Multi-stage EMI Filter with Excellent Attenuation Performance

- Rated currents from 1 to 30 A
- Two-stage filter
- Very high differential and common-mode attenuation
- Optional medical versions (B type)
- Optional safety versions (A type)
- Optional overvoltage protection (Z type)

**Performance indicators**

<table>
<thead>
<tr>
<th>Attenuation performance</th>
<th>standard</th>
<th>high</th>
<th>very high</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated current [A]</td>
<td>0</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>80</td>
<td>100</td>
</tr>
</tbody>
</table>

**Technical specifications**

- **Operating voltage**: 110/250 VAC, 50/60 Hz
- **Operating frequency**: dc to 400 Hz
- **Rated currents**: 1 to 30 A @ 40°C max.
- **High potential test voltage**:
  - P -> PE 2000 VAC for 2 sec (standard types)
  - P -> PE 2500 VAC for 2 sec (B types)
  - P -> N 1100 VDC for 2 sec
- **Design corresponding to**: UL 1283, CSA 22.2 No. 8 1986, IEC/EN 60939
- **Flammability corresponding to**: UL 94 V-2 or better
- **Surge pulse protection (optional)**: 2 kV, IEC 61000-4-5
- **MTBF @ 40°C/230 V (Mil-HB-217F)**: 1,300,000 hours (1 to 10 A types)
  - 1,100,000 hours (12 A types)
  - 517,000 hours (16 and 30 A types)
- **Temperature range (operation and storage)**: -25°C to +100°C (25/100/21)

**Features and benefits**

- FN 2090 two-stage filters are designed for easy and fast chassis mounting.
- The FN 2090 filters are also available as B versions with no Y-capacitors for medical applications as well as A versions with low capacitance for safety critical applications with a requirement for low leakage currents.
- All filters provide an exceptional conducted attenuation performance, based on chokes with high permeable core material and excellent thermal behavior.
- FN 2090 two-stage filters are designed for noisy applications requiring excellent filter performance.
- The higher inductivity versus amperage offers increased attenuation performance with the same form factor compared to FN 2060 and FN 2080 filter series.
- All FN 2090 filters can be delivered with optional surge pulse protection.
- FN 2090 filters are also available as singlestage filters (FN 2030 series).
- Various terminal options allow you to select the desired connection style.

**Typical applications**

- Electrical and electronic equipment
- Consumer goods
- Household equipment
- Building automation
- Industrial applications
- Machinery
- Medical equipment
- Electronic data processing equipment
- Office automation and datacom equipment
- Various noisy applications requiring high filter performance

**Approvals**

- UL
- CSA
- CEC
- RoHS
- CE
### Filter selection table

<table>
<thead>
<tr>
<th>Filter(^a)</th>
<th>Rated current(^b)</th>
<th>Leakage current(^b)</th>
<th>Inductance</th>
<th>Capacitance</th>
<th>Resistance</th>
<th>Input/Output connections</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>@ 40°C (25°C)</td>
<td>@ 230V AC/50 Hz</td>
<td></td>
<td>(L) [μH]</td>
<td>(C_x) [μF]</td>
<td>(C_y) [nF]</td>
<td>(R) [kΩ]</td>
<td></td>
</tr>
<tr>
<td>FN 2090-1-..</td>
<td>1 (1.1)</td>
<td>0.5</td>
<td>20</td>
<td>0.22</td>
<td>2</td>
<td>1</td>
<td>680</td>
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<tr>
<td>FN 2090-3-..</td>
<td>3 (3.4)</td>
<td>0.5</td>
<td>14</td>
<td>0.33</td>
<td>2</td>
<td>1</td>
<td>470</td>
</tr>
<tr>
<td>FN 2090-4-..</td>
<td>4 (4.5)</td>
<td>0.5</td>
<td>14</td>
<td>0.33</td>
<td>2</td>
<td>1</td>
<td>470</td>
</tr>
<tr>
<td>FN 2090-6-..</td>
<td>6 (6.7)</td>
<td>0.67</td>
<td>8</td>
<td>0.47</td>
<td>3.3</td>
<td>1</td>
<td>330</td>
</tr>
<tr>
<td>FN 2090-8-..</td>
<td>8 (8.9)</td>
<td>0.67</td>
<td>8</td>
<td>0.47</td>
<td>3.3</td>
<td>1</td>
<td>330</td>
</tr>
<tr>
<td>FN 2090-10-..</td>
<td>10 (11.2)</td>
<td>0.67</td>
<td>8</td>
<td>0.47</td>
<td>3.3</td>
<td>1</td>
<td>330</td>
</tr>
<tr>
<td>FN 2090-12-..</td>
<td>12 (13.4)</td>
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<td>1</td>
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<td>220</td>
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<tr>
<td>FN 2090-16-..</td>
<td>16 (17.9)</td>
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<td>4</td>
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<td>10</td>
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<td>220</td>
</tr>
<tr>
<td>FN 2090-20-..</td>
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<td>1.02</td>
<td>2.7</td>
<td>1</td>
<td>10</td>
<td>1</td>
<td>220</td>
</tr>
<tr>
<td>FN 2090-30-08</td>
<td>30 (33.5)</td>
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<td>1.5</td>
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<td>10</td>
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<td>220</td>
</tr>
<tr>
<td>FN 2090A-1-..</td>
<td>1 (1.1)</td>
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<td>20</td>
<td>0.22</td>
<td>0.47</td>
<td>4</td>
<td>0.47</td>
</tr>
<tr>
<td>FN 2090A-3-..</td>
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<td>4</td>
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<tr>
<td>FN 2090A-4-..</td>
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<td>0.47</td>
<td>4</td>
<td>0.47</td>
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<td>FN 2090A-6-..</td>
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<td>0.47</td>
<td>4</td>
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<tr>
<td>FN 2090A-10-..</td>
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<td>0.47</td>
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<td>10</td>
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<td>220</td>
</tr>
<tr>
<td>FN 2090A-16-..</td>
<td>16 (17.9)</td>
<td>0.08</td>
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<td>10</td>
<td>1</td>
<td>220</td>
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<tr>
<td>FN 2090A-20-..</td>
<td>20 (22.4)</td>
<td>0.08</td>
<td>2.7</td>
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<td>10</td>
<td>1</td>
<td>220</td>
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<tr>
<td>FN 2090B-1-..</td>
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<td>4</td>
<td>0.47</td>
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<td>1.5</td>
<td>1</td>
<td>10</td>
<td>1</td>
<td>220</td>
</tr>
</tbody>
</table>

\(^{**}\) To compile a complete part number, please replace the .. with the required I/O connection style.

For surge pulse protection, please add Z (e.g. FN 2090Z-10-06, FN 2090BZ-20-08).

\(^{**}\) Maximum leakage under normal operating conditions. Note: if the neutral line is interrupted, worst case leakage could reach twice this level.

### Typical filter attenuation

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

- **1 to 4 A types**
- **6 to 10 A types**
- **12 to 20 A types**
- **30 A types**

![Typical filter attenuation graphs](image-url)
Mechanical data

Connection style -06, 1 A types

Connection style -06, 3 to 20 A types

Connection style -07, 1 A types (same dimensions as style -06)

Connection style -07, 3 to 20 A types (same dimensions as style -06)

Connection style -08, 20 and 30 A types
## Dimensions

<table>
<thead>
<tr>
<th></th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>E (mm)</th>
<th>F (mm)</th>
<th>G (mm)</th>
<th>H (mm)</th>
<th>I (mm)</th>
<th>J (mm)</th>
<th>K (mm)</th>
<th>L (mm)</th>
<th>M (mm)</th>
</tr>
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<tbody>
<tr>
<td>1 A</td>
<td>71</td>
<td>46.6</td>
<td>22.3</td>
<td>50.5</td>
<td>44.5</td>
<td>61</td>
<td>21</td>
<td>10.8</td>
<td>16.8</td>
<td>25.25</td>
<td>5.3</td>
<td>6.3</td>
<td>0.7</td>
</tr>
<tr>
<td>3 A</td>
<td>85</td>
<td>54</td>
<td>30.3</td>
<td>64.8</td>
<td>49.8</td>
<td>75</td>
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<td>19.9</td>
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<td>0.7</td>
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<tr>
<td>4 A</td>
<td>85</td>
<td>54</td>
<td>30.3</td>
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<td>30.3</td>
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<td>12.3</td>
<td>20.8</td>
<td>19.9</td>
<td>5.3</td>
<td>6.3</td>
<td>0.7</td>
</tr>
<tr>
<td>8 A</td>
<td>113 ±1</td>
<td>57.5 ±1</td>
<td>45.4 ±1</td>
<td>94 ±1</td>
<td>56</td>
<td>103</td>
<td>25</td>
<td>12.4</td>
<td>32.4</td>
<td>15.5</td>
<td>4.4</td>
<td>6</td>
<td>0.9</td>
</tr>
<tr>
<td>10 A</td>
<td>113 ±1</td>
<td>57.5 ±1</td>
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<td>6</td>
<td>0.9</td>
</tr>
<tr>
<td>12 A</td>
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<td>45.4 ±1</td>
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<td>15.5</td>
<td>4.4</td>
<td>6</td>
<td>0.9</td>
</tr>
<tr>
<td>16 A</td>
<td>113 ±1</td>
<td>57.5 ±1</td>
<td>45.4 ±1</td>
<td>94 ±1</td>
<td>56</td>
<td>103</td>
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<td>15.5</td>
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<td>6</td>
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</tr>
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<td>57.5 ±1</td>
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<td>103</td>
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<td>15.5</td>
<td>4.4</td>
<td>6</td>
<td>0.9</td>
</tr>
<tr>
<td>30 A</td>
<td>113 ±1</td>
<td>57.5 ±1</td>
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<td>103</td>
<td>25</td>
<td>12.4</td>
<td>32.4</td>
<td>15.5</td>
<td>4.4</td>
<td>6</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Tolerances: ±0.5

All dimensions in mm; 1 inch = 25.4 mm

Tolerances according: ISO 2768-m/EN 22768-m

Please visit [www.schaffner.com](http://www.schaffner.com) to find more details on filter connectors.
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