

Soft turn ON of IGBT 12's increases motor life time

In 1990-92 Grundfos carried through some tests on small motors to investigate if the change from the VLT® 200 series to the VLT® 3000 series would cause motor problems, PAM versus PWM modulation. The conclusion was that Grundfos recommended to install LC filters between the PWM frequency converter and the motor, if the frame size of the motors were MG71 and MG80, UP circulation pumps, MS402 submersible pumps and JP/ CH and CHI products.

At the introduction of the VLT® 5000 we agreed on repeating the test by comparing the VLT® 5000 and the VLT® 3000. One problem was that the motors had now been improved compared to 1992.

Therefore Grundfos made 30 new motors after the "old" design.

We could connect 15 motors to 2 VLT® 3004 frequency converters and 15 motors to 2 VLT® 5004 frequency converters.

The amount was equally divided on 2,4 or 6 pole motors.

The arrangement can be seen on fig.1.

We conclude that the VLT® 3000 without filter has damaged 9 motors and that the VLT® 5000 has not caused defect motors.

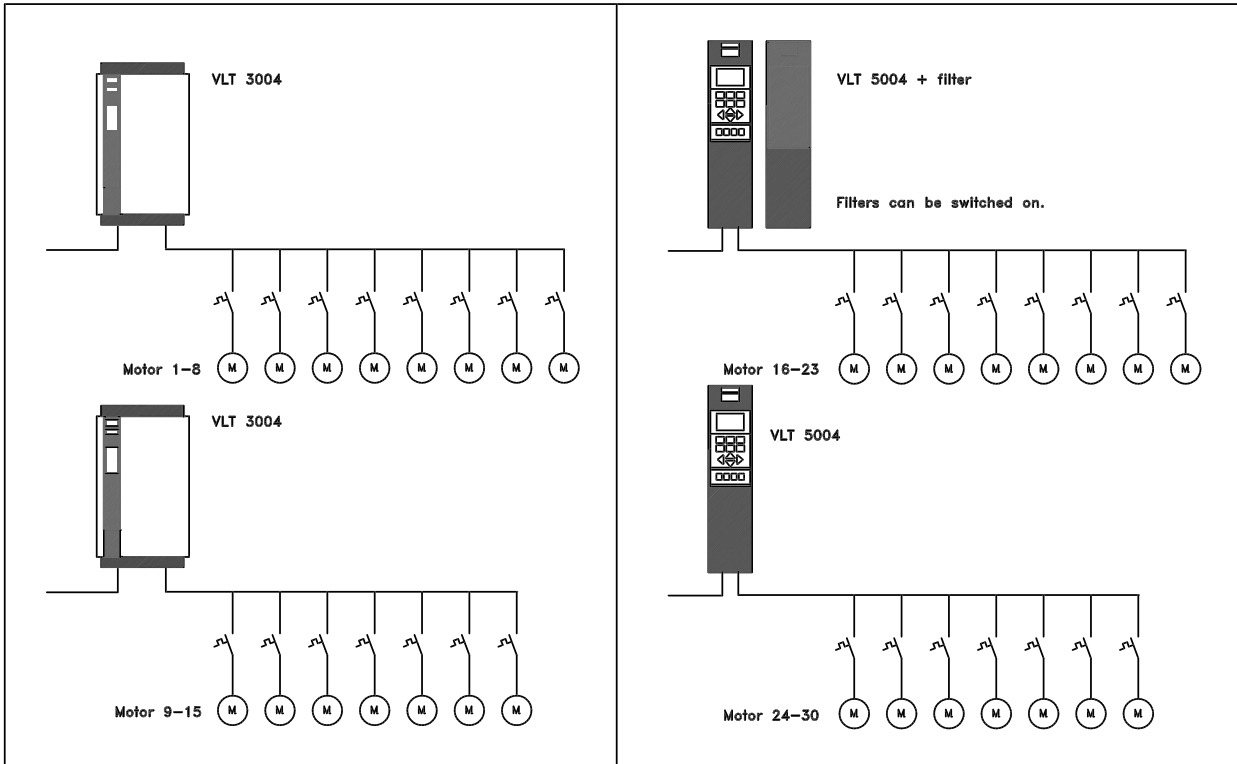
The conclusion is that the LC filters are not necessary to protect against winding failures on small motors when they are connected to VLT® 5000 frequency converters.

Date	X days	VLT3004			VLT 5004		
		2 pole	4 pole	6 pole	2 pole	4 pole	6 pole
1997-10-07	1			5			
1997-10-09	3		1				
1997-10-10	4		1				
1997-10-13	7	1					
1997-11-11	36	1					
1998-01-12	56*						
1998-08-25	323						
Status failures in total		2	2	5	0	0	0

* Failures on frequency converter VLT 5004. Motor no. 16-23 stops and starts on 1998-12-09.

All motors are of 1990 design. In the part the design of the motor winding insulation has been improved.

¹⁾ Soft turn ON of the IGBT 12's are used in the VLT 5001 to 5011/380-500V and VLT 5001 to 5006/200-230V.



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Fig 1
The motor cable length varies between 2.5 and 4 meters.