COSTA POWER INDUSTRIES PVT LTD

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UPS BASICS

Everything you ever wanted to know about uninterruptible power systems but were afraid to ask.

Why is power protection important?

No company can afford to leave its IT assets unprotected from power issues. Here are just a few of the reasons why:

- **Even short outages can be trouble.** Losing power for as little as a quarter second can trigger events that may keep IT equipment unavailable for anywhere from 15 minutes to many hours. And downtime is costly. Some experts believe the U.S. economy loses between $200 billion and $570 billion a year due to power outages and other disturbances.
- **Utility power isn't clean.** By law, electrical power can vary widely enough to cause significant problems for IT equipment. According to current U.S. standards, for example, voltage can legally vary from 5.7 percent to 8.3 percent under absolute specifications. That means that what utility services promising 208-phase voltage actually deliver can range from 191 to 220 volts.
- **Utility power isn't 100 percent reliable.** In the U.S., in fact, it's only 99.9 percent reliable, which translates into a likely nine hours of utility outages every year.
- **The problems and risks are intensifying.** Today's storage systems, servers and network devices use components so miniaturized that they falter and fail under power conditions earlier-generation equipment easily withstood.

- **Generators and surge suppressors aren't enough.** Generators can keep systems operational during a utility outage, but they take time to startup and provide no protection from power spikes and other electrical disturbances. Surge suppressors help with power spikes but not with issues like power loss, under-voltage and brownout conditions.
- **Availability is everything these days.** Once, IT played a supporting role in the enterprise. These days it's absolutely central to how most companies compete and win. When IT systems are down, core business processes quickly come to a standstill.
- **Availability is everything, but power costs must be managed.** The cost of power and cooling has spiraled out of control in recent years. Data center managers are typically held responsible for achieving high availability while simultaneously reducing power costs. Highly-efficient UPS systems can help with this goal, and products are available today that were not an option even a few years ago.

What is a UPS?

Put simply, a UPS is a device that:

1. Provides backup power when utility power fails, either long enough for critical equipment to shut down gracefully so that no data is lost, or long enough to keep required loads operational until a generator comes online.

2. Conditions incoming power so that all-too-common sags and surges don't damage sensitive electronic gear.

What are the main types of UPS?

UPSs come in three major varieties, which are also known as topologies:

Single-conversion systems

In normal operation, these feed incoming utility AC power to IT equipment. If the AC input supply falls out of predefined limits, the UPS utilizes its inverter to draw current from the battery, and also disconnects the AC input supply to prevent backfeed from the inverter to the utility. The UPS stays on battery power until the AC input returns to normal tolerances or the battery runs out of power, whichever happens first. Two of the most popular single-conversion designs are standby and line-interactive:

- *Standby UPSs* allow IT equipment to run off utility power until the UPS detects a problem, at which point it switches to battery power. Some standby UPS designs incorporate transformers or other devices to provide limited power conditioning as well.
- *Line-interactive UPSs* regulate input utility voltage up or down as necessary before allowing it to pass through to protected equipment. However, like standby UPSs, they use their battery to guard against frequency abnormalities.

Double-conversion systems

As the name suggests, these devices convert power twice. First, an input rectifier converts AC power into DC and feeds it to an output inverter. The output inverter then processes the power back to AC before sending it on to IT equipment. This double-conversion process isolates critical loads from raw utility power completely, ensuring that IT equipment receives only clean, reliable electricity.

In normal operation, a double-conversion UPS continually processes power twice. If the AC input supply falls out of predefined limits, however, the input rectifier shuts off and the output inverter begins drawing power from the battery instead. The UPS continues to utilize battery power until the AC input returns to normal tolerances or the battery runs out of power, whichever occurs sooner. In case of a severe overload of the inverter, or a failure of the rectifier or inverter, the static switch bypass path is turned on quickly, to support the output loads.

Multi-mode systems

These combine features of both single- and double-conversion technologies while providing substantial improvements in both efficiency and reliability:

- Under normal conditions, the system operates in line-interactive mode, saving energy and money while also keeping voltage within safe tolerances and resolving common anomalies found in utility power.
- If AC input power falls outside of preset tolerances for line-interactive mode, the system automatically switches to double-conversion mode, completely isolating IT equipment from the incoming AC source.
- If AC input power falls outside the tolerances of the double-conversion rectifier, or goes out altogether, the UPS uses the battery to keep supported loads up and running. When the generator comes online, the UPS switches to double-conversion mode until input power stabilizes. Then it transitions back to high-efficiency line-interactive mode.

Multi-mode UPSs are designed to dynamically strike an ideal balance between efficiency and protection. Under normal conditions, they provide maximum efficiency. When problems occur, however, they automatically sacrifice some efficiency to deliver maximum levels of protection. The end result is that data centers can save tens of thousands a year on energy without compromising data center performance or reliability. For more information on multi-mode UPSs, please see two additional white papers, “Which UPS is Right for the Job” and “Maximizing UPS Availability” at www.upsbatteriesindia.com/

Rating :-

A UPS’s rating is the amount of load, in volt-amperes (VA), that it’s designed to support. UPSs are available with ratings as low as 300 VA and as high as 5,000,000 VA or more. Use this very basic procedure to determine the approximate UPS rating your organization requires:

1. Make a list of all the equipment your UPS will be protecting.
2. Determine how many volts and amps every device on the list draws.
3. For each device, multiply volts by amps to arrive at a VA figure.
4. Add all of the VA figures together.
5. Multiply that sum by 1.2, to build in room for growth.

The UPS you buy should have a rating equal to or greater than the final number you arrived at in step 5, unless you have more precise load data for the equipment you are protecting. Here are a few additional considerations to keep in mind:

- Relying solely on nameplate ratings may lead you to oversize the UPS system, so always use your equipment manufacturer’s sizing calculator tools as well, if available. Most major manufacturers have Web-based or downloadable sizing tools that can closely estimate your equipment’s power draw based on the configuration you are using.
- When deploying a centralized power protection architecture, you typically deploy larger kVA UPSs than you would deploy using a distributed power protection scheme.
- If your UPS will be supporting motors, variable-speed drives or laser printers, add more VA capacity to your requirements to account for the high power inrush that occurs when those devices startup. Your UPS vendor can assist in applying the proper UPS and rating for these types of applications.
- Companies that anticipate rapid near- or medium-term growth should use a multiple higher than 1.2 when building in room for growth in the procedure above. So should organizations that expect to upgrade their server hardware soon, as newer servers tend to have higher power requirements than older models .

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