

What To Look For When Buying A UPS

Last year's blackouts in the US, UK and Italy highlighted the need for a reliable power supply, particularly if you look after critical electrical equipment. However, mains failures are not the only aspect of a reliable power supply. You also need to cope with voltage sags and surges, transients (such as lightning strikes), high-frequency noise, harmonic distortion and frequency variation, often traced to low-quality power sources. As a recent insurance survey of electrical and electronic systems claims showed, 29% were associated with power disturbances.

Various systems can protect against some of these problems; power conditioners, automatic voltage stabilisers and standby power systems, but none offer complete protection for all, except an uninterruptible power system (UPS) with on-line dual conversion. The diagram shows the schematic of an online dual conversion system (VFI technology - voltage and frequency independent according to BS EN60950).

Here, the mains is converted to a dc supply that powers the inverter and charges the battery. The inverter generates the output wave which is voltage and frequency independent of the input mains supply. The inverter generated output waveform provides a clean and stable supply to a very tight electronically controlled tolerance. The inverter runs all the time, with no switching and no break in supply. If the mains fail, it simply draws straight from the battery.

Battery Considerations

The UPS should be able to support the load for as long as the application needs to be kept running. The example is radio base and mobile phone cell stations that must continue to operate during a complete power failure to the site and/or local electrical storm.

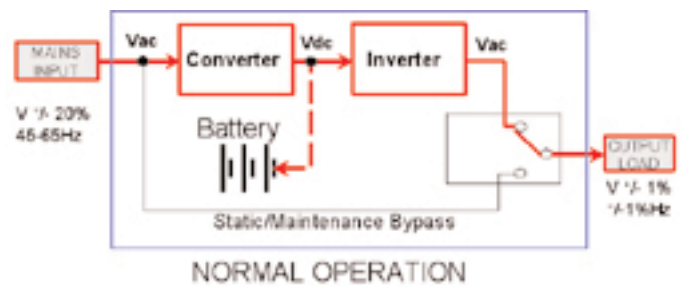
The main type of UPS battery used is the Valve Regulated Sealed Lead Acid (VRLA) type. A. The VRLA has a 5 or 10 year design life and is maintenance free. Runtimes up to several hours can be generated from a suitably sized battery pack or local generating set.

Physical Considerations

The typical weight for a UPS of 200kVA power and a five minute battery is approximately 2,500kg. For remote operating locations consideration has to be given to where to house the UPS - either in a local building or specially fabricated structure. With this in mind physical constraints can become more of an issue in terms of easy access to site, security, environmental and fire control, and remote monitoring. Typical environmental problems include temperature control both during the winter and summer months in remote access cabins which can detrimentally affect the working life of both the batteries and UPS electronics.

Load Requirements

Manufacturer's rating plates normally state the maximum peak load, the estimated average running load is usually half this. Such power draws however, need to be considered with



An on-line dual conversion system (VFI technology)

future needs in mind. As technology improves and appliances are upgraded they usually result in a need for more power. If a generator supplies the power to the UPS, then the harmonic difference between the two could pose a problem. Both also have voltage regulators and if they are operating at the same time they will struggle against each other. One of the voltage regulators needs to be slowed down. It is advisable to buy a generator that is at least 1.6 times more powerful than the UPS. This extra power would not be wasted because it can be used to power non-essential equipment.

Standards

Uninterruptible power systems are built to standard BS EN 62040, replacing EN50091. It has three parts covering general and safety requirements, and performance and test stipulations. The Engineering Recommendation G5/4 is one recommendation that should also be considered. It concerns planning levels for harmonic voltage distortion and the connection of non-linear equipment to transmission systems and distribution networks in the UK. Experts say larger UPS equipment shouldn't put more than 5% harmonic distortion back into the mains supply. A 6-pulse rectifier on a UPS will reflect around 20 to 30%, whereas a 12-pulse rectifier will reduce this figure to around 8%. If a harmonic filter is included, the level of distortion drops to below 5%. The best solution is a 6-pulse rectifier with a harmonics filter which is not load dependent. For UPS exceeding 200kVA, this solution is not available and the best alternative is a 12-pulse rectifier with a filter.

Latest UPS Developments

Although you should never forget that the key factor to consider for a UPS is reliability, there are a number of technological developments worth considering, especially in models below 10kVA. Optimal battery management can be achieved with prolonged battery life using LRCD (low ripple current discharge) and batteries can be 'hot-swapped' to gain prolonged back-up time. Specifiers should also look for a low impact on the mains supply with a guaranteed output quality.

Firstly, digitally controlled automatic (or manual) by-pass is needed in case of load fault conditions. User selectable operating modes are another, including On-line (where

Continues on page 2...



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Continued from page 1...

the inverter powers continuously), Economy (where the UPS supports the load when the mains fail or the load fluctuates), Smart Active (where the mode is selected depending on the stability of the mains by the UPS itself), or Emergency (where the UPS is in standby mode and only operates when the mains fail). Advanced diagnostics include status, measurements and alarms, and UPS' can be updated digitally. Remote monitoring, control and shut-down software can be included for all operating system environments. This means that real time information can be displayed on critical UPS data such as mains voltage, UPS load and battery charge. It also allows remote interrogation of UPS logs and operating parameters, to enable easy diagnosis of potential alarm and fault conditions. You can also define and instigate an unattended, orderly shutdown and establish for example, critical file server shutdown hierarchy.

For complete peace of mind, remote site monitoring services are now possible from selected UPS manufacturers and specialists to support 24-7 maintenance and response contracts. This service monitors the UPS for any changes in operation and links up to the UPS customer service team to offer round the clock diagnostics and support. A service engineer could be on-site even before a fault situation becomes critical!

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For more information on Riello Galatrek UPS:

- www.riello-ups.co.uk
- www.riello-ups.com

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email
telephone

sales@riello-ups.co.uk
0800 269 394

service@riello-ups.co.uk
0800 298 5355

tec@riello-ups.co.uk
0800 781 7959

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