

Is Your UPS Rated for Industrial Environments?

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The following is a detailed overview instructing what to look for when selecting an uninterruptible power supply (UPS) for use in a harsh industrial application. The demanding environmental conditions present in a typical industrial application require using a UPS that has been specifically designed to meet these demands.



Falcon UPS with 10- year battery

Further, to meet the return on investment (ROI) expectations of a typical industrial company, the UPS selected must continue to operate flawlessly in this harsh environment for over 10 to 15 years and require minimal maintenance. This is a tall order considering the broad range of conditions that may be encountered.

Temperature is the most measured quality in any industrial environment, yet when selecting a UPS for industrial use, the operational temperature range of the UPS is the most overlooked. Average ambient temperatures encountered in industrial environments can range from -4° to $+122^{\circ}\text{F}$, with some harsh industrial applications having a demanding -30° to 149°F .

Temperature

So why select an office or IT grade UPS having an operation temperature range of 32° to 104°F for industrial use where temperatures well outside this range may be encountered? The answer is simple; until recently most UPS manufacturers focused primarily on the office and IT markets, only offering products meeting their 32° to 104°F operational temperature specifications.

Most industrial computers, servers, PLCs and communications equipment have operational temperature specifications of -4° to 131°F . Within the last couple of years some UPS manufacturers have recognized the need for true industrial-grade UPS products. When the industrial applications ambient temperature range dictates, an industrial-grade on-line UPS should be used that meets or exceeds the same specifications as the industrial equipment it is protecting.

Most office or IT grade UPS products have not been designed to operate for sustained periods of time outside the manufacturer’s stated operational temperature range. Further, they have undergone safety agency testing and qualification using the same operational temperature specifications.

During the safety agency engineering evaluation of the UPS, the temperature rise of critical components is measured to verify their maximum temperature remains under their rated limits. This test is conducted while the UPS is operating inside the manufacturer specified temperature range. Installing office and IT grade UPS units in locations requiring sustained operation outside the manufacturer’s specified temperature range often will result in reliability, safety, code and liability insurance issues.

Another area of concern is that office and IT-grade UPS products incorporate low-cost, 5-year rated, Valve Regulated Lead Acid (VRLA) batteries. Specifically, the battery manufacturer’s operational temperature specification for these batteries is typically 5° to 131°F. The battery manufacturer’s safety agency certifications were also obtained using the same temperature range. In addition, the battery manufacturer’s stated VRLA, 5-year battery life is predicated on the battery operating at ambient temperatures below 77°F. The battery manufacturer states when the batteries are stored or operated in an environment above these temperatures, the battery life must be derated. The higher the temperature, the shorter the battery life, until at 122°F the battery life is reduced to nine months. For cold temperatures below 32°F, the battery capacity is reduced causing the amount of battery runtime to be reduced also.

Solution

For applications where ambient temperatures are outside the typical UPS operational temperature range of 32° to 104°F, it is preferable to select a true “industrial-grade” on-line UPS (see Figure 1) that has been designed to operate continuously outside the normal office equipment temperature ratings.

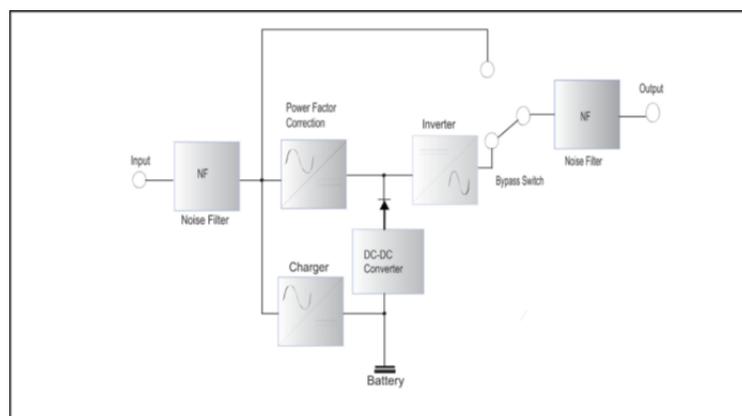


Fig. 1: Industrial-grade on-line UPS topology.

Mid-level, industrial-grade UPS models are available having an operational temperature specification of -4° to 131°F with UL1778 and cUL listing status. High temperature models are also available incorporating special wide temperature range, 10-year rated batteries, and having a UL1718 listed temperature specification of 22° to 149°F . Depending on the brand and type of 10-year VRLA battery used, the battery life at 122°F can vary from nine months to four years.

Airborne contaminants are present in many industrial environments and can be a major consideration when selecting and installing a UPS. The type and amount of airborne contaminants must be identified prior to selecting any UPS. If the contaminant is electrically conductive, the UPS, as with any other electronic equipment, should be installed in a contaminant-free location within the facility. At a minimum, the UPS could be installed in a NEMA 4 sealed enclosure located as far away from the contamination source as possible.

Since a NEMA 4 enclosure is sealed, the enclosure must be large enough to dissipate heat generated by the UPS through convection. As an option, an approved air conditioner could be installed on the enclosure. As an added precaution, the internal UPS circuit boards should have conformal coating applied. Should the contaminant be flammable, combustible or explosive, only a UPS meeting the applicable NFPA, EX, or IECEx standards and the mandated certifications must be used.

Industrial environments typically suffer from localized power pollution generated by a large amount of equipment, motors, pumps, welders, etc., operating from the facility's electrical system. Industrial computers, servers, PLCs and variable speed drives are often adversely affected and can even be damaged by the power pollution. The pollution manifests itself in the form of high voltage transients, voltage sags, brownouts, current distortion, noise and other disturbances on the ac power lines throughout the facility.

The installation of an industrial-grade, double conversion on-line UPS will not only provide any required battery backup, but will clean up most of the localized power pollution. It will provide a source of continuous, clean, regulated ac power to power sensitive PLCs, controllers, computers and equipment.

Should battery backup not be needed, industrial-grade, double conversion power conditioners are also available and perform the same functions, assuring costly unnecessary downtime is prevented. UPS types other than an industrial-grade, true double conversion on-line topology are not acceptable for most industrial applications. They will only provide battery backup, limited transient protections, and tap-switch voltage regulation. They pass the remaining power pollution through to your sensitive equipment.

One other consideration is the projected service life of the UPS or power conditioner. Office and IT grade UPS products are designed to provide a service life equal to their application. In these applications, the computers and servers they are protecting will become obsolete in five years.

As such, these UPS are constructed with a grade of components that typically offer a 5 to 8 year service life. In comparison, the average life for industrial equipment to assure an acceptable ROI is 10 to 15 years. As such, the true industrial-grade UPS has been designed to meet the expected 10 to 15-year service life.

In the industrial environment uptime and low equipment-maintenance costs are king. In high-production-quantity facilities, even a few hours of line stoppage a year can cost a company an astronomical amount of money. The UPS, line conditioner, and control equipment are a complete system at the heart of key industrial processes. Purchasing a UPS that is not rated to meet these demands can only lead to unnecessary downtime, maintenance, premature equipment failure and lost profits. The cost of ownership of a true industrial grade, on-line UPS often offsets any initial cost.

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