ARGA Controls Battery Monitor Update

How we Detect Open Cell/High Impedence-Corrosion/Open Strap

On the new 25-1000 unit, we can monitor ripple voltage and ripple current (with the optional current sensor). Based on the value of the ripple voltage and ripple current, we can detect an open cell, bad filter capacitors, high Impedance/corrosion, or an open strap.

Open Cell detection how it works; when the internal resistance of the battery string changes (battery experts will tell you any change to a battery is always an indication there is a problem) it will cause the ripple voltage of the charger to increase. We monitor ripple voltage, once it exceeds (200 mv) an alarm will signal an open cell condition. Since we monitor the entire string the customer will need to get their battery folks to test the batteries to determine the bad cell.

If they test the entire string and the internal resistance of the batteries is within the manufacturer's specs, (it could be that the charger filter capacitors may have degraded or failed). When the filter caps inside the charger go bad, there will be a large increase to the ripple voltage on the DC bus. This excessive ripple is bad for batteries as it will shorten the life of the batteries if not addressed.

High Impedance/Corrosion Detection: This requires using the optional clamp on current sensor to monitor ripple current, along with ripple voltage. This was developed with Florida Power & Light due to the high corrosive salt air near their substations. FP & L was concerned with corrosion on the post and terminals on their battery strings. This was a bigger concern than an open cell condition. When there is excessive corrosion on the battery string, the ripple voltage will increase, and the ripple current will decrease (over time). This is an indicator that there is corrosion on your terminal post or straps. Once the ripple voltage exceeds a threshold (200 mv) and ripple drops below its threshold (10 ma) an alarm will signal a high impedance/corrosion alarm. If they stay within these range, there is no alarm. If the customer is monitoring through the digital output (DNP 3.0/Modbus) they will see this change and can be proactive in determining what is causing this change.

Open Strap Detection: By monitoring the ripple current of the battery string, we can detect if a terminal strap were to become open. The optional current sensor is clamped onto one side of the battery string (we recommend on an isolated wire either at the battery or the wire between the upper rack of batteries to the lower rack). If a strap opens or a cable gets disconnected from the battery, the ripple current will fall to zero. This indicates you no longer have a battery available to the DC bus. Most customer have their chargers in parallel with their batteries. If you are monitoring the voltage of the system and the batteries become disconnected, you will still see the voltage of the charger and not realize you have lost your battery. In many cases the charger is not sized to handle the DC load of all the equipment if all the breakers were to be operated at the same time. This is where the batteries are needed.

Hopefully, this will make it clear how we determine an open cell-bad filter caps, high impedance/corrosion, or an open strap. Note: this is all done passively.