah	Ni-Cd
9333	PAGlok 5.0 SuperPack	13.2V	5.0Ah	Ni-Cd
9344	PAGlok 5.0 SuperPack	14.4V	5.0Ah	Ni-Cd
9387	PAGlok C50 Digital Cobalt	14.4V	50Wh	Ni-Cd
9386	PAGlok C50 Cobalt	14.4V	50Wh	Ni-Cd

1.2 **Construction:** PAGlok batteries have welded cell interconnections of low-resistance nickel strap. The case for these models consists of high-impact injection mouldings with an internal cradle feature designed to protect the cells from impact damage. The batteries are sealed and non user-serviceable.

1.3 **Cells:** Premium grade Nickel-Metal Hydride or Nickel-Cadmium sealed rechargeable cylindrical cells.

1.4 Voltage:

12.0V nominal:

(10 cells connected in series, nominal voltage 1.2V per cell).

13.2V nominal:

(11 cells connected in series, nominal voltage 1.2V per cell).

14.4V nominal:

(12 cells connected in series, nominal voltage 1.2V per cell).

1.5 Capacity:

7.5 ampere-hours: 9375, 9370.

5.0 ampere-hours: 9354, 9357, 9329, 9333, 9344.

50 watt hours: 9386, 9387.

1.6 The latest PAG digital batteries (Time Batteries, System RTI batteries and the Digital SuperPack) incorporate state-of-the-art low-power microelectronic circuits, giving the user access to battery state-of-charge information.

1.7 Time Batteries incorporate PAG's unique built-in Power & Time Display. When on-load they can supply an accurate run-time

prediction for the equipment being powered, expressed in hours and minutes. Away from the camera they display available battery capacity in ampere-hours (0.1Ah increments), and percentage (1% increments).

- 1.8 When a camera is fitted with PAG System RTI and powered by compatible batteries, the current loaded capacity followed by a countdown of remaining run-time in hours, minutes and seconds is displayed in the viewfinder. The system instantly takes account of any changing loads and conditions. The Digital SuperPack will display percentage figures of remaining available battery capacity in 5% increments.
- 1.9 The PAG Digital Battery Reader (Model No. 9657) can be used to view the remaining capacity, in ampere-hours, of any PAG digital battery. A handy Conversion Card is available to allow the likely running time to be established for any given load.
- 1.10 PAG digital batteries are self-diagnostic. Prior to any cumulative effect developing as permanent damage the battery will report that it requires a service. See Sections 3.2.6 and 3.2.7.
- 1.11 **Output Protection:** PAGlok batteries are protected against short circuit and excessive currents by means of a self-resetting protection device. Rated maximum continuous output current is 10 amperes (Nickel-Cadmium) and 7.5 amperes (Nickel-Metal Hydride). The batteries are protected against over-temperature by means of a self-resetting thermal trip rated 71°C.
- 1.12 **Operating Temperature Range:** Optimum discharge efficiency is achieved within the temperature range 0°C to +40°C.
- 1.13 **Dimensions, excluding locking claws (H x W x D):**
 208 x 126 x 44mm: 9375, 9370, 9354, 9357, 9329, 9333, 9344.
 162 x 105 x 31mm: 9386, 9387.
- 1.14 **Weights:**

9375	PAGlok NMH100 Time Battery	13.2V 7.5Ah	2.20kg
9370	PAGlok NMH100 SuperPack	13.2V 7.5Ah	2.20kg
9354	PAGlok 5.0 Digital System RTI	13.2V 5.0Ah	1.95kg
9357	PAGlok 5.0 Digital SuperPack	13.2V 5.0Ah	1.95kg
9329	PAGlok 5.0 SuperPack	12.0V 5.0Ah	1.80kg
9333	PAGlok 5.0 SuperPack	13.2V 5.0Ah	1.95kg
9344	PAGlok 5.0 SuperPack	14.4V 5.0Ah	2.10kg
9387	PAGlok C50 Digital Cobalt	14.4V 50Wh	1.20kg
9386	PAGlok C50 Cobalt	14.4V 50Wh	1.20kg

SECTION 2

CARE & MAINTENANCE

- 2.1 Batteries can be stored indefinitely without significant loss of cell life. For long-term storage, batteries should be in the discharged state.
- 2.2 Maintenance charging is not required during long-term storage.
- 2.3 Store in a cool, dry place. Long-term storage at temperatures above +35°C will reduce the battery's life because of deterioration of organic materials such as the gasket and separator. Excessively low storage temperatures (below -30°C) are also to be avoided since the electrolyte may freeze, resulting in permanent cell damage.
- 2.4 After prolonged storage, do not fast-charge the battery immediately. The cells should first be re-formed and balanced by giving the battery a slow (C/10) charge for 24 hours. When the battery is subsequently put into service, 2 or 3 cycles of charge and discharge may be required to return the battery to its maximum available capacity.

 Users with AR Series chargers may find the following procedure beneficial:

 Charge the battery until the charger indicates that it is charged.

 Disconnect the battery from the charger, and then re-apply it, using the 'Recovery' program.

 Allow this program to run until the charger again indicates that the battery is charged.
- 2.5 The battery should be in a fully charged state before use. Even after one week in storage, it is advisable to give the battery a top-up charge before use.
- 2.6 Use only the recommended chargers (see Section 3.1.3).
- 2.7 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.
- 2.8 The battery is designed for a maximum continuous output of 10 amperes (Nickel-Cadmium) and 7.5 amperes (Nickel-Metal Hydride). Battery output is protected by means of a self-resetting over-current protection device. The device has a time/current

characteristic which will allow surge currents up to 15 amperes to flow, but will trip if a continuous current exceeding 12 amperes is drawn. The batteries are protected against over-temperature by means of a self-resetting thermal trip rated 71°C.

- 2.9 PAGlok batteries are sealed, and contain no user-serviceable components. If any attempt is made to open the case, it is possible that the damage may 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 CHARGING INSTRUCTIONS

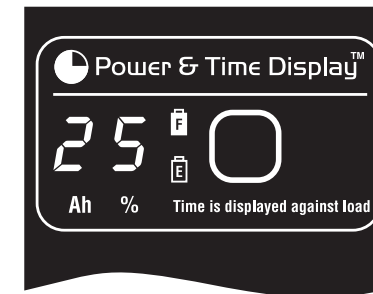
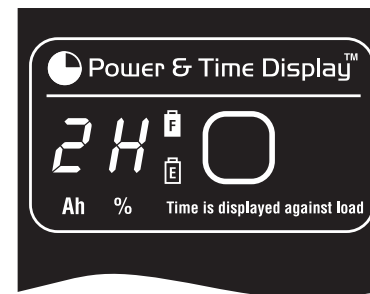
- 3.1.1 The battery should be in a fully charged state before use. Even after one week in storage it is advisable to give it a top-up charge before use.
- 3.1.2 The battery should be charged only from a PAG ACS charger. Other types of charger may not be suitable, and could damage the battery irreparably.
- 3.1.3 Suitable chargers for all PAGlok batteries are the PAG AR124PLD (Model 9792), the PAG AR122PL (Model 9794), PAG Quasar (Models 9726 & 9752), and the PAG MC124 (Model 9785). These chargers are equipped with the mating PAGlok connectors, which allow the batteries to be plugged directly onto the charger without the use of charging adaptors. The chargers incorporate PAG ACS, a unique microcomputer control system that enables these chargers to fast-charge any reputable make of battery safely, while significantly extending its working life.
- 3.1.4 When a battery has been discharged at a high current 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.

3.2 CAPACITY INDICATION

- 3.2.1 The latest PAG digital batteries are able to provide the user with an accurate indication of remaining capacity whenever required.

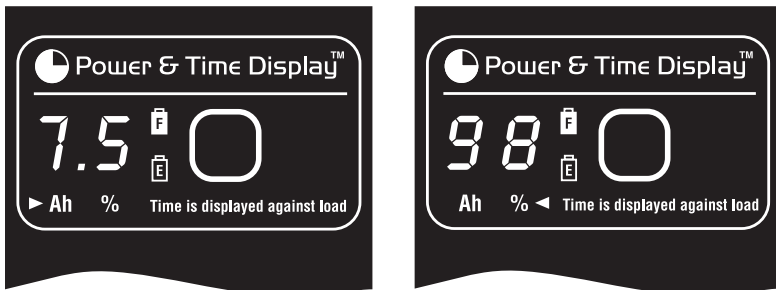
The electronics within the batteries gathers data and processes it on a continuous basis, so that the stored capacity figure is always updated. The battery's microcontroller continually processes the mass of data which is required to make this system really accurate. Aided by a real-time clock, essential information is stored in non-volatile RAM. This information includes date of manufacture, serial number, and numerous details associated with each charge/discharge cycle.

- 3.2.2 It is a fact that batteries perform in different ways under different conditions. By processing the many parameters of shifting data, 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.
- 3.2.3 Time Batteries incorporate the PAG Power & Time Display which is able to show 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.

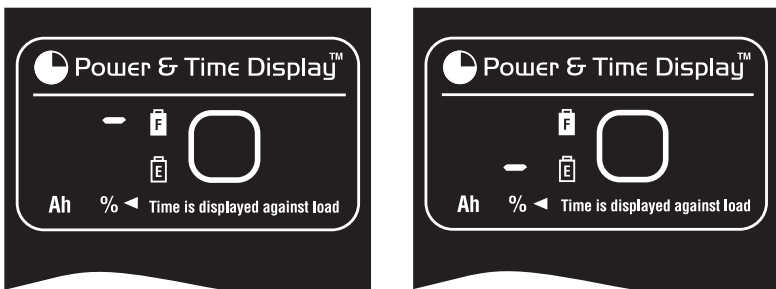


The hours will be displayed first, followed by the minutes.

3.2.4 The battery is also able to indicate the remaining capacity, expressed either in ampere-hours or percentage. These figures are available 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'.

- 3.2.5 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 during transit or storage.
- 3.2.6 Time Batteries are self-diagnostic. Prior to any cumulative effect developing as permanent damage the battery will report that it requires a service. This is shown by the capacity display pulsing with a 50% on/off duty cycle when the button is pressed. A complete charge (the battery display must register 'FULL') followed immediately by a complete discharge will clear the condition, and the battery will confirm this by showing the normal display when the button is pressed.

- 3.2.7 The PAG C50 batteries incorporate an LED-array state-of-charge indicator.
- 3.2.8 All PAG digital batteries are able to display the stored capacity figure by means of the PAG Digital Battery Reader, Model No. 9657. The Reader is able to communicate with the battery, using only the positive and negative contacts. Information is passed digitally to the Reader, which de-codes the data and displays it on its illuminated LCD display. The Reader is not polarity sensitive, and may be applied to the battery contacts in any orientation.

Repeated partial discharge of the battery can result in temporary loss of usable capacity. It is undesirable to continue using a battery with such a regime, as the condition is liable to become irreparable. In this event, the Reader will display the capacity figure alternating with the phrase 'CYCL'. When the Reader is removed from the battery, the phrase 'CYCL' will be displayed for five seconds. A complete charge followed by a full discharge will clear the condition, and the Reader will confirm this by again showing the normal display when applied to the battery.

- 3.2.9 A good approximation of the run-time of any piece of equipment can be gained using a PAG Digital Battery Reader Conversion Card. With the PAG Digital Battery Reader giving the remaining battery capacity, and knowledge of the power consumption in watts, the conversion card enables the user to calculate the expected running time.

3.3 IN-THE-VIEWFINDER RUN-TIME INFORMATION (SYSTEM RTI)

- 3.3.1 In addition to the capacity indication detailed above, PAG digital batteries form part of the unique PAG System RTI. This is the world's first truly accurate, in-the-viewfinder, battery run-time information system for all broadcast cameras, regardless of age or manufacturer.
- 3.3.2 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 instantly against any change in load.

When the Digital SuperPack is used in conjunction with System RTI the system displays the available capacity in ampere-hours, as with the RTI battery, the difference being that on entering record this changes to remaining capacity counting down in 5% increments. For more information about PAG Digital System RTI see the System RTI Instruction Manual.

SECTION 4

SAFETY

- 4.1 When used correctly, Nickel-Metal Hydride and Nickel-Cadmium batteries are a rugged, safe, clean and trouble-free means of storing power. Offering a high energy density, the cells do not deteriorate when left in a discharged state, making them ideally suited to applications where reliable portable power is required. However, the user should be aware that incorrect use 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 as this may cause burns. Batteries should be discharged for transit.
- 4.3 CORROSIVE ELECTROLYTE: The electrolyte is a mixture of potassium-hydroxide (KOH) and water. This can cause chemical burns to human tissue, should leakage occur. 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 medical attention.
- 4.4 ACCIDENTAL SHORT-CIRCUITING: Nickel-Metal Hydride and Nickel-Cadmium cells can deliver power at very high rates. Paglok batteries are protected at their output connections by self-resetting overload protection devices, but severe mechanical abuse of a battery 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 Nickel-Metal Hydride and Nickel-Cadmium batteries are classified as controlled waste, and must 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 4.4).

Batteries must be in a discharged state, and be clearly marked "FOR RECYCLING".

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: sales@paguk.com

SECTION 5

WARRANTY

- 5.1 Notwithstanding any provision of any agreement the following Warranty is exclusive: PAG Limited warrants each PAGlok Battery it manufactures to be free of defects in material and workmanship under use and service for 18 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 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.

- 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.