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Technical Note 086

Sine Filters Used with ACS880 Drives
Application Considerations when applying Sine Wave Filters on the output of an ACS880 drive

Description:

This document addresses some of the common questions that arise when applying Sine Wave Filters on the output of an ACS880 drive. This includes when and if it is possible to operate the drive in Direct Torque Control (DTC) mode, things to consider with a Custom Filter, and how to correctly set the relevant parameters in the drive.

**Application considerations:**

Sine Filters may be applied for various reasons, but the most common reason involves the need to apply the drive with a motor that is quite far away from it. It may be possible to use either an ABB filter or a custom third-party filter. In either case, the question of whether it is possible to operate in DTC may arise. This is a bit easier to determine when using an ABB filter since testing has been done and we have experience with these filter designs. We can generally run in DTC but there may be some limitations to motor control because of the effects of the filter components and the cable characteristics resulting from longer motor cable lengths

Custom filters may require more consideration and the recommendation of contacting ABB to discuss the details of the application. Often some discussion is needed with the filter manufacturer to be sure the needs of the filter are addressed so we can take steps to avoid excess heating. For example, the filter may require a higher drive output carrier frequency resulting in a need for the drive be derated for current. Another important limitation to consider when using DTC involves using a motor that is smaller than the drive. Without using a filter, the smallest ratio allows for a motor rated for 1/6 of drive's output current, but when using a Sine Filter and DTC it is only 1/2 of the drive's current rating.

Parameter Settings:

When using ABB Sine filters, set parameter 95.15 Special HW Settings Bit 1 to 'On' (1). This is for ABB Sine Filters only and does not apply to dV/dt filters. When using Custom filters set 95.15 Bit 3 to 'On' (1). Note that this setting does not limit the output switching frequency. This is done by setting parameter 97.09 to 'Custom' and then setting 97.01 Switching frequency reference, and 97.02 Minimum switching frequency based on the needs of the filter requirements. Since the filter is not an ABB filter, 99.18 Sine Filter Inductance and 99.19 Sine Filter Capacitance need to be set in Group 99. The inductance is defined as the per phase inductance of the filter. The capacitance value depends on the connection of the capacitors in the circuit.

If the capacitors are star/wye connected, then enter the capacitance of *one leg* in parameter 99.19.
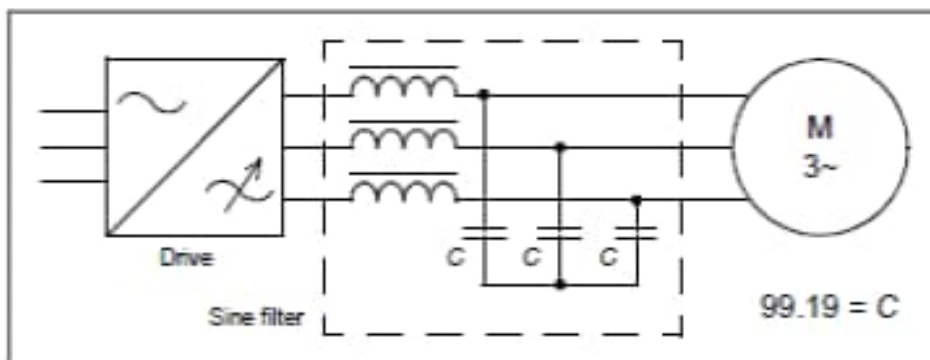
If they are delta connected multiply the value by 3 and enter that for the value.
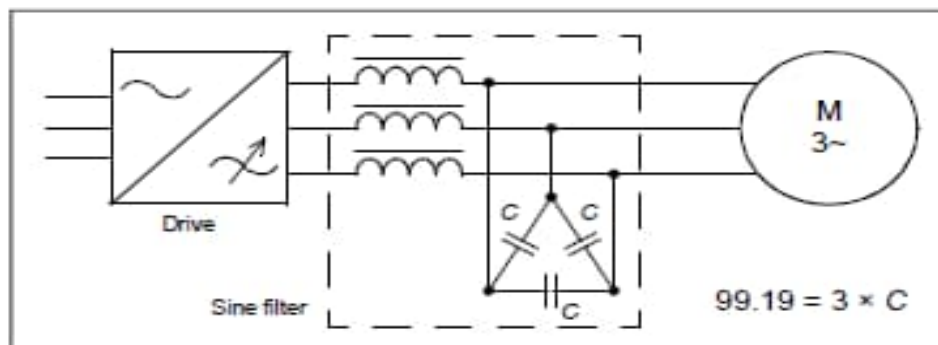
This document is a supplement to the following drive firmware manual:
- 3AUA0000085967 - ACS880 primary control program