

Hot Swappable Uninterruptible Power Supplies

Removing the Downtime in Data Centers

White Paper

Introduction

Unscheduled downtime of critical loads can cause a tremendous financial loss while frustrating IT technicians, and management. Many Uninterruptible Power Supplies (UPS) have addressed the down time associated with routine battery maintenance by offering a “hot swappable battery” feature integral to their UPS design. This well known feature is often a key consideration for many buyers when sourcing a UPS. However, this feature falls short when protecting against downtimes associated with other UPS emergency and planned maintenance activities. These more important potential problems affecting downtime can be easily overlooked without the proper power distribution considerations.

In today’s cost sensitive environment, it is critical to avoid any preventable downtimes associated with UPS failures as well as routine UPS maintenance. This paper will outline the advantages of the bypass distribution module as the solution to unscheduled downtime as well as illustrate how the IT professional can essentially have a “hot swappable UPS” when adding this device into the power distribution network.

The Problem

A typical single phase power distribution scenario is shown below in figure 1. Several types of faults can occur requiring the UPS to be shutdown, replaced, or repaired. When these types of faults occur, the user is forced to shut down the connected loads while the repairs are made or the UPS is replaced. The loads can be manually restarted on utility during this time but are typically not protected from a power loss.



Figure 1

Preventative maintenance can also require the loads to be secured from the UPS. For example, a UPS without the “hot swappable battery” feature would require the loads to be shutdown while the batteries are replaced. This often generates additional expenditures due to inconvenient out-of-hours maintenance windows.

The Solution

A bypass module added to the power distribution network alleviates unscheduled downtime by allowing the user to select between multiple sources of power for the connected loads. Sources are typically Utility Power and UPS power. Should there be a fault requiring maintenance or a planned maintenance activity on the UPS, the user can follow a simple procedure to isolate the load from the affected source.



Figure 2

Xtreme Advantage:

Key product features should be considered when selecting a bypass module. For example, Xtreme Power’s series of XBDM’s (Xtreme Bypass Distribution Module) prevent unnecessary downtime for the connected loads but also provide the additional key advantages:

1. XBDM’s can be used with almost any UPS manufacturer for UPS sizes up to 3kVA
2. Provides additional receptacles for load distribution

3. Provides additional surge protection for connected loads
4. Can be added to the distribution network at any time

Coupling the inherent advantages of bypass module technology with the design considerations made by Xtreme Power has allowed this series of product to stand alone in this area of power products.



Typical Xtreme Power XBDM Module (Front View)



Typical Xtreme Power XBDM Module (Rear View)

The XBDMs can be mounted in the front or rear of a 19" rack, or vertical in the front or rear of a 19" rack, or mounted to a wall near the UPS and equipment to be support. Flexible configuration allows for the placement of the XBDM where it is needed.

How the XBDM works:

Utility Power is connected to the XBDM. The XBDM provides the input power to the UPS and the output of the UPS is fed back into the XBDM. The critical loads are connected directly to the XBDM's receptacles.

There are two modes of operation for the XBDM: Utility and UPS.

- **UPS Mode:** Power is being routed through the UPS system during normal operation



Figure 3: UPS MODE

- **Utility mode:** Power bypasses the UPS system; XBDM supplies power to the load. The UPS can be removed and replaced without any interference to the load.



Figure 4: UTILITY MODE

- Transferring between the two modes is accomplished via a break-before-make, UL 489 listed, rocker switch that insures a transfer of 8ms or less between sources. A typical transfer is shown in figure 5.

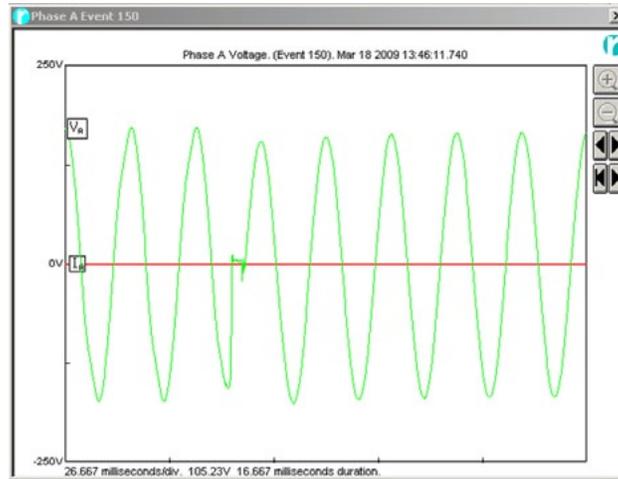


Figure 5: 4.2ms TRANSFER TIME

Conclusion

Unscheduled downtime associated with single phase UPS maintenance, and emergency maintenance has long been a battle for IT Personnel. UPS manufacturers have tried to limit the downtime linked to battery replacements by incorporating a well known feature as "hot swappable batteries" but this does not provide enough protection for other types of downtime. The bypass module has proved to be a valuable power product by virtually removing almost all of the unscheduled downtimes. Bypass modules such as Xtreme Power's XBDM should be considered when sourcing a UPS and for modifying an existing power distribution network.

About Xtreme Power Conversion Corporation

Xtreme Power is a global manufacturer of power quality and data center solutions. Xtreme Power manufactures UPS from 400VA to 40kVA. We design, engineer, and services UPS, rack power distribution units, and portable cooling products for a global network of OEMs and distributors.

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