SUBJECT: Grounding Recommendations for the DSD 412

Safety considerations and the NEC require that the metal chassis and cabinet components of all exposed electrical apparatus be connected to earth ground for protection of personnel. This, of course, is only common sense. But the manner in which grounding wires are connected and installed can make a difference in the emissions of and sensitivity to electrical noise.

For elevator installations with DC drives it is common that:

- There is a primary power isolation transformer near the drive -
  - To provide the correct Vac drive input to match the Vdc requirements.
  - The secondary side is usually ungrounded, but the secondary may be grounded or have a high impedance ground w/ Ground Fault measurement.
- The DSD 412 is mounted on a sub-panel, within an electrical enclosure.
- The elevator hoist motor is located nearby and sits on building steel.
- The velocity encoder is mounted on the motor frame.
- The elevator car controller may or may not be in a separate cabinet.

Since there is always some capacitive coupling from electrical circuits to ground, some SCR switching noise will want to flow between the drive chassis and the motor, and between the drive chassis and the transformer frame. The best method to minimize interference is to give noise current a direct low resistance path in which to flow, and a higher resistance path to where it is unwanted.

Magnetek recommends that:

1. Grounding wire considerations...
   a. A grounding stud be provided in the drive enclosure cabinet, welded to the metal frame.
   b. A grounding wire be provided directly from the drive chassis to that stud.
   c. A grounding wire be provided directly from the drive sub-panel to that stud.
   d. A grounding wire be provided directly from the motor frame to that stud.
   e. A grounding wire be provided from the transformer frame to that stud.
   f. A grounding wire be provided from building steel to that stud.
   g. A grounding wire be provided from the car controller enclosure to that stud.

Recommendations (continued)

h. If a motor armature ripple filter is used, a grounding wire should be provided from the reactor core to the drive enclosure grounding stud. The panel holding ripple filter capacitors and the metal enclosure should be ground wire bonded to the core of the reactor.
i. The building electrical distribution system ground bonding wire for primary power should be connected to the transformer frame grounding point, and then bonded to the walls of transformer enclosure.
j. All electrical power wiring should be incased in metal conduit rather than open electrical raceway trays.
k. Each wire pair (three for three phase) should be in its own conduit.
l. Ground bonding wires must be sized to meet or exceed NEC fault current requirements of the equipment size. Magnetek recommends using larger than the NEC minimum ground wire sizes between the drive chassis, motor, transformer, and building steel.

2. Magnetek also recommends that the tachometer/encoder housing and shaft be insulated from the motor frame and shaft. Use shielded cable for encoder wiring, connected per the Magnetek diagrams.

3. The DSD 412 drive controller circuit common should be connected to chassis ground with an AWG #18 wire from TB1,43 or 44 to TB11. (TB11 is on lower left side of Main PCB)

4. For analog signal exchange between the drive and car controller, it is preferred that differential signaling be used, with the car controller circuit common also grounded locally. Second best is to ground the car controller single ended analog circuits via a common wire tie from car controller to drive.

5. 24V logic signal circuits have the negative side grounded at the drive via the connection above to TB11. If 24V signaling is used, rather than relay contacts, be sure to provide a tie wire between drive controller and car controller circuit commons.

6. If serial communications are used, it is preferred that it be RS422 with optically isolated receivers. If RS232 is used, circuit commons of both the drive and car controller must provide a tie wire between drive controller and car controller circuit commons.