

Ecosine Max, 50 Hz Passive Harmonic Filters



- Demonstrate best cost-performance ratio
- Achieve 8% THDi for diode rectifier without Ldc, and 5% THDi for diode rectifier with 4% Ldc
- Best-in-class partial load performance
- Most compact open panel design for cabinet integration
- Reliable and robust
- Plug and play, ready to use



Approvals



UL pending

Features and benefits

Schaffner ecosine harmonic filters represent an economical solution to the challenge of load-applied harmonics mitigation in three-phase power systems. With a plug-and-play approach and more compact dimensions than comparable products, they can be quickly installed and easily commissioned. They increase the reliability and service life of electric installations, help utilize electric system capacity better, and are the key to meet Power Quality standards such as IEEE 519. Ecosine filters reshape your distorted current back to the desired sinusoidal waveform. Schaffner ecosine filters can be applied to virtually any kind of power electronics with front-end six-pulse rectifiers, 3-phase diode or thyristor bridges, where harmonic current distortion needs to be reduced to defined limits.

Technical specifications

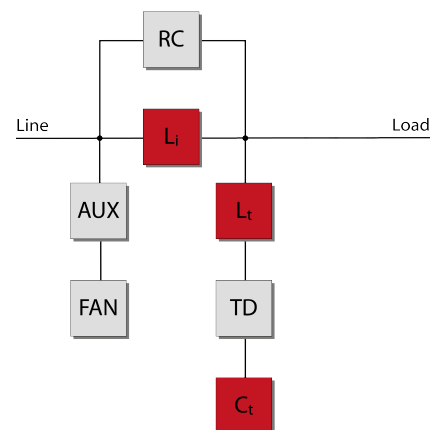
Nominal operating voltage	3 x 380 VAC to 415 VAC ±10%
Operating frequency	50 Hz ±1 Hz
Nominal motor drive input power rating	250 to 500kW
Total harmonic current distortion THID*	<8% @ rated power for drives without Ldc <5% @ rated power for drives equipped with 4% Ldc
Efficiency	>99% for rated voltage and power
High potential test voltage	P -> E 2520 VAC (1s)
Protection category	IP 00
Cooling	External cooling**
Overload capability	1.6x rated current for 1 minute, once per hour
Ambient temperature range	-25°C to +45°C fully operational +45°C to +70°C derated operation*** -25°C to +85°C transport and storage
Flammability corresponding to	UL 94 V-2
Design corresponding to	Filter: UL 61800-5-1, EN 61800-5-1 Chokes: EN 60076-6
Earthing System	TN, TT, IT
Overvoltage category	OV III (IEC 60664-1)
MTBF @ 45°C/415 V (Mil-HB-217F)	>200,000 hours

* System requirements: THVD <2%, line voltage unbalance <1%
 Note: performance specifications in this brochure refer to six-pulse diode rectifiers. SCR rectifier front-ends will produce different results, dependent upon the firing angle of the thyristors.
 ** Please check the inlet air flow required for cooling table on page 6 of this document.
 *** $I_{derated} = I_{nominal} \cdot \sqrt{\frac{(T_{max} - T_{amb})}{(T_{max} - T_{nominal})}} = I_{nom} \cdot \sqrt{\frac{(70^\circ\text{C} - T_{amb})}{25^\circ\text{C}}}$

Typical applications

- Equipment with front-end six-pulse rectifier
- Motor drives
- Factory automation equipment
- Water/wastewater treatment facilities
- Fan and pump applications
- HVAC installations
- Mission-critical processes
- DC fast chargers

Typical electrical schematic



Filter selection table with circuit breaker module

Filter	Rated load power @ 400 V/50 Hz [kW]	Motor drive input current* [Arms]	Rated filter input current [Arms]	Required Ldc for 5% THDi** [mH]	Typical power losses @ 45°C [W]	Circuit breaker rated current [A]	Weight [kg]	Terminal	Frame size
FN 3471-250-99-E0XXSXX	250	435	376	0.082	1974	250	240	Busbar	S08
FN 3471-315-99-E0XXSXX	315	655	475	0.065	2226	250	270	Busbar	S08
FN 3471-355-99-E0XXSXX	355	727	538	0.058	2346	300	292	Busbar	S08
FN 3471-400-99-E0XXSXX	400	808	608	0.051	3501	400	362	Busbar	L08
FN 3471-500-99-E0XXSXX	500	985	766	0.041	3195	400	410	Busbar	L08

* Motor drive input current without harmonic filter.

** FN 3471 filters can be applied for drives with and without Ldc. 8% THDi (@ rated power) is achieved when FN3471 is applied to drives without Ldc, while 5% THDi (@ rated power) is achieved when there is a 4% Ldc present in the drive.

Filter selection table with trap disconnect jumper

Filter	Rated load power @ 400 V/50 Hz [kW]	Motor drive input current* [Arms]	Rated filter input current [Arms]	Required Ldc for 5% THDi** [mH]	Typical power losses @ 45°C [W]	Weight [kg]	Terminal	Frame size
FN 3471-250-99-E0XXJXX	250	435	376	0.082	1974	240	Busbar	S08
FN 3471-315-99-E0XXJXX	315	655	475	0.065	2226	270	Busbar	S08
FN 3471-355-99-E0XXJXX	355	727	538	0.058	2346	292	Busbar	S08
FN 3471-400-99-E0XXJXX	400	808	608	0.051	3501	362	Busbar	L08
FN 3471-500-99-E0XXJXX	500	985	766	0.041	3195	410	Busbar	L08

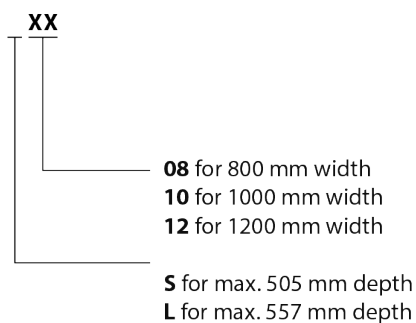
* Motor drive input current without harmonic filter.

** FN 3471 filters can be applied for drives with and without Ldc. 8% THDi (@ rated power) is achieved when FN3471 is applied to drives without Ldc, while 5% THDi (@ rated power) is achieved when there is a 4% Ldc present in the drive.

Earth terminals

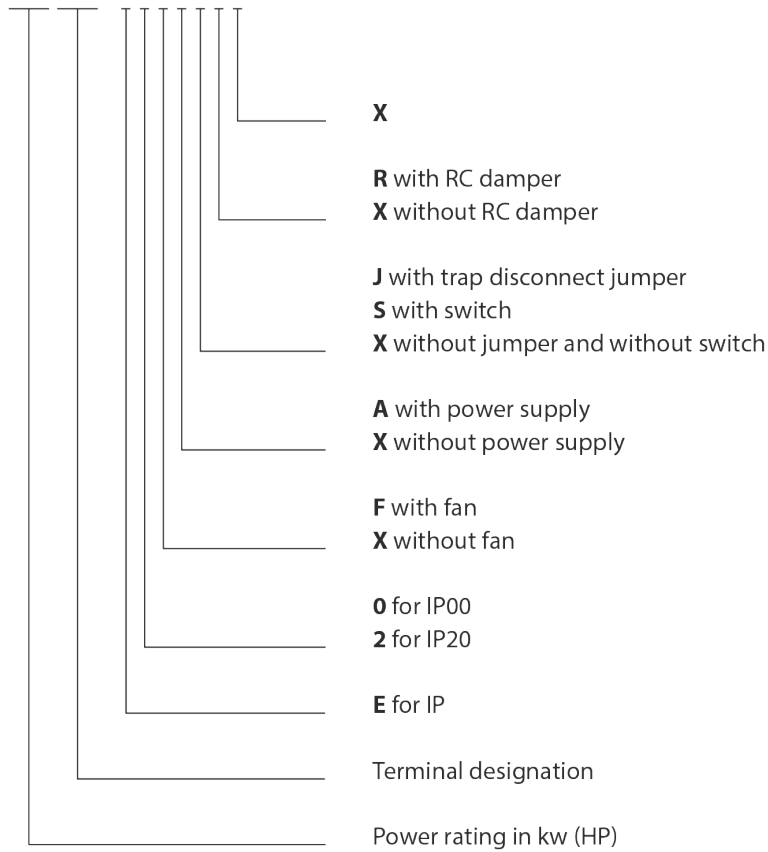
Earth (PE)	Screw thread	Screw torque value [Nm]
S08-L12	M12	20-25

Frame size designation



Product selector

FN 34nn-xxx-yyy-



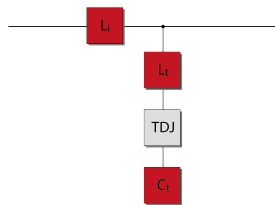
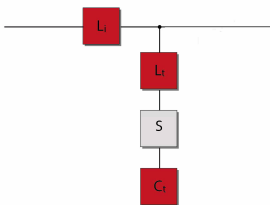
Filter configurations

E0XXSXX

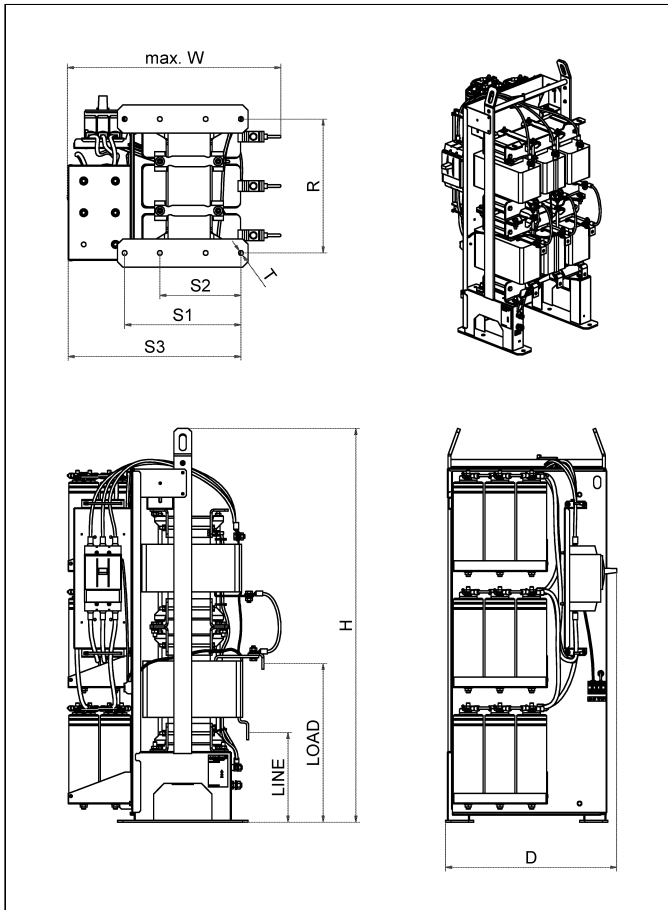
- For rectifiers with and without DC-link choke
- Filters contain trap disconnect switch

E0XXJXX

- For rectifiers with and without DC-link choke
- Filters contain trap disconnect jumper



Mechanical data of IP 00 enclosure



Dimensions

Frame size*	W	D	H	R	S1	S2	S3	T	LINE	LOAD	Recommended cabinet size WxDxH
S08	max. 650	max. 505	1120	380	330	230	490	13.5	255 ± 10	470 ± 30	800x600x2000
S10	890	max. 505	1120	370	514	n/a	280	13.5	255 ± 10	240 ± 30	1000x600x2000
S12	1060	max. 505	1120	370	684	n/a	280	13.5	255 ± 10	230 ± 10	1200x600x2000
L08	max. 680	557	1320	458	320	225	485	13.5	290 ± 10	540 ± 30	800x600x2000
L10	890	max. 557	1320	455	504	n/a	285	13.5	290 ± 10	230 ± 10	1000x600x2000
L12	1060	max. 557	1320	455	674	n/a	285	13.5	290 ± 10	220 ± 10	1200x600x2000

* General tolerance: ISO 2768-v
All dimensions (and tolerance) are in mm.

Inlet air flow required for cooling

Frame size	Min air volume* [m ³ /h]
S08, L08	1050
S10, L10	1050
S12, L12	1050

* External air flow required for filter configurations without embedded ventilation
Recommended installation on top of cabinet.



Headquarters, global innovation and development

Switzerland

Schaffner Group

Industrie Nord
Nordstrasse 11e
4542 Luterbach
T +41 32 681 66 26
info@schaffner.com

To find your local partner within Schaffner's global network: www.schaffner.com

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Sales and application centers

China

Schaffner EMC Ltd. Shanghai

T20-3 C, No 565 Chuangye Road,
Pudong district
201201 Shanghai
T +86 21 3813 9500
cschina@schaffner.com
www.schaffner.com.cn

Finland

Schaffner Oy

Sauvonrinne 19 H
08500 Lohja
T +358 10 567 2855
finlandsales@schaffner.com

France

Schaffner EMC S.A.S.

16-20 Rue Louis Rameau
95875 Bezons
T +33 1 34 34 30 60
F +33 1 39 47 02 28
francesales@schaffner.com

Germany

Schaffner Deutschland GmbH

Schoemperlenstrasse 12B
76185 Karlsruhe
T +49 721 56910
F +49 721 569110
germanysales@schaffner.com

India

Schaffner India Pvt. Ltd

REGUS WORLD TRADE CENTRE
WTC, 22nd Floor Unit No 2238, Brigade
Gateway Campus, 26/1, Dr. Rajkumar Road
Malleshwaram (W)
560055 Bangalore
T +91 80 67935355
indiasales@schaffner.com

Italy

Schaffner EMC S.r.l.

Via Ticino, 30
20900 Monza (MB)
T +39 039 21 41 070
italysales@schaffner.com

Japan

Schaffner EMC K.K.

Taiju-Seimei Sangenjaya Bldg.
1-32-12, Kamiuma, Setagaya-ku
154-0011 Tokyo
T +81 3 5712 3650
F +81 3 5712 3651
japansales@schaffner.com
www.schaffner.jp

Singapore

Schaffner EMC Pte Ltd.

#05-09, Kg Ubi Ind. Estate
408705 Singapore
T +65 6377 3283
F +65 6377 3281
singaporesales@schaffner.com

Spain

Schaffner EMC España

Calle Caléndula 93, Miniparc III, Edificio E
El Soto de Moraleja, Alcobendas
28109 Madrid
T +34 917 912 900
F +34 917 912 901
spainsales@schaffner.com

Sweden

Schaffner EMC AB

Östermalmstorg 1
114 42 Stockholm
T +46 8 5050 2425
swedensales@schaffner.com
www.schaffner.com

Switzerland

Schaffner EMV AG

Industrie Nord
Nordstrasse 11e
4542 Luterbach
T +41 32 681 66 26
switzerlandsales@schaffner.com

Taiwan R.O.C.

Schaffner EMV Ltd.

20 Floor-2, No 97, Section 1, XinTai 5th Road
22175 XiZhi District New Taipei City 22175
T +886 2 2697 5500
F +886 2 2697 5533
taiwansales@schaffner.com
www.schaffner.com.tw

Thailand

Schaffner EMC Co. Ltd.

Northern Region Industrial Estate
67 Moo 4 Tambon Ban Klang
Amphur Muangng P.O. Box 14
51000 Lamphun
T +66 53 58 11 04
F +66 53 58 10 19
thailandsales@schaffner.com

United Kingdom

Schaffner Ltd.

5 Ashville Way, Molly Millars Lane
Wokingham
RG41 2PL Berkshire
T +44 118 9770070
F +44 118 9792969
uksales@schaffner.com

USA

Schaffner EMC Inc.

52 Mayfield Avenue
Edison, New Jersey
T +1 732 225 9533
F +1 732 225 4789
usasales@schaffner.com
www.schaffnerusa.com

Schaffner North America

6722 Thirlane Road
24019 Roanoke, Virginia
T +1 276 228 7943
F +1 276 228 7953

Schaffner North America

823 Fairview Road
24382 Wytheville, Virginia
T +1 276 228 7943
F +1 276 228 7258