

# Specifying the Ideal DC UPS for Industrial Applications

By Mike Johnson, Vice President and Mark Dziedzic, Product Manager

Microprocessor-based industrial controls — PLCs, industrial computers, HMI, drives, motion controllers, and sensors — are the foundation of high productivity, quality, and competitiveness. If there is one universal factor that can and will disrupt microprocessor-based controls and cause downtime, that factor is power quality.

Since industrial electrical systems frequently experience voltage fluctuations, harmonic distortions, noise, and short- or long-term power outages, it is essential to ensure maximum uptime by specifying an uninterruptible power supply (UPS) for the application. Specifying the optimum UPS for a control system can be one of the most cost-effective investments available today.

A UPS consists of two elements, a power control source and a battery. When input power is within safe limits, the UPS supplies power to the supported loads and maintains the batteries in charged condition. When a power quality issue threatens to shut down a 24-volt DC-based control system, the UPS maintains adequate power to the supported load by switching to the maintenance free battery. The UPS easily bridges short disruptions lasting up to several minutes. If a longer duration disruption should occur, the UPS can be configured to issue an orderly shutdown signal to a monitoring device and trigger a safe power down of the connected load, ensuring that settings at the time of the outage are saved. This “snapshot” of where the process was when it shut down facilitates a fast, effective restart of the system once power is restored.

## When weighing the relative merits of an AC and DC UPS in the plant environment, the DC UPS comes out ahead



There are two types of UPS: AC and DC. The typical AC UPS is designed to meet the needs of environmentally controlled data centers and offices, not industrial environments. Generally, AC UPSs will have a fan, which in a plant environment typically has a relatively low Mean-Time-Between Failure (MTBF). An AC UPS may be designed for 19-inch rack mounting not appropriate for installation in shallow NEMA control panels. The power control source and battery modules may not be compliant with UL 508 requirements, which is essential for mounting in a control panel.

An AC UPS generates heat and consumes energy as the 120-volt AC is converted back and forth to charge the batteries and power the control system. On the other hand, the AC to DC conversion from a DC UPS is performed once by the system power supply, not three times as does an AC UPS. The DC UPS eliminates the inefficiencies of all these back and forth conversions and thus conserves energy and generates less heat. At a minimum, DC UPS units designed for industrial settings must have the following — DIN rail mounting, high MTBF, UL 508, CE, and FCC compliance. For all of these reasons, specify a DC UPS rather than an AC UPS for DC industrial applications.

## Important information about batteries

To ensure maximum battery life, the DC power charger must maintain the optimum 24-volt charge. Over or under charging of UPS batteries affects battery life expectancy. A microprocessor-based UPS ensures proper battery charging, and will result in increased battery life. In addition to over or under charging, battery life can also be shortened by high temperatures found in harsh industrial environments. In these specific environments, it is recommended to specify the DC UPS for +50°C or higher.

It is vital to consider the maximum backup time of the DC UPS at full load when specifying a unit. That length of time must be sufficiently long for the controller to take a snapshot of the machine or line operations at the time of shutdown. Specify a DC UPS that not only covers today's backup-time requirements, but also tomorrow's expansion needs. Purchase a system with the capability to add batteries as the control system evolves.

UPSs that incorporate sealed batteries and are described as no-spill and non-gassing may actually emit small amounts of gases during charging. In NEMA 1 control panels, these gases are easily vented. Even a small concentration of gases can build up to a hazardous level in unventilated panels sealed with gaskets against dust, oil, and water. Sealed panels have blown up because of battery-gas build up. For this reason, batteries must never be placed in unventilated, sealed control panels. For every sealed panel application, specify a DC UPS that offers batteries designed to be externally mounted to the sealed panel or enclosure. These external battery modules should be safely housed in a NEMA 1 type enclosure.

Some UPS batteries require technician replacement. However, user replaceable batteries eliminate the need for a service technician and will save time and money. Traditional battery systems may be hardwired which require technical expertise; however, even technical expertise may result in reversed wiring which can damage UPS systems. Therefore, you should specify a DC UPS with a polarized battery connection to prevent these issues.

## Key features for operations and diagnostics

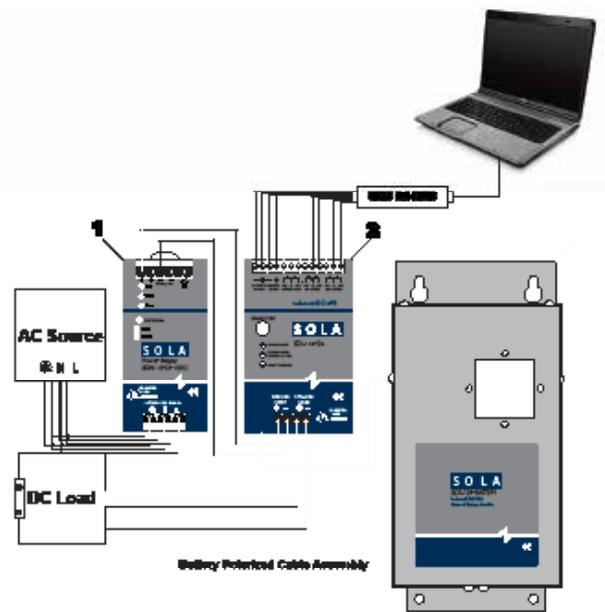
The advanced DC UPS comes standard with a suite of essential operational and diagnostic features. Ensure that the DC UPS specified offers the following must-have features: remote monitoring, diagnostics, and shutoff capabilities; automatic self-testing of the control power source functionality and battery condition; LED status indicators for easy visual diagnostics of the condition of the control power source and the battery; overload protection in normal and battery modes; and universal system monitoring relay terminals. Relay contacts provide reliable signaling to a controller that the system is on battery power. USB communications capability to connect to computers is a plus.

## Local support

A battery's life shortens considerably when it is not kept at optimum charge. That is why inventoried batteries do not last long sitting on a shelf in the plant's parts crib. For this reason, make sure that DC UPS batteries are locally available from stocking distributors that are aware of battery shelf-life limitations. Nearby and readily available units, and application expertise from the distributor, add more layers to the assurance of maximum uptime.

**For more information on DC UPS products and all issues regarding power quality, contact:**

EGS Electrical Group  
 9377 W. Higgins Road  
 Rosemont, IL 60018  
 Phone: 877-377-4384  
 Email: [sales@solahd.com](mailto:sales@solahd.com)  
 Web: [www.solahd.com](http://www.solahd.com)



*External Battery Module System  
 connected to an existing Power Supply*