Electronics Preventive Maintenance (UPS Power Module, PDU, Flywheel, LCM)
Scope of Work
Attachment R-2

This scope of work is shared by the following power quality equipment types: **Eaton UPS, PDU/PDR/RPP/STS, Vycon Flywheel, Lithium Communicator Module (LCM) and Non-Eaton equipment (MVS)**. Note the applicable features vary by type of equipment being contracted and additional scopes of work may be required.

The following is an outline of general checks performed during an Eaton® Preventive Maintenance of the Eaton UPS Power Module normally performed by Eaton field service personnel. All checks are designed to be performed during offline operation, in the bypass mode. All checks or processes may not be applicable to all equipment types or models.

1. **Visual Inspection**
   - **a.** Inspect all printed circuit board connections for cleanliness, swab contacts if necessary.
   - **b.** Inspect all power connections for signs of overheating
   - **c.** Inspect all subassemblies for signs of component defects or stress
   - **d.** Inspect all DC capacitors for signs of leakage
   - **e.** Inspect all AC capacitors for signs of leakage
   - **f.** Inspect and inventory all customer-owned spare parts
   - **g.** Inspect for, and perform as required, any open engineering changes
   - **h.** If work is completed under a PowerTrust™ Ultra contract, inspect battery monitoring system

2. **Internal Operating Parameters**
   - **a.** DC Ground Detection Offset (if applicable)
   - **b.** Inverter leg current average balance (if applicable)
   - **c.** Output filter current average phase balance (if applicable)
   - **d.** Rectifier bridge current average leg balance (if applicable)
   - **e.** AC Protection settings are checked
   - **f.** DC Protection settings are checked
   - **g.** Input and Output Frequency and Voltage Bandwidth settings are checked
   - **h.** Verify AC and DC filter capacitance
   - **i.** Verify AC tank and trap filter capacitance (if applicable)
   - **j.** Verify Power Supply voltages
   - **k.** Update UPS firmware as necessary with customer approval (parts if required are included at no charge under service agreements with full parts coverage, otherwise billable)
   - **l.** Evaluate Field Service Bulletins (FSBs) for potential updates (parts if required are included at no charge under service agreements with full parts coverage, otherwise billable)

3. **External Operating Parameters**
    a. System Input and Output Voltages (all phases)
    b. System Input and Output Currents (all phases)
    c. DC Charging Voltages (float and equalize), record settings, adjust to nominal
    d. Rectifier phase on and walk up
    e. Inverter phase on and walk up
    f. Adjust all panel meters to measured values
    g. System Bypass Voltages (all phases)
    h. Manual and UV Transfer Testing, verify uninterrupted transfer waveform (if applicable)
    i. Outage simulation, and battery capability testing, and verify charger current limit
    j. Generator operation and interface verification (if applicable)

4. **Environmental Parameters**
    a. UPS area ambient temperature and condition of ventilating equipment
    b. General Cleanliness of UPS Power Module
    c. General Cleanliness of UPS area
    d. Replace air filters as applicable and necessary (parts if required are included at no charge under service agreements with full parts coverage, otherwise billable)
    e. Clean outside of UPS including control/display panel
    f. Flywheel only: Drain oil and change oil and filters (NOTE: One (1) oil and filter change per year)

5. **Battery Cabinet Checks**
    a. General appearance of Battery System (all types)
    b. General cleanliness of Battery System area (all types)
    c. Inspect cells for physical abnormalities
    d. Inspect all DC connections for abnormalities
    e. Battery System area ambient temperature and condition of ventilating equipment
    f. For internal batteries only measure and record:
        i. Overall battery float voltage
        ii. Charger output current and voltage
        iii. Negative terminal temperature of one cell/battery per battery cabinet shelf or rack tier
        iv. Momentary load testing of cells < 100 watts (e.g. 9E, 9x55, **not** 9330)

6. **Lithium Communicator Module (LCM), if under Flex contract coverage**
    a. Inspect and verify LCM data logging, functional test and integration to lithium battery cabinet(s)
    b. Download LCM data for storage in Eaton cloud application for customer reporting

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7. **Monitoring System Parameters**
    - **a.** Alarm archive review and printing
    - **b.** Alarm lamp test-local and remote (if applicable)
    - **c.** Replace all open monitor bulbs
    - **d.** If work is completed under a PowerTrust Ultra contract, inspect battery monitoring system
    - **e.** Review Battery Test in history (if applicable)
    - **f.** Update connectivity card firmware as necessary

8. **General**
    - **a.** Customer Consultation
    - **b.** Verbal Recommendations
    - **c.** General Observations

Following the Preventive Maintenance inspection, a written report will be provided detailing the results of the inspection, and making specific recommendations toward future remedial action, upgrades, or sparing.