

Reliable back-up power prevents machine damage and data loss

By: Eric Olson

Uninterruptible power supplies (UPS) provide critical protection for a wide range of industrial applications. From telecommunications to automation and control to assembly production, DC-UPS systems enable continuous machine operation or controlled shutdown of systems to prevent damage and data loss. DC-UPS systems protect a multitude of equipment including switchgears, material handling systems, production machinery and industrial PCs.

A broad selection of reliable, high-quality [DC-UPS back-up power systems](#) is available from industrial automation and control components supplier Altech Corp., including the C-TEC and AKKUTEC DC-UPS systems designed and manufactured by J. Schneider Elektrotechnik.

C-TEC DC-UPS

C-TEC ultracapacitor-based DC-UPS systems provide dependable, quick back-up power to eliminate stress on the primary power supply in peak power demand conditions and short power outages. C-TEC systems are ideal for brief back-up events such as controlled shutdowns of industrial PCs during power failures.

C-TEC devices store energy in ultracapacitors and release it during interruption of the main power supply. Models are available that accept

input in the form of AC mains power or DC power from a power supply. C-TEC units function as an uninterruptible power supply, providing a steady DC output powered by mains power during normal operation or ultracapacitors during power failure. Rapid ultracapacitor charging and discharging is controlled by a microcontroller.

Providing a reliable, stable supply of power regardless of fluctuating or failing mains supply, C-TEC systems ensure continuity of operations in the event of adverse power conditions like supply voltage dips, sags, drop outs or surges. Back-up times up to 55 minutes are possible depending on load.



Figure 1. The DC UPS of the C-TEC 2408 series is equipped with integrated ultracapacitors for accumulating energy. Source: Altech



C-TEC systems are available with output currents ranging from 2 A to 40 A at output voltages of 12 V, 24 V or 48 V with energy capacities of 0.5 kJ to 20 kJ. Extension modules are available that contain additional ultracapacitors to provide extended back-up times. Total back-up time is a function of capacitor energy content, voltage output and current output.

Figure 2. The accumulator-buffered DC supply works according to the standby parallel principle and guarantees, in connection with a lead accumulator and for a certain amount of time, a safe back-up in case of mains failure. Source: Altech

Compared to battery-based UPS systems, C-TEC ultracapacitor modules offer a number of advantages. Unlike traditional lead-acid batteries, ultracapacitors do not contain toxic chemicals. They are environmentally safe and virtually maintenance free over lifetimes exceeding 20 years, operating at 35° C with no need to replace or maintain batteries.

C-TEC back-up systems are also suitable for operation in harsh environments, such as in atmospheres where gaseous ammonia would damage electronic equipment. Since ultracapacitors do not emit gases, C-TEC units can be installed in hermetically sealed housings, protecting them from harsh atmospheres. This makes them ideal for use in applications like chemical plants or animal feeding systems.

In addition, ultracapacitor-based C-TEC devices exhibit superior thermal resistance compared to chemical battery-based UPS solutions. C-TEC's ultracapacitors enjoy undiminished lifetimes at ambient temperatures up to 70° C, whereas batteries start to lose lifetime at temperatures of just 20° C.

AKKUTEC DC-UPS

Ultracapacitor-based back-up systems provide reliable short-term power. However, for long-duration power failures, a solution with higher charge capacity is needed. The AKKUTEC DC-UPS system meets this need, functioning as a battery-buffered DC power supply that works in a standby parallel mode with a lead-acid battery.

During normal supply of AC mains power, AKKUTEC carries out microcontroller-based battery charging. If power fails, AKKUTEC draws on the battery's stored energy, delivering a constant, reliable DC current and voltage to power the load until mains power returns or battery voltage falls below a minimum threshold.

AKKUTEC is an integrated solution that handles charging, discharging, monitoring and testing of the connected battery.

Compared to other back-up systems with a separate power supply, UPS and monitoring installations, AKKUTEC reduces installation cost and saves space.

Ideal for backing up large loads over extended periods of time, AKKUTEC systems can achieve battery back-up times up to 96 hours depending on load. AKKUTEC systems are available with output currents ranging from 2 A to 40 A at output voltages of 12 V, 24 V or 48 V with charging currents from 1.1 A to 44 A. AKKUTEC devices can be paired with lead-acid batteries of various sizes to extend total back-up time.



Figure 3: AKKUTEC DC-UPS systems are ideal for backing up large loads over extended time periods. Source: Altech

Communication

For back-up power systems, device monitoring, control and parameter adjustment are important functions that increase system adaptability and maximize efficiency for specific applications.

Monitoring and parameterization capabilities are enabled for C-TEC and AKKUTEC DC-UPS back-up power systems with software modules installed on Windows-based PCs. TECControl and paraTEC software communicates with C-TEC and AKKUTEC devices over wired USB, RS-232 or proprietary secure TECbus connections between device and PC.

Possibilities of Parameterisation

output voltage 1:
output voltage in back-up operation for 24V range

Activation:
At first the shutdown signal must have been inactive for the adjusted time to be notified as valid in case of active shutdown

General error:
field active: When the capacitor control is activated a general error is displayed. (In case of error, the LED „error“ illuminates and the corresponding relay is closed)

C above:
If the energy content of the capacitor exceeds the adjusted value, the LED UC> illuminates and the corresponding relay switches.

C below:
If the energy content of the capacitor under runs the adjusted value, the LED UC> expires and the corresponding relay drops down.

switch off delay at USB-Shutdown-Signal:
time until switch off after a valid shut-down signal via USB.

Auto-restart after switch off:
If during the shut-down procedure U_e comes back, the output is switched off for the adjusted time to reset the PC. Afterwards, U_e is switched on to restart the PC.

Signaling delay mains failure:
The minimum duration of the failure of the supply U_e before the message U_e OK is deleted. The LED U_e OK expires, the relay U_e OK drops down.

Figure 3. The software is used to set up or change the characteristics of the C-TEC units. Source: Altech

TECControl enables continuous monitoring of the computer network and C-TEC or AKKUTEC DC-UPS energy storage system. The software can initiate a controlled shutdown of the industrial PC and DC-UPS device in the event of a mains failure after a preset delay. Back-up power during the delay and shutdown is provided by the DC-UPS system. Upon restoration of the mains supply, the DC-UPS device powers back on, allowing automatic restart of the connected industrial PC.


TECControl allows customization of controlled shutdown behavior, including:

- Setting the delay time in the seconds before shutdown in the event of a mains failure.
- Setting the delay time in the seconds before shutdown in the event of low capacity of the capacitors or batteries.
- Triggering an audio warning or executing an external program in the event of mains failure.

The paraTEC software module allows customization of C-TEC and AKKUTEC device parameters, such as:

- The output voltage during back-up operation.
- The percentage threshold above which the capacitors in a C-TEC device are considered full.
- The maximum permissible battery temperature of batteries in an AKKUTEC system.
- The delay until the system is switched off after a shutdown signal is received via USB.

Also available is the J. Schneider GO IoT/Industry 4.0 Gateway. The gateway serves as a bridge between C-TEC and AKKUTEC power supplies, the customer's PC and the internet, allowing monitoring and parameterization via TECControl and paraTEC software programs. Local and remote display of process data such as current, voltage and battery charge is possible with the gateway, which is equipped with USB, RS-485, CAN bus and Ethernet ports.



AC-UPS	DC-UPS	AC-UPS	AC-UPS	AC-UPS
20kVA	24V, 5A	60kVA	60kVA	160A
1h back-up time	redundant	input 500V for IT networks	input 500V for IT networks	for 13-cellular lead-acid battery + inverter
IP 54 extendable	with distribution	15 min back-up time	15 min back-up time	1.5kVA, 230V for nuclear facilities

Figure 4. Already-implemented cabinet solutions aid customers in acquiring proven capabilities as a reasonable price.
Source: Altech

Conclusion

J. Schneider Elektrotechnik's C-TEC and AKKUTEC DC-UPS back-up systems provided by Altech deliver a reliable supply of energy in the event of power failures to enable continuous operations or controlled shutdowns to prevent data loss and protect equipment from damage. Windows-based software modules are available alongside the DC-UPS systems to allow device monitoring and parameter customization, including local and remote display of process data and parameter adjustment via an internet-connected gateway.

[Contact Altech](#) today to connect with experienced product engineers to discuss DC-UPS solutions tailored to your specific application.