

Jamestronic -----

Li-ion rechargeable battery charger and analyzer

CHGR801 is an intelligent Li-ion rechargeable battery charger and analyzer designed for 3.6V or 3.7V (nominal voltage) rechargeable Li-ion batteries. It has 2 channels each channel can operate independently in any one of 4 modes : Charge, Discharge, Discharge+Charge and Testing Mode.

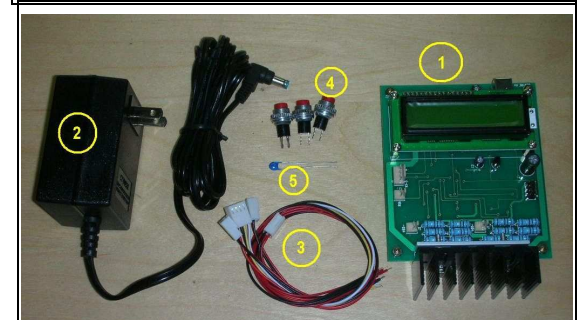
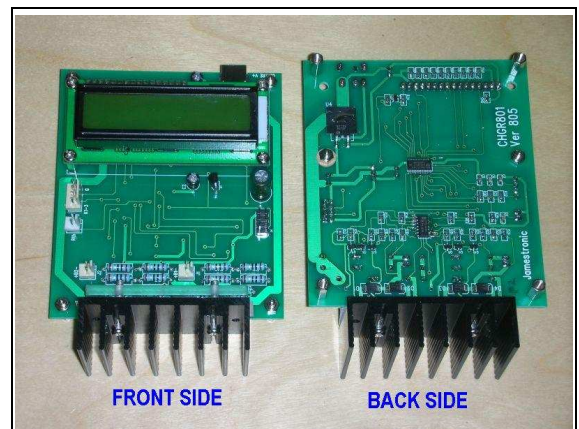
Each mode has 4 settings of current level. Charge current can be selected from 100mA to 800mA. Discharge current can be selected from 50mA to 400mA. The LCD display shows all the information of each channel : voltage level, current level, current capacity, operation time and temperature in both deg F and deg C. CHGR801 has reversed battery protection. When the battery is inserted in reverse polarity, the device will not be damaged. It will just refuse to start any operation. It also has thermal shutdown protection when the detected temperature is above 122°F/50°C. To make this thermal shutdown protection work effectively, the thermistor must be installed close enough to sense the battery temperature.

Features

- Operate at AC100-240V with adaptor provided
- For all size of 3.6/3.7V Li-ion rechargeable batteries (depends on battery holder)
- 2 independent channels
- 16 characters x 2 line LCD with backlight
- 3 push buttons to operate
- 4 mode of operations : Charge, Discharge, Discharge+Charge, Testing
- Charge current selectable at 100, 200, 400 or 800mA
- Discharge current selectable at 50,100, 200 or 400mA
- Testing current range is same as Discharge
- Measure from 1 to 9999mAh current capacity
- Measure temperature from 32°F/0°C to 194°F/90°C
- Charge end at 4.15V +/-0.05V
- Intelligent LCD backlight
- Reverse battery insertion protection

CHGR801

Li-ion rechargeable battery charger and analyzer User Manual



CHGR801KIT Content

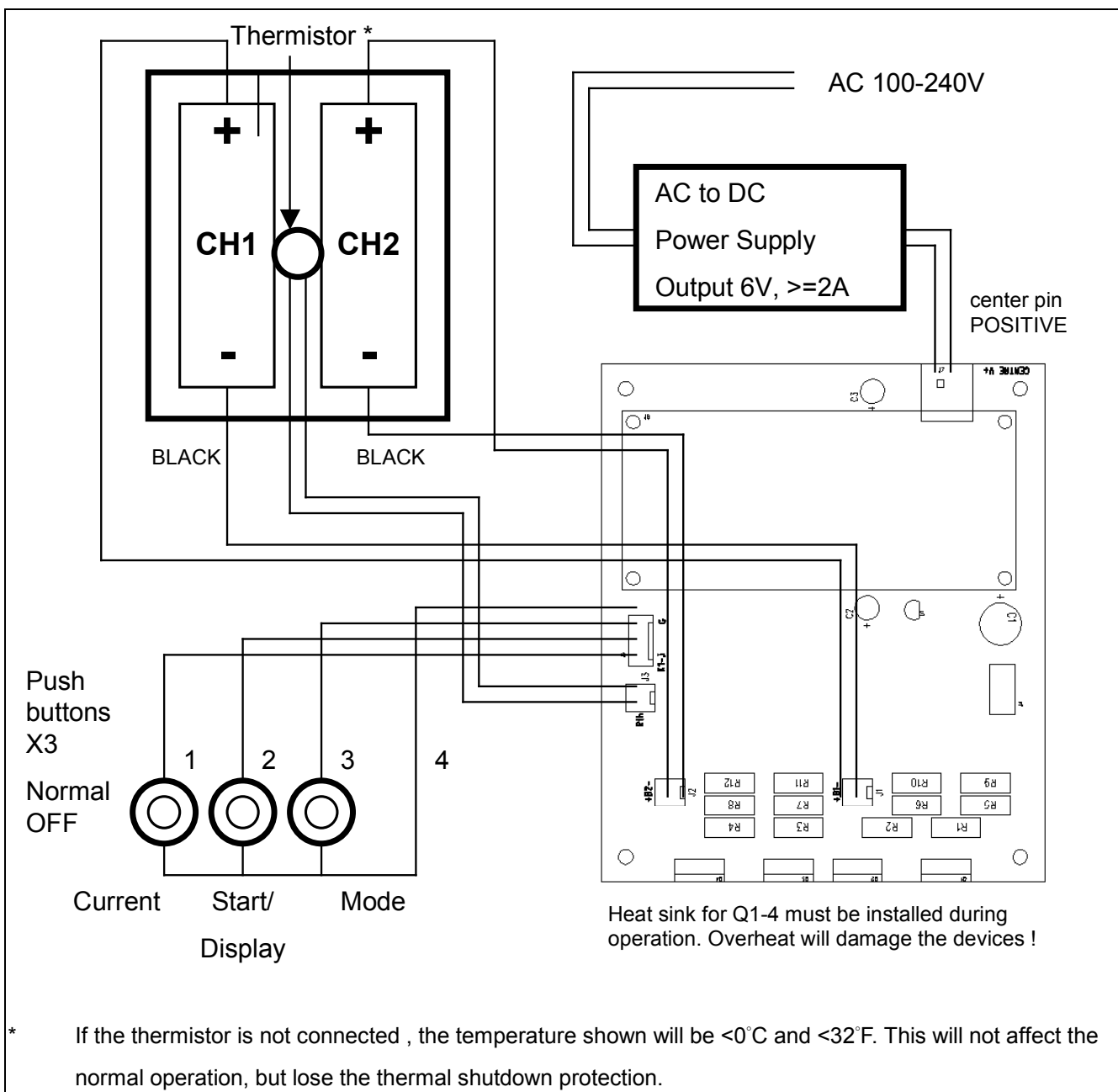
1. Main board (PCB dimension 90mm X 105mm/3.55 inch X 4.13 inch)
2. AC 100-240V to DC 6V 2A (or >2A) adaptor with USAAC plug
3. Connecting wires : 2-pin wire X 3, 4-pin wire X 1
4. Push button X 3
5. Thermistor NTC 10k@77°F/25°C

Physical Data :

Packing weight : 450-500g/0.99-1.1lb

Packing size : 16cm X 11cm X 9cm

Figure 1. System wiring diagram



Operations

[1] Insert one Li-ion rechargeable battery into either Channel 1 or Channel 2. Or 2 batteries into both channels. Insert with the right polarity.

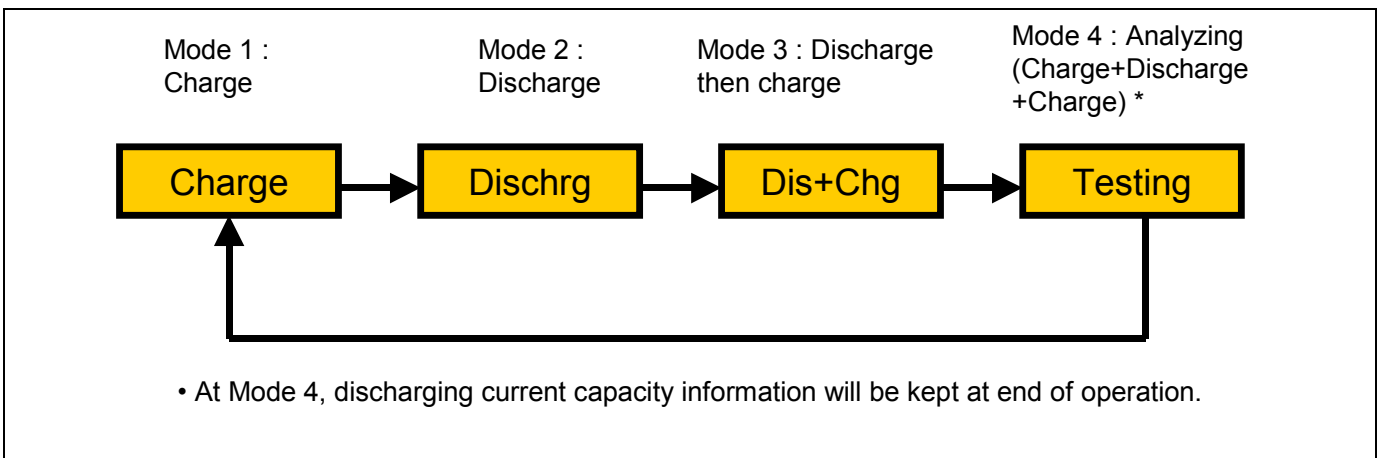
Hints : The second line of the LCD display will show battery voltage at this stage.

This device has reverse polarity protection. If battery is reversely inserted, there will be no damage to the battery nor the device. However normal operation cannot be started with reversed battery. Please remove and insert again correctly.

[2] Press the “Mode” button to select the desired operation mode.

Hints : The second line of LCD display will show the current at this stage.

Figure 2. Four modes of operation



[3] Press the “Current” button to select the desired current.

Hints : The second line of LCD display will show the current selected.

Table 1. Current selectable in each mode of operation

Mode of Operation	Current Selectable	Remarks
CHARGE	100, 200, 400, 800mA	Current selected applies to battery voltage 3.0V to 4.1V. Current will always be 50mA for pre-charging when battery voltage < 3.0V. Current will be 50% of current selected when battery voltage is >4.1V and before charge cycle end.
DISCHARGE	50, 100, 200, 400mA	Discharge will stop when battery voltage drops below 2.7V
DISCHARGE + CHARGE	50, 100, 200, 400mA	Current selected applies to discharging cycle, charging current will be X 2. Pre-charge and final charge current rating apply. (See CHARGE Mode)
TESTING	50, 100, 200, 400mA	Current selected applies to discharging cycle, charging current will be X 2. Pre-charge and final charge current rating apply. (See CHARGE Mode)

[4] Press the “Start/Display” button to start the operation.

Hints :

Once started, the “?” in line one of the display will disappear.

If second battery is inserted, repeat step [2] to [4].

[5] Press the “Start/Display” button to change the information displayed.

Hints :

When neither channel is in selecting mode (displaying XXXXXX?), pressing button “START/DISPLAY” will change the information in the second line of the display.

Figure 3. Five modes of display (at second line)

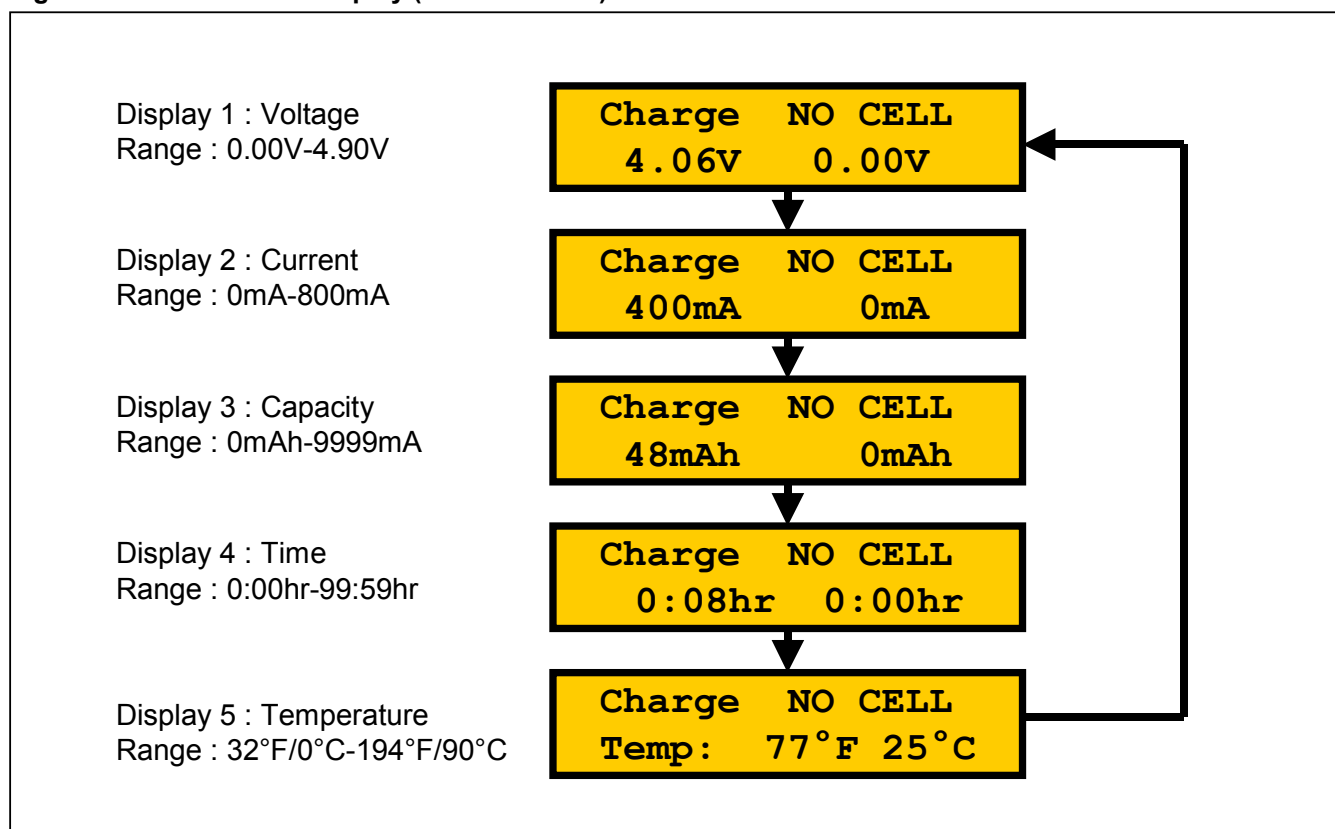


Table 2. Line 1 Display at different stage of operation

At different stage of operation, line one of the LCD display will show the operation stage :

Display	Charge	Dischrg	Dis+Chg	Testing
Mode	Charging	Discharging	Discharging + Charging	Charging + Discharging + Charging
Stage 1	Pre-Chg Pre charge	Dischrg Discharge	DIS+chg Discharge	Test1pC 1st Pre charge
Stage 2	Charge Charge	End Dis End discharge	dis+PRE Pre charge	Test1CH 1st Charge
Stage 3	Final-C Final charge		dis+CHG Charge	Test1fC 1st Final charge
Stage 4	End Chg End charge		dis+FNL Final charge	TestDis Discharge
Stage 5			End D+C End Dis+Charge	Test2pC 2nd Pre charge
Stage 6				Test2CH 2nd Charge
Stage 7				Test2fC 2nd Final charge
Stage 8				EndTest End Test

[6] End of operation

When all operations are completed, the display will show “End Chg”, “End Dis”, “End D+C” or “EndTest”. The battery can now be removed.

Hints :

The backlight will keep turning on when either channel is at the end of operation.

[7] Early termination of the operation

The operation can be terminated at any time by removing the battery.

Hints :

Battery can be re-inserted and operation starts from Step [1] again.

[8] Intelligent LCD backlight

8.1 Backlight turns off automatically 3 minutes after last key was pressed.

8.2 Backlight turns on when any channel completes operation

8.3 Backlight blinks every second if over temperature is detected ($>50^{\circ}\text{C}$)

Installation hints :

The PCB assembly can fit into a 3.5" external harddisk drive case. A metal case should be used to provide the same function as the heatsink bundled. The MOSFET (Q1-Q4) of the PCB assembly MUST be electrical isolated from the case and each other. The silicon tape, mounting bracket and screws used in the heatsink bundled can be reused in this application.

Example :



The thermistor does not have polarity, it's two terminals can be connected in either direction. The thermistor should

be installed as close as possible to the batteries. Thermal grease should be applied to reduce the thermal resistance.

Several good ways to install the thermistor are :

1. Make a hole on the middle of the battery holder. Let the thermistor to pop up a little, so that it can in touch with the batteries.
2. On top of above, add a metal plate on the thermistor. This allows the metal plate to have larger contact area with the batteries. Add thermal grease between the metal plate and the thermistor.

Caution

Failure to install the thermistor properly will disable the thermal shutdown protection which should activates when the thermistor temperature reaches 122°F/50°C. Poor thermal conductivity between the thermistor and the batteries will keep the batteries being charged or discharged even when its temperature is at dangerously high level. Fire or explosion might occur as a result.

Safety Precaution

1. Never leave this device unattended with power on.
2. Do not leave batteries in the battery holder for a prolonged period. Remove batteries from the holder as soon as operation is completed.
3. Always check the battery temperature when charging or discharging is in progress. Batteries in this device will generate more heat at charging status than at discharging , also more heat in higher current setting.
4. Damaged, failed, aged batteries may convert charging energy into heat energy and may never end the charging cycle. This will create excess heat.
5. Do not connect damaged, corroded, unknown or other types batteries (other than 3.6/3.7V rechargeable Li-ion battery) into this device.
6. Do not allow short circuit between batteries in each channel. Each terminal of the battery holder must be electrical isolated from each other.

Li-ion rechargeable battery characteristic

After charging or discharging Li-ion rechargeable battery, the terminal voltage will change slightly even no more current flow through the battery. This is due to chemical reaction propagation delay. The chemical closer to the battery terminals receives/delivers more current then the inner chemical. All chemical inside the battery takes time to equalize the voltage. This phenomenon is more significant when using higher charging/discharging current. Batteries with inactive chemical also exhibit this effect.

Other related document

Quick Set up Manual : CHGR801 Quick setup.pdf
Schematic : CHGR801 schematic V807.pdf

Website : www.longrand.net

Ordering and inquiry : electronics@longrand.net

Disclaimers

Charging or discharging of damaged, failed, aged Li-ion batteries may cause fire, explosion or injury to users. Users should have professional knowledge and safety precaution when use of this product. The producer does not assume any liability arising out of the use of this product, including consequential or incidental damages.