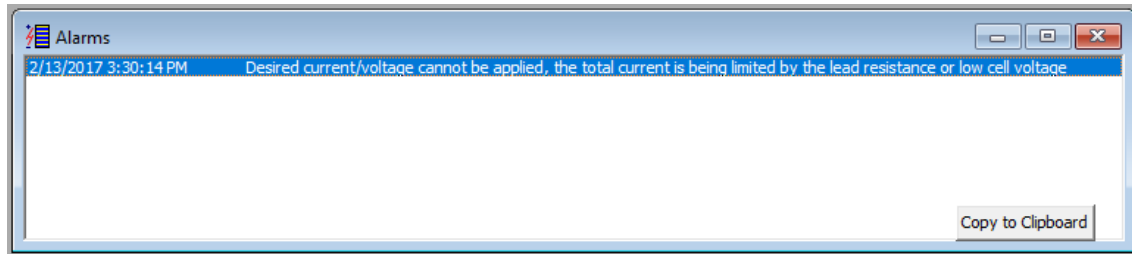


Application Note – Alarm: Desired Current/Voltage Cannot be Applied and the 850/890 Load Resistance & Minimum Voltage

Question: I am getting the following error or alarm when testing my fuel cell:

“Desired current/voltage cannot be applied, the total current is being limited by the lead resistance or low cell voltage”



What does this mean and how do I fix it?

Answer: This alarm is not uncommon and is associated with low voltage at the 850/890 bus bar terminals. The load in the 850/890 has a small but finite internal resistance ($\sim 1 \text{ m}\Omega$) which requires that the voltage at the unit's bus bar terminals is greater than zero. There is ohmic voltage drop between the cell itself and the bus bar terminals due to the resistance of the load cables (the heavy cables that carry the current) plus contact resistances at the load cable/current collector connection and the load cable/bus bar connection. So even if the cell voltage is 0.3 V, the voltage at the bus bar terminals maybe 0.1 V due to 0.2 V of ohmic voltage drop in the load cables. The details depend on the current, load cable resistance, *etc.*

For example, the 850e 100 W / 100 A model, has a minimum resistance specification of less than 2 milliohms ($< 2 \text{ m}\Omega$). This means that at an operating current of 75 A, the voltage measured at the load terminals can be driven by the load to as low as 0.15 V ($= 75 \text{ A} \times 2 \text{ m}\Omega$). If the fuel cell will not produce 75 A at a cell voltage of at least 0.15 V, then it will not be possible to get to 75 A even with perfect (zero resistance) load cables.

To solve this problem:

- Verify that all connections are very tight in order to minimize contact resistances. You should not be able to move the load cable connections.
- If the problem persists after verifying that all connections are tight, you must decrease the load cable resistance by one or more of the following approaches: (1) using shorter load cables, (2) using heavier gauge (thicker) cables (0/4 or larger), and/or (3) doubling up the load cables, *e.g.*, two sets of load cables in parallel on each cell half will decrease the load cable resistance by 50%.

If you make your own cables, pay special attention to attaching low-resistance lug terminals on the ends so the whole cable assembly has low resistance.

This error is not indicative of a problem with the equipment.