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Smart Charge Controller OWNER'S MANUAL

The IOTA IQ-LIFEPO Charge Controller is designed for automatic charging control for DLS Battery Chargers with LiFePO₄ battery applications, providing enhanced battery charging and maintenance. The IOTA IQ-LIFEPO allows the DLS Charger to operate as an automatic “smart charger” that gives the customer the benefit of automatic Bulk, Float, and Maintenance cycles. Multi-stage charging with the IQ-LIFEPO increases the charging capacity of the DLS charger, decreases the charge time, and ensures a maintained and full battery charge. The IOTA IQ-LIFEPO monitors the battery at all times. If the DLS voltage remains in the Float stage for fifteen days, the IOTA IQ-LIFEPO will automatically initiate the Maintenance Cycle for a predetermined time to help maintain the battery, and then resume float stage charging. **ATTENTION: While the IQ-LIFEPO is designed to accommodate most LiFePO₄ battery and BMS systems, always refer to the manufacturer’s specifications for your batteries allowable charging parameters.**

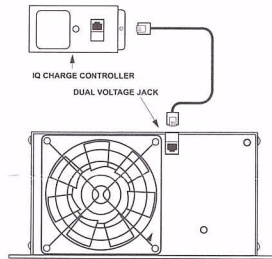
NOTE: The IQ-LIFEPO is for use with batteries with Battery Management Systems (BMS) only. Not for use with unprotected LiFePo₄ batteries.

INSTALLATION

The IOTA IQ-LIFEPO Charge Controller installs by simply plugging the IQ cord into the Dual Voltage jack located on the DLS* (Refer to Figure A). The IOTA IQ-LIFEPO circuitry is then automatically engaged. Note: the cord provided is specifically designed for use with the IOTA IQ-LIFEPO. Do not use the IOTA IQ-LIFEPO with any cord other than one supplied with the unit.

*Location of the Dual Voltage Jack may vary depending on the DLS Model.

FIGURE A. IQ INSTALLATION



OPERATION AND LED INDICATOR REFERENCE

The LED Indicator on the IQ informs the user of the DLS charging state and the battery charge status. When first activated, the IQ will read the number of cells in the battery and indicate the voltage of the battery through a number of flashes. **Refer to Figure C.**

LIT/FLASHING LED - After detecting the battery, the IQ-LIFEPO will initiate a Bulk Charge phase. When the IQ-LIFEPO is in the Bulk Charge mode, the LED indicator will flash rapidly (approx. 2 flashes per second). When the Bulk Charge is complete, the IQ-LIFEPO will begin the Float Charge phase and the LED will remain lit (no flashing). Refer to **Figure B** for Charge Stage descriptions.

Figure B: Charge Stage Descriptions

BULK	The Bulk State charges the battery at the full-rated output of the charger, reducing the time it takes to charge the battery.
FLOAT	Once the battery has been fully charged, the charger remains in the Float State, monitoring the battery for drop in voltage.
MAINTENANCE	If the battery has remained in the Float State for 15 days, the IQ automatically provides reinitiates a bulk charge to ensure the battery remains in a completely charged condition.

Figure C: LED Code Table

LED CODE TABLE		
CELL INDICATION		
6 FLASHES	12V Battery	
12 FLASHES	24V Battery	
24 FLASHES	48V Battery	
CHARGE PHASE	LED STATUS	VOLTAGE 12V / 24V / 48V
FLOAT	SOLID GREEN	13.6 / 27.2 / 54.4
BULK	FLASHING RED	14.7 / 29.4 / 58.8

***Manufacturer’s Note:** New versions of the IQ LIFEPO use a three-color LED indicator. For previous versions of the IQ LIFEPO, the LED indicator will flash GREEN during the Bulk stage. New three-color LED IQ models can be recognized by the white appearance of the LED indicator while OFF (original IQ LED indicators will appear green when OFF.)

ATTENTION: Original versions of the IQ LIFEPO (Green-only LED indicator) are not suitable for use with DLS 54V chargers.

OPERATION AND LED INDICATOR REFERENCE (cont.)

The LED indicator will remain lit or flashing when the charger is unplugged or disconnected from the AC supply (de-energized). During this time, the IQ continues to monitor the battery voltage. If the battery voltage drops below a pre-determined voltage (Refer to **Figure D** for predetermined values), the IQ will automatically initiate the smart-charging cycle once the AC input is re-connected.

IRREGULAR FLASHING LED - If the LED is flashing irregularly or intermittently, then the IQ has entered a FAULT state due to a voltage irregularity. When this occurs, the IQ must be re-set in order to resume normal operation. Refer to the FAULT STATE instructions below for re-setting procedures.

CHARGING STAGE DESCRIPTIONS

BULK STAGE - During this state, the charger will operate either at Full Current output or Constant Voltage output depending on the discharged state of the battery. A discharged battery will dictate the voltage and force the charger into constant-current operation. As the battery charges, the charger transitions to a constant-voltage operation. This BULK STAGE will continue for either 240 minutes or until the battery voltage reaches the "High Trigger" value (whichever occurs first). At this point, the BULK STAGE will operate for another 15 minutes before switching to the FLOAT STAGE.

FLOAT STAGE - This charge state holds the batteries at Constant Voltage for a period not longer than fifteen days. During this state, the charger not only floats the batteries, but it can also provide load current up to its maximum rating for other loads without depleting the battery capacity. The FLOAT STAGE will end when either the battery voltage drops below the "Low Trigger" point or at the end of 15 days when the IQ-LiFePO initiates the MAINTENANCE stage to ensure a complete charged condition. In either situation, the unit exits the FLOAT STAGE and enters the BULK STAGE.

FAULT STATE - If the IQ enters a FAULT state, its circuitry is automatically disabled. In this state, the functionality of the IQ is completely disabled, the LED will flash irregularly, and the charger reverts to a stand-alone FLOAT STATE voltage. The unit will not exit this stand-alone FLOAT STATE, therefore the unit must be reset by following the steps below.

1. Unplug the charger from its AC source.
2. Disconnect the [+] positive cable from the battery.
3. Wait 30 seconds before reconnecting the input and output. To avoid arcing, it is recommended that the charger be connected to the AC input FIRST before connecting the output of the charger to the battery*.

*Note that the connection sequence of the input and output covered above is recommended every time an operator connects the charger to the batteries. However, as long as the charger remains connected to the battery, periodic unplugging of the AC input does not require this sequence.

Figure D: Predetermined Stage Trigger Values

PREDETERMINED VARIABLES FOR OPERATION				
Battery Voltage	BULK	FLOAT	LOW TRIGGER	HIGH TRIGGER
12V	14.7V	13.6V	12.8V	14.6V
24V	29.4V	27.2V	25.6V	29.2V
48V	58.8V	54.4V	51.2V	58.4V

NOTE: The IQ-LiFePO is for use with batteries with Battery Management Systems (BMS) only. Not for use with unprotected LiFePo⁴ batteries.