Terminal Block VIN+, VIN- and Ground connections

This board is equipped with one or more terminal blocks for measuring power using either an INA219 single channel, or an INA3221 triple channel power monitor chip. The concept is to intercept the lines carrying power to measure the voltage and current. This is often done for up to 3 different things:

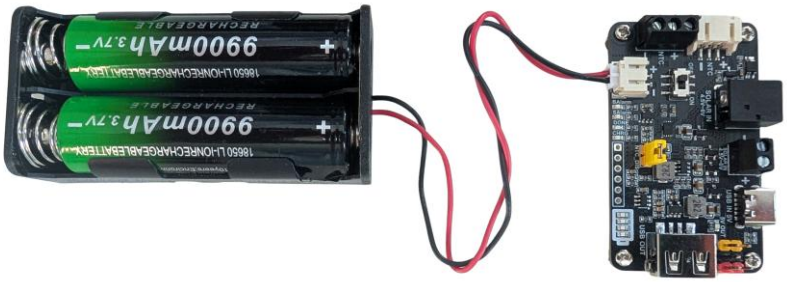
1. Measure the battery (primarily the voltage)
2. Measure the solar panel (primarily the voltage)
3. Measure the entire system (primarily for current draw)

The issue is that it is very easy to wire it incorrectly to the board and fry the electronics on the board almost instantly. We intend in the future to provide boards with more protection circuitry, but in the meantime if you hook up the positive line to the ground input, it will fry the traces on the board and the INA chip itself because you will be inputting the full power of a lithium chip into the system backwards. This document is intended to help you wire it correctly. On the standalone sensor boards, there are separate inputs for battery and solar. The solar input is a USB-C port and cannot be hooked up backwards. But in every other case you need to use a great amount of diligence when wiring things to the INA inputs which are normally done through the screw terminal blocks.

Battery to BMS Connection

It is assumed that you have a Battery Management System board that takes solar power and charges the battery. There is normally a battery holder that often has a JST PH 2.0 connector that plugs into the BMS. If you have some other type of connection, you will need to cut and strip wires, but the concept of how they connect is the same. The problem is that there is no universal system to determine the order of the red (+) and black (ground) wires in the connectors. So our intent is to provide some pigtail parts that allow you to wire it properly for your system, but you can shoot yourself (and our board) in the foot if you do it wrong.

Here is a typical connection from battery holder to BMS:

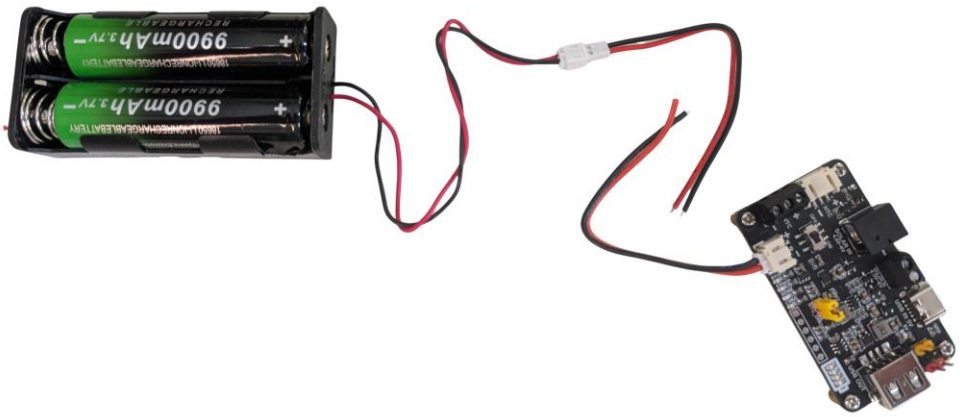


We can use pigtail wires to split the connection. There are two components to the pigtails - sockets and plugs. Plugs are inserted into sockets. Sockets contain wires with male pins whereas plugs contain wires with female connections. Notice the metal tabs sticking up in the one picture. These tabs are what click into place in the plastic shell to hold the wires into place:





In this next photo, I inserted both socket and plug wires into the connection to expose wires that will be inserted into the terminal block on the main board for measuring the power. You can simply use raw wires instead, but this method allows you to have connections that can be connected and disconnected. *But you will notice that most pigtails have red and black reversed from common battery holders because there is no universal standard*. This is a problem that needs to be managed to avoid frying the circuit.



So, you either need to keep track of + and - yourself, or you need to reverse the wires inside the pigtail connections. You can reverse the wires using tweezers or a pin to lift the plastic tab, slide the wires out, push the tab back into place, and reinsert the wires reversed until they click into place. If you insert the wire and it slides right back out, you either did not push the plastic tab back into place or your wire is upside down.

So, as much as we would like to provide pigtails with connectors already on them with the red and black the way you need them to connect your battery holder to our board, we have no way of knowing the polarity of your battery holder. As mentioned already, one solution is to cut off any connectors and strip the wires and connect them directly into the terminal block and into your BMS. Alternatively, and preferably, we provide JST PH 2.0 male and female connectors that you can use. We may provide pigtails with the read and black wires reversed, or we may provide just the JST PH shells and precrimped wires and you need to insert them into the JST shell connectors the way they need to go and then strip the other end of the wires and attached them into the terminal block wire inlet and tighten them down.

