

Chiller Grounding

There are really 2 types of ground in a system like ours.

First, is the safety ground. All external points that a person can touch should have a good connection to ground or earth. If a ground fault does occur, then current will flow back to ground. If the ground connection is poor, then high voltage will be present and someone could get hurt.

Second, is the ground that is required for high frequencies and communications. This type of ground requires good physical contact, short wire lengths, very low resistance at high frequencies, and possibly a guide for the high frequency current. This type of ground is critical in drive applications. The drive generates a carrier frequency at high power to provide the correct waveform to the motor. The rapid rise in voltage that occurs in the drive is designed not to exceed 4,000 volts / usec. This very high frequency will follow a different ground path than DC voltage. The parasitic inductances in wire length may cause high frequency current to flow in a direction not expected. The parasitic capacitance of close conductors may cause more high frequency current to flow than expected. The IGBT has a parasitic capacitance that will cause current to flow into the ground every time the IGBT is switched on and off. This current must have a guided directing it back to ground or the current may flow into other devices such as the drive logic board, gate drivers, or other devices on the same power line. The problem could cause a drive fault or failure. Connecting the motor frame to the right side of the drive enclosure does not guide the ground current very well to ground. The current must flow through the steel of the enclosure. Steel is a fairly poor conductor. The ground current will have many paths to follow on its way to ground. This is the reason that the ground stud was added to the left back side of the drive enclosure.

The ground stud was placed on the back left side of the drive, because it is not in the way or in view of the customer, and it is located very close to the ground connection that is connected to the utility ground connection. On the Rapter design, the ground connection for the logic board and the gate driver boards are not connected to the drive enclosure. They have isolated grounds that are connected directly to the utility ground.

Several years ago the ground system on the filter logic board was change because of problems. Originally, the filter logic board was ground through the VSD logic board. We saw a few problems in the field, and I went to one site and changed the grounding of the filter logic board. The system ran fine after that. The filter logic board now has its own ground connection.

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