ENGINEERING TOMORROW

Fact Sheet

VLT® Sine-wave Filter MCC 101

VLT® Sine-wave Filter MCC 101 output filters are differential mode low-pass filters that suppress the switching frequency component from the drive and smooth out the phase-to-phase output voltage of the drive to become sinusoidal. This reduces the motor insulation stress and bearing currents.

By supplying the motor with a sinusoidal voltage waveform, the switching acoustic noise from the motor is also eliminated.

Thermal losses and bearing currents

The sinusoidal voltage supply to the motor reduces hysteresis thermal losses in the motor. Since the motor insulation lifetime is dependent on the motor temperature, the sine-wave filter prolongs the lifetime of the motor.

The sinusoidal motor terminal voltage from the sine-wave filter furthermore has the advantage of suppressing bearing currents in the motor. This reduces the risk of flashover in the motor bearings and thereby also contributes to extended motor lifetime and increased service intervals.

Quality and design

All filters are designed and tested for operation with the VLT® AutomationDrive FC 302, VLT® AQUA Drive FC 202, and the VLT® HVAC Drive FC 102. They are rated for the nominal switching frequency of the FC series and therefore no derating of the drive is needed. The enclosure is designed to match the look and quality of the FC series drives.

Advantages

- Compatible with all control principles including flux and VVC+
- Parallel filter installation is possible for applications in the high power range

Range

3 x 200 – 500 V, 2.5 – 800 A
3 x 525 – 690 V, 4.5 – 660 A

Enclosures

- IP00 and IP20 wall-mounted enclosures rated up to 75 A (500 V) or 45 A (690 V)
- IP23 floor-mounted enclosures rated 115 A (500 V) or 76 A (690 V) or more
- IP54 both wall-mounted and floor-mounted enscloures rated up to 4.5 A, 10 A, 22 A (690 V)

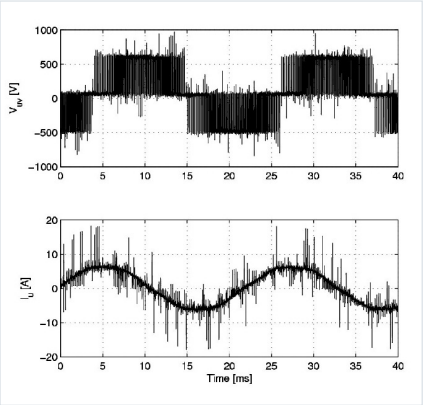
Mounting

- Can be mounted side by side with the drive for ratings up to 75 A (500 V) and 45 A (690 V)

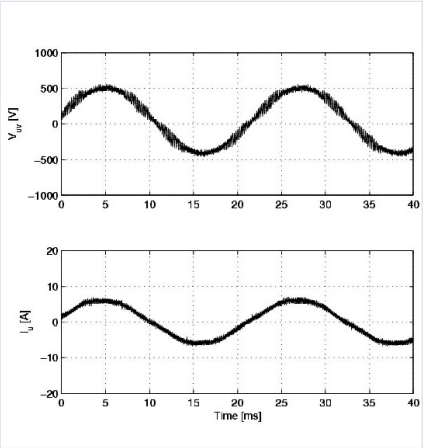
Perfect match

for applications with short motor cables, older motors, 690 V applications with general purpose motors, frequent braking, or aggressive environments

Feature	Benefit
Supplies the motor with a sinusoidal voltage waveform	Prevents flashover in motor windings
Eliminates over-voltages and voltage spikes caused by cable reflections	Protects the motor insulation against premature aging
Reduces electromagnetic interference by eliminating pulse reflection caused by current ringing in the motor cable. This allows the use of unshielded motor cables in some applications.	Trouble-free operation
Eliminates acoustic noise in motor	Noiseless motor operation
Reduces high frequency losses in motor	Prolongs service interval of motor



Voltage and current without filter

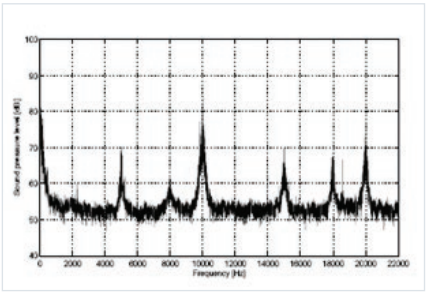


Voltage and current with filter

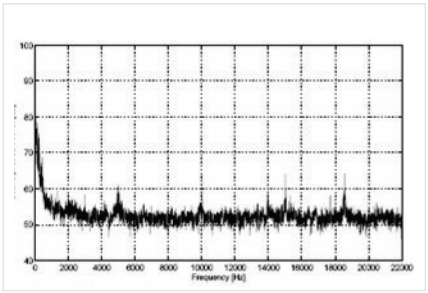
Specifications

Voltage rating	3 x 200 – 500 V and 3 x 525 – 690 V
Nominal current I_N @ 50 Hz	2.5 – 800 A (500 V) 4.5 – 660 A (690 V) For higher current ratings, mount sine-wave filters in parallel
Motor frequency	For 2.5 – 10 A (500 V): – 0-60 Hz without derating – 61-120 Hz with derating For 10-800 A (500 V) and full 690 V range: – 0-50 Hz without derating – 51-100 Hz with derating
Ambient temperature	-25° to 45°C without derating
Minimum switching frequency, f_{min}	1.5 kHz – 5 kHz, depending on filter type
Maximum switching frequency, f_{max}	8 kHz
Overload capacity	160% for 60 sec at 10-minute intervals
Enclosure ingress protection rating	IP00 and IP20 for wall-mounted enclosures rated up to 75 A (500 V) or 45 A (690 V). IP23 for floor-mounted enclosure rated 115 A (500 V) or 76 A (690 V) or more. IP54 both wall-mounted and floor-mounted enscloures rated 4.5 A, 10 A, 22 A (690 V)
Approvals	CE, UL 508

Relative sound pressure measurements from the motor with and without sine-wave filter



No filter



With sine-wave filter

Performance Criteria	VLT® dU/dt filter	VLT® Sine-wave filter
Motor insulation stress	Up to 100 m cable (shielded/unshielded) complies with the requirements of IEC60034-17* for general purpose motors. Above this cable length the risk of "double pulsing" increases.	Provides a sinusoidal phase-to-phase motor terminal voltage. Complies with IEC-60034-17* and NEMA-MG1 requirements for general purpose motors with cables up to 500 m (1 km for enclosure size D and above).
Motor bearing stress	Slightly reduced, mainly in high power motors	Reduces bearing currents caused by circulating currents. Does not reduce common-mode currents (shaft currents).
EMC performance	Eliminates motor cable ringing. Does not change the emission class. Does not allow longer motor cables as specified for the built-in RFI filter in the frequency converter.	Eliminates motor cable ringing. Does not change the emission class. Does not allow longer motor cables as specified for the built-in RFI filter in the frequency converter.
Max. motor cable length	100 m - 150 m With guaranteed EMC performance: 150 m screened Without guaranteed EMC performance: 150 m unscreened	With guaranteed EMC performance: 150 m shielded and 300 m unshielded (only conducted emissions). Without guaranteed EMC performance: up to 500 m (1 km for enclosure type size D and above).
Acoustic motor switching noise	Does not eliminate acoustic switching noise from the motor	Eliminates acoustic switching noise from the motor caused by magnetostriction
Relative size	15 – 50% (depending on power size)	100%
Relative price	50%	100%

** Not 690 V*

Danfoss Drives, Ulsnaes 1, DK-6300 Graasten, Denmark, Tel. +45 74 88 22 22, Fax +45 74 65 25 80, www.danfoss.com/drives, E-mail: info@danfoss.com

Danfoss can accept no responsibility for possible errors in catalogues, brochures and other printed material. Danfoss reserves the right to alter its products without notice. This also applies to products already on order provided that such alterations can be made without subsequential changes being necessary in specifications already agreed.
All trademarks in this material are property of the respective companies. Danfoss and the Danfoss logotype are trademarks of Danfoss A/S. All rights reserved.

© Copyright Danfoss Drives | 2017.03