

Ecosine 400-480 VAC 50Hz Economy Passive Harmonic Filters



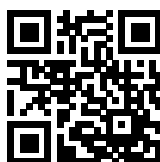
Economy line of passive harmonic filters for THDi <10%

Help to comply with EN 61000-3-12, IEEE-519 and other PQ standards

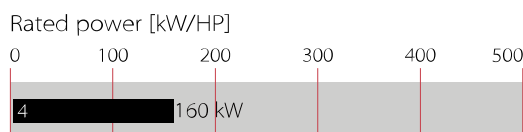
Support an efficient utilization of electrical system capacity

Ideal for motor drives with 6-pulse rectifier front-end

Suitable for diode and thyristor (SCR) rectifiers applications



Performance indicators



Approvals & Compliances



Features and Benefits

FN 3416 (50 Hz) models of the ECOsine product family represent the very compact “economy line” with a THID performance of $\leq 10\%$ (with Ldc).

They are ideal for non-linear three-phase equipment with B6 rectifier front-end that do not require the industry leading <5% THID performance provided by Schaffner ECOsine FN 3410/12 filters.

The performance is still sufficient to comply with EN 61000-3-12 or with IEEE-519 for $I_{sc}/I_L < 50$. Schaffner ECOsine filters help to unburden the electrical infrastructure from excess loading and heat caused by current harmonics, and therefore support a better utilization of electric system capacity.

Lower harmonics also reduce the risk of system resonances and potential downtime of sensitive electronic equipment.

FN 3416/18 filters upgrade standard motor drives to “low-harmonic drives” quickly and easily.

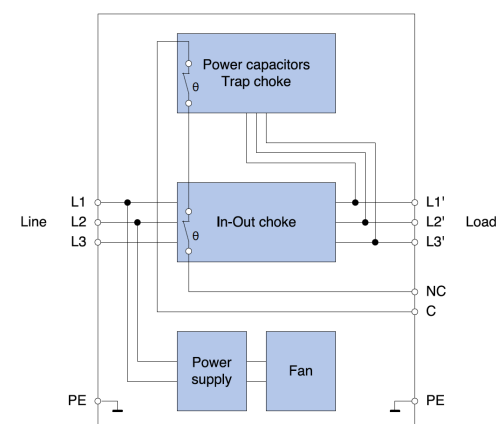
Typical Applications

Three-phase power conversion equipment with front-end six-pulse rectifier (diode or SCR)

Motor drives, like those used e.g. in pump and fan applications

Battery chargers, incl. DC fast chargers for e-cars

Typical electrical schematic



Technical Specifications

Nominal operating voltage	3x 380 to 500 VAC $\pm 10\%$
Operating frequency	50Hz ± 1 Hz (FN 3416)
Nominal motor drive input power rating	4 to 160 kW
Total harmonic current distortion THDi*	<10% @ rated power (with DC-Link choke) <15% @ rated power (without DC-Link choke)
Total demand distortion TDD	According to IEEE-519
Efficiency	>98% @ nominal line voltage and power
Overload capability	1.6x rated current for 1 minute, once per hour
SCCR**	100 kA
High potential test voltage	P -> E 2500 VAC (2 sec)
Earthing System	TN, TT, IT
Protection category	IP 20
Cooling	Internal fan cooling, unregulated
Ambient temperature range	-25°C to +45°C fully operational +45°C to +70°C derated operation*** -25°C to +70°C transport and storage
Design corresponding to	UL 508, EN 61558-2-20, CE (LVD2006/95/EC)
Flammability corresponding to	UL 94 V-2 or better
MTBF @ 45°C/500 V (Mil-HB-217F)	200,000 hours

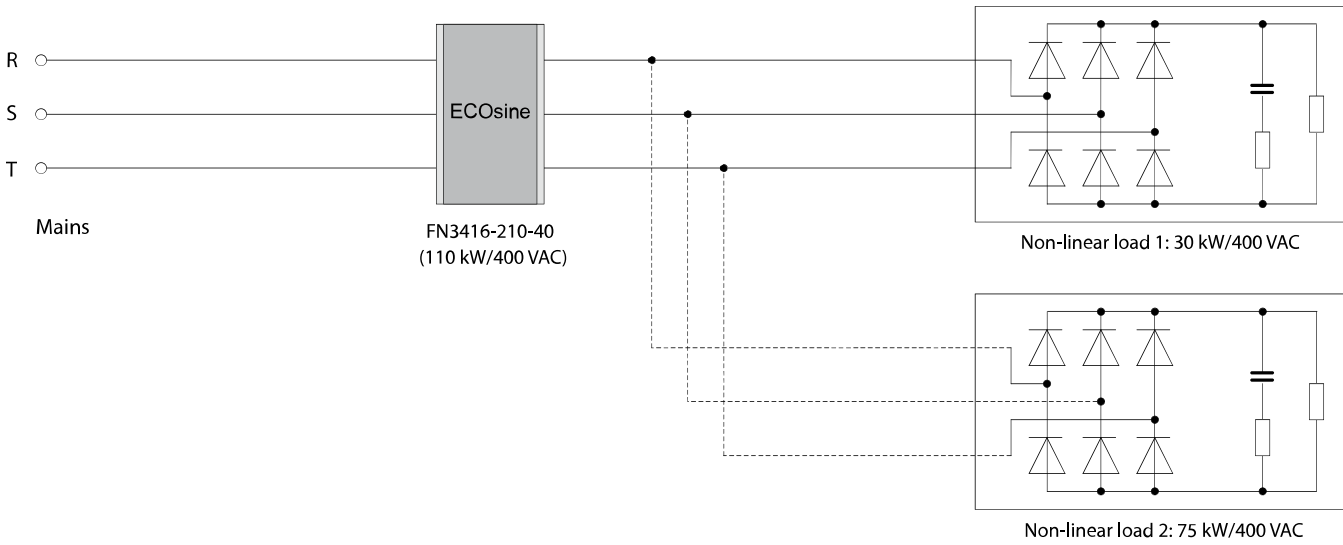
* System requirements: THVD <2%, line voltage unbalance <1%
Note: performance specifications in this datasheet refer to six-pulse diode rectifiers. SCR rectifier front-end will produce different results, depending upon the firing angle of the thyristors.

** External UL-rated fuses required.

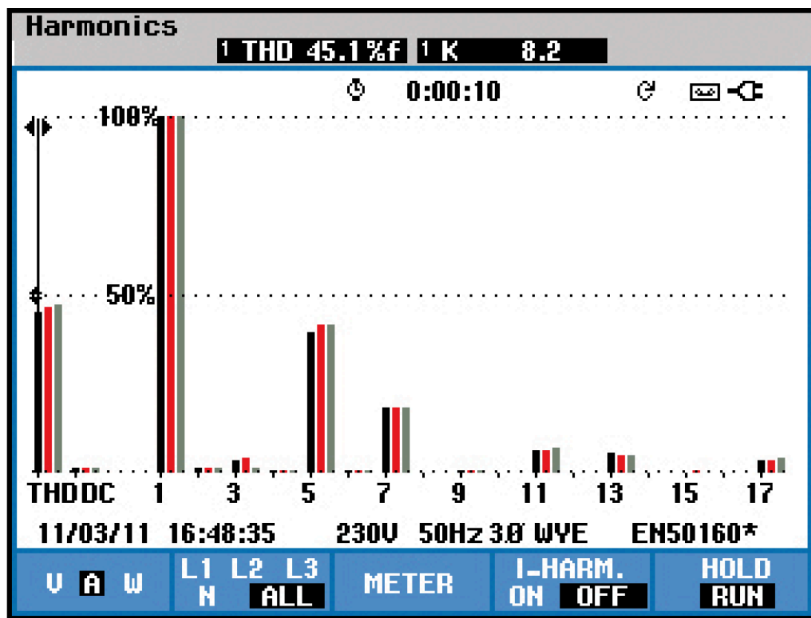
*** Iderated = $I_{nominal} \cdot \sqrt{(70^\circ\text{C} - T_{amb})/25^\circ\text{C}}$

Filter Application

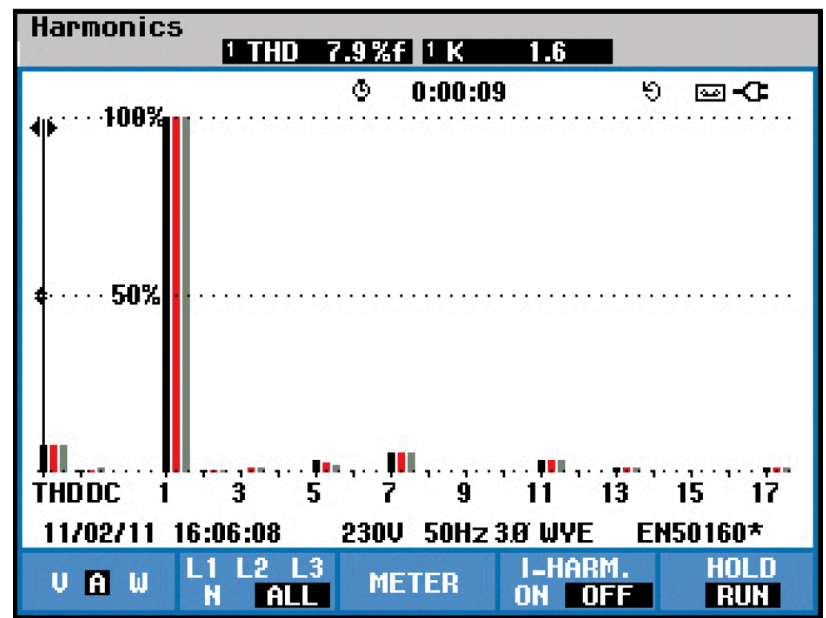
ECOsine filters are best installed directly at the input of 6-pulse rectifiers. It is possible to connect several non-linear loads (e.g. motor drives) in parallel. In this case the rating of the filter must match the sum of the power ratings of drives connected to it. The use of a (built-in) DC-link choke is recommended for best harmonics mitigation performance. If the expected input power exceeds the rating of the largest available filter, and a custom solution is not desired, then two or more filters can be wired in parallel. In this mode of operation, it is recommended to use filters with equal power ratings to ensure proper current sharing.



Typical Filter Performance





Motor drive with Ldc, without harmonic filter



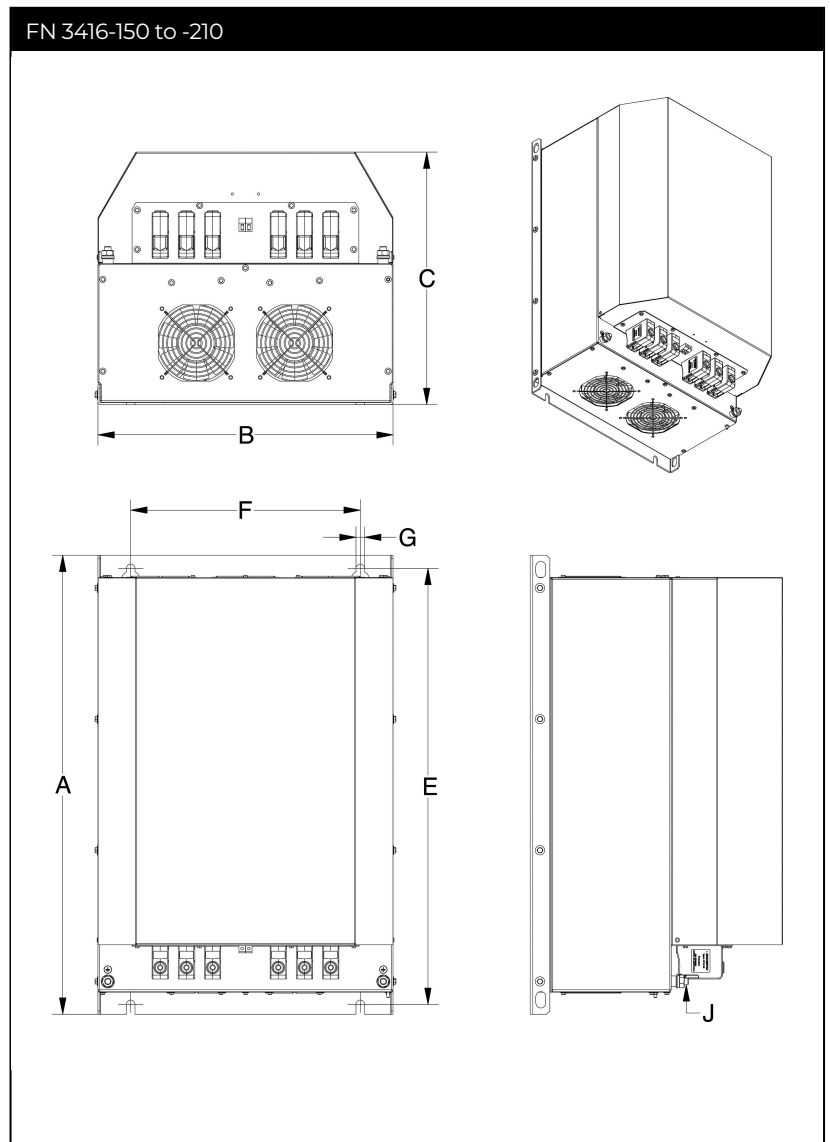
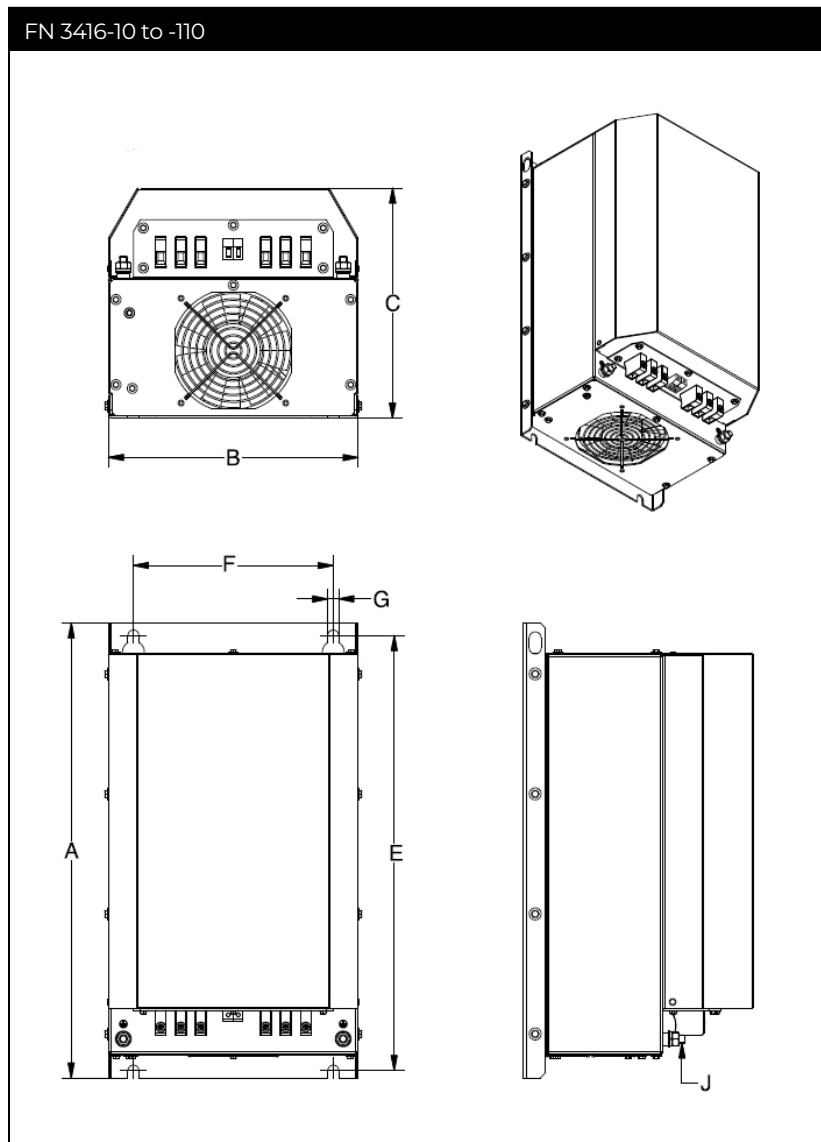
Motor drive with Ldc, with ECOsine FN 3416

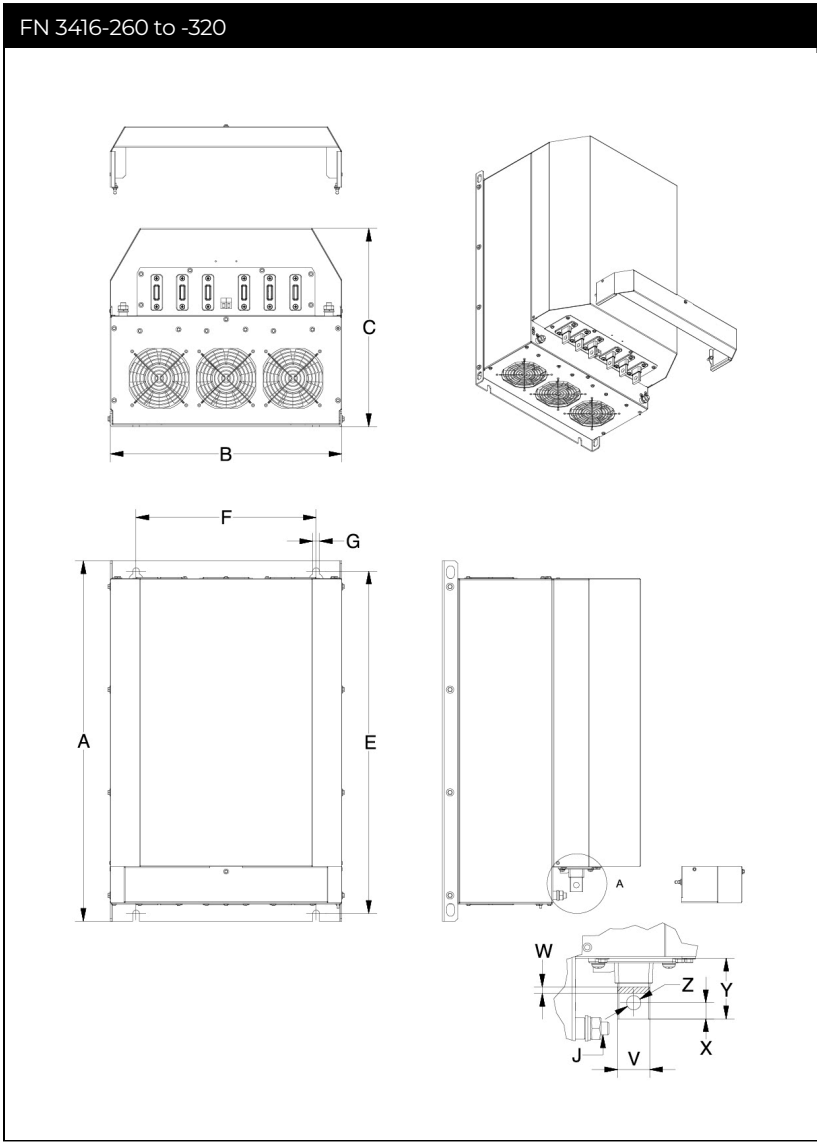
Filter Selection Table

Filter*	Rated load power @ 400 VAC/50 Hz	Rated load power @ 500 VAC/50 Hz	Power loss** @ 25°C/50 Hz	Input /output connections		Weight [kg]
	[kW]	[kW]	[W]			
FN 3416-10-44	4	5.5	63	-44		10
FN 3416-13-44	5.5	7.5	82	-44		10
FN 3416-16-44	7.5	11	105	-44		15
FN 3416-24-33	11	15	153	-33		20
FN 3416-32-33	15	18.5	294	-33		22
FN 3416-38-33	18.5	22	256	-33		25
FN 3416-45-33	22	30	306	-33		29
FN 3416-60-34	30	37	408	-34		37
FN 3416-75-34	37	45	410	-34		43
FN 3416-90-35	45	55	493	-35		47
FN 3416-110-35	55	75	546	-35		50
FN 3416-150-40	75	90	784	-40		86
FN 3416-180-40	90	110	817	-40		92
FN 3416-210-40	110	132	887	-40		100
FN 3416-260-99	132	160	947		-99	125
FN 3416-320-99	160	200	988		-99	135

* Filter to be selected by system voltage and load (motor drive) power. Note: the harmonic filter will reduce RMS input current. Therefore, filter selection by current rating, as it is common for EMC/EMI filters, is not recommended.
 ** Calculated power loss at rated load power.

Mechanical Data





Dimensions

FN 3416-...	10	13	16	24	32	38	45	60	75	90	110	150	180	210	260	320
A	390	390	390	455	455	455	455	520	520	580	580	700	700	700	700	700
B	185	185	185	250	250	250	280	280	280	280	280	450	450	450	450	450
C	190	190	190	230	230	230	230	248	248	248	248	385	385	385	385	385
E	370	370	370	435	435	435	435	500	500	555	555	665	665	665	665	665
F	140	140	140	200	200	200	200	225	225	225	225	350	350	350	350	350
G	9	9	9	11	11	11	11	11	11	11	11	13	13	13	13	13
J	M6	M6	M6	M8	M8	M8	M8	M8	M8	M10	M10	M10	M10	M10	M10	M10
V																25
W																6
X																12.5
Y																47
Z																11

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

Filter connector cross sections	-33	-34	-35	-40	-44
Solid wire	16 mm ²	35 mm ²	50 mm ²	95 mm ²	10 mm ²
Flex wire	10 mm ²	25 mm ²	50 mm ²	95 mm ²	6 mm ²
AWG type wire	AWG 6	AWG 2	AWG 1/0	AWG 4/0	AWG 8
Recommended torque	1.5–1.8 Nm	4.0–4.5 Nm	7–8 Nm	17–20 Nm	1.0–1.2 Nm

Installation

For more detailed information and step by step installation guidelines, please consult the user manual at www.schaffner.com or the installation instructions (delivered with each filter).

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