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

Technical specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal operating voltage</td>
<td>3 x 440 VAC to 480 VAC ±10%</td>
</tr>
<tr>
<td>Operating frequency</td>
<td>50 Hz ±1 Hz</td>
</tr>
<tr>
<td>Nominal motor drive input power rating</td>
<td>315 to 560kW</td>
</tr>
<tr>
<td>Total harmonic current distortion THID*</td>
<td>&lt;8% @ rated power for drives without Ldc</td>
</tr>
<tr>
<td></td>
<td>&lt;5% @ rated power for drives equipped with 4% Ldc</td>
</tr>
<tr>
<td>Efficiency</td>
<td>&gt;99% for rated voltage and power</td>
</tr>
<tr>
<td>High potential test voltage</td>
<td>P -&gt; E 2520 VAC (1s)</td>
</tr>
<tr>
<td>Protection category</td>
<td>IP 00</td>
</tr>
<tr>
<td>Cooling</td>
<td>External cooling**</td>
</tr>
<tr>
<td>Overload capability</td>
<td>1.6x rated current for 1 minute, once per hour</td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>-25°C to +45°C fully operational</td>
</tr>
<tr>
<td></td>
<td>+45°C to +70°C derated operation***</td>
</tr>
<tr>
<td></td>
<td>-25°C to +85°C transport and storage</td>
</tr>
<tr>
<td>Flammability corresponding to</td>
<td>UL 94 V-2</td>
</tr>
<tr>
<td>Design corresponding to</td>
<td>Filter: UL 61800-5-1, EN 61800-5-1</td>
</tr>
<tr>
<td></td>
<td>Chokes: EN 60176-6</td>
</tr>
<tr>
<td></td>
<td>&gt;200,000 hours</td>
</tr>
<tr>
<td>Earthing System</td>
<td>TN, TT, IT</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>OVN (IEC 60664-1)</td>
</tr>
</tbody>
</table>

* 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.

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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.

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

![Typical electrical schematic](image-url)
### Filter selection table with circuit breaker module

<table>
<thead>
<tr>
<th>Filter</th>
<th>Rated load power @ 480 V/50 Hz [kW]</th>
<th>Motor drive input current* [Arms]</th>
<th>Rated filter input current [Arms]</th>
<th>Required Ldc for 5% THDi** [mH]</th>
<th>Typical power losses @ 45°C [W]</th>
<th>Circuit breaker rated current [A]</th>
<th>Weight [kg]</th>
<th>Terminal</th>
<th>Frame size</th>
</tr>
</thead>
<tbody>
<tr>
<td>FN 3481-315-99-E0XSSXX</td>
<td>315</td>
<td>564</td>
<td>393</td>
<td>0.094</td>
<td>2223</td>
<td>250</td>
<td>250</td>
<td>Busbar</td>
<td>S08</td>
</tr>
<tr>
<td>FN 3481-355-99-E0XSSXX</td>
<td>355</td>
<td>630</td>
<td>444</td>
<td>0.083</td>
<td>2274</td>
<td>250</td>
<td>272</td>
<td>Busbar</td>
<td>S08</td>
</tr>
<tr>
<td>FN 3481-400-99-E0XSSXX</td>
<td>400</td>
<td>701</td>
<td>501</td>
<td>0.074</td>
<td>2403</td>
<td>300</td>
<td>288</td>
<td>Busbar</td>
<td>S08</td>
</tr>
<tr>
<td>FN 3481-500-99-E0XSSXX</td>
<td>500</td>
<td>856</td>
<td>630</td>
<td>0.059</td>
<td>3240</td>
<td>400</td>
<td>376</td>
<td>Busbar</td>
<td>L08</td>
</tr>
<tr>
<td>FN 3481-560-99-E0XSSXX</td>
<td>560</td>
<td>947</td>
<td>709</td>
<td>0.053</td>
<td>3256</td>
<td>400</td>
<td>385</td>
<td>Busbar</td>
<td>L08</td>
</tr>
</tbody>
</table>

* Motor drive input current without harmonic filter.
** FN 3481 filters can be applied for drives with and without Ldc. 8% THDi (@ rated power) is achieved when FN3481 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

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<tr>
<th>Filter</th>
<th>Rated load power @ 480 V/50 Hz [kW]</th>
<th>Motor drive input current* [Arms]</th>
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<th>Weight [kg]</th>
<th>Terminal</th>
<th>Frame size</th>
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<td>393</td>
<td>0.094</td>
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* Motor drive input current without harmonic filter.
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### Earth terminals

<table>
<thead>
<tr>
<th>Earth (PE)</th>
<th>Screw thread</th>
<th>Screw torque value [Nm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>S08-L12</td>
<td>M12</td>
<td>20-25</td>
</tr>
</tbody>
</table>

### Frame size designation

- **S08** for 800 mm width
- **10** for 1000 mm width
- **12** for 1200 mm width
- **S** for max. 505 mm depth
- **L** for max. 557 mm depth
Product selector

**FN 34nn-xxx-yyy-**

- **X**
  - with RC damper
  - without RC damper
- **J** with trap disconnect jumper
- **S** with switch
- **X** without jumper and without switch
- **A** with power supply
- **X** without power supply
- **F** with fan
- **X** without fan
- **0** for IP00
- **2** for IP20
- **E** for IP

**Terminal designation**

**Power rating in kw (HP)**

Filter configurations

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

- **EDXXJXX**
  - For rectifiers with and without DC-link choke
  - Filters contain trap disconnect jumper
Mechanical data of IP 00 enclosure

**Dimensions**

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

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

**Inlet air flow required for cooling**

<table>
<thead>
<tr>
<th>Frame size</th>
<th>Min air volume[^a] [m³/h]</th>
</tr>
</thead>
<tbody>
<tr>
<td>S08, L08</td>
<td>1050</td>
</tr>
<tr>
<td>S10, L10</td>
<td>1050</td>
</tr>
<tr>
<td>S12, L12</td>
<td>1050</td>
</tr>
</tbody>
</table>

[^a]: External air flow required for filter configurations without embedded ventilation
Recommended installation on top of cabinet.
Headquarters, global innovation and development

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

Switzerland

China

Schaffner EMC Ltd. Shanghai
T20-3-C, No 656 Chuangye Road, Pudong district
201201 Shanghai
T +86 21 3813 9500
csschina@schaffner.com
www.schaffner.com.cn

Finland

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

Germany

Schaffner Deutschland GmbH
Schoemperlenstrasse 128
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 223B, 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, Kasmuma, 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 Calendula 93, Miniparc III, Edificio E
El Soto de Muriedas, Alcobendas
28109 Madrid
T +34 917 912 900
F +34 917 912 901
spainsales@schaffner.com

Switzerland

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

United Kingdom

Schaffner Ltd.
5 Ashville Way, Molly Mills 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

823 Fairview Road
24382 Wytheville, Virginia
T +1 276 228 7943
F +1 276 228 7953

North America

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

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