

## Universal sine wave output filter for motor drives

# SCHAFFNER

energy efficiency and reliability



- Smoothing of PWM drive output voltage
- Efficient motor protection
- Increase of motor service life
- Reduction of audible motor noise
- Reduction of parasitic losses
- Improvement of system reliability

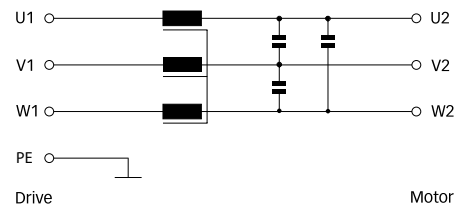
### Approvals



### Technical specifications

Nominal operating voltage:	3x 400/230VAC ±10%
Motor frequency:	0 to 70Hz
Switching frequency:	4 to 16kHz
Rated currents:	2.5 to 610A @ 40°C
Motor cable length:	400m max.
Impedance (uk):	10% @ nominal voltage, 50Hz & rated current
Residual ripple voltage:	<5%
High potential test voltage:	P → E 3000VAC for 3 sec P → P 2000VAC for 3 sec
Protection category:	IP00 (filters up to 150A according to VBG 4)
Overload capability:	2x rated current at switch on for 30 seconds, 1.5x rated current for 1 minute, once per hour
Temperature range (operation and storage):	-25°C to +85°C (25/085/21)
Insulation class:	T40/F (155°C)
Flammability corresponding to:	UL 94V-2 or better
Design corresponding to:	EN 61558-2-20 (VDE 0570-2-20)

### Typical electrical schematic



### Features and benefits

- Conversion of the PWM output signal (symmetrical voltage components) of motor drives into a smooth sine wave with low residual ripple.
- Elimination of premature motor damage caused by high dv/dt, overvoltages, motor overheating and eddy current losses.
- Significantly increased service life of electric motors.
- Reduction of the pulse load of motor drive IGBTs and the parasitic losses on long shielded motor cables.
- Cost-effective and space-saving open frame filter design.
- Vacuum impregnation ensures less humming noise and high durability.

### Typical applications

- Motor drive applications with long motor cables
- Pumps
- Conveyors
- HVAC applications
- Elevators
- General automation tasks
- Applications with multiple motors in parallel

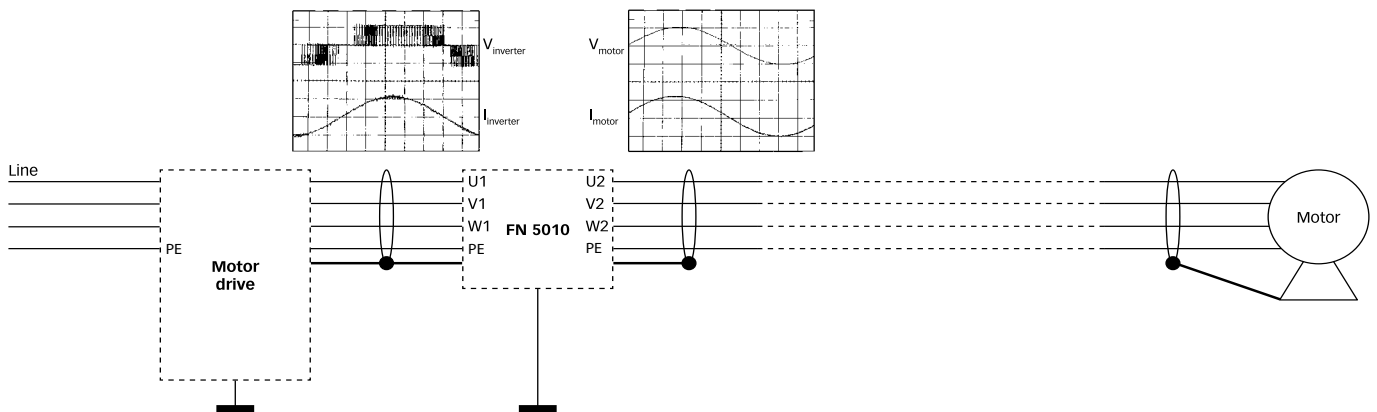
Filter selection table

Filter	Rated current @ 40°C	Typical motor power rating*	Nominal inductance	Nominal capacitance	Typical power loss**	Input/Output connections	Total	Cu.	Weight Al.
	[A]	[kW]	[mH]	[µF]	[W]				
FN 5010-2.5-99	2.5	1.1	22.4	1.5 Δ	50	-99	2.6	0.68	
FN 5010-4.5-99	4.5	2.2	11	1.5 Δ	66	-99	3	1.1	
FN 5010-8-99	8	4	7.2	1.5 Δ	73	-99	6.6	2.2	
FN 5010-10-99	10	5.5	4.2	1.5 Δ	91	-99	6.6	2.6	
FN 5010-13-99	13	7.5	4.2	1.5 Δ	124	-99	7.3	3.2	
FN 5010-18-99	18	11	3.5	1.5 Δ	144	-99	11.5	3.6	
FN 5010-24-99	24	15	2.4	1.5 Δ	191	-99	14	5	
FN 5010-32-99	32	18.5	2	2 Δ	273	-99	16	6.8	
FN 5010-42-99	42	22	1.58	7 Y	252	-99	22	7.4	
FN 5010-48-99	48	30	1.5	7 Y	340	-99	28	8.8	
FN 5010-60-99	60	30	1.1	4 Δ	290	-99	35	10.9	
FN 5010-75-99	75	37	0.9	4 Δ	340	-99	42	11.5	
FN 5010-90-99	90	45	0.8	5 Δ	360	-99	46	12.8	
FN 5010-110-99	110	55	0.7	5 Δ	400	-99	58	13	
FN 5010-150-99	150	75	0.5	7 Δ	716	-99	75	14.8	
FN 5010-180-99	180	90	0.4	10 Δ	820	-99	88	1.4	10.9
FN 5010-210-99	210	110	0.4	10 Δ	1065	-99	115	2.1	11.2
FN 5010-270-99	270	132	0.3	12 Δ	1230	-99	150	2.1	14
FN 5010-325-99	325	160	0.3	12 Δ	1820	-99	194	5.2	21
FN 5010-410-99	410	200	0.2	18 Δ	1830	-99	206	5.2	23.8
FN 5010-510-99	510	315	0.17	20 Δ	2255	-99	290	6.5	32
FN 5010-610-99	610	355	0.14	25 Δ	2520	-99	330	7.7	37.5

\* General purpose four-pole (1500r/min) AC induction motor rated 400V/50Hz.

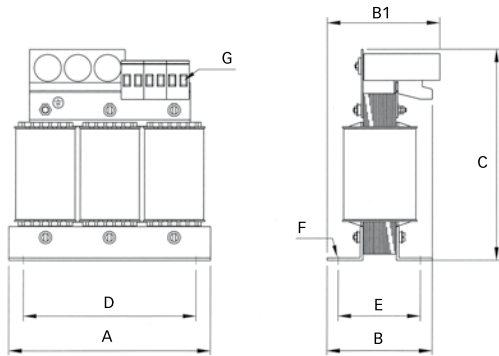
\*\* Exact value depends upon the motor cable type and length, switching frequency, motor frequency and further stray parameters within the system.

Typical block schematic

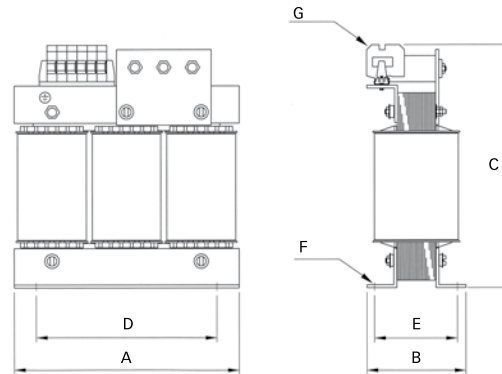


**Mechanical data**

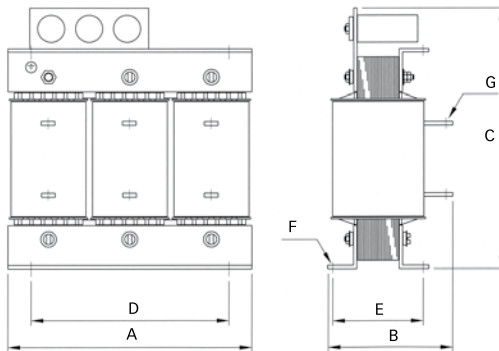
2.5 to 42A types



48 to 150A types



180 to 610A types



**Dimensions**

	A	B	B1	C	D	E	F	G
2.5A	125	65	110	180	100	45	5 x 8	2.5mm <sup>2</sup>
4.5A	125	75	110	180	100	55	5 x 8	2.5mm <sup>2</sup>
8 and 10A	155	95	118	205	130	70	8 x 12	4mm <sup>2</sup>
13A	190	100	125	230	170	58	8 x 12	4mm <sup>2</sup>
18A	190	120	125	230	170	78	8 x 12	10mm <sup>2</sup>
24A	210	125	135	260	175	85	8 x 12	10mm <sup>2</sup>
32A	210	135	135	260	175	95	8 x 12	10mm <sup>2</sup>
42A	230	170	150	285	180	122	8 x 12	10mm <sup>2</sup>
48A	240	210	<B	290	190	125	8 x 12	16mm <sup>2</sup>
60A	240	220	<B	290	190	135	8 x 12	16mm <sup>2</sup>
75A	300	210	<B	345	240	134	11 x 15	35mm <sup>2</sup>
90A	300	215	<B	345	240	139	11 x 15	35mm <sup>2</sup>
110A	300	237	<B	345	240	161	11 x 15	50mm <sup>2</sup>
150A	420	217	<B	470	370	142	11 x 15	50mm <sup>2</sup>
180A	420	235	<B	470	370	157	11 x 15	Ø11
210A	420	260	<B	470	370	182	11 x 15	Ø11
270A	420	295	<B	470	370	217	11 x 15	Ø11
325A	480	310	<B	580	430	238	13 x 18	Ø11
410A	480	320	<B	550	430	238	13 x 18	Ø11
510A	500	350	<B	580	430	255	13 x 18	Ø11
610A	500	370	<B	670	430	268	13 x 18	Ø18

All dimensions in mm; 1 inch = 25.4mm  
Tolerances according: ISO 2768-m / EN 22768-m