

# VLT® Power Options dU/dt filter



### The perfect solution for:

- Applications with short motor cables (up to 150 m)
- Applications with older motors
- Aggressive environments
- Applications with frequent braking

### Range

3 x 200 – 690 V (up to 880 A)

### Enclosures

IP 00 and IP 20/23 enclosure in the entire power range.

### Mounting

- Side by side mounting with the drive
- Filters wall mounted up to 480 A (380 V) and floor mounted above that size

**dU/dt filters reduce the dU/dt values on the motor terminal phase-to-phase voltage – an issue that is important for short motor cables.**

dU/dt filters are differential-mode filters which reduce motor terminal phase-to-phase peak voltages spikes and reduce the rise time to a level that lowers the stress on the insulation of motor windings.

Compared to sine-wave filters, the dU/dt filters have a cut-off frequency above the switching frequency. The voltage at the motor terminals is still PWM pulse shaped, but the rise time and U<sub>peak</sub> are reduced. They are smaller, weigh less and have a lower price compared to sine-wave filters. Furthermore, because of the smaller inductance and capacitance, the dU/dt filters introduce a negligible reactance between inverter and motor and are therefore suitable for high dynamic applications.

### Superior compared to output chokes

Output chokes cause undamped oscillations at the motor terminals which increase the risk of double pulsing and over-voltages higher than twice the DC link voltage.

The dU/dt filters are low-pass L-C filters with a well defined cut-off frequency. Therefore the ringing oscillations at the motor terminals are damped and there is a reduced risk of double pulsing and voltage peaks.

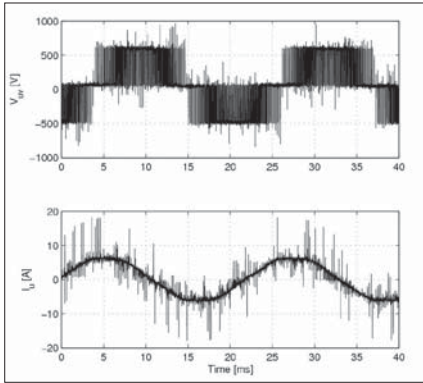
### Quality and Design

All dU/dt 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 designed to match the look and quality of the VLT® FC series drives.

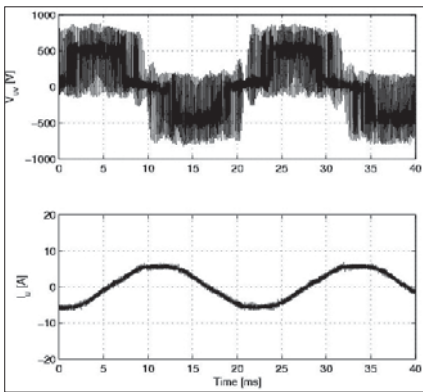
### Advantages

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

Features	Benefits
<ul style="list-style-type: none"> <li>• Reduces dU/dt stresses</li> </ul>	<ul style="list-style-type: none"> <li>• Increases motor service interval</li> </ul>
<ul style="list-style-type: none"> <li>• Lowers the magnetic interference propagation on surrounding cables and equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Trouble-free operation</li> </ul>
<ul style="list-style-type: none"> <li>• Low voltage drop makes dU/dt filters the ideal solution for highly dynamic applications with flux vector regulation</li> </ul>	<ul style="list-style-type: none"> <li>• Small size and cost compared to sine-wave filters</li> </ul>



Voltage and current without filter

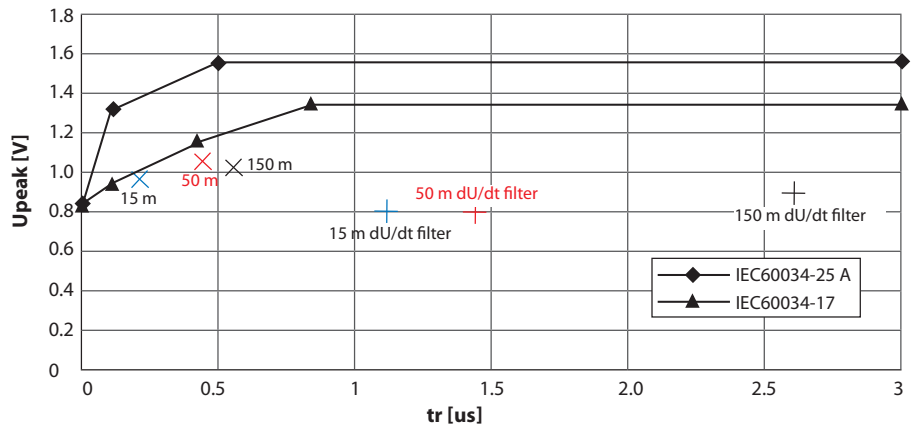


Voltage and current with filter

## Specifications

Voltage rating	3 x 200 – 690 V
Nominal current $I_N$ @ 50 Hz	44 – 880 A @ 200 – 380 V, 40 – 780 A @ 460 V 32 – 630 A @ 600 V and 27 – 630 A @ 690 V for higher power modules can be paralleled
Motor frequency	0 – 60 Hz without derating Max. 100 Hz (with derating)
Ambient temperature	-25° to 45°C without derating
Max. switching frequency	$f_{sw}$ 1,5 kHz – 4 kHz depending on filter type
Mounting	Side-by-side
Overload capacity	160% for 60 sec every 10 min.
Enclosure degree	IP 00 and IP 20/23
Approvals	CE, UL508

## dU/dt limit curves



The dU/dt value decreases with the motor cable length whereas the peak voltage increases. Therefore it is recommended to use sine-wave filters in installations with motor cable lengths above 150 m.

Performance Criteria	dU/dt filters	Sine-wave filters
<b>Motor insulation stress</b>	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).
<b>Motor bearing stress</b>	Slightly reduced, mainly in high power motors.	Reduces bearing currents caused by circulating currents. Does not reduce common-mode currents (shaft currents).
<b>EMC performance</b>	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.
<b>Max. motor cable length</b>	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).
<b>Acoustic motor switching noise</b>	Does not eliminate acoustic switching noise from the motor.	Eliminates acoustic switching noise from the motor caused by magnetostriction.
<b>Relative size</b>	15 – 50% (depending on power size)	100%
<b>Relative price</b>	50%	100%

\* Not 690 V