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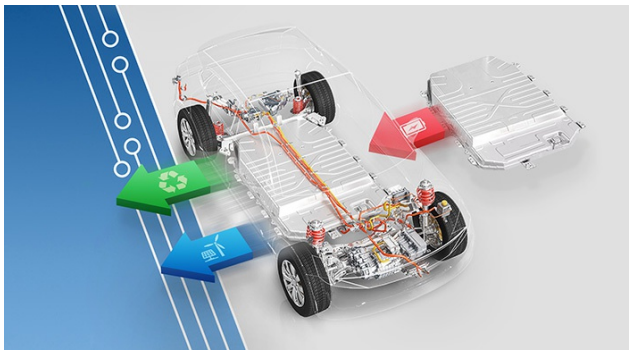
Programmable power supplies and electronic loads

EA Elektro-Automatik (EA) offers CANopen-capable power supplies and electronic loads deployed e.g. while recycling of batteries and for fuel cell testing.



The company's power supplies and electronic loads enable second life test and final recycling of batteries (Source: EA Elektro-Automatik)

The complete article is published in the December issue of the CAN Newsletter magazine 2021. This is just an excerpt.

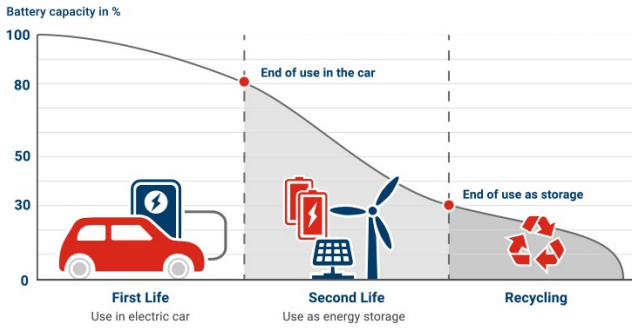
With increasing operating time, the lithium-ion batteries used in electric vehicles become less effective and need to be replaced. The old batteries then begin a second life or are finally recycled. EA has developed a range of products for initial battery production, recharging, second life test, and final recycling.

The batteries' second-life use

If the storage capacity of the lithium-ion battery systems is no longer sufficient for use in e-vehicles, residual capacities may well be available for second-life use. Potential applications of second-life batteries range from home storage, emergency power supplies, and energy storage for solar power or wind energy.

With the 30-kW EA-PSB 10000 bidirectional (charge/discharge) power supply, the batteries are tested for their remaining capacity by charging them to almost 100 % and then discharging them again. The DC power supply takes the energy from the connected battery during the discharge process and converts it into AC volt- age with an efficiency of up to 96 %. This is then fed back into the local power grid. In a four-unit rack package, the power supplies offer a power density of up to 1,92 MW, thus, enabling for mass testing. Additional time savings are possible due to the device's capability to seamlessly switch between operation as source and sink. The true auto-ranging feature guarantees the maximum possible charge and complete discharge of the batteries through high load currents also at voltages below 2 V_{DC}.

Final battery recycling



Battery lifecycle (Source: EA Elektro-Automatik)

After a certain operating time, batteries can only be finally recycled. For this purpose, they are disassembled into their individual parts, which can be further used. This process must be managed properly to ensure safety and prevent ignition. Lithium-ion batteries and lithium-ion polymer batteries must be completely discharged, which can be achieved with the 30-kW EA-ELR 10000 regenerative electronic load. The electronic load series can achieve up to 1,92 MW in rack systems. The residual battery charge can be extracted in a short time period and fed into the grid with an efficiency of up to 96 %. In this way, grid regeneration reduces operating costs, protects the environment, and lowers heat generation. In most cases, this makes external cooling systems unnecessary. Optionally, the EA-ELR 10000 is available in a sealed enclosure with a 90-% efficient water cooling.

Test and simulation of fuel cells

Use cases for fuel cells include power generation for commercial vehicles (e.g. forklifts, delivery vehicles, trucks and buses), backup power generation systems, and other power sources. Fuel cell engineers have to conduct characterization (resistance), performance, and durability tests to adhere to required specifications. The performance is indicated via polarization (voltage and current) curves. A durability test is performed in operating conditions, where the stack is subjected to a continuous series of charge/discharge cycles. EA's egenerative loads enable to test fuel cell resistance, performance, and lifetime. The bidirectional laboratory power supplies are able to simulate the characteristics of different fuel cells.

If you would like to read the full article, you can download it free of charge or you download the entire magazine.

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