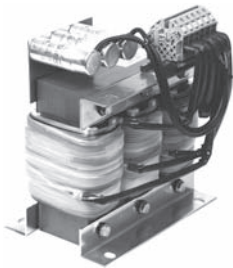


Output filters FN 5010

Universal sine wave output filter for motor drives

SCHAFFNER

safety for electronic systems



- 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

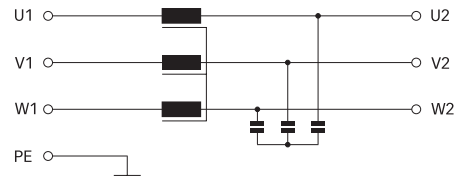
RoHS
2002/95/EC

By January 2006

Technical specifications

Nominal operating voltage:	3x 400VAC (FN 5010) 3x 690VAC (FN 5010HV)
Motor frequency:	0 to 70Hz
Switching frequency:	4 to 16kHz
Rated currents:	2.5 to 610A @ 40°C
Motor cable length:	max. 400m shielded max. 300m unshielded
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 VBG4)
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:	UL94V-2 or better
Design corresponding to:	EN61558-2-20 (VDE0570-2-20)

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, over voltages, motor overheating and eddy current losses.
- Significantly increased service life of electric motors.
- Reduction of the pulse load of motor drive IGBT's 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

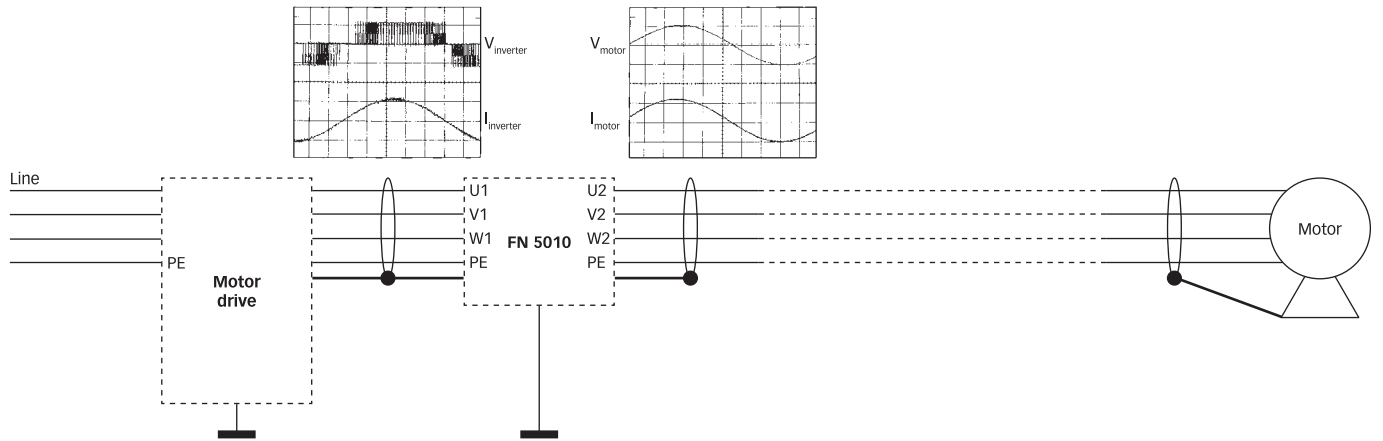
Filter selection table

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]		[kg]	[kg]	[kg]
FN 5010-2.5-99	2.5	1.1	22.4	1.5	50	-99	2.6	0.68	
FN 5010-3.5-99	3.5	1.5	16	1.5	54	-99	2.6	1.05	
FN 5010-4.5-99	4.5	2.2	11	1.5	66	-99	3	1.1	
FN 5010-6.5-99	6.5	3	8.4	1.5	70	-99	5.4	2.1	
FN 5010-8-99	8	4	7.2	1.5	73	-99	6.6	2.2	
FN 5010-10-99	10	5.5	4.2	1.5	91	-99	6.6	2.6	
FN 5010-13-99	13	7.5	4.2	1.5	124	-99	7.3	3.2	
FN 5010-18-99	18	11	3.5	1.5	144	-99	11.5	3.6	
FN 5010-24-99	24	15	2.4	1.5	191	-99	14	5	
FN 5010-32-99	32	18.5	2	2	273	-99	16	6.8	
FN 5010-42-99	42	22	1.58	7	252	-99	22	7.4	
FN 5010-48-99	48	30	1.5	4	340	-99	28	8.8	
FN 5010-60-99	60	30	1.1	4	290	-99	35	10.9	
FN 5010-75-99	75	37	0.9	4	340	-99	42	11.5	
FN 5010-90-99	90	45	0.8	5	360	-99	46	12.8	
FN 5010-110-99	110	55	0.7	5	400	-99	58	13	
FN 5010-150-99	150	75	0.5	7	716	-99	75	14.8	
FN 5010-180-99	180	90	0.4	10	820	-99	88	1.4	10.9
FN 5010-210-99	210	110	0.4	10	1065	-99	115	2.1	11.2
FN 5010-270-99	270	132	0.3	12	1230	-99	150	2.1	14
FN 5010-325-99	325	160	0.3	12	1820	-99	194	5.2	21
FN 5010-410-99	410	200	0.2	18	1830	-99	206	5.2	23.8
FN 5010-480-99	480	250	0.185	20	2100	-99	255	6.5	28
FN 5010-510-99	510	315	0.17	20	2255	-99	290	6.5	32
FN 5010-610-99	610	355	0.14	25	2520	-99	330	7.7	37.5
FN 5010HV-2.5-99	2.5	1.5	61	1.5	60	-99	5.8	0.86	
FN 5010HV-3.5-99	3.5	2.2	43.5	1.5	64	-99	6.6	1.55	
FN 5010HV-4.5-99	4.5	3	33.5	1.5	63	-99	7.5	2.4	
FN 5010HV-6.5-99	6.5	4	23.5	1.5	73	-99	11.2	3.95	
FN 5010HV-8-99	8	5.5	19	1.5	83	-99	13.3	4.35	
FN 5010HV-10-99	10	7.5	15.2	1.5	102	-99	15.8	5.7	
FN 5010HV-13-99	13	11	11.7	1.5	124	-99	18.9	6	
FN 5010HV-18-99	18	15	8.4	1.5	136	-99	27.2	9.5	
FN 5010HV-24-99	24	18.5	6.3	2.2	189	-99	29.7	11	
FN 5010HV-32-99	32	22	4.7	2.2	264	-99	46.5	15.7	
FN 5010HV-42-99	42	30	3.6	4.7	254	-99	53.6	16.4	
FN 5010HV-48-99	48	37	3.1	4.7	380	-99	66	16.9	
FN 5010HV-60-99	60	45	2.5	4.7	528	-99	70.7	17.4	
FN 5010HV-75-99	75	55	2	5.6	631	-99	78	19.6	
FN 5010HV-90-99	90	75	1.75	5.6	793	-99	94.7	25.2	
FN 5010HV-110-99	110	90	1.38	10	898	-99	112	27.8	
FN 5010HV-150-99	150	110	1	10	1121	-99	152	29.6	
FN 5010HV-180-99	180	160	0.85	12	1140	-99	181	2.3	17.8
FN 5010HV-210-99	210	200	0.73	18	1392	-99	200	3.4	19.6
FN 5010HV-270-99	270	250	0.56	18	1495	-99	210	3.4	26.6
FN 5010HV-325-99	325	315	0.47	22	1612	-99	232	4.9	35
FN 5010HV-410-99	410	355	0.37	28	1876	-99	277	6.3	47.6
FN 5010HV-480-99	480	400/450	0.32	36	2225	-99	289	8.4	49.7
FN 5010HV-510-99	510	450	0.3	36	2400	-99	303	8.4	51.4
FN 5010HV-610-99	610	500	0.25	44	2740	-99	335	13	53.9

* General purpose 4-pole (1500r/min) AC induction motor rated 400V/50Hz for FN 5010 filters, 690V/50Hz for FN 5010HV filters.

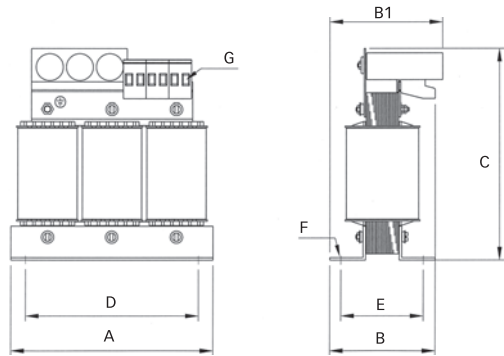
** Exact value depends upon the motor cable type and length, switching frequency, motor frequency and further stray parameters within the system.

Typical block schematic

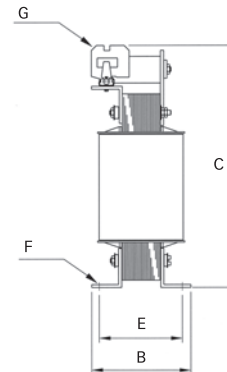


Mechanical data

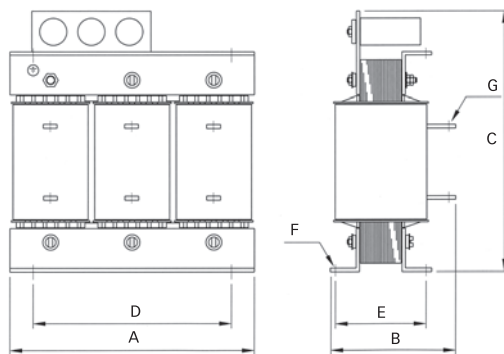
2.5 to 42A types



48 to 150A types



180 to 610A types



Dimensions

FN 5010	A	B	B1	C	D	E	F	G
2.5 and 3.5A	125	65	110	180	100	45	5 x 8	2.5mm ²
4.5A	125	75	110	180	100	55	5 x 8	2.5mm ²
6.5	155	80	118	205	130	55	8 x 12	4mm ²
8 and 10A	155	95	118	205	130	70	8 x 12	4mm ²
13A	190	100	125	230	170	58	8 x 12	4mm ²
18A	190	120	125	230	170	78	8 x 12	10mm ²
24A	210	125	135	260	175	85	8 x 12	10mm ²
32A	210	135	135	260	175	95	8 x 12	10mm ²
42A	230	140	150	285	180	122	8 x 12	10mm ²
48A	240	210	<B	290	190	125	8 x 12	10mm ²
60A	240	220	<B	290	190	135	8 x 12	16mm ²
75A	300	210	<B	345	240	134	11 x 15	35mm ²
90A	300	215	<B	345	240	139	11 x 15	35mm ²
110A	300	237	<B	345	240	161	11 x 15	50mm ²
150A	420	217	<B	470	370	142	11 x 15	50mm ²
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
325 and 410A	480	310	<B	580	430	234	13 x 18	Ø11
480A	500	340	<B	670	430	238	13 x 18	Ø11
510A	500	370	<B	670	430	248	13 x 18	Ø11
610A	500	370	<B	670	430	268	13 x 18	Ø11

All dimensions in mm; 1 inch = 25.4mm
Tolerances according: ISO2768 / EN22768

Dimensions

FN 5010HV	A	B	B1	C	D	E	F	G
2.5 to 4.5A	155	95	118	205	130	70	8 x 12	2.5mm ²
6.5A	190	110	125	230	170	68	8 x 12	4mm ²
8A	190	120	125	230	170	78	8 x 12	4mm ²
10A	210	125	135	260	175	85	8 x 12	4mm ²
13A	210	135	135	260	175	95	8 x 12	4mm ²
18 and 24A	230	160	<B	290	180	122	8 x 12	10mm ²
32A	300	215	<B	345	240	135	11 x 15	10mm ²
42A	300	232	<B	345	240	152	11 x 15	10mm ²
48A	360	235	<B	420	310	136	11 x 15	10mm ²
60A	360	241	<B	420	310	142	11 x 15	16mm ²
75A	360	261	<B	420	310	157	11 x 15	35mm ²
90A	420	228	<B	470	370	153	11 x 15	35mm ²
110A	420	248	<B	470	370	173	11 x 15	50mm ²
150A	420	288	<B	470	370	213	11 x 15	50mm ²
180A	480	350	<B	470	430	258	13 x 18	Ø11
210 and 270A	480	340	<B	580	430	248	13 x 18	Ø11
325A	480	350	<B	580	430	258	13 x 18	Ø11
410A	480	350	<B	690	430	258	13 x 18	Ø11
480A	480	360	<B	690	430	268	13 x 18	Ø11
510A	480	370	<B	690	430	278	13 x 18	Ø11
610A	480	360	<B	790	430	268	13 x 18	Ø11

All dimensions in mm; 1 inch = 25.4mm
Tolerances according: ISO2768 / EN22768