

## TECHNICAL NOTE

### **Subject:** Proper Wiring Practices for AC and DC Drives

The subject of electrical noise (Radio Frequency Interference and Electro-Magnetic Interference) is a hot topic. Electrical noise can cause erratic performance, and even failures of AC and DC Drives. It often occurs because customers do not pay attention to proper wiring techniques when installing AC and DC Drives. When investigating possible noise problems, please check that the following guidelines have been followed during the installation and wiring of AC and DC Drives. These guidelines are just as important inside the customer's cabinet as they are in wiring on the machine.

- 1.** Power leads must be separated from signal leads. High voltage leads such as incoming line, or outgoing armature and field circuits can be run together, but must be separated from low voltage signals. In addition, stranded copper wire should be used, not a solid conductor.
- 2.** If a noise filter is installed in advance of the AC or DC Drive, the wiring from the filter to the drive should be as short as possible. It is also necessary to shield the motor leads once a noise filter is installed.
- 3.** Low voltage leads such as potentiometers, inhibit and enable circuits, start/stop, and reversing commands can be further divided into two groups: switching and analog signals. These leads can be run together as long as the analog signals (potentiometer or voltage following) are shielded from the switching signals (inhibit, start/stop or reversing). Signal leads, such as potentiometers, transducers or milliamp signals, should be wired with either shielded or twisted wire. Multi-conductor twisted cable is recommended. If shielded wire must be used, the shield must be securely grounded at the AC and DC Drive end only. However, there may be times when grounding the shield is not necessary. This may only be determined by trial and error.
- 4.** When low voltage and/or high voltage leads must go to the same location, for example, to an in-cabinet terminal strip, or through conduit to the machine, they must be wired separately. It is not acceptable to use a cable or "drop cord" which mixes these leads together. If these leads cross in a cabinet, they should do so at right angles to minimize the influence of induced magnetic fields.



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