General Purpose EMC Filter

- EMC solution for industrial inverters and motor drives
- Rated currents from 8 to 280 A
- Selectable voltage level of 440 V and 520 V
- High differential and common-mode attenuation

### Technical specifications

**Maximum continuous operating voltage**
- 3x 440/250 VAC (FN 351)
- 3x 520/300 VAC (FN 351 H)

**Operating frequency**
- DC to 60 Hz

**Rated currents**
- 8 to 280 A @ 40°C

**High potential test voltage**
- P -> E 2600 VDC for 2 sec (FN 351)
- P -> P 1900 VDC for 2 sec (FN 351)
- P -> E 2750 VDC for 2 sec (FN 351 H)
- P -> P 2250 VDC for 2 sec (FN 351 H)

**Protection category**
- IP 20

**Overload capability**
- 4x rated current at switch on, 1.5x rated current for 1 minute, once per hour

**Temperature range (operation and storage)**
- -25°C to +85°C (25/085/21) (FN 351)
- -25°C to +100°C (25/100/21) (FN 351 H)

**Flammability corresponding to**
- UL 94 V-2 or better

**Design corresponding to**
- UL 1283, CSA 22.2 No. B 1986, IEC/EN 60939

**MTBF @ 40°C/400 V (MIL-HB-217F)**
- 135,000 hours

### Features and benefits

- Broad range of power ratings for fast and convenient filter selection
- Available as 440 VAC (FN 351) and 520 VAC (FN 351 H) versions for network-specific applications
- FN 351 filters provide a broadband common and differential-mode attenuation performance, which remains available also when high interference levels are present
- Solid, touch-safe filter terminals contribute to overall equipment safety
- Introduced as one of the very first motor drive EMC filters in the market, FN 351 has been widely imitated and has successfully proven its function over more than 10 years

### Approvals

- UR / CSA: FN 351 up to 110 A; cCSAus: FN 351 H up to 110 A

### Typical applications

- Three-phase motor drives
- Inverters and converters
- Industrial automation equipment
- UPS
- SMPS
- General purpose three-phase filtering

### Typical electrical schematic

- A typical electrical schematic showing the connections and components of the filter system.
## Filter selection table

<table>
<thead>
<tr>
<th>Filter*</th>
<th>Rated current @ 40°C (25°C)</th>
<th>Typical drive power rating**</th>
<th>Leakage current*** @ 440/520 VAC/50 Hz</th>
<th>Power loss @ 25°C/50 Hz</th>
<th>Input/Output connections</th>
<th>Weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>FN 351-8-29</td>
<td>8 (9.2)</td>
<td>3</td>
<td>0.3</td>
<td>7</td>
<td>-29</td>
<td>0.8</td>
</tr>
<tr>
<td>FN 351-16-29</td>
<td>16 (18.5)</td>
<td>5.5</td>
<td>0.3</td>
<td>8</td>
<td>-29</td>
<td>1.3</td>
</tr>
<tr>
<td>FN 351-25-33</td>
<td>25 (28.9)</td>
<td>11</td>
<td>3.2</td>
<td>8</td>
<td>-33</td>
<td>1.4</td>
</tr>
<tr>
<td>FN 351-36-33</td>
<td>36 (41.6)</td>
<td>15</td>
<td>3.2</td>
<td>9</td>
<td>-33</td>
<td>1.5</td>
</tr>
<tr>
<td>FN 351-50-..</td>
<td>50 (57.7)</td>
<td>22</td>
<td>3.5</td>
<td>11</td>
<td>-33</td>
<td>1.6</td>
</tr>
<tr>
<td>FN 351-64-..</td>
<td>64 (73.9)</td>
<td>30</td>
<td>3.5</td>
<td>15</td>
<td>-34</td>
<td>1.7</td>
</tr>
<tr>
<td>FN 351-80-34</td>
<td>80 (92.3)</td>
<td>37</td>
<td>3.7</td>
<td>23</td>
<td>-34</td>
<td>5.6</td>
</tr>
<tr>
<td>FN 351-110-35</td>
<td>110 (127)</td>
<td>55</td>
<td>3.7</td>
<td>25</td>
<td>-35</td>
<td>5.8</td>
</tr>
<tr>
<td>FN 351-180-36</td>
<td>180 (208)</td>
<td>90</td>
<td>3.7</td>
<td>49</td>
<td>-36</td>
<td>13.0</td>
</tr>
<tr>
<td>FN 351-280-37</td>
<td>280 (323)</td>
<td>132</td>
<td>4.3</td>
<td>70</td>
<td>-37</td>
<td>28.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Filter*</th>
<th>Rated current @ 40°C (25°C)</th>
<th>Typical drive power rating**</th>
<th>Leakage current*** @ 440/520 VAC/50 Hz</th>
<th>Power loss @ 25°C/50 Hz</th>
<th>Input/Output connections</th>
<th>Weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>FN 351 H-8-29</td>
<td>8 (9.2)</td>
<td>4</td>
<td>0.3</td>
<td>7</td>
<td>-29</td>
<td>1.1</td>
</tr>
<tr>
<td>FN 351 H-16-29</td>
<td>16 (18.5)</td>
<td>7.5</td>
<td>0.3</td>
<td>8</td>
<td>-29</td>
<td>1.3</td>
</tr>
<tr>
<td>FN 351 H-25-33</td>
<td>25 (28.9)</td>
<td>15</td>
<td>3.8</td>
<td>8</td>
<td>-33</td>
<td>1.4</td>
</tr>
<tr>
<td>FN 351 H-36-33</td>
<td>36 (41.6)</td>
<td>18.5</td>
<td>3.8</td>
<td>9</td>
<td>-33</td>
<td>1.5</td>
</tr>
<tr>
<td>FN 351 H-50-..</td>
<td>50 (57.7)</td>
<td>30</td>
<td>3.8</td>
<td>11</td>
<td>-33</td>
<td>1.6</td>
</tr>
<tr>
<td>FN 351 H-64-33</td>
<td>64 (73.9)</td>
<td>37</td>
<td>3.8</td>
<td>15</td>
<td>-33</td>
<td>1.7</td>
</tr>
<tr>
<td>FN 351 H-80-34</td>
<td>80 (92.3)</td>
<td>45</td>
<td>4.4</td>
<td>23</td>
<td>-34</td>
<td>5.6</td>
</tr>
<tr>
<td>FN 351 H-110-35</td>
<td>110 (127)</td>
<td>75</td>
<td>4.4</td>
<td>25</td>
<td>-35</td>
<td>5.8</td>
</tr>
<tr>
<td>FN 351 H-180-36</td>
<td>180 (208)</td>
<td>110</td>
<td>4.4</td>
<td>49</td>
<td>-36</td>
<td>13.0</td>
</tr>
</tbody>
</table>

To compile a complete part number, please replace the -.. with the required I/O connection style.

** Calculated at rated current, 400 VAC (FN 351)/480 VAC (FN 351 H) and cos phi=0.8. The exact value depends upon the efficiency of the drive, the motor and the entire application.

*** Standardized calculated leakage current acc. IEC60939 under normal operating conditions (FN 351 at 440 VAC and FN 351H at 520 VAC).

## Typical filter attenuation

Per CISPR 17; A=50Ω/50Ω sym; B=50Ω/50Ω asym; C=0.1Ω/100Ω sym; D=100Ω/0.1Ω sym

### Graphs

- **8 A types**
- **16 A types**
- **25 A types**
- **36 and 50 A types**
- **64 A types**
- **80 and 110 A types**
- **180 A types**
- **280 A types**
# Mechanical data

<table>
<thead>
<tr>
<th>8 and 16 A types</th>
<th>25 to 64 A types</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Diagram" /></td>
<td><img src="image2.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>80 and 110 A types</th>
<th>180 and 280 A types</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3.png" alt="Diagram" /></td>
<td><img src="image4.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>
### Dimensions

<table>
<thead>
<tr>
<th></th>
<th>8 A</th>
<th>8 A (-H)</th>
<th>16 A</th>
<th>25 A</th>
<th>36 A</th>
<th>50 A (-33)</th>
<th>50 A (-34)</th>
<th>64 A (-33)</th>
<th>64 A (-34)</th>
<th>80 A</th>
<th>110 A</th>
<th>180 A</th>
<th>280 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>180</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>400</td>
<td>400</td>
<td>510</td>
<td>700</td>
</tr>
<tr>
<td>B</td>
<td>115</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>170</td>
<td>170</td>
<td>180</td>
<td>260</td>
</tr>
<tr>
<td>C</td>
<td>60</td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>80</td>
<td>90</td>
<td>133</td>
<td>155</td>
</tr>
<tr>
<td>D</td>
<td>85</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>350</td>
<td>350</td>
<td>360</td>
<td>530</td>
</tr>
<tr>
<td>E</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
<td>373</td>
<td>373</td>
<td>470</td>
<td>660</td>
</tr>
<tr>
<td>F</td>
<td>100</td>
<td>136</td>
<td>136</td>
<td>136</td>
<td>136</td>
<td>136</td>
<td>136</td>
<td>136</td>
<td>136</td>
<td>130</td>
<td>130</td>
<td>156</td>
<td>220</td>
</tr>
<tr>
<td>G</td>
<td>6.5</td>
<td>6.5</td>
<td>6.5</td>
<td>6.5</td>
<td>6.5</td>
<td>6.5</td>
<td>6.5</td>
<td>6.5</td>
<td>6.5</td>
<td>15</td>
<td>15 x 6.5</td>
<td>16 x 9</td>
<td>16 x 9</td>
</tr>
<tr>
<td>H</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>I</td>
<td>17</td>
<td>17</td>
<td>17</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>39</td>
<td>39</td>
<td>45</td>
<td>83</td>
<td>110</td>
</tr>
<tr>
<td>J</td>
<td>M6</td>
<td>M6</td>
<td>M6</td>
<td>M6</td>
<td>M6</td>
<td>M6</td>
<td>M6</td>
<td>M6</td>
<td>M6</td>
<td>M10</td>
<td>M10</td>
<td>M10</td>
<td>M10</td>
</tr>
<tr>
<td>L</td>
<td>17</td>
<td>17</td>
<td>17</td>
<td>18.4</td>
<td>18.4</td>
<td>18.4</td>
<td>17</td>
<td>18.4</td>
<td>17</td>
<td>70</td>
<td>70</td>
<td>85</td>
<td>100</td>
</tr>
</tbody>
</table>

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

### Filter input/output connector cross sections

<table>
<thead>
<tr>
<th></th>
<th>-29</th>
<th>-33</th>
<th>-34</th>
<th>-35</th>
<th>-36</th>
<th>-37</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid wire</td>
<td>6 mm²</td>
<td>16 mm²</td>
<td>35 mm²</td>
<td>50 mm²</td>
<td>95 mm²</td>
<td>150 mm²</td>
</tr>
<tr>
<td>Flex wire</td>
<td>4 mm²</td>
<td>10 mm²</td>
<td>25 mm²</td>
<td>50 mm²</td>
<td>95 mm²</td>
<td>150 mm²</td>
</tr>
<tr>
<td>AWG type wire</td>
<td>AWG 10</td>
<td>AWG 6</td>
<td>AWG 2</td>
<td>AWG 1/0</td>
<td>AWG 4/0</td>
<td>AWG 6/0</td>
</tr>
</tbody>
</table>

Recommended torque  
- 0.6-0.8 Nm  
- 1.5-1.8 Nm  
- 4.0-4.5 Nm  
- 7-8 Nm  
- 17-20 Nm  
- 27-30 Nm  

Please visit [www.schaffner.com](http://www.schaffner.com) to find more details on filter connectors.
Headquarters, global innovation and development

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

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
csschina@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
Schoemerlenstrasse 128
76185 Karlsruhe
T +49 721 56910
F +49 721 569110
germany@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
Malleshwar (W)
560055 Bangalore
T +91 80 67935355
indiasales@schaffner.com

Italy
Schaffner EMC S.r.l.
Via Ticino, 30
20090 Monza (MB)
T +39 039 21 41 070
italysales@schaffner.com

Japan
Schaffner EMC K.K.
Taizu-Seimei Sanjyagawa Bldg.
1-32-12, Kamsum, Setagaya-ku
154-0011 Tokyo
T +81 3 5712 3650
F +81 3 5712 3651
japan@schaffner.com
www.schaffner.jp

Singapore
Schaffner EMC Pte Ltd.
#05-09, Kg Ubli 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 Moraleja, Alcobendas
28109 Madrid
T +34 917 912 900
F +34 917 912 901
spainsales@schaffner.com

Sweden
Schaffner EMC AB
Ostermalmsg 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
switzerland@schaffner.com

Taiwan R.O.C.
Schaffner EMV Ltd.
20 Floor-2, No 97, Section 1, XinTai 5th Road
22175 XZhi 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 Muang Ph, Box 14
51000 Lampun
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
NJ 08802 29209
T +1 732 225 9533
F +1 732 225 4789
usasales@schaffner.com

Schaffner North America
6722 Thirland Road
24019 Roanoke, Virginia
T +1 732 225 7943
F +1 732 225 7933

Schaffner North America
823 Fairview Road
24382 Wytheville, Virginia
T +1 732 225 7943
F +1 732 225 7258

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

© 2018 Schaffner Group

The content of this document has been carefully checked and understood. However, neither Schaffner nor its subsidiaries assume any liability whatsoever for any errors or inaccuracies of this document and the consequences thereof. Published specifications are subject to change without notice. Product suitability for any area of application must ultimately be determined by the customer. In all cases, products must never be operated outside their published specifications. Schaffner does not guarantee the availability of all published products. This disclaimer shall be governed by substantive Swiss law and resulting disputes shall be settled by the courts at the place of business of Schaffner Holding AG. Latest publications and a complete disclaimer can be downloaded from the Schaffner website. All trademarks recognized.