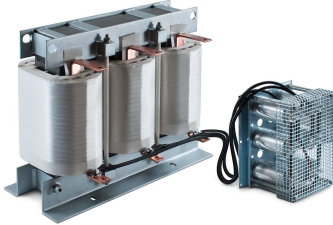


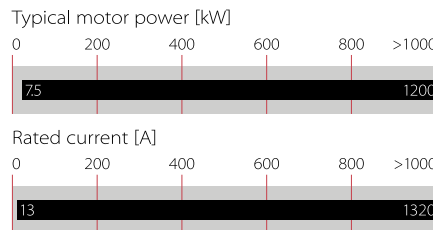
LC Sine Wave Filter for 600 VAC and 690 VAC Motor Drives Applications



- ▮ Smooth sine wave without voltage peaks
- ▮ Motor protection against pulse pattern stress
- ▮ Improvement of system reliability
- ▮ Reduces bearing currents
- ▮ Ideal for retrofit installations
- ▮ Fits for long motor cable lengths (≤2000 m)
- ▮ Motor drive power range up to 1,200 kW



Performance indicators



Technical specifications

Nominal operating voltage	3x690 VAC (UL: 3x600 VAC)
Motor frequency	0..70 Hz (up to 200 Hz with derating according graph)
Rated currents	13 to 1320 A
Temperature range (operation and storage)	-25°C to 70°C (25/070/21) 13 to 45 A: -25 to +30°C 75 to 1320 A: -25 to +45°C
Motor cable length	Up to 2,000 m (see graph)
Impedance (uk)	8 to 10% @ 690 V, 50 Hz and rated current
Residual ripple voltage	<5%
High potential test voltage	P → E 3600 VAC, 1 minute P → P 3600 VAC (without Caps), 1 minute P → P 2600 VDC, 1 minute
Protection category	IP 00
Overload capability	1.5 × rated current for 1 minute, once per hour
Insulation class	EIS 200
Flammability corresponding to	UL 94 V-2 or better
Design corresponding to	IEC 61558-2-20
Environmental reliability	IEC 60068-2-1
Capacitor class	UL 810 approved
Creepage and clearance distances	According UL 61800-5-1
Inductors	UL-approved Electrical Insulation System (EIS) class 200 (N)
Rated currents	13 to 1320 A @ 45°C
Switching frequency	See filter selection table

Approvals



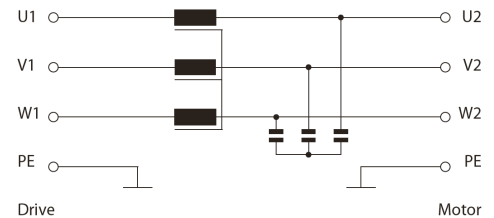
Features and benefits

- ▮ Converts the rectangular PWM output voltage of motor drives into a smooth sine wave with low residual ripple
- ▮ Elimination of premature motor damage caused by high dv/dt, overvoltages, cable ringing, motor overheating, and eddy current losses
- ▮ Improves bearing life time because of bearing currents caused by circulating currents
- ▮ Reduces electromagnetic emissions and acoustic noise levels
- ▮ Eliminates pulse reflections in the motor cable

Typical applications

- ▮ HVAC applications
- ▮ Pumps
- ▮ Ventilators
- ▮ Conveyors
- ▮ Compressors
- ▮ Elevators
- ▮ Cranes
- ▮ Medium voltage applications, deployed in front of the step-up transformer
- ▮ Retrofit installations with motor drives
- ▮ Motor drive with long motor cable
- ▮ Motor drive with multiple motors in parallel

Typical electrical schematic



Filter selection table

Filter****	Rated temp. [°C]	Rated current	Typical motor drive power rating	Typical motor drive power rating	Nominal inductance [mH]	Nominal capacitance *** [µF]	Min. switching frequency ** [kHz]	Typical power loss [W]	Input/Output connections	Weight
		@ rated temp. / 50 Hz [A]	690 V/50 Hz* [kW]	600 V/60 Hz* [HP]						
FN 5040 HV-13-83	30	13	7.5	10	11.7	4.7	2	170	-83	14
FN 5040 HV-28-84	30	28	22	25	5.5	10	2	280	-84	30
FN 5040 HV-45-86	30	45	37	40	3.4	20	2	360	-86	38
FN 5040 HV-75-99	45	75	55	60	2	33	2	500	-99	75
FN 5040 HV-115-99	45	115	90	100	1.3	47	2	850	-99	106
FN 5040 HV-165-99	45	165	132	150	0.9	66	2	1100	-99	145
FN 5040 HV-260-99	45	260	200	250	0.6	94	2	1200	-99	220
FN 5040 HV-300-99	45	300	250	300	0.5	136	2	1600	-99	240
FN 5040 HV-430-99	45	430	355	400	0.35	272	1.5	2000	-99	311
FN 5040 HV-530-99	45	530	450	500	0.28	340	1.5	2400	-99	410
FN 5040 HV-660-99	45	660	630	650	0.23	408	1.5	2900	-99	505
FN 5040 HV-765-99	45	765	710	750	0.2	476	1.5	3800	-99	536
FN 5040 HV-940-99	45	940	900	1000	0.16	612	1.5	3400	-99	668
FN 5040 HV-1320-99	45	1320	1200	1300	0.12	816	1.5	4700	-99	945

* At rated current, voltage and frequency. The proper power selection depends on the drive specification, the motor and the application requirements.

** With reduced motor cable length, the max. switching frequency is 16 kHz.

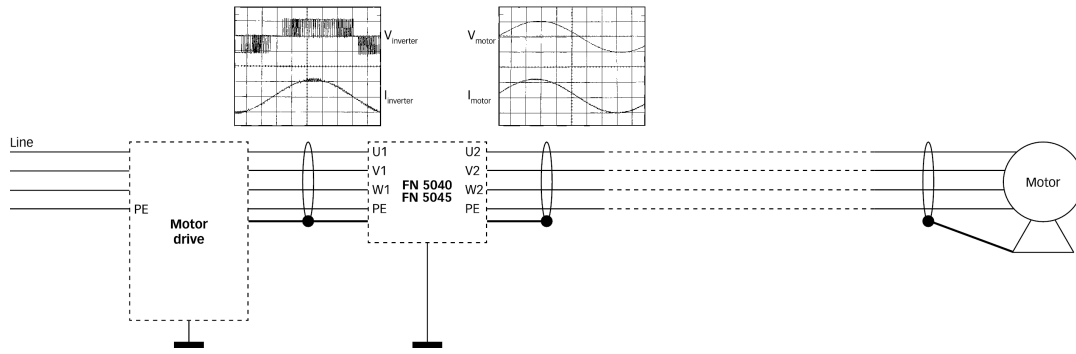
*** The capacitance connection is Y

**** Filters up to 300 A are with UL approval. 430 A ... 1320 A are without UL approval.

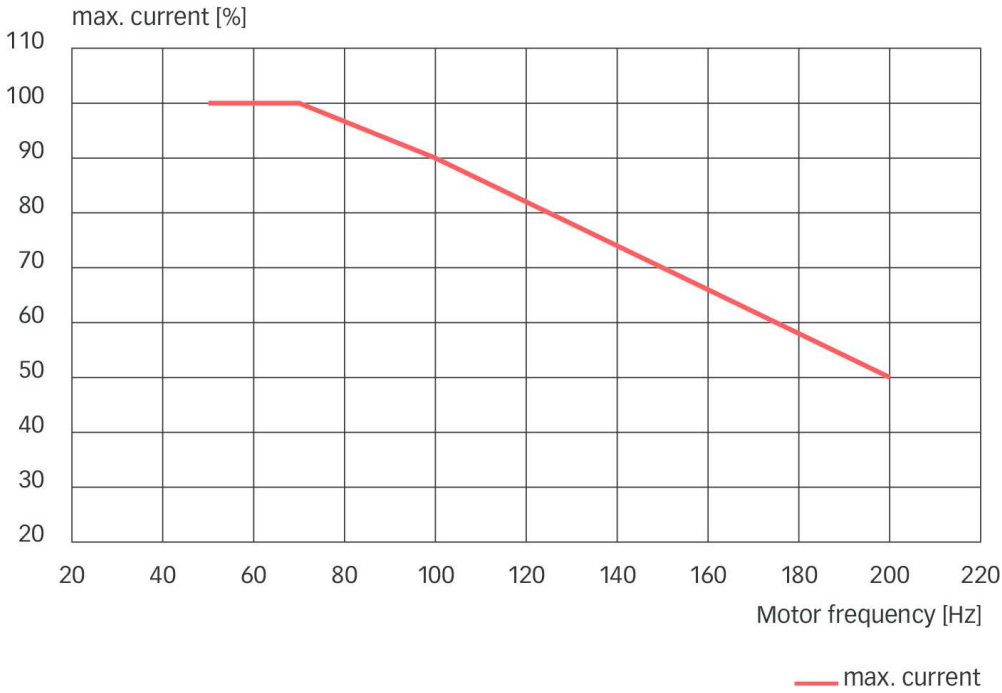
Required drives settings

Ensure the drive's switching frequency is set to the required minimum switching frequency (see filter selection table). The mode of operation must be "scalar" (V/Hz) with a fixed switching frequency. Check the drives manufacturer manual whether special settings are necessary. In any doubt contact the drives manufacturer. **CAUTION: If the motor drives settings are not correct the filter may be damaged.**

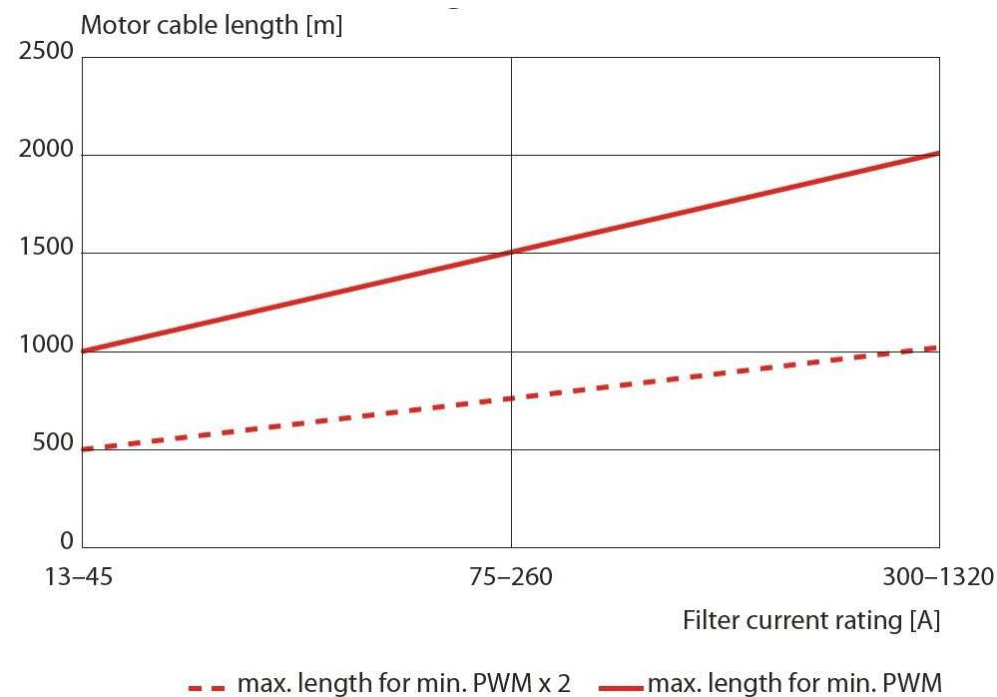
Typical block schematic



Motor frequency derating



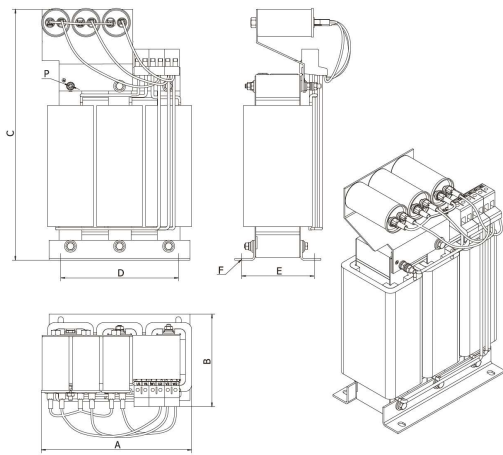
Max. motor cable length*



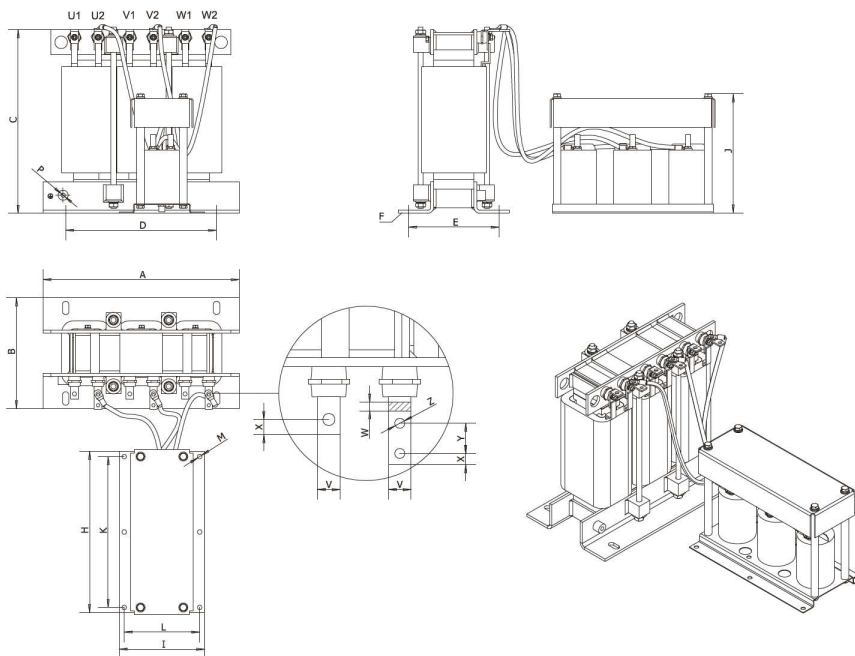
*In case a step-up transformer is used, then the length is meant to be between the filter and transformer.

Mechanical data FN 5040 HV

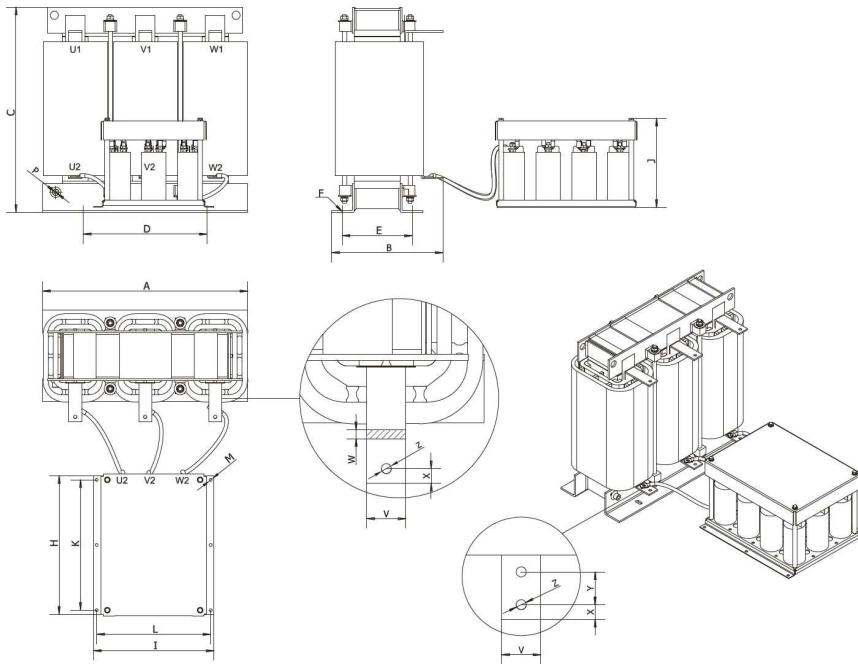
13 to 45 A types



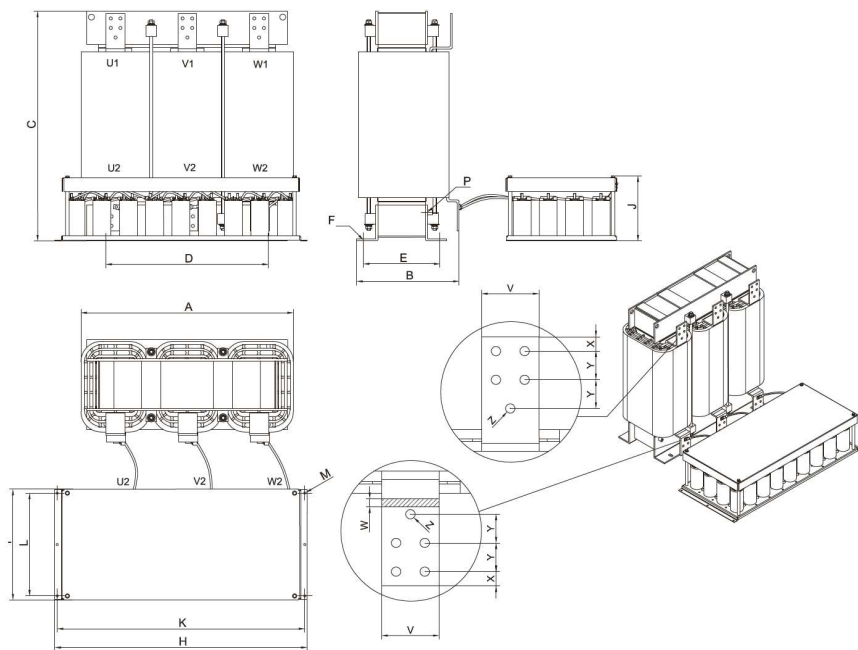
75 to 165 A types



260 to 940 A types






1320 A type



Dimensions FN 5040 HV

	13 A	28 A	45 A	75 A	115 A	165 A	260 A	300 A	430 A	530 A	660 A	765 A	940 A	1320 A
A	235	225	267	392	465	512	583	540	645	680	740	725	765	895
B	160	165	190	235	275	275	318	315	347	348	430	402	435	445
C	290	375	425	375	425	482	484	625	633	761	775	875	925	965
D	180	175	215	300	300	300	300	300	380	380	560	560	580	680
E	101	108	127	180	180	180	180	20	215	215	245	245	245	320
F	8x12	8x12	11x15	13x27	13x27	13x27	13x27	13x27	13x27	13x27	13x28	13x28	17x30	17x30
H				330	330	330	330	330	425	705	705	760	1055	1055
I				170	170	270	270	270	370	328	328	463	463	463
J				240	240	240	240	275	275	275	275	275	275	275
K				300	300	300	300	300	400	685	685	740	1035	1035
L				150	150	250	250	250	350	300	300	430	430	430
M				Ø9	Ø9	Ø9	Ø9	Ø9	Ø9	Ø9	Ø9	Ø9	Ø9	Ø9
P	M6	M6	M6	M6	M8	M10	M10	M10	M12	M12	M12	M12	M12	M12
V				15	20	25	30	30	40	40	60	60	80	80
W				3	3	4	5	5	5	6	6	8	8	8
X				7.5	10	12.5	15	15	20	20	20	20	20	20
Y				30	30	30	30	30	40	40	40	40	40	40
Z				6.6	9	11	11	11	13.5	13.5	13.5	13.5	13.5	13.5
Capacitor bank cable length [m]				1 m	1 m	1 m	1.5 m	1.5 m	1.5 m	1.5 m	2 m	2 m	2 m	2 m

Filter input/output connector cross sections

	-83	-84	-86
			
Solid wire	0.75 - 4 mm ²	2.5 - 10 mm ²	0.75 - 50 mm ²
Flex wire	1 - 4 mm ²	4 - 10 mm ²	0.75 - 35 mm ²
AWG type wire	AWG 16 - 10	AWG 18 - 6	AWG 18 - 0/1
Recommended torque	1.24 Nm (11 lb-in)	1.24-2.26 Nm (11-20 lb-in)	3.4-5.6 Nm (30-50 lb-in)

Please visit www.schaffner.com to find more details on filter connectors.

Note:

For additional information please consult the documents „Basis in EMC and Power Quality“ and the sine wave filter „Mounting and Installation Guidelines“, published in the download section „Installation Instructions“ of www.schaffner.com



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