

du/dt filters

du/dt filtering suppresses inverter output voltage spikes and rapid voltage changes that stress motor insulation. Additionally, du/dt filtering reduces capacitive leakage currents and high frequency emission of the motor cable as well as high frequency losses and bearing currents in the motor.

Insulated N-end (non-driven end) bearings and / or common mode filters are also required for motor bearing currents with motors bigger than 100 kW. For more information please see the ACS800 hardware manuals.

The need for du/dt filtering depends on the motor insulation. For information on the construction of the motor insulation, consult the manufacturer. If the motor does not fulfil the following requirements, the lifetime of the motor might decrease.

Filter selection table for ACS800

Motor type	Nominal mains voltage (U_N)	Motor insulation requirement
ABB M2 and M3 motors	$U_N \leq 500 \text{ V}$	Standard insulation system.
	$500 \text{ V} < U_N \leq 600 \text{ V}$	Standard insulation system in conjunction with du/dt filtering or reinforced insulation.
	$600 \text{ V} < U_N \leq 690 \text{ V}$	Reinforced insulation system in conjunction with du/dt filtering.
ABB form-wound HXR and AM motors	$380 \text{ V} < U_N \leq 690 \text{ V}$	Standard insulation system.
ABB random-wound HXR and AM motors	$380 \text{ V} < U_N \leq 690 \text{ V}$	Check motor insulation system with the motor manufacturer. du/dt filtering with voltages over 500 V.
Non-ABB random-wound and form-wound	$U_N \leq 420 \text{ V}$	Insulation system must withstand $\hat{U}_{LL}=1300 \text{ V}$.
	$420 \text{ V} < U_N \leq 500 \text{ V}$	If the insulation system withstands $\hat{U}_{LL}=1600 \text{ V}$ and $\Delta t=0.2 \mu\text{s}$, du/dt filtering is not required. With du/dt filtering, the insulation system must withstand $\hat{U}_{LL}=1300 \text{ V}$.
	$500 \text{ V} < U_N \leq 600 \text{ V}$	If the insulation system withstands $\hat{U}_{LL}=1800 \text{ V}$, du/dt filtering is not required. With du/dt filtering, the insulation system must withstand $\hat{U}_{LL}=1600 \text{ V}$.
	$600 \text{ V} < U_N \leq 690 \text{ V}$	If the motor insulation system withstands $\hat{U}_{LL}=2000 \text{ V}$ and $\Delta t=0.3 \mu\text{s}$, du/dt filtering is not required. With du/dt filtering, the insulation system must withstand $\hat{U}_{LL}=1800 \text{ V}$.

Symbol	Explanation
U_N	Nominal mains voltage.
$\hat{U}_{LL}$	Peak line to line voltage at motor terminals.
Δt	Rise time, i.e. interval during which line to line voltage at motor terminals changes from 10% to 90% of full voltage range.

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External du/dt filters for ACS800-01/-02/-11/-31

ACS800			du/dt filter type (3 filters included in kits marked *)															
			Unprotected (IP00)						Protected to IP22		Protected to IP54							
			NOCH0016-60	NOCH0030-60	NOCH0070-60	NOCH0120-60 a)	NOCH0260-60 a)	FOCH0260-70	FOCH0320-50	FOCH0610-70	NOCH0016-62	NOCH0030-62	NOCH0070-62	NOCH0120-62	NOCH0016-65	NOCH0030-65	NOCH0070-65	NOCH0120-65
400 V	500 V	690 V																
-0003-3																		
-0004-3	-0004-5																	
-0005-3	-0005-5																	
-0006-3	-0006-5		1							1				1				
-0009-3	-0009-5																	
-0011-3	-0011-5	-0011-7																
	-0016-5																	
-0016-3	-0020-5	-0016-7																
0020-3**)		-0020-7	1								1				1			
		-0025-7																
-11-0020-3*)	-0025-5	-0030-7																
-31-0020-3*)	-0030-5	-0040-7																
-0025-3	-0040-5	-0050-7																
-0030-3	-0050-5	-0060-7																
-0040-3	-0060-5			1								1				1		
-0050-3																		
-0060-3	-0070-5	-0070-7																
0070-3**)	0100-5**)	-0100-7			1								1				1	
-0075-3	-0105-5	-0120-7																
-11-0070-3**)	-11-0100-5**)																	
-31-0070-3**)	-31-0100-5**)				1													
-0100-3	-0120-5				1													
-0120-3	-0140-5					1												
-0135-3	-0165-5	-0140-7																
-0140-3	-0170-5	-0145-7																
-0165-3	-0205-5																	
-0170-3	-0210-5	-0170-7						1										
-0205-3	-0255-5																	
-0210-3	-0260-5	-0175-7																
		-0205-7																
		-0210-7																
		-0260-7																
-0260-3	-0320-5								1									
-0320-3	-0400-5	-0320-7																
-0400-3	-0440-5	-0400-7																
-0440-3	-0490-5	-0440-7																
-0490-3	-0550-5	-0490-7																
	-0610-5	-0550-7								1								
		-0610-7																

^{a)} Note the exceptions in ACS800-11-0020-3, ACS800-11-0070-3 and ACS800-11-0100-5 ACS800-31-0020-3, ACS800-31-0070-3 and ACS800-31-0100-5

Applicability

Factory-installed du/dt filters are available for the ACS800-07/-07LC/-17/-17LC/-37/-37LC. They are installed inside the drive cabinet. Unprotected IP00 filters must be placed into an enclosure of adequate degree of protection.

Dimensions and weights of the du/dt filters

du/dt filter	Height mm	Width mm	Depth mm	Weight kg
NOCH0016-60	185	140	115	2.4
NOCH0016-62/65	323	199	154	6
NOCH0030-60	215	165	130	4.7
NOCH0030-62/65	348	249	172	9
NOCH0070-60	261	180	150	9.5
NOCH0070-62/65	433	279	202	16.6
NOCH0120-60***	200	154	106	7
NOCH0120-62/65	785	308	256	46
NOCH0260-60***	383	185	111	12
FOCH0260-70	382	340	254	47
FOCH0320-50	662	319	293	65
FOCH0610-70	662	319	293	65

*** 3 filters included, dimensions apply for one filter.



NOCH0016-60



NOCH0016-62



NOCH0016-65



FOCH0610-70