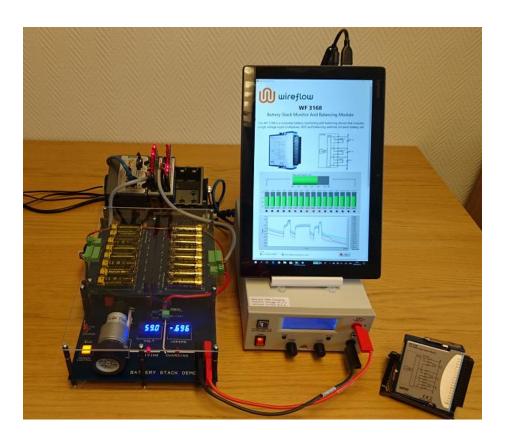# Battery Stack Demo

Battery charging and discharging - How does it work

Abstract

The WireFlow Battery Stack demo shows how the WF3168 C Series module can be used in an application where a Battery Stack is charged by a constant current power supply and is used for driving a DC motor.
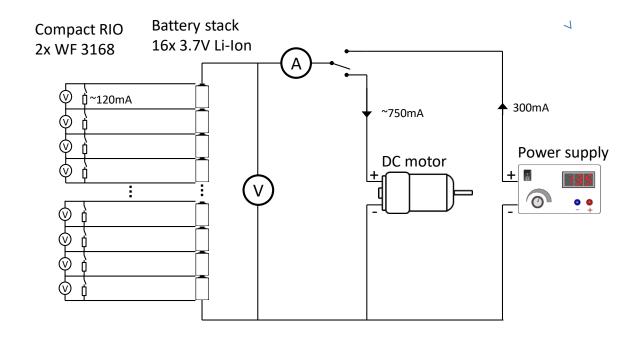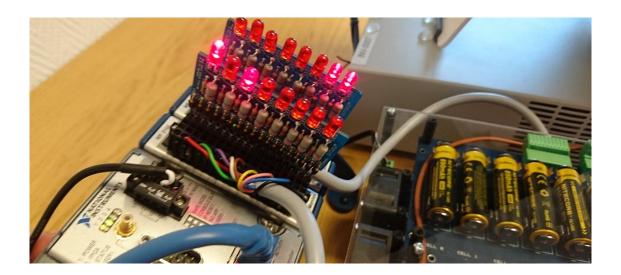
The circuit

The demo has 16 series connected batteries. They are connected to an electric DC motor. To charge the batteries it is possible to disconnect the motor and instead connect a power supply to the battery stack.

An ampere-meter and voltmeter are used to display the battery voltage and the current during charging and loading of the batter stack.

Two WF3168 WF Battery stack monitoring modules are used to measure the voltage over each cell. The modules are also used to discharge individual cells. A resistor board on each WF3168 module has LEDs that's lit when a cell is discharged.

The theory

The power supply used for charging is set to CC 300 mA and CV 67.2 V (max).

- 300mA is specified for the battery type we are using.
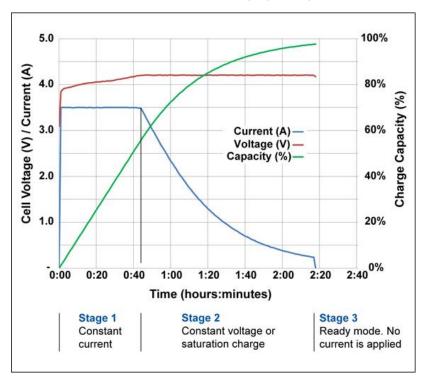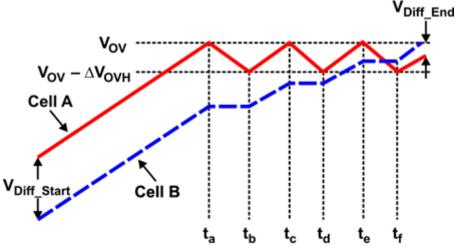- 67,2 / 16 = 4.20 V which is the max charging voltage for Li-ion.

Figure 1 Charging diagram

The goal when charging is that all cells shall become 4.20 volt. But some batteries will charge faster and for these we can activate discharge to get all cells to reach 4.20 volt simultaneously. With the demo software we do this manually. For automatic balancing software there exist different algorithms.

V_{OV} = Overvoltage (OV) detection threshold range

ΔV_{OVH} = OV detection hysterisis program step

Figure 2 Example of automatic balancing algorithm