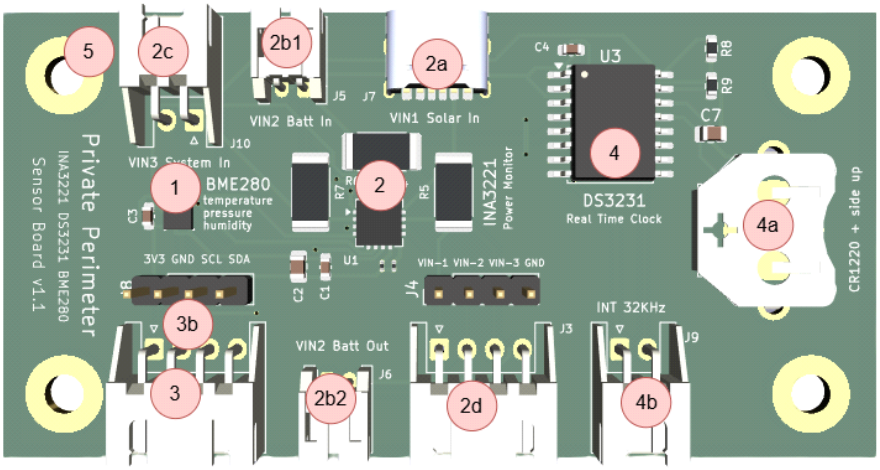
Sensor XH VIN+, VIN- and Ground connections

This board is equipped with a device 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)

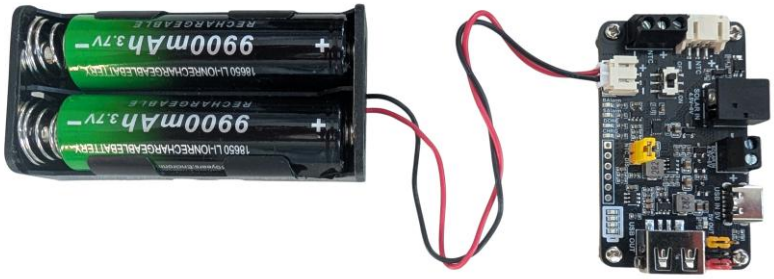
The issue is that it is very easy to wire it incorrectly to the board and fry the electronics on the board almost instantly. We intend in the future to provide boards with more protection circuitry, but in the meantime if you hook up the positive line to the ground input, it will fry the traces on the 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 can be a JST PH socket or a terminal block.



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:



If your battery holder is wired the same as our board, you can plug your battery holder into the Battery-In port (2b1), and then plug a JST PH 2.0 connector into the Battery-Out port (2b2) and jumper it to the BMS board. *But take care because most JST PH pigtails are wired reverse of the battery holders and you may need to swap red and black to avoid frying components or entire boards.*

As an alternative you can capture the VIN2- signal at the 4-port JST XH connection (2d) and route it yourself.

JST Pigtail Tutorial

We can use pigtail wires to split the connections, but you need to understand how they are built in case you need to swap red and black wires. 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:





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. We provide JST PH 2.0 male and female connectors that you can use, but you need to pay careful attention to the polarity.

There are two ways to connect the battery system to VIN2 as you can see in this drawing in New Wiring 1 and New Wiring 2. Although the System and Solar each have their own VIN+ connections using the JST XH connector (2c) and the USB connector (2a), respectively, the only way to get the VIN- for these is via the JST XH Output connector (2d), similar to New Wiring #1 below, but using VIN1- (for Solar) and VIN3- (for System).

