

## Delta-Q QUIQ Charger Troubleshooting Guide

### **No Lights at all (All Models)**

No lights at all indicate that ac power to the charger is not connected or that the AC voltage is too low.

- 1) Check the connections to ac power. Check for AC voltage between 104 and 260 VAC at the charger.
- 2) If the AC voltage is verified to be correct at the connection to the charger, and the charger still displays no lights at all, return the charger for service.

### **FAULT LED Flashing (All Models)**

The Fault LED flashes to indicate the micro controller inside the battery charger has detected a fault. The number of flashes indicates the fault detected. Count the number of flashes to determine the fault.

With any battery system, the most common problem will be a faulty battery connection. Because of the high likelihood of a battery connection problem, it is always worthwhile to confirm that all connections are good before checking for any other problems.

**NOTE:** There are 3 different part numbers for the Delta-Q charger. All chargers operate in the same manner. Differences include: physical appearance, such as face plate labels; charge algorithm selection (as noted in instruction manual for each); harnesses; and charge modes (0606-00523/0606-00678 and 0606-00623/0606-00723) each have an optional PRC (Pack Recovery Charge) cycle for recycling GEL batteries ONLY.

#### **[1 Flash]**

0606-00423 - High Battery Voltage (Auto-Recovery)

- 1) Indicates either a battery failure or an open circuit. Check the battery connections. Check the battery for an open cell. Confirm the battery is in good condition.
- 2) This fault will automatically clear and the charger will restart charging when this problem is removed.
- 3) High battery voltage could also occur if there is another source charging the battery. Disconnect any other sources during charging.

0606-00523/0606-00678 & 0606-00623/0606-00723 – Temp Out Of Range

- 1) The battery is too Hot or too Cold to charge.

#### **[2 Flashes]**

0606-00423 - Low Battery Voltage (Auto-Recovery)

- 1) Indicates a battery failure, no battery connected, or a lower than expected battery voltage. Check the battery and battery connections.

- 2) Check the nominal battery voltage. The first two digits of the four-digit model name indicate the battery voltage it supports. Confirm that a nominal battery voltage is the same as the charger voltage.
- 3) This fault will clear automatically when the low battery voltage problem is rectified.

0606-00523/0606-00678 & 0606-00623/0606-00723 – Battery Voltage Is Out Of Range

- 1) The battery voltage is too High or too Low to allow charging to proceed.

**[3 Flashes] -Charge Timeout**

Indicates the battery failed to charge within the allowed time. This could occur if the battery is of larger capacity than the algorithm is intended for. In unusual cases it could mean charger output is reduced due to high ambient temperature.

- 1) Check the battery for damage such as shorted cells and insufficient water. Try the charger on a good battery.
- 2) If the same fault occurs on a good battery, check the connections on the battery and connection to ac.
- 3) Confirm that the nominal battery pack voltage is the same as the battery charger voltage.
- 4) This fault must be cleared manually by unplugging the ac, waiting 30 seconds and reconnecting the ac power.

**[4 Flashes] -(DOES NOT APPLY TO 0606-00523 or 0606-00623)**

0606-00423 – *Check Battery. This fault indicated the battery pack could not be trickle charged up to the minimum level required for the normal charge cycle to be started.*

- 1) Check that none of the battery pack connections between modules are reversed or incorrectly connected.
- 2) Check that one or more cells in the battery are not shorted.
- 3) Confirm that the nominal battery pack voltage is the same as the battery charger voltage.
- 4) Try the charger on a good battery.

0606-00678 & 0606-00723 – *AC Shutdown; Auto-recover. Charger has shut down due to AC line voltage going out of range. Charger will restart when AC voltage comes back in to range and the SMC interval has elapsed.*

- 1) Verify AC line voltage is above 104VAC.

**[5 Flashes] -Over Temperature**

This fault indicates the charger has become too hot during operation. This extra fault indication (as opposed to the flashing ammeter described above) indicates an even higher temperature was reached inside the charger. Though not damaging to the charger, charge time will be extended significantly.

- 1) This fault indication will not clear automatically, but the charger will restart charging automatically when the temperature drops. The fault indication must be cleared manually by unplugging the ac, waiting 30 seconds and reconnecting the ac power.
- 2) If possible, install the charger in a cooler location.
- 3) Confirm that dirt or mud is not blocking the cooling fins of the charger. Clean the charger. Rinse the charger with low-pressure hose if required. Do not use high pressure. Do not use a pressure washer.

### **[6 Flashes] –Delta-Q QuiQ Fault**

This fault indicates that the batteries will not accept charge current, or an internal fault has been detected in the charger. This fault will nearly always be set within the first 30 seconds of operation.

- 1) Try to clear the fault by unplugging AC power, waiting 30 to 60 seconds, and then reconnect the AC power.
- 2) Check all battery connections. Look for a high resistance connection. The most likely reason for this fault is a fault in the battery such as a bad battery connection, an open cell, or insufficient water.
- 3) This fault will occur if an internal fuse inside the charge blows. If the green wire is shorted to ground even momentarily the fuse will blow. To check the fuse, measure with an ohmmeter between the green and red wires with the ac disconnected. If a short circuit is not measured, the fuse has blown. Return unit to a service depot to have this fuse replaced.
- 4) For software revision 0.81 or older, this fault may indicate that the input or output voltage went out of range. Check input and output connections before returning the unit to a service depot. Charger may need to be brought to a service depot to have its software upgraded. Refer to the lower right hand corner on the back of the Product Manual to determine the software revision.
- 5) If this fault occurs after battery charging has started, confirm that ac power was not interrupted and that all battery connections are good.
- 6) If all battery connections are good, an internal fault has been detected and the charger must be brought to a qualified service depot.

### **AC LED Flashing**

Flashing of the AC LED indicates the AC voltage is low. On older model chargers, it could also mean AC voltage is too high. Low input voltage results in longer charge times, but does not affect the charge quality. High AC input voltage will prevent charging.

- 1) When using an extension cord, make sure it is a grounded 3-wire 14 AWG gauge cord of 25' lengths or shorter and 12 AWG for greater than 25' lengths. (Preferably 12 AWG 25'.)

### **Ammeter Flashing**

A flashing ammeter indicates the charger has reduced the charging current due to high internal temperatures during charging. This condition results in longer charge times, but does not affect the charge quality.

- 1) Provide better airflow to the charger.
- 2) Try to move the charger to a cooler location.
- 2) Confirm that dirt or mud is not blocking the cooling fins of the charger. Clean the charger. Rinse charger with low-pressure hose if required. Do **NOT** use high pressure. Do **NOT** use a pressure washer.

### **80% LED Flashing**

This LED is used to indicate the selected charge algorithm. The 80% LED will only flash for the first 10 seconds of operation if a battery is not detected.

- 1) Check battery connections.

### **100% LED Flashing**

This **LED** flashing indicates a finish phase. This phase can last for several hours and indicates normal operation.

### **80% & 100% LED Flashing**

Indicates charger is in PRC (Pack Recovery Charge) mode.

- 1) Charger will revert to previous set algorithm after this charger cycle has completed.

### **AC LED ON, Charger Won't Start Charging**

The charger must detect a good battery before it will start charging.

- 1) Confirm battery connections are good.
- 2) The nominal voltage for a lead acid battery is 2 V per cell. For example, a 72V battery will have  $72/2 = 36$  cells.
- 3) If the battery voltage is greater than 2.5V per cell, the charger will not start charging.
- 4) If the battery voltage is less than 0.5V per cell, the charger will not start.
- 5) For software revisions 0.81 or lower, the charger will not start charging if the battery voltage is less than 1 V per cell. Refer to the lower right hand corner of the back of the Product Manual to determine the software revision.

### **Single LED Flashing Green (0606-00623 & 0606-00723 ONLY)**

On units with a single, multi-color LED, flashing green indicates one of two things: normal charging or battery algorithm display. The battery charge algorithm will only be displayed for ten seconds if a battery is not detected.

- 1) If the LED flashes green at a rate of once per second, the charger is charging the battery. The duty cycle (amount of time the LED is on, compared to the amount of time the LED is off) indicates the state of charge of the battery. If the LED is on most of the time, the battery is nearing full charge.
- 2) If the LED flashes slower (one flash every 1.5 to 2 seconds), or flashes a number of times and then pauses, a battery has not been detected and the number of flashes indicates the charge algorithm. Refer to the Product Manual for more information. The battery charge algorithm will only be displayed for the first 10 seconds of operation when a battery is not detected, and then a fault will be displayed. Check all battery connections if the algorithm is displayed when a battery is connected.

### **Single LED Flashing Yellow**

The flashing yellow on a single LED model indicates normal charging with reduced output current due to higher charger internal temperatures, thermal cutback. Though the charge time will be longer, the quality of the charge will not be affected.

- 1) Provide better airflow to the charger.
- 2) Try to move the charger to a cooler location.
- 3) Confirm that dirt or mud is not blocking the cooling fins of the charger. Clean the charger. Rinse charger with low-pressure hose if required. Do not use high pressure. Do not use a pressure washer.

The flashing yellow on a multi LED model indicates low AC line voltage (see also 'FAULT LED 4 Flashes' above).

### **Single LED Flashing Red**

See "FAULT LED Flashing" above.

### **Excessive Battery Watering Requirements or Strong Sulphur (Burnt Egg) Smell**

These symptoms indicate over-charging or high battery temperature. These symptoms are unlikely to be caused by too high a charge current since the maximum charge current of the charger will be small compared to even a moderately sized battery pack.

- 1) Confirm that the battery pack is not too small- usually (greater than) > 50Ah.
- 2) Confirm that the nominal battery voltage matches the charger output voltage.
- 3) Confirm the correct battery charge algorithm. If the battery pack is new, the algorithm will need to be changed if the pack is not the same as the old one. Refer to the Product Manual for instructions on how to determine and change the battery charge algorithm.

### **Best Installation Method**

For the preferred conditions for installation, read "Determine Mounting Location" under "Installation Instructions" in the Product Manual, OR consult the GEM Service Manual. When mounting the charger it is best to locate it in a position best situated for maximum air flow and ventilation to keep the charger running cool at maximum efficiency.

### **Changing the Battery Charge Algorithm**

The mode to change the battery charge algorithm can only be selected during the first 10 seconds of operation. Refer to "Check/Change Charging Algorithm" in the Product Manual. If the 10-second window is missed, cycle the AC power by unplugging the charger, waiting 30 seconds, and then reconnecting AC power.

- 1) 0606-00423 – Disconnect the charger positive connection by cycling the MDS (Master Disconnect Switch) to the 'OFF' position. Apply AC power, observe self test LED operation. When the bar graph is flashing a single LED, turn the MDS 'ON' for 3 seconds. Count 100, 200, 300, 'OFF'. The LED should advance to the next number/algorithm. Continue to count in 3-second intervals until the desired algorithm is selected. When you reach this point turn the MDS to the 'ON' position for a minimum of 10 seconds or at least until you hear a click sound. The charger has now accepted the selected algorithm and stored it in its permanent memory. Allow the charger to run a full charge cycle before vehicle operation.
- 2) 0606-00523/0606-00678 - Disconnect the charger positive connection by cycling the MDS (Master Disconnect Switch) to the 'OFF' position. Apply AC power, observe self test LED operation. The charger will indicate a flashing LED on the 80% icon. Ex. 13 = Flash, pause, Flash Flash Flash, pause...repeat, etc. Turn the MDS 'ON' for 4 seconds. Count 100, 200, 300, 400, 'OFF'. Observe the change in the LED operation and count the lights. Continue to count in 4-second intervals until the desired algorithm is selected. When you reach this point turn the MDS to the 'ON' position for a minimum of 10 seconds or at least until you hear a click sound. The charger has now accepted the selected algorithm and stored it in its permanent memory. Allow the charger to run a full charge cycle before vehicle operation.
- 3) 0606-00623/0606-00723 - Disconnect the charger positive connection by cycling the MDS (Master Disconnect Switch) to the 'OFF' position. Locate the DC-DC converter located under the dash area to the lower passenger side. Disconnect the 2-pin White/Green plug from the converter. \*IT IS RECOMMENDED THAT

THE LATEST UPGRADE SURE POWER BRAND DC CONVERTER UNIT BE INSTALLED WITH THE DELTA-Q CHARGER FOR BEST VEHICLE PERFORMANCE AND CHARGER OPERATION. Apply AC power and observe self-test LED operation. Continue with instructions following Step 2 above from charger 0606-00523.

\* For any other questions/comments/concerns, please contact Global Electric Motorcars, LLC, GEM Technical Support, 866.764.0616, [www.gemcar.com](http://www.gemcar.com)