OutBack POWER™
member of The alpha Group™

Positive Grounding Of OutBack Devices

Positive grounding has been used in the telecommunications industry for many years, primarily because the grounded positive electrode of a battery bank will corrode at a much slower rate than a grounded negative electrode. However, the integration of negative grounded equipment such as certain OutBack devices can be problematic if not installed with the correct balance of system components in the right configuration.

A single inverter without a HUB connection is not a problem. Ground the positive terminal of the battery and move the DC breaker/disconnect from the positive conductor to the now ungrounded negative conductor. This would be like Inverter 1 in Figure 1 without the Inverter 2 and HUB connections.

However, a destructive current path can be created when multiple OutBack devices are interconnected through the HUB. Figure 1 below shows the normal current path of a battery connected to multiple inverters which are also connected to the HUB. The AC current path to the AC loads are not shown for simplicity. The red and black lines in Figure 1 show the power connections between the battery and the two inverters with arrows indicating current flow. The blue lines inside the inverters and the HUB represents the circuit current flowing through these devices. The red and black lines between the inverters and the HUB shows the HUB getting its power from both inverters in parallel.

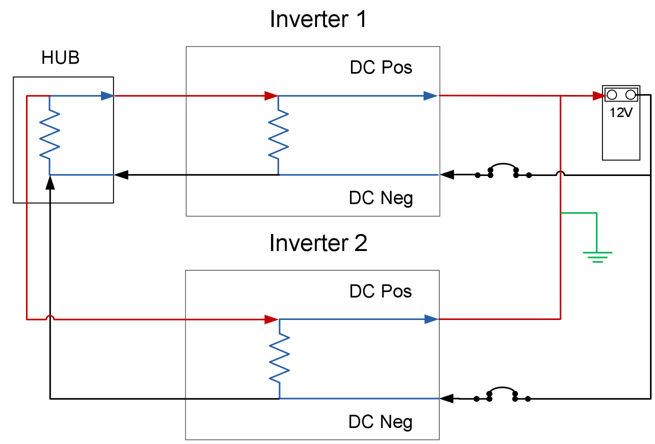

Figure 1

As long as both DC circuit breakers remain closed, there is no problem with normal operation in all devices. However, should one of the DC breakers open up as shown in Figure 2 with Inverter 2, then the circuit current path for Inverter 2 goes through the HUB (see purple line with arrows) causing the much smaller components and circuit traces in the HUB to burn open making the HUB inoperable.

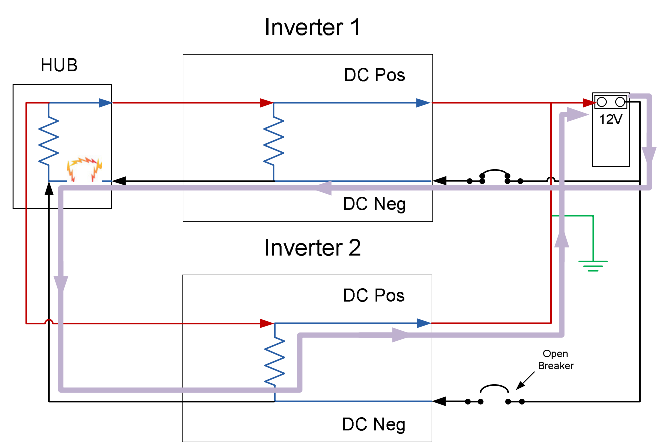

Figure 2

The problem described above with multiple inverters and an OutBack HUB can be eliminated by using ganged DC circuit breakers for both DC battery conductors as shown in the diagram in Figure 3. It's important to note that putting a circuit breaker in the grounded conductor does not conform to the National Electrical Code as established for North America and is only recommended for use in off-grid applications.

NOTE: ***the FLEXnet DC battery monitor and GFDI components must never be installed in a positive-grounded system under any configuration.***

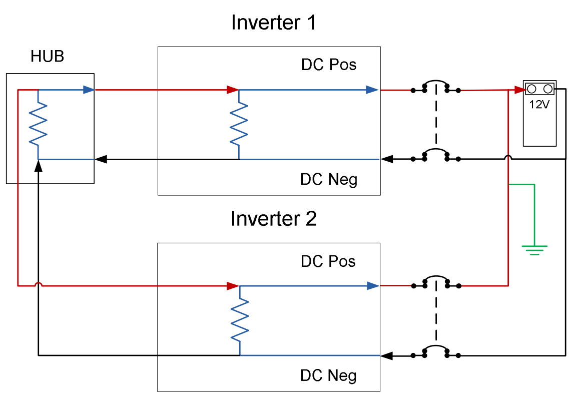

Figure 3

Another similar condition exists with our FLEXmax charge controllers in a positive-grounded system. A destructive current path will be formed through the FET circuit of the charge controller when both the battery bank and photovoltaic (PV) array are grounded so either the battery bank or the PV array must be floated. If a HUB is added in multiple charge controller applications, then a double-pole-single-throw breaker must also be added for both positive and negative output conductors of each charge controller as shown in the top half of Figure 4.

A system comprising multiple charge controllers and multiple inverters requires double-pole breakers on both positive and negative conductors of all DC power conductors, and ***either*** the battery bank or the PV array with a floating ground as shown in the full system diagram in Figure 4.

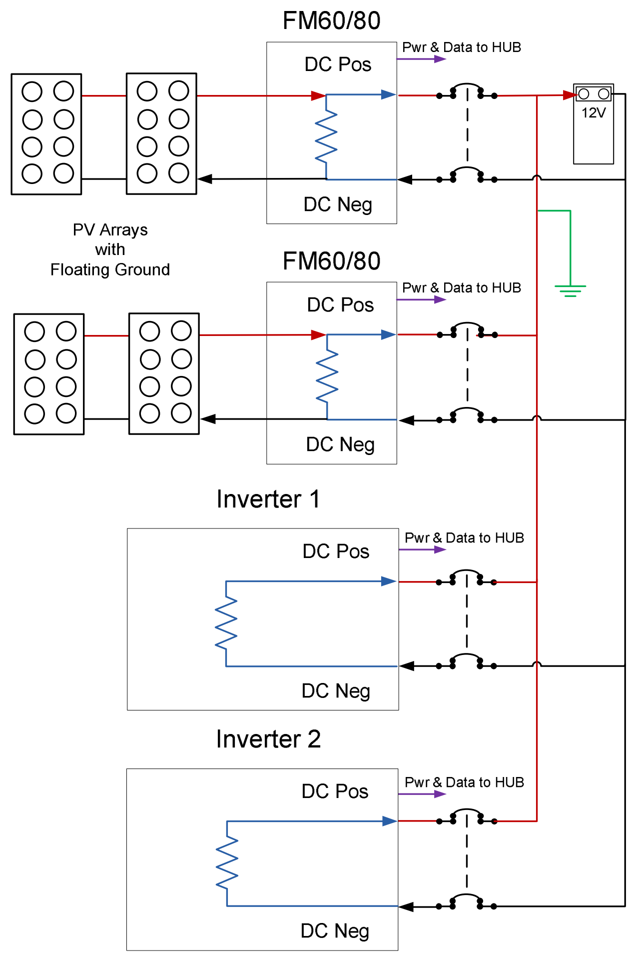

Figure 4