



## PPMS EverCool II Service Note 1099-410

# High Voltage Fuses Failure Troubleshooting and Replacement

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### Introduction:

Under high environmental temperature conditions the high voltage fuses in the fuse bay of the HAC4500 outdoor helium compressor might prematurely “blow” at a current substantially lower than the rated current. If this occurs Quantum Design recommends replacing the 20A fuses with 30A fuses.

### Tools Needed

- High Voltage Fuse Puller tool: Quantum Design Part Number - HM740

### Parts Needed

- Three 30 Amps (Time Delay, Class RK1) fuses: Quantum Design Part Number - FD30A-.81X5

### 1. Troubleshooting

The most evident symptom of “blown” high voltage fuses is for the indoor Compressor Control Unit to report a “CAP COMM LOSS” or “COMP INVERTER FAULT” message. Any attempt to power cycle the indoor Compressor Control Unit will not fix the problem but rather cause it to get stuck at 0 SEC during the initialization routine.

The sudden loss of high voltage power will also cause an error (“ERROR” LOG message from Node 4: MODBUS [1] Read COM Error [2]”) and, an informational message (“INFO” LOG message from node 4: Number Received [0] number”) to appear in the MultiVu event log file. To access this log in MultiVu click on Utilities → Event Log and make sure that the error check box is selected. In general, any loss of power or “blackout” will cause these errors to appear, so do not assume that this necessarily means that your fuses have blown. Rather, all these symptoms occurring together indicate that your fuses may have blown.

Another possible way to tell if the fuses are “blown” is to open the ECMon.exe program located in the C:\QdPpms\Tools folder and then click on Components → Split Compressor. In here you will see the temperatures of different sensors located in the HAC4500 compressor. If you have lost the high voltage power these temperatures will either stop updating or will read some erroneous value (i.e. 999, 0, or 1).

### 2. Replacement of the Fuses



#### WARNING!!

Please note that all high voltage connections should only be made by a licensed electrician.

1. Set the system in standby mode from MultiVu by clicking Instrument → Shutdown → click OK.
2. Power down the indoor compressor by toggling the switch in the back of the indoor unit. This will shut down any 200-230 V power delivered to the Outdoor Compressor Unit.
3. Power down high voltage power by turning off the high voltage breaker. **WAIT FOR 30 MINUTES BEFORE PROCEEDING TO THE NEXT STEP!!** This will allow all the capacitors in the compressor discharge to a safe level before opening the fuse bay.



#### WARNING!!

Disconnecting and Handling High Voltage Power Connections Requires Precautions to AVOID Electrical hazards that could result in bodily harm, or loss of life. The Fuse Bay Encloses both 200-230 V and 380-408 V power outlets.

4. Locate the outdoor compressor fuse bay (located on the same side as the high pressure lines) and remove the bay panel cover by unscrewing the two Phillips 8-10" screws.

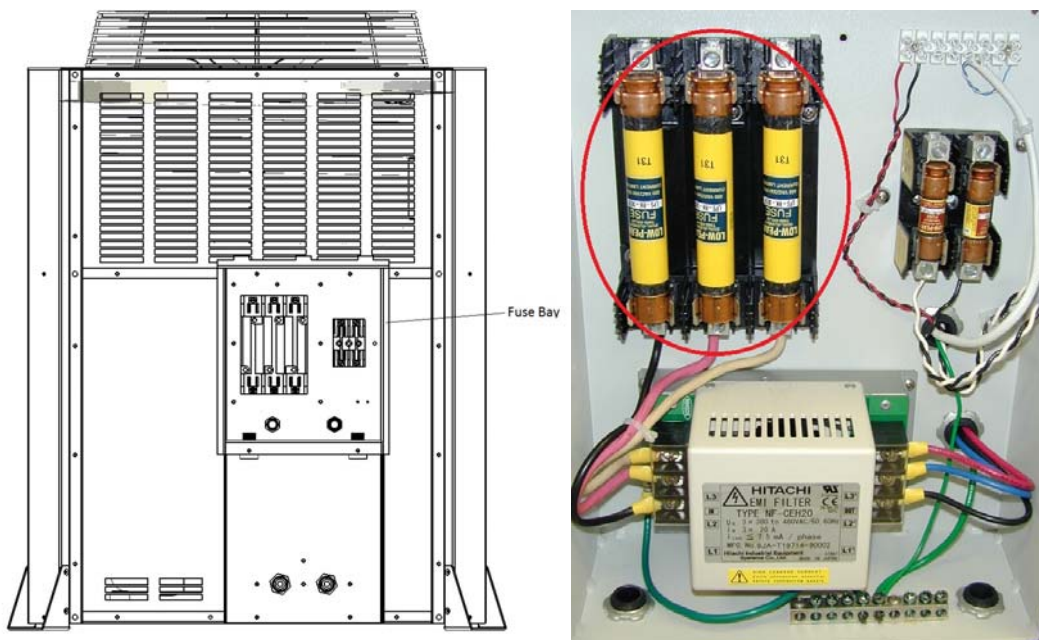


Figure 1. Electronics bay in the outdoor compressor unit. High voltage fuses circled in Red.

5. Check the resistance of each fuse and verify that at least one of them is reading open ( $> 1 \text{ MOhm}$ ).
6. Discard the 20 Amp fuses and replace them with the 30 Amp fuses.
7. Secure the electronics bay panel back on the compressor and make sure that is screwed on tight for a water tight connection.

### **3. Starting up the system**

1. Once the outdoor compressor unit is back together power on the indoor compressor control unit by toggling the switch on the back of the indoor compressor unit.
2. Turn the High Voltage Power back on by switching on the High Voltage Power Breaker.
3. Re-start MultiVu by double clicking the MultiVu icon.
4. Verify that you do not have any communication error messages when starting MultiVu. If you do, make sure that you do not get any more since the ones that may be displaying at this point will have been stored due to the power being off on the indoor and outdoor compressor units.
5. If everything is communicating at this point verify that the compressor and helium level control are enabled from within MultiVu by clicking on the EverCool display box located on the bottom of MultiVu and looking at the status of both "Compressor Control" and "Helium Level". These should be reading "Automatic" and "Enabled" respectively.
6. If you have lost too much Liquid Helium (below 60%), wait for the system to refill to above 60% before using the magnet and temperature control. The status should be in "Recirc. & Filling" if it is below that level. Contact a qualified Quantum Design representative for assistance if need be.