

MachineDesign®

# MACHINE SAFETY BACKUP WITH COMMUNICATIONS



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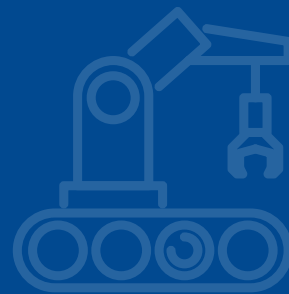
**Altech Corp.**®

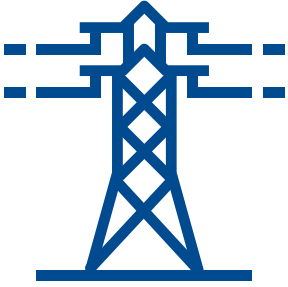
**Machine safety rules and regulations are different at every location**, including in other countries around the world. When protecting your machines, you are also protecting your production and throughput. There are many options for protection—the most valuable of which don't just provide backup and shutdown, but also communicate effectively.

All manufacturing plants need to incorporate power safety devices, whether for small operations or large, single machines or whole plants. Hazardous areas, specifically, can be difficult to maintain. Even the word *hazardous* can be viewed and explained in a variety of ways, depending on whether you're referring to a construction site, manufacturing plant, or chemical plant—each of which requires something different. Consider power stations, oil and gas, or airports that must be intrinsically safe. Engineers and technical departments are responsible for making sure equipment and employees are safe. Relevant standards and codes of practice presented by standards organizations such as OSHA provide detailed guidance for those involved.

In particular, hazardous air environmental conditions are extremely unsuitable for electronics equipment installations. For example, the petroleum industry uses anhydrous ammonia to neutralize the acid constituents of crude oil and in protecting equipment such as bubble plate towers, heat exchanges, condensers, and storage tanks from corrosion. In the rubber industry, ammonia is used to stabilize raw latex to prevent coagulation during transportation and storage. Ammonia is found not only in industrial plants, but also in agricultural areas and farms, as it is used in the manufacture of pesticides and detergents.

Ammonia has the capacity to melt away many of the components on a printed circuit board itself. It is also damaging to cables, housings and interconnections of any kind, resulting in dramatically reduced life expectancy. When considering backup systems, it is best to use ones that are hermetically sealed from such outside hazards.





## Short-Term Power Outages

One valuable solution for hazardous conditions, where riding through short-term outages is important, is the capacitor-power-supply, such as those found in Altech's C-TEC series of UPS systems (Fig. 1). Because these capacitor systems never develop gases, it is possible to install these systems in an IP66 housing made of V2A stainless steel for long-term operation.

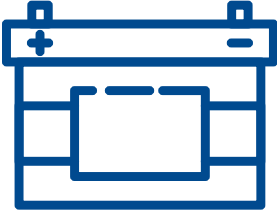


1. The DC UPS of the C-TEC 2408 series is equipped with integrated ultracapacitors for accumulating energy.

In general, the C-TEC series uses what the company calls ultracapacitors. These devices offer a different source of DC power than rechargeable batteries. The devices provide energy densities that are much higher (up to 10,000 times) than conventional electrolytic capacitors. These systems are primarily used for short-term interruptions while a standby power generator is turned on and supplies steady AC to the UPS—which quickly recharges the ultracapacitors.

The C-TEC series provides users with a compact footprint, short-duration runtime for critical applications, low environmental impact, high efficiency, low running costs, and elevated working ambient temperatures. Thermal resistance of the C-TEC series devices allow them to work for their lifetime with an ambient temperature of up to 70°C, where batteries lose lifetime at temperatures of 20°C.

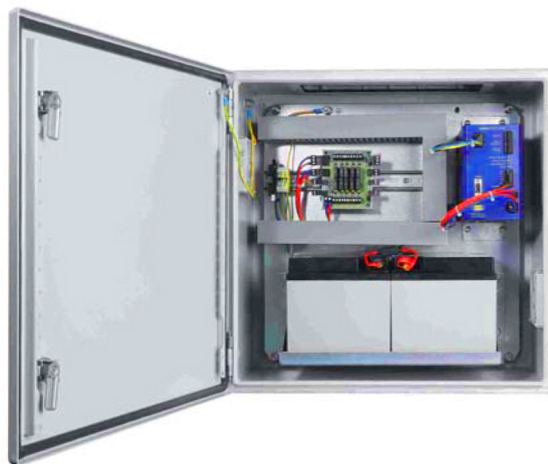




## Long-Term Power Outages

The first thing to understand is that once power is dropped offline for any reason, your system goes down. In most industries, there are sequences that must be gone through in order to get machines back online in a safe and organized manner. Using an all-in-one DC-UPS Backup system built specifically for long-term power outages is the best solution to reduce this type of downtime, which always comes at a high financial cost.

For UPS systems that need to operate for longer periods of time, the **AKKUTEK** series provide important battery management features such as battery charge, battery monitoring, and battery test of the connected battery (Fig. 2). Full management capabilities are essential when used in critical operation. The series works with open/sealed lead acid, lead gel and, optionally, Ni-Cd, Ni-MH, and Li-Ion batteries. The user is able to set predefined charging curves for those battery types, or other charging curves can be loaded into the device via PC.



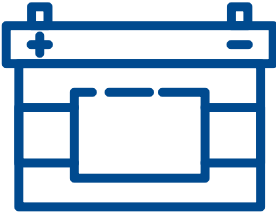
2. The accumulator-buffered DC supply works according to the standby parallel principle and guarantees, in connection with a lead accumulator and, for a certain amount of time, a safe back-up operation of the DC supply in case of a mains failure.energy.

Because the series offers connection to a wide range of input voltages, such as 120 and 230 V ac the series is usable anywhere in the world without any additional settings. Higher voltage input versions are also available. Output voltages are assigned or can be selected before installation for any voltage between 12 and 24 V dc, plus 48 V dc units are available as standard versions from stock. An



An important aspect of the devices includes that they are **constantly monitored.**





automatic multi-stage operation optimizes and adapts to the battery status as part of the microprocessor control of the system.

As mentioned, an important aspect of the devices includes that they are constantly monitored. This allows these units, when disconnected from the power source, to adapt to the most effective conditions. For example, the battery will supply the load until the battery voltage drops to a 1.5 V per cell level—which prevents the battery from deep discharge.

Using specific algorithms, the **battery's condition** is instantly detected and an appropriate charging mode is chosen by the system.

A real-time diagnostics system continuously monitors the charging progress, which checks for possible faults such as elements in short-circuit, accidental reverse polarity connections, or disconnection of the battery.

Further, this backup solution tests the internal impedance status of the system to avoid any risk of damages. Through the use of a battery stimulation circuit, algorithms are used to recognize sulphated batteries or batteries with a short-circuited cell. Additional checks include checking for accidental disconnection of the battery cables, test of wire connection impedance, battery in open circuit, reverse polarity check, battery voltage connection check, and end-of-charge check.

A clear definition of each system operation via LED indications and relay contacts for main or back-up, battery fault, and flat battery signaling are standard. LED display signals indicate input main on/off, battery fault, low battery, and type of battery charge mode. In addition, there are remote link capabilities to drive the devices from boost, bulk-to-trickle, and trickle-to-float charge, or you can permanently boost or bulk charge the system using a jumper.



## Extended Communications Capabilities

Series units are equipped with many standard communications protocols to allow access to collected information and operation. Most units have a built in MOD Bus or CANbus protocol built in and accessible through an RJ45 connector. Some units are also available with the J1939 CANbus protocols for direct communication with Gen Sets.

**ParaTEC Software**  
The software is used to set up or change the characteristics of the C-TEC units.

**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 shut-down

**General error:**  
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  $U_{a, OK}$  comes back, the output is switched off for the adjusted time to reset the PC. Afterwards,  $U_a$  is switched on to restart the PC.

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

**It is possible to adjust C-TEC devices in the way that the release of input and load is effected only if the total capacity is available.**

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


A strong set of parameterization software capabilities are also included. Altech's ParaTEC software is available for both the C-TEC and AKKUTEK series products (Fig. 3). For this product, both Windows software and drivers are installed together, allowing the user to freely select the software user.

Parameter capabilities are wide and can include the ability to switch on threshold; maximum battery temperature; the distance of the threshold to the test voltage; the time the AKKUTEK switches off the output voltage after a valid shutdown signal; the option of how to handle how long the UPS operation will last in case the voltage drops to the deep discharge threshold; and how long the shutdown signal must be present without interruption in order to be recognized as valid.



## Conclusion

Although we've been talking about smaller operations, which are the most common and require single units, Altech is also involved in multi-unit installations in a wide variety of industries. The company provides a wide range of functionality in already-implemented systems that have been in use for years. Such systems can easily and inexpensively provide the right safety to your company while delivering the specific requirements you need (Fig. 4).



<b>AC-UPS</b>	<b>DC-UPS</b>	<b>AC-UPS</b>	<b>AC-UPS</b>	<b>AC-UPS</b>
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

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

Making sure your plant and process has the correct power safety devices installed is critical to maintaining your throughput. Downtime is costly and bringing equipment back online requires a long, safe process, often for each individual machine. But controlling the operations of the power backup system and monitoring it for efficiency and proper operations is highly recommended in order to have full control of your manufacturing operations. It's important to select the right equipment—that will do the job properly—from the start.