EMI Noise Checklist

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This document provides help for applications experiencing problems due to electromagnetic interference (EMI) noise. It collects the experience of Kollmorgen engineers who have solved many noise problems in the field. If you follow these guidelines, you are much less likely to have problems with electrical noise in your application.

1. Use Kollmorgen cables.
Kollmorgen engineers have designed the best cables for use in our servo systems. Experience has shown that machine builders who use Kollmorgen power and feedback cables have far fewer problems than those who build cables.

2. Use common-mode chokes on motor leads.
Cables longer than 25 m (82 ft.) may need motor common-mode chokes. Check product documentation for details.

3. Separate drive/motor power and signal cables.
Bundle and route signal cables separately from motor/power cables. Run cables in separate conduits or maintain at least 100 mm (4 in.) between signal and power bundles for drives under 20 A. Use 150 mm (6 in) for 40 A drives and 200 mm (8 in) for 80 A drives.

If you are using a separate AC power filter, maintain separation of leads entering and exiting the line power filter. Locate the filter as close as possible to the point where the incoming power enters the cabinet. If you are using internal power filters (such as with Kollmorgen’s SERVOSTAR 300/600/700 and AKD), maintain at least 100 mm (4 in.) of separation between line power and motor leads. If it is necessary for input power and motor leads to cross, cross them at 90 degrees.

4. Splice cables properly.
If you need to divide cables, use connectors with metal backshells. Ensure that both shells connect along the full 360 degrees of the shields. No portion of the cabling should be unshielded. Never divide a cable across a terminal strip.

5. Ensure good shield connections.
For cables entering a cabinet, connect shields on all 360 degrees of the cable. Never connect a simple “pigtail.”

6. Use differential inputs for analog signals.
Noise susceptibility in analog signals is greatly reduced by using differential inputs. Normally, connect the output signal to the + differential input and the ground of the device generating the output to the - differential input. Use twisted-pair, shielded signal lines, connecting shields on both ends. Many Kollmorgen drives provide internal filtering to reduce effects of electrical noise.

7. Ensure good connections between the cabinet components.
Connect the back panel and cabinet door to the cabinet body using several conductive braids. Never rely on hinges or mounting bolts for ground connections. Provide an electrical connection across the entire back surface of the drive panel. Electrically-conductive panels such as aluminum or galvanized steel are preferred. For painted and other coated metal panels, remove all coating behind the drive.

8. Ensure good ground connection.
Connect from cabinet to proper earth ground. Ground leads should be the same gauge as the leads to main power or one gauge smaller.

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