

## CLUSTERED COMPUTERS vs. 1:1

### General

Choosing the right type of UPS for your application is critical. If more than one load is being protected, then a decision must be made on how many UPS's should be purchased. There are many factors that determine

whether to have a Cluster system (one UPS to supply power to many loads) or a 1:1 system configuration (one UPS for each load). It is recommended that if at least two loads are in need of protection,

then a cluster system should be implemented. There are many advantages of using a cluster system versus a 1:1 system configuration. Listed below are some of these advantages.

### Advantages of Clustered Computer System vs. 1:1 System Configuration

#### Counting the Cost

Let's say one computer was purchased for an office, and with that computer one UPS is installed. Later another computer is purchased, and another UPS is installed. Now 3 more computers are installed and three more UPS's. Count the cost: the office now has 5 computers and 5 UPS's. If each UPS costs \$1,200 then the total cost is \$6,000. Whereas if a single UPS was purchased it might only cost \$3,500. So cost is definitely a factor.

#### Load Protection and the Automatic Static Bypass

Protection of the load is the greatest concern when selecting a UPS. Not only do you want to protect your load from all input disturbances, but also output disturbances as well. Larger UPS's featuring an automatic static bypass allow complete protection from disturbances caused by the load. The automatic static bypass is simply a static switch that connects the load directly to the utility power. Faults such as out of spec output voltages, load faults, and overloads will damage smaller UPS's and also cause load interruption or malfunction. If the UPS is equipped with an automatic bypass, the processor

will analyze the output; and if an overload, out of spec voltage, or a load fault is detected, the UPS will connect the load directly to the utility line until the fault subsides. This protects the load and the UPS from the damaging effects of an abnormal output condition.

#### Maintenance Bypass

Most small UPS's do not have a maintenance bypass. When a situation arises where the UPS needs to be serviced, then the load which is connected to the UPS must be disconnected. This can be critical if your system cannot be interrupted. The advantage of having a cluster system where a larger UPS is used, is that a maintenance bypass is available. So if by some chance the UPS needs to be serviced, it can be removed from the load while the utility still supplies power via the maintenance bypass system, without interruption.

#### Batteries

Batteries play a key role in the selection of a UPS system. In a 1:1 system configuration there may be anywhere from 2 to 30 computers and UPS's. The average UPS has a life of about 15 years, but the batteries may last only 3- 5 years. So during

the lifetime of the UPS the batteries must be replaced 4 or 5 times. If there are 30 computers in an office, during the life of the UPS you will need to buy 300 batteries! If the computer loads are connected to one UPS, the unit may only have 4 batteries in it. So the company would only be paying for 20 batteries during the life of the UPS instead of 300. Another advantage a single UPS system has over a 1:1 system configuration are extended run times. If a company had purchased 10 UPS's for 10 computers and they need to increase the backup time on the units, they would need to purchase 10 more UPS's and then discard the 10 they were using. The reason for this is that most small UPS's do not have extended runtime capability. If a single UPS is implemented and given that the UPS is larger, runtime upgrades can be purchased for a fraction of the cost that it would be to replace all of the smaller units. Also in a single UPS system, an extra battery pack can be installed, which provides N+1 redundancy. In case of a battery pack failure, the extra battery pack will supply power to the load without interruption. This feature is not offered on smaller UPS's.

## Common Ground

In any building's electrical system, high impedance contributes to 81.4% of unwanted noise on the ground. This is due to the fact that when a device draws power from the utility, the flow of the electricity back to the ground-neutral bond in the building represents a high impedance. This impedance is what causes high magnitude ground noise which leads to equipment malfunction. In a 1:1 system configuration, it is possible to have many

computers and UPS's connected to different grounds. This results in added noise to other equipment in the building. If a cluster system is implemented, then a larger UPS with a transformer can be used. The transformer derives its own ground neutral bond providing a common ground for the computers and peripherals on the system. This eliminates common mode noise. This short path of return greatly reduces the impedance and the ground noise.

## Laser Printers

On most of the smaller UPS's the inrush current that laser printers produce is far greater than what they can handle. So if an office has a 1:1 system configuration and each computer is connected to a laser printer, then individual UPS's cannot be used because of their inrush current limitations. Larger UPS's can handle the high inrush currents associated with laser printers, providing complete protection of your systems.

## Can the UltraUPS be used in a Cluster System?

The UltraUPS is an ideal UPS for a cluster system application. Below is a table with some of its features that qualify it for use in a cluster system.

Features for Cluster Operation of the UltraUPS	
Automatic Static Bypass	Yes
Security Maintenance Bypass	Yes
N+1 Redundancy	Yes
Extended Runtimes	Yes
Optional Isolation Transformer	Yes
High Inrush Current Capability (Laser Printers)	Yes

## Summary

If in an office environment, cluster system is recommended if backup is needed for at least two computers. A cluster system provides a more dependable and stable UPS system than a 1:1 system configuration.

The advantages of a one UPS multiple load system over a 1:1 system configuration are:

- Less expensive to purchase
- Complete output protection
- Uninterrupted maintenance
- Available extended runtimes
- Less ground noise
- N+1 redundancy
- Laser printer compatibility.

Not only does the UltraUPS meet all the criteria for use as a cluster system, its low input THD and digitally re-mastered sinewave output, makes it the perfect UPS for multiple loads.