

IQ4-X AUTOMATIC SMART-CHARGING for DLS-X BATTERY CHARGERS

BULK
ABSORPTION
FLOAT
EQUALIZATION



IQ FUNCTIONS

IOTA's IQ4-X Smart-Charging Technology enables any DLS-X Series charger to automatically deliver the advantages of Bulk, Absorption, Float, and Equalization stage charging, resulting in fast, safe charging of system batteries and protection against sulfation and stratification for optimal battery life.

Bulk

The Bulk Stage allows the DLS unit to charge batteries at its full-rated output for a predetermined duration, reducing the time needed to charge the battery.

Absorption

During the Absorption Stage, the voltage drops and the batteries are then held for a controlled period at a voltage slightly less than the Bulk voltage to ensure a full and complete charge.

Float

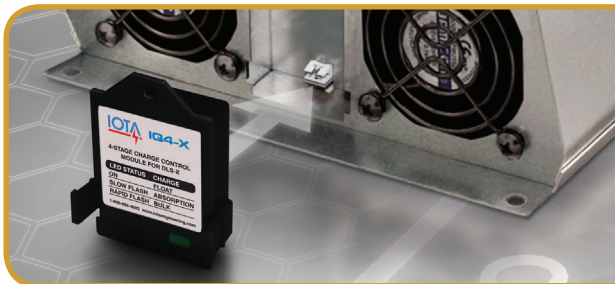
At the Float Stage, the DLS unit delivers a 'trickle' charge, maintaining the battery's full charge while avoiding the dangers of "gassing" or "boiling" caused by over-charging.

Equalization

If the battery remains in the 'Float' state for an extended period, the IQ4-X charge controller re-initializes the smart-charge cycle to dissolve any sulfate layers accumulated on the battery plates and to prevent stratification.

SMART CHARGING BENEFITS

- Automatic, worry-free maintenance of system batteries.
- Delivers a full charge quickly without risk of boiling or increased gassing of the battery.
- Optimizes battery life by preventing damaging stratification and sulfation.
- On-board docking of the IQ4-X module allows for easy installation on DLS-X models without additional mounting.
- LED indicator light provides a visual indication of the current charging stage of the IQ4-X.



SIMPLE INSTALLATION

The external IQ4-X module connects to the module docking port on the end of the DLS-X unit. Simply remove the screw securing the port cover, and insert the IQ4-X module. The IQ4-X flanges will snap into place and the IQ4-X will automatically initiate the smart-charging circuitry. Re-attach the screw to secure the IQ4-X onto the DLS-X.



OPERATION

The LED Indicator on the IQ4-X informs the user of the DLS-X charging state and the battery charge status. When first activated, the IQ4-X will read the number of cells in the battery and indicate the voltage of the battery through a number of flashes. **Refer to Figure A**

LIT/FLASHING LED - After reading the battery, the IQ4-X will initiate in Bulk Charge phase. When the IQ4-X is in the Bulk Charge mode, the green LED indicator will flash rapidly (approx. 2 flashes per second). When the Bulk Charge is complete, the IQ4-X begins the Absorption Charge and the LED indicator will flash at a slower rate (approx. 1 flash per second). If the battery is not in need of charging, the IQ4-X will begin the Float Charge phase and the LED will remain lit (no flashing).

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 IQ4-X continues to monitor the battery voltage. If the battery voltage drops below a pre-determined voltage (Refer to **Figure D** for predetermined values), the IQ4-X will automatically initiate multi-stage charging (BULK, ABSORPTION, and FLOAT) once the AC input is re-connected.

Figure A: LED Code Table

LED CODE TABLE		
CELL INDICATION		
6 FLASHES	12V Battery (6 cells)	
12 FLASHES	24V Battery (12 cells)	
CHARGE PHASE	LED STATUS	VOLTAGE RATE
FLOAT	ON	2.266 PER CELL
ABSORPTION	SLOW FLASHING	2.366 PER CELL
BULK	RAPID FLASHING	2.466 PER CELL

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 225 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 ABSORPTION STAGE.

ABSORPTION STAGE - This state is limited to 240 minutes (4 hours) during which the charger will operate either at Full Current output or Constant Voltage output depending on the discharged state of the battery. During Full Current output, the charger is providing its full current rating and will slowly increase the battery voltage to the “Absorption Stage” voltage. At the end of the 240 minutes, the charger will revert to the FLOAT STAGE.

FLOAT STAGE - This charge state holds the batteries at Constant Voltage for a period not longer than seven 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 seven days when the IQ4-X initiates an equalization stage to remove sulfate layers from the battery plates. In either situation, the unit exits the FLOAT STAGE and enters the BULK STAGE.

Figure B: Predetermined Stage Trigger Values

PREDETERMINED VARIABLES FOR OPERATION						
Battery Voltage	BULK	ABSORPTION	FLOAT	LOW TRIGGER	HIGH TRIGGER	OVER VOLTAGE FAULT
12V	14.8V	14.2V	13.6V	12.8V	14.6V	15.2V
24V	29.6V	28.4V	27.2V	25.6V	29.2V	30.4V