PATCO

MODEL PC-6050

The Model 6050 Lion Charger is designed to support Li-Ion batteries in the range from 1 to 5 Amp Hours of capacity, with pack voltages from 3.6 to 14.4 Volts. The Model 6050 has a power envelope available at the battery during charging of 30 watts, and comes configured for a nominal C/2 charge rate and a six hour time out. The Model 6050 has three modes of operation.

1. Pre-qualification Mode – When the battery is first connected to the charger, a current equal to 1/10 of the maximum charge current is applied to the battery to determine if the battery parameters fall within acceptable tolerances for charging to begin.
2. Constant Current Mode – Provided the battery parameters of terminal voltage, polarity, and temperature are acceptable, the Model 6050 begins to charge the battery using a constant current source, set for C/2.
3. Constant Voltage Mode – This mode provides a tapering current flow to the battery as the Model 6050 replaces the final 50% of charge to the battery.

The following two graphs illustrate how these functions are accomplished. The Model 6050 is charging a battery composed of two 5 AH Li-Ion cells in series, using a nominal C/2 charge rate. The first curve, **Fig 1**, shows the current from the Model 6050 as it brings the battery from full discharge to full charge. The second curve, **Fig 2**, shows the voltage measured at the battery's terminals.

During the first minute of the charge cycle, the Model 6050 supplies to the battery a current of .25 Amperes. This current is used to qualify the battery as to measured parameters prior to beginning the actual charge process. Once the Model 6050 verifies it has an acceptable battery to charge, it switches to a constant current of 2.5 Amps. It remains in this state until the battery terminal voltage reaches 8.2 volts. The Model 6050 then switches to a constant voltage source and the current begins to taper as the battery's internal cell voltage rises with its state of charge. When the current to the battery reaches a preset level, usually the constant current divided by 20, or 6 hours has elapsed since charging began, the current to the battery goes to zero.

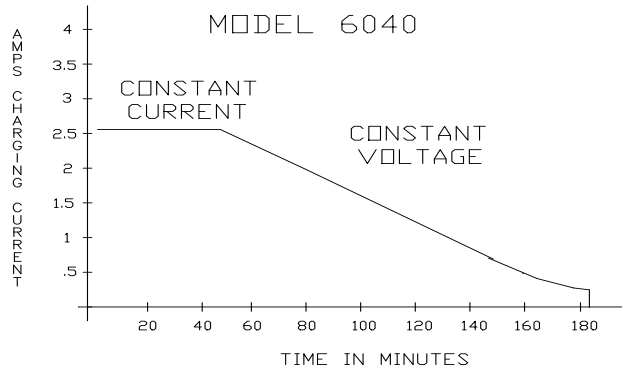

FIGURE 1

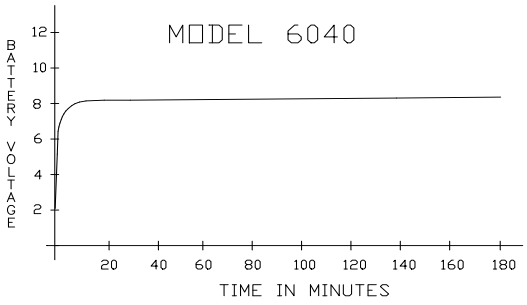

FIGURE 2

Two LED's provide a status report to the user of the charger's operations. Initially, during pre-qualification and the constant current phase of charging, the Red light is on. At the point the charger switches from constant current to constant voltage, the green light comes on in addition to the red light. When the charger has measured the current to the battery equal to I-full, or approximately 1/15 of the maximum charge current, the red light will turn off. The Green light will remain on if the time-out period occurs before I-full is reached. If the charger times out while still in the constant current mode, the Red light will blink, indicating that the charge process failed. If the battery's terminal voltage never reaches a nominal 3 volts per cell using the pre-qualification current, the Red light will blink, indicating a defective battery.

The Model 6050 is designed to support volume Li-Ion applications. Internal settings provide a range of options, enabling the Model 6050 to support 12 battery pack configurations. Nominally setup around the SAFT Li-Ion battery packs, the configurations are for one to four cells, and three current ranges amounting to C/2 for the three basic capacities of SAFT MP cells.

To order a Model 6050, the customer must provide Patco with the cell count to be charged, and the cell type. From this data, the transition voltage and ending voltage will be set, along with the current supplied during the constant current phase.

Since Li-Ion is very sensitive to excessive charge voltage, the Model 6050 has two adjustments that permit very precise control over these charge voltages. The first adjustment sets the exact voltage at which the unit makes its transition from constant current to constant voltage. Because the battery is accepting a high charge current, this transition may of necessity be set higher than the finish voltage for the cells, but is a nominal 4.1 Volts per cell. Next the ending voltage is set. Because the current is so low at charge terminate, the IR losses in the charger/battery interface are minimal. This voltage is set to precisely 4.1 Volts per cell, ensuring complete control at the end-of-charge point.

Specifications

	Model 6050
Constant Current	.3 to 5 Amps
Ending Voltage Range	4.1 – 16.4 Volts
Power out	30 Watts
I Full	.066 Constant Current
I Min	.05 Constant Current
Time out	6 Hours
AC Voltage In	100-260 VAC
Frequency In	50/60 Hz
Power In	50 Watts

Size:
5” Long, 3 1/4” Wide, 2.5” High

Construction:
Aluminum

Weight:
.8 lbs., .4 Kg

Operating Temperature:
0-50 Degrees C

Output:
DC Coaxial Connector, 5.5mm/2.5mm, Center post positive

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