Temperature affects on battery charging

Product type: *NXRT UPS internal battery and battery pack modules*

Model UPS	***NXRT-1000***	***NXRT-1500***	***NXRT-2000***	***NXRT-3000***
Model EBP	***NXRT-EBP1***	***NXRT-EBP2***	***NXRT-EBP3***	***NXRT-EBP3***

Purpose: The purpose of this bulletin is to notify NXRT UPS system customers of an issue found in regard to a small number of NXRT systems exposed to local ambient temperatures >77°F for a periods of time.

The Problem:

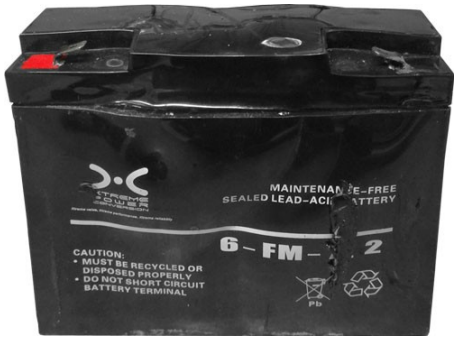
There are battery packs with swollen or failed batteries as a result of overcharging due to high ambient temperatures (see photos below). As batteries age, the problem worsens under these conditions and battery replacements are recommended.

Room temperatures may be below 77°F but temperature hot spots may be present close to the UPS and battery module areas. If temperature hot spots are present at any time, then one or more batteries in the string may start to fail. The internal battery impedance changes as the battery fails increasing the charge current through the affected battery and all other batteries in the string. This creates a charging current imbalance - higher current for some batteries and less for others yielding more failures over time.

NXRT-EBP chargers are often connected to the UPS systems compounding situations of imbalanced charging currents as described above by increasing current for a greater imbalance therefore accelerating the rate failure.

Each NXRT battery pack (EBP) has its own 2A charger built into the NXRT-EBP. These NXRT-EBP chargers are powered from an external AC source via an IEC/5-15P power cord and should be connected only on every third NXRT-EBP. Do not connect the IEC/5-15P power cord into a UPS receptacle. Please refer to the current NXRT user manual for more details.

Temperature/Overharged affected battery **Non affected battery**



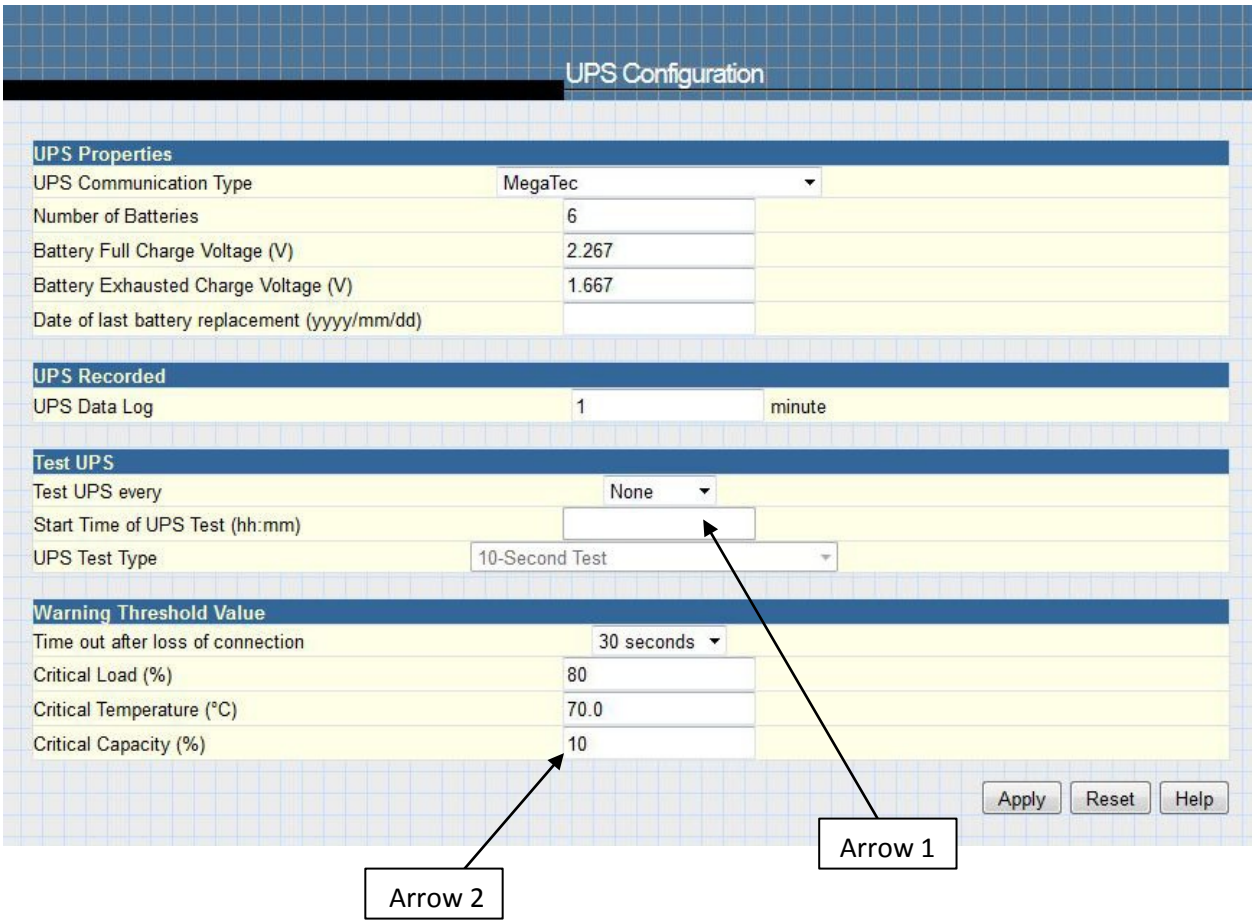
The Solution:

As a result of Xtreme Power's analysis of the problem, the following customer actions are recommended for each NXRT system onsite:

1. Remove all AC power cords connected to the EBP's. Contact Xtreme Power Technical support at 800-582-4524 for systems with over (4) NXRT-EBP's.

2. Xtreme Power recommends ambient temperature levels of less than 77°F around each the NXRT UPS and battery pack(s). Make necessary steps to lower ambient temperatures if needed.
3. Visually inspect battery trays and batteries for each battery tray in the system.
   Refer to NXRT BATTERY INSPECTION PROCEDURE for details on how to perform the needed checks. Replace batteries over three years of age.

4. If SNMP Card is installed:
    A. Run battery test. See arrow 1.
    B. Modify critical capacity % alarm to better alert when batteries are low. The default is 10% and can be changed to 30%. See arrow 2.



NXRT Battery Inspection Procedure

This procedure outlines the steps needed to inspect the *battery tray* **or** *batteries in the battery tray* for the NXRT Series.

Model UPS	NXRT-1000	NXRT-1500	NXRT-2000	NXRT-3000
Model EBP	NXRT-EBP1	NXRT-EBP2	NXRT-EBP3	NXRT-EBP3

The UPS will be online supporting the load during the inspection. This procedure must be performed when the UPS system is fully charged (no battery discharges within 24 hours). The load will be susceptible to Utility outages during the time that the battery(s) are not installed in the UPS system. If EBP's are present, perform checks on the EBP's first .

If XBDM's (Xtreme Bypass Distribution Module) are present, transfer the loads to bypass in accordance with XBDM user manual. Transfer the XBDM back when the battery inspection procedure is completed.

If the system is in alarm, please contact Tech Support at 1-800-582-4524 or techsupport@xpcc.com before commencing this procedure.

The procedure can also be performed with the UPS turned off with the AC power cord unplugged from Utility.

Caution: Please read through the procedure before attempting the battery inspection procedure. If you are uncomfortable or unable to perform any of the tasks, please contact a qualified technician. Batteries present a risk of electric shock and high short circuit current. The following precaution should be observed when working on batteries:

- Remove watches, rings or other metal objects.
- Use tools with insulated handles.
- Use protective eye protection when individual batteries are exposed.
- Use proper lifting techniques with battery trays. Battery trays can weigh up to 45lbs when batteries are installed.
- Follow the procedures as shown and call Xtreme technical support with questions at any time before or when performing this procedure.
- Contact Xtreme Power with questions to return old batteries to Xtreme Power.

NXRT-EBP3 inspection will be outlined below. NXRT-EBP's have two strings of batteries to inspect while the UPS' will have only one. The procedure is the same for all.

1. Make any needed steps to access the UPS's right front bracket. Remove (4) Phillips head screws to remove the UPS's right front bracket.

2. Remove the Bezel set screw

3. Slide front bezel to the right and let hang by front panel cable.

4. Remove the necessary outer sets of screws to slide out the desired battery tray. **Caution**- the battery tray is approximately 45lbs.

5. Visually inspect the battery tray. Check to see if the battery tray and/or batteries are deformed due to swollen temperature affected batteries.

6. **If possible,** measure the voltage at the Anderson connector using a multi-meter at the back of the battery tray. Verify polarity and voltage. Acceptable voltage levels will vary depending on the model NXRT battery tray that is being inspected. *Reference the table on page 7 of this procedure for full charge voltage levels to compare against the meter reading. <u>If a multimeter is not available, then perform visual inspection only.</u>*

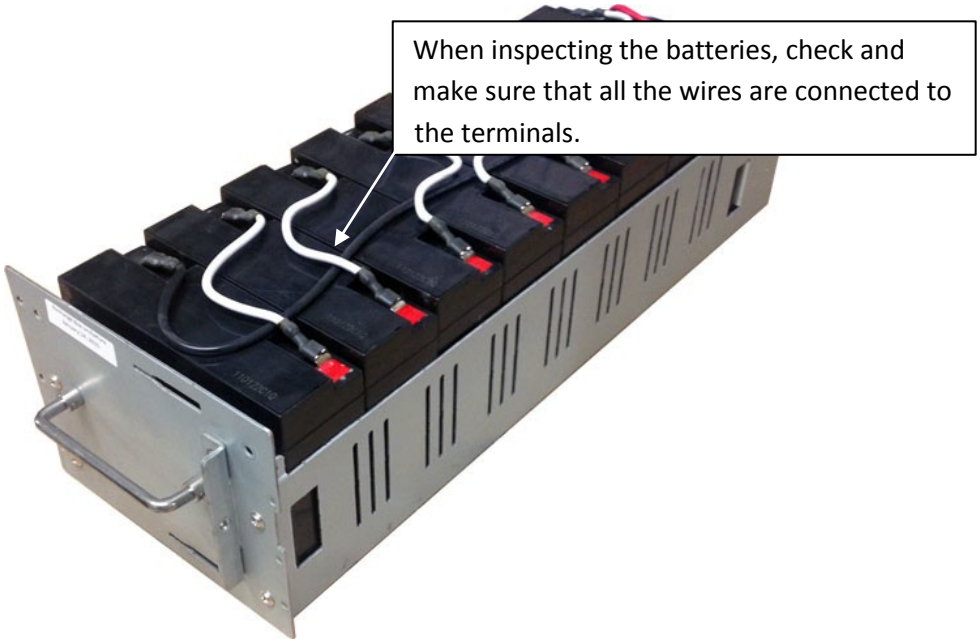
Model UPS	NXRT-1000	NXRT-1500	NXRT-2000	NXRT-3000
Model EBP	NXRT-EBP1	NXRT-EBP2	NXRT-EBP3	NXRT-EBP3
Nominal Voltage Level	36VDC	48VDC	96VDC	96VDC
Full Charge Voltage	>38VDC	>51VDC	>100VDC	>100VDC

If the batteries in the tray fail visual inspection or string values are below full charge values, contact Xtreme Technical Support at 1-800-582-4524

If you cannot tell if the batteries are swollen from visually inspecting the battery tray continue to the next step.

7. Remove each necessary Phillips head screw on the battery tray's top cover and remove top cover.

8. Visually inspect the batteries. Check to see if the batteries are swollen or if corrosion is present on the terminals.



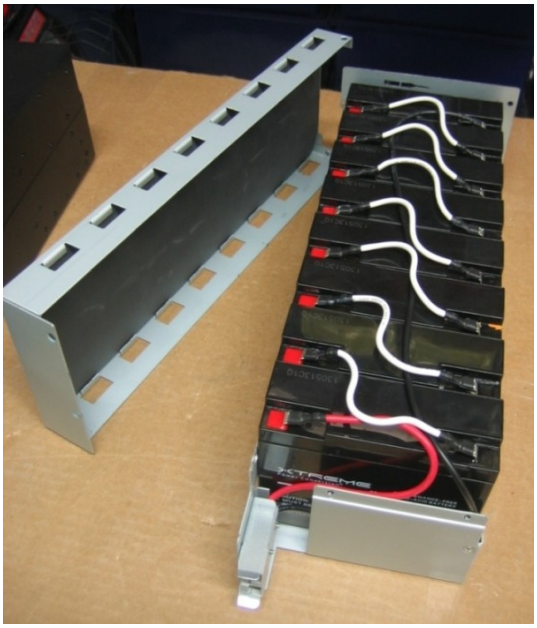
Example above of non-temperature affected batteries

Example above of temperature affected batteries (shown without wires)

Temperature/Overharged affected battery **Non affected battery**

If the batteries do not pass visual inspection, contact Xtreme Power Technical Support at 1-800-582-4524

9. After visual inspection passes, replace top cover and secure the necessary screws



10. Insert battery (s) tray into the UPS or EBP. Replace the necessary screws to secure the battery tray into the UPS.

11. Replace front bezel by aligning the metal guides with the Battery Pack slots. Slide the bezel to the left to snap into place.

Secure front bezel screw

12. Replace right front bracket

13. Procedure is complete. Restart UPS system in accordance with the user manual.