

VLT® Power Options Sine-wave filter



The perfect solution for:

- Applications with older motors
- Aggressive environments
- Applications with frequent braking
- 690 V applications with general purpose motors
- Motor cable length above 150 metres

Range

3 x 200 – 500 V, 2.5 – 1200 A
3 x 525 – 690 V, 13 – 1320 A

Enclosures

- IP 00 and IP 20 wall-mounted enclosure up to 75 A (500 V)/13 A (690 V)
- IP 23 floor-standing enclosure from 115 A (500 V)/28 A (690 V)

Mounting

- Side by side mount with the drive up to 75 A (500 V)

Sine-wave output filters are 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 any bearing currents in the motor.

This reduces the risk of flash-over in the motor bearings and thereby also contributes to extended motor lifetime and increased service intervals.

Quality and Design

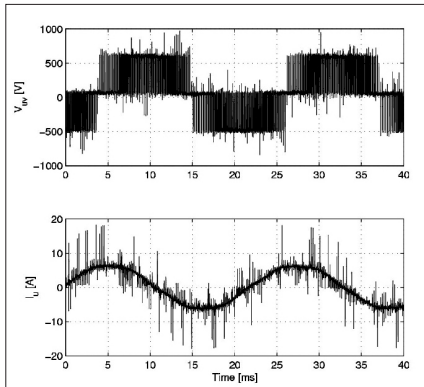
All filters are designed and tested for operation with the VLT® Automation-Drive FC 302, VLT® AQUA Drive FC 202, and the VLT® HVAC Drive FC 102. They are rated for the nominal switching frequency of the VLT® FC series and therefore no derating of the drive is needed.

The enclosure is designed to match the look and quality of the VLT® FC-series drives.

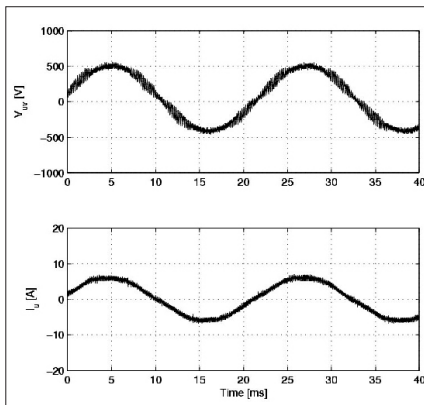
Advantages

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

Features	Benefits
• 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 frequent losses in motor	• Prolongs service interval of motor



Voltage and current without filter

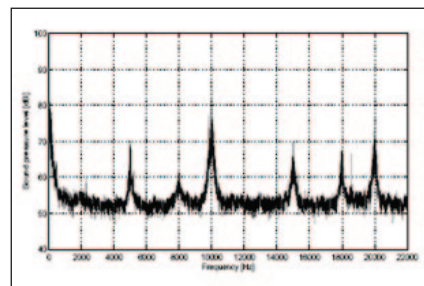


Voltage and current with filter

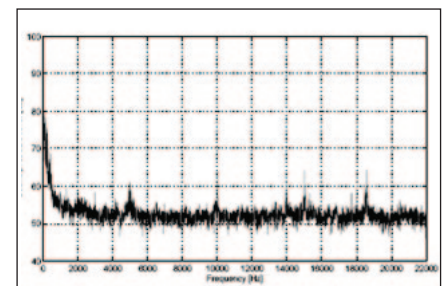
Specifications

Voltage rating	3 x 200 - 500 V and 3 x 525 - 690 V
Nominal current I_N @ 50 Hz	2.5 – 1200 A for higher power modules can be paralleled
Motor frequency	0 – 60 Hz without derating 100/120 Hz (up to 10 A) with derating
Ambient temperature	-25° to 45°C without derating
Min. switching frequency	f_{min} 1,5 kHz – 5 kHz depending on filter type
Max. switching frequency	f_{max} 8 kHz
Overload capacity	160 % for 60 sec every 10 min.
Enclosure degree	IP00/IP20/IP23 (ref. page 1)
Approvals	CE UL508 (only 500 V up to 115 A)

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



No filter



With sine-wave filter

Performance Criteria	du/dt filters	Sine-wave filters
Motor insulation stress	Up to 100 m cable (shielded/unshielded) complies with the requirements of IEC60034-17* (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 frame 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 frequency converter's built-in RFI filter.	Eliminates motor cable ringing. Does not change the emission class. Does not allow longer motor cables as specified for the frequency converter's built-in RFI filter.
Max. motor cable length	100 m ... 150 m With guaranteed EMC performance: 150 m screened Without guaranteed EMC performance: 150 m unshielded	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 frame 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