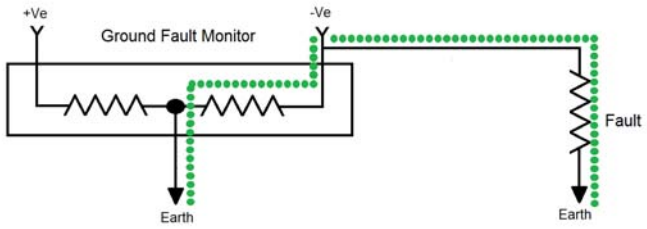
Ground fault tracing: circuit characterization

Ungrounded DC battery strings can have voltages ranging from 130 V to 250 V and higher.

These systems are designed to ensure that a single ground fault will not trip anything off-line. However, if another ground fault occurs on the same circuit it can lead to excessively high current flows and create dangerous situations. This is why these types of systems require ground fault monitors. Ground fault monitors will indicate when a ground fault occurs either on the positive or negative side of the string.

Ground fault monitors use a high impedance center tap resistance. This splits the voltage in half;, one side is positive and the other is negative. In an un-faulted system, these voltages should be relatively close, pending system impedance. In a faulted system, one side will be greater than the other. The lower side has the ground fault.



The ground fault presents an impedance path to ground. The ground fault monitor also provides a path to ground. This means the current used to detect the fault will be split between the actual ground fault and the ground fault monitor ground. If the ground fault is close to earth, then the ground fault monitor's ground should not be an issue. The majority of fault current used for tracing will go through the ground fault. However, if the ground fault has a higher impedance than the ground fault monitor, then the majority of the fault current will go through the ground fault monitor.

This is why it is recommended to remove the ground fault monitor earth connection before starting a trace. This removes the ground path through the ground fault monitor.

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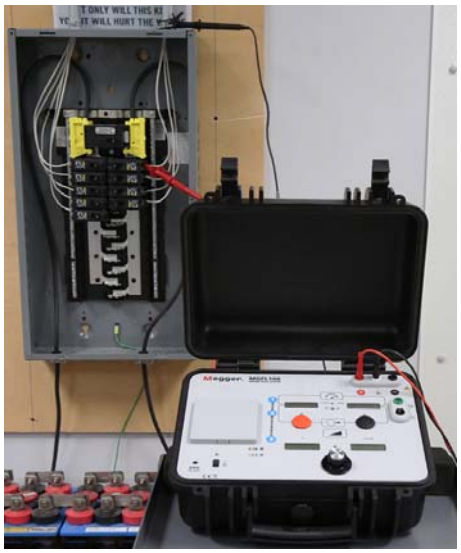
However, in some cases, it may not be possible to remove the earth connection from the ground fault monitor. This can make locating high impedance faults quite difficult or impossible.

Circuit characterization can help alleviate this problem. In this procedure, the un-faulted circuits are characterized. Place the MGFL100 transmitter output leads between each circuit in the panel and earth.



Turn on the MGFL100 output and apply a small current through each circuit. The transmitter will display the resistance and capacitance of each circuit.

Some of these circuits would be expected to read OL, with very high impedances. When a fault occurs, use the transmitter to read the impedance of each circuit and compare them to the un-faulted impedance. This can help you locate the circuit that has changed and has the fault.

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