

An Intelligent Battery System Designed for the Demands of Modern Acquisition



PAGlink in action (photo courtesy of Beth Davidow).

PAG has developed a new system of high-power linking batteries, designed to power all types of digital video camera used for broadcast news acquisition, video production and digital cinematography.

PAGlink is the first battery system that allows you to link as many as 8 Lithium-Ion batteries, in parallel, for charge or discharge. Linking batteries and combining their capacities greatly extends the run-time for power-hungry modern professional cameras, and allows currents of up to 12A to be drawn for simultaneously powering the camera and its accessories.

More Power Required

Developments in camera technology have seen an increase in the power demands being made on Li-Ion batteries. In addition, there are a greater number of camera accessories to be powered simultaneously. In many cases the cameras alone are likely to have a power consumption of 40W to 50W, and the accessories can increase the total power consumption to around 100W.

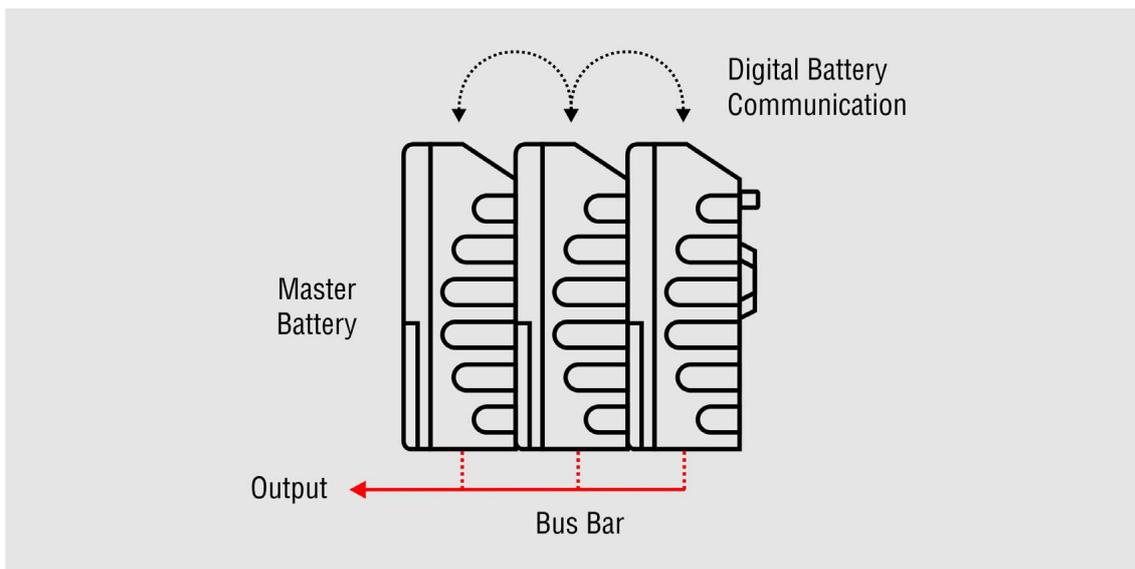
Many companies have introduced larger Li-Ion batteries that have capacities greater than 160 Watt-hours. These batteries have been banned by air transport authorities from passenger aircraft, because they are considered potentially dangerous. Lithium Manganese batteries that allow higher currents to be drawn are offered by some companies as a solution, but this technology is significantly more expensive.

Link-Up and Power-Up

If the power demand is great it is safer to spread it across more than one Li-Ion battery by linking them in parallel. It is more economic, more convenient and more flexible to link the batteries directly without the need for an additional mounting plate. For air transportation it is preferable if the batteries being linked have capacities that do not exceed 100 Watt-hours. These are classified as 'flight friendly' by the air transport authorities, and can be transported inside the aircraft cabin, without quantity restriction.

PAGlink Innovation

PAG's innovation is the introduction of a linking battery system that allows multiple battery units to be linked, and one that is capable of providing a higher current. The PAGlink system offers unique features, such as linked charging, built-in run-time indication, multi-viewfinder data system compatibility, and external software updating.



The First Digital Battery System

PAGlink batteries create a high-speed network, allowing them to communicate with each other and manage output. The system elects the battery nearest to the camera (or load) to be the 'master' and ensures that this battery is always active (but not necessarily delivering current). The system makes the most efficient use of the energy available, and prevents a transfer of charge between batteries. As discharge progresses, the system electronically adds or subtracts batteries from the power rail (bus bar) to deliver the current required. The status of individual batteries and total run-time can be viewed via the battery displays. As long as the 'master' battery remains connected, batteries may be added to or removed from the stack (hot-swapped) in order to achieve continuous running. The system ensures that the maximum linked output is managed to a safe level. This is not the only aspect of the PAGlink system that is unique.

Made for High Loads

The PAGlink connector system incorporates high-current pin contacts, rather than the blade contacts used by other manufacturers. The pin contacts contribute to the higher current capability of the batteries. Up to 12A can be drawn from PAGlink batteries when they are linked and in a similar state of charge. Individual PAGlink Gold Mount batteries allow 10A to be drawn and V-Mount batteries allow 8A.



Smaller and Lighter Batteries

PAGlink batteries are smaller and lighter for their capacity than those of other manufacturers. Individually, PAGlink offers a choice between two capacities that are the same physical size: The PL96 has a capacity of 96 Watt-hours and the PL150 has a capacity of 150 Watt-hours. The two capacity options are compatible and can be linked for both charging and discharging.

PAGlink offers two battery connection systems: one features batteries that mount to the camera via the Sony V-Mount connector, and the other uses the 3-stud Anton/Bauer battery mount.

Three 96Wh PAGlink batteries, weighing less than 2.2kg, create a single power source of 288Wh (more than four and a half hours run-time for a camera that consumes 60W). A power source of 300Wh can be achieved using just two PL150 batteries, with a combined weight of only 1.54kg.

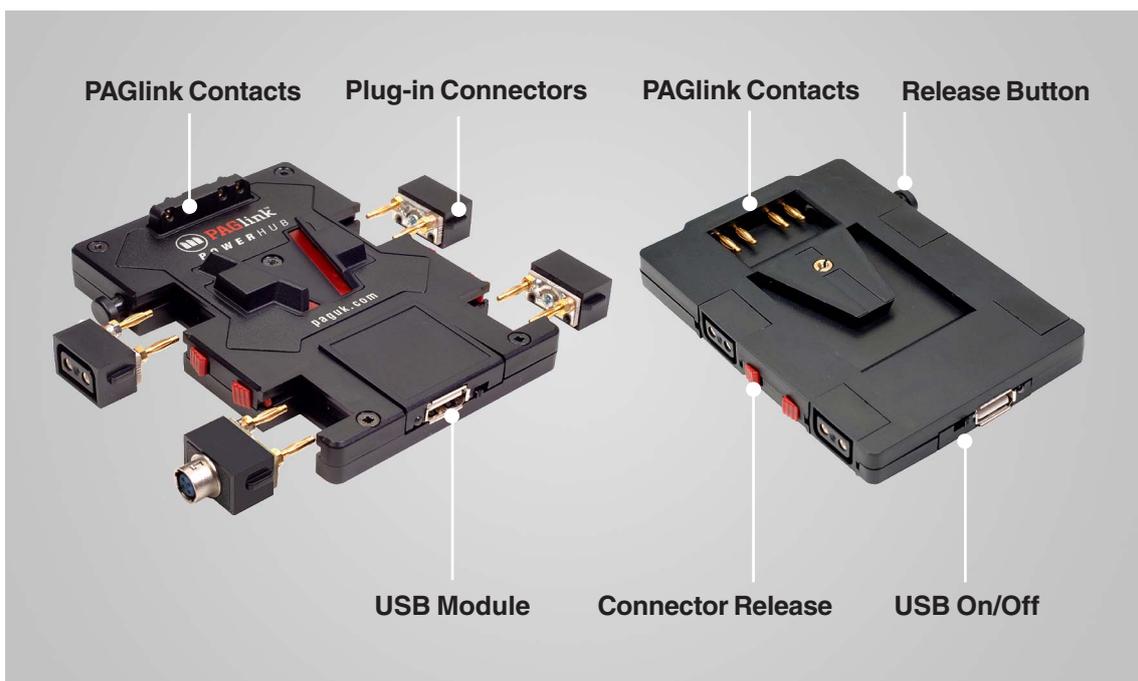




Power More Camera Accessories

PAGlink is the first battery system that allows power to be drawn from the battery linking contacts. Power can be accessed by attaching the PAGlink PowerHub and used for audio devices, lighting, monitors and transmission accessories. The PowerHub can be sandwiched between two PAGlink batteries, which allows accessories to remain powered-up while batteries are hot-swapped.

The PowerHub provides four 12V DC outputs via D-Tap connectors (other connector types, such as Hirose, Lemo and 2.1mm/PP90 are available). The interchangeable plug-in connectors allow you to reposition the output to the left or right side of the camera. A USB output module (5V, 1 amp) is also included for charging your smartphone or powering suitable accessories.





Run-Time for All Batteries

Uniquely, all PAGlink batteries feature built-in run-time indication, expressed in hours and minutes, relative to the power consumption of the camera set-up. The run-time prediction is recalculated if the power consumption is increased or decreased. When the batteries are linked, the individual displays provide total run-time data for the combined batteries, and capacity data for the individual packs. All PAGlink batteries maintain an accurate state-of-charge display by tracking their performance, and adjusting calibration values to compensate for the ageing of the cells.

There is a choice between the economic 5-light indicator, and the more convenient numeric display. The numeric option displays Run-Time to a resolution of 1 minute and capacity to a resolution of 1%. The 5-light option displays run-time in 10 minute blocks and capacity in 20% segments. When the battery reaches less than 10% capacity the indicator light flashes.

In-Viewfinder Battery Status

PAGlink batteries will display their charge status as a percentage of available capacity in the viewfinders of cameras designed to accept this data. Different data standards are used by camera and battery manufacturers; PAGlink batteries automatically adjust the data output standard to support the following: SMB (Sony), I²C (IDX) and analogue 0V to 5V (Anton/Bauer). They can also be programmed easily by the user to provide capacity data in the viewfinders of RED cameras (see the PAGlink battery user instructions for more details). When the batteries are linked, the data displayed in the viewfinder is for the combined capacity available.



PAGlink Battery Reader

The Battery Reader can be used to access data stored in the PAGlink battery's microprocessor. It enables you to track the number of charge/discharge cycles performed by each battery and ensure that they are all used equally.

The Reader is slid onto the battery contacts and will automatically display the battery state of charge as a percentage. Pressing the up and down buttons will reveal the various categories, which are as follows:

1. State of charge as a percentage
2. Available capacity in ampere-hours
3. Cell temperature in degrees Celsius
4. Number of charge/discharge cycles
5. Voltage (Pd = potential difference)
6. Full capacity in ampere-hours
7. Date of birth (manufacture)
8. Software version

Programmable in the Field

PAGlink batteries and chargers are programmable via external contacts and can be easily updated in the field by the user, via a software update tool. Updates are sometimes required to accommodate changes in camera or charging technology. This feature ensures that your batteries are future proof.



Linked Battery Charging - An Industry First

The PAGlink system allows up to 8 batteries to be charged whilst linked, which is an industry first, developed by PAG. PAG has introduced a compact, two-position charger that will charge up to 16 PAGlink batteries simultaneously (8 on each position). Charging is fast, efficient and fully-automatic. The batteries can be in any state of charge when you link them for charging. Priority is given to batteries that are more discharged. Fully charged batteries turn off automatically and independently. The charge status of each battery is shown on its own display so that you can see at a glance which batteries are ready for use. The battery's numeric display can be rotated for legibility with a single button press during charging.

Eight fully-discharged 96Wh PAGlink batteries will be fully charged in 10 hours. PAG also offers a 4-position PL16+ charger that will charge simultaneously, up to 32 batteries without user-intervention. Batteries can be safely left on the charger to top-up until they are needed.





Ultra-Compact Charging

Additionally, PAG has introduced a low-cost, ultra-compact charger that will fit easily in any kit bag. The PAGlink Micro Charger will charge two linked batteries in approximately 8 hours, or one battery, to 80% charged, in approximately 3 hours.

The previous generation of PAG chargers can be used without modification, to charge PAGlink batteries whilst linked. Alternatively, the V-Mount Li-Ion chargers of other reputable manufacturers are also suitable. In order to charge batteries whilst linked, non-PAGlink chargers require that batteries are within 40% state-of-charge of each other.

Flight-Friendly

PAGlink was conceived with Air Transport regulations in mind. Li-Ion batteries that have capacities greater than 160Wh are banned from passenger aircraft. With PAGlink, far greater capacities can be created by linking flight-friendly PAGlink batteries. IATA dangerous goods regulations allow an unspecified quantity of PL96 batteries to be transported in the cabin of passenger aircraft. In addition, two PL150 batteries per person are permitted. All PAG Li-Ion batteries are tested to UN standards by an independent authority, in accordance with the IATA DGR.

Improved Low Temperature Performance

Batteries, and cameras for that matter, do not perform well at sub-zero temperatures. It is important that they are not left in extremely cold environments overnight or exposed to them during use. PAGlink batteries have an enhanced low temperature performance that means they will still operate at -20°C, however, the optimum battery discharge temperature is +10°C to +45°C.



Replaceable Linking Mechanism

A unique feature of PAGlink is the design of the battery linking mechanism. If linked batteries suffer an excessive mechanical blow the linking mechanism will allow them to separate safely, protecting the battery packs from irreparable damage. The battery linking mechanism can be replaced, without opening the sealed battery case. It is a mandatory requirement for Li-Ion batteries to be sealed in order to preserve the original build standard of the UN certified device, and for this reason Li-Ion batteries should never be tampered with, let alone re-celled.

Although PAGlink batteries are designed to survive the rigours of everyday use in a professional environment, it is common sense to handle batteries with care and to avoid subjecting them to severe impact.

The Industry's Best Value Battery System

PAGlink is a competitively priced, high-quality battery system that embodies unique and advanced patented technology. PAG's design philosophy ensures that its batteries achieve the longest possible working life. Some customers have reported good capacity from their PAG Li-Ion batteries even after 7 years use. This is well in excess of the industry average life. PAG guarantees its 96Wh Li-Ion batteries for 3 years, and its 150Wh batteries for 2 years, with no restrictions on the conditions of use. When the already attractive price is divided by the number of years service provided, we believe that PAG batteries offer the best value for money in the industry.

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