

design Alternative Solutions for Backup Power

FAQs

FREQUENTLY ASKED QUESTIONS

Q. What current options are available for backup power solutions?

A. Systems that require backup power solutions usually have small battery backups or generators. Small backup systems traditionally rely on batteries for energy storage while larger systems may use generators or more uncommon systems such as flywheels, superconducting magnetic energy storage, or fuel cells for larger installations. While there can be a need for a battery based solution, batteries have a limited life span. Their life is based on the number of discharges and charges they undergo. Battery installations are difficult due to the long list of regulations and standards they must abide. Their installations must comply with local and national health and safety standards. Environmental regulations, which mainly affect larger installations, can include requirements for ventilation, handling, and disposal of batteries. Flywheels, for example, require an extreme amount of maintenance. Also, systems that use generator sets and fuel cells have poor turn-on response and are not very reliable.

Q. What alternatives provide a more secure and reliable power source?

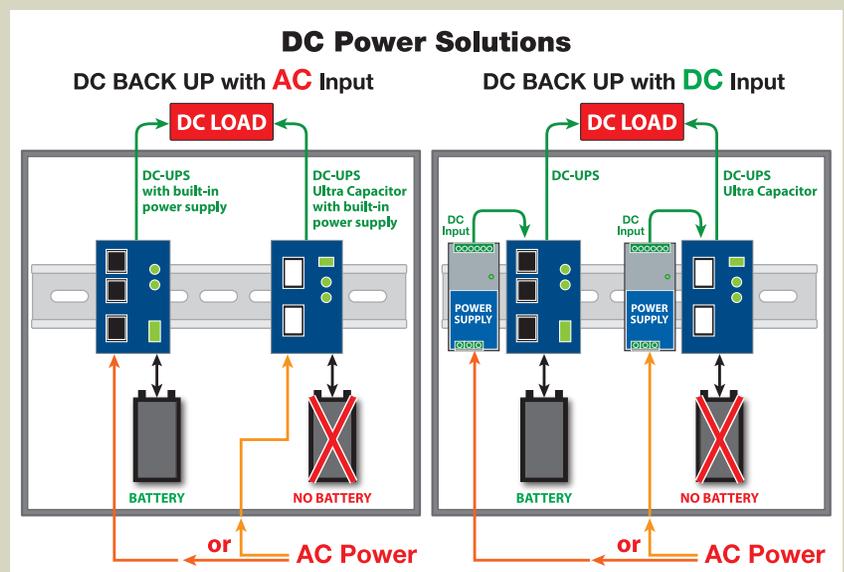
A. Two alternatives that can be used instead of generators are an all-in-one power solution system and an ultra-capacitor system.

An all-in-one power solution combines a power supply unit, battery charger, battery care module, or backup module. The all-in-one battery solution is based on the battery operating as a storage device (batteries are not included). The available power is

automatically distributed among load and battery, while supplying power to the load always is the first priority. The maximum available current of the load output is two times the value of the device's rated current. If the device is disconnected from the main power source, the battery will supply the load until the battery voltage reaches 1.5 V per cell. This prevents the battery from deep discharge. The battery charging is controlled via a microprocessor. Using algorithms, the battery's condition will be detected and based on that, an appropriate charging mode is chosen. The real-time diagnostics system will continuously monitor the charging progress and indicate possibly occurring faults such as elements in short circuit, accidental reverse polarity connection or disconnection of the battery by the battery fault LED and a flashing code of the diagnosis LED. The all-in-one solution can provide a variety of charging voltages: 12VDC, 24VDC, and

48VDC. The solution is highly efficient; up to 91% via switching technology.

The ultra-capacitor solution stores energy within a compact design that does not use a battery but super capacitors to store energy. The load is energized from the buffer module until it is depleted. The capacitors are either a 12 or 24V system design. It operates between temperatures of -40°F to 140°F and can provide up to 10,000 watts of energy plus extension modules. The system can be customized up to 600A. Backup times depend on the state of the charge of the ultra-capacitors and the load in which they are supplying. Compared to standard buffer modules, ultra-capacitor units are capable of prolonged backup times (up to 55 minutes) and fast discharges. Capacitors excel at controlled shutdown functions and allowing for the protection of computer systems. Backup times are dependent on the load and amount



of capacitors within the unit. Backup times can be calculated to better serve the requirements of required functions.

Q. In which situations would one prefer to use an ultra-capacitor versus an all-in-one multi-power solution?

A. An all-in-one solution is beneficial for cleaner power and versatility of use. The solution is suitable for most common battery types and the device itself is mounted in a compact design case for protection. A higher efficiency of the battery is achieved thanks to continuous control over time. They offer more monitoring in the main connection nodes: input, output load, battery. The solution provides adjustable current if that is a requirement and ease of battery diagnosis. The all-in-one solution has several output protection features as against troubleshoots like short circuiting, overload, deep battery discharge, etc. The ease of diagnosis is possible through the event logging of: number of battery charging cycles, charge cycles completed, aborted charge cycles, Ah charged, charging time, total number of transitions standby / backup, etc. Examples of the event management are: checking the load output, shutdown management of PCs (UPS function), RESET management of a generic equipment.

The all-in-one solution offers DIN rail mounting. Also, the load output will not be affected by battery conditions. The solution insures continuous power supply to the load even in conditions of completely discharged batteries. The automatic multi-stage operation optimizes and adapts to the battery status. It can recharge deeply discharged batteries even when their voltage is close to zero, thus allowing recharge and complete recovery of flat batteries.

The downside of the all-in-one solution is that it uses a battery. They are used more widely in industry and are easier to implement. Battery has a shorter life cycle and more maintenance required. Also, they have to be replaced more often; standard lifetime is three to five years. Charging batteries also takes a significant long time. The ultra-capacitor solution is beneficial for customizable systems but could incur high cost on initial-purchase hardware and installation. They are resistant to shocks and vibration, environmentally safe, have no toxic chemicals, and are virtually maintenance-free. The ultra-capacitor modules are built with super capacitors that last up to 20 years. The use of ultra-capacitors also reduces wiring time due to integrated energy storage. The wiring is also vibration-secured via spring-loaded plugs. There is no limitation on their use; they can be incorporated into any design. Ultra-cap modules are also chargeable in a short time and able to provide large amount of energy when needed. They have microcontroller-based charging and discharging of the ultra-capacitors. The ultra-capacitors have seamless switchover and a long operational life.

Q. What are the industry benefits to using such systems?

A. All-in-one solutions can be found in several industries. They are used in infrastructure industries like industrial water pumping, fire protection systems, power supply continuity, and remote measurement stations. They are also used in commercial industries like audio, lighting, electric vehicles, off-highway equipment, and wireless control.

Ultra-capacitor solutions can be found in manufacturing industries, data collection services, and energy and construction industries. Among manufacturing industries using them are textile manufacturing, molding machinery, automotive, automation, packaging, and steel production. They are also used as power backups for data centers, feeding systems, wind turbines, and tunneling machines. ■

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Ultra Capacitor DC-UPS

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- Higher energy vs. electrolytic capacitors
- Up to 10,000 Ws energy plus extension mods
- 12 or 24V system design
- Customized systems up to 600A
- Higher power vs. batteries
- Resists shock and vibration



Battery Based

All-In-One DC-UPS

- Power supply, battery charger, battery care module and backup module in one device
- Three charging modes
- Available in 12VDC, 24VDC and 48VDC
- Adjustable charging current up to 35A
- Easy battery diagnosis and fault identification either by LED or external devices connected to fault
- High efficiency up to 91% via switching technology



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