Multi-stage AC/DC 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 enhanced performance versions
- Optional overvoltage protection (Z type)

**Rated voltage**
- 250 VAC, 50/60 Hz; 250 VDC

**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 (equiv. cap <88 nF)
- P -> PE 2550 VDC for 2 sec (equiv. cap >88 nF)
- P -> PE 2500 VAC for 2 sec (B types)
- P -> N 1100 VDC for 2 sec

**Temperature range (operation and storage)**
- -25°C to +100°C (25/100/21)**

**Certified to**
- UL 1283, CSA 22.2 No. 8 1996, IEC/EN 60939 (applies to AC and DC applications)
- Terminal plastic for -06/-08 version: UL 94 V-0
- Laces for -07 version: UL 94 VW-1
- Grommet for -07 version: UL 94 V-0
- Helps compliance to IEC61000-4-5 (Differential Mode only)

**Overvoltage category**
- II acc. IEC 60664-1
- 2 acc. IEC 60664-1

**Pollution degree**
- 2 acc. IEC 60664-1

**Altitude**
- 2000m (above derating applies)**
- 1,300,000 hours (1 to 10 A types)
- 1,100,000 hours (12 and 30 A types)
- 517,000 hours (16 and 30 A types)

**MTBF @ 40°C/230 V (MIL-HB-217F)**
- 1,300,000 hours (1 to 10 A types)
- 1,100,000 hours (12 and 30 A types)
- 517,000 hours (16 and 30 A types)

**Technical specifications**

- **Rated voltage**
- **Operating frequency**
- **Rated currents**
- **High potential test voltage**
- **Temperature range (operation and storage)**
- **Certified to**
- **Flammability corresponding to**
- **Surge pulse protection (Z type)**
- **Overvoltage category**
- **Pollution degree**
- **Altitude**
- **MTBF @ 40°C/230 V (MIL-HB-217F)**

* maximum RMS operating voltage at rated frequency or the maximum DC operating voltage

** for dedicated requests exceeding this specification (e.g. -40 °C or higher altitude) please contact your local Schaffner Sales office

**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

**Performance indicators**

<table>
<thead>
<tr>
<th>Attenuation performance</th>
<th>standard</th>
<th>high</th>
<th>very high</th>
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<tbody>
<tr>
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<td>0</td>
<td>20</td>
<td>60</td>
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<tr>
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<td>40</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>30</td>
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**Features and benefits**

- FN 2090 two-stage filters are designed for easy and fast chassis mounting.
- FN 2090 B versions without capacitors to earth comply to 1MOP for ME (medical equipment) acc. IEC 60601-1
- FN 2090 A versions with low capacitance to earth for safety critical applications with a requirement for low leakage currents.
- FN 2090 filters offers an optimized filter range for enhanced performance AC and DC applications, in same compact size (KK, LL, NN types)
- All filters provide an exceptional conducted attenuation performance, based on chokes with high permeable core material.
- FN 2090 two-stage filters are designed for noisy applications requiring excellent filter performance.
- The higher inductivity offers increased attenuation performance with the same form factor as FN 2060 and FN 2080 series.
- All FN 2090 filters can be delivered with optional surge pulse protection (Z type).
- FN 2090 filters are also available as singlestage filters (FN 2030 series).
- Various terminal options allow you to select the desired connection style.
<table>
<thead>
<tr>
<th>Filter*</th>
<th>Buy</th>
<th>Rated current @ 40°C (25°C)</th>
<th>Leakage current** @ 250V AC/50 Hz (@ 120V AC/60 Hz)</th>
<th>Power Loss @ 25°C/DC</th>
<th>Inductance*** L [mH]</th>
<th>Capacitance*** Cx [nF]</th>
<th>Cy1 [nF]</th>
<th>Cy2 [nF]</th>
<th>Resistance*** R [kΩ]</th>
<th>Input/Output connections</th>
<th>Weight [g]</th>
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<tr>
<td>FN2090-1-..</td>
<td>1 (1.1)</td>
<td>0.45 (0.26)</td>
<td>1.8</td>
<td>20</td>
<td>0.22</td>
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<td>-0.07</td>
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<tr>
<td>FN2090-3-..</td>
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<td>-0.07</td>
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<td>FN2090-4-..</td>
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<td>-0.07</td>
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<tr>
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<td>0.47</td>
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<td>73</td>
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<tr>
<td>FN2090A-30-08</td>
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<tr>
<td>FN2090B-3-..</td>
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<td>0.47</td>
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<td>191</td>
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<tr>
<td>FN2090B-8-..</td>
<td>8 (8.9)</td>
<td>0.00</td>
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<td>0.47</td>
<td>0.47</td>
<td>0.47</td>
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<td>330</td>
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<tr>
<td>FN2090B-10-..</td>
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<td>0.47</td>
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<td>FN2090B-12-..</td>
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<td>-0.07</td>
<td>391</td>
</tr>
<tr>
<td>FN2090B-16-..</td>
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<td>FN2090B-20-..</td>
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<td>FN2090B-30-08</td>
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<td>-0.06</td>
<td>-0.07</td>
<td>548</td>
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</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. FN2090Z-10-06, FN2090BZ-20-08). The different letters code the used Cy values in the filter type (A = 0.47nF; K = 22nF; L = 33nF; N = 100nF; as the FN2090 is a dual stage filter each letter stands for one stage of Cy).
** Maximum leakage under usual AC operating conditions (acc. IEC 60939-3). Note: if the neutral line is interrupted, worst case leakage could reach twice this level. Leakage current for DC application is 0mA.
*** Tolerances apply: Inductance: ±30%+50%, Capacitance: ±20%, Resistance: ±10%
Typical filter attenuation

Per CISPR 17; CM=50 Ω/50 Ω sym; DM=50 Ω/50 Ω asym

1 A: Standard type  A type  B type  Enhanced performance

3 A: Standard type  A type  B type  Enhanced performance

4 A: Standard type  A type  B type  Enhanced performance

6 A: Standard type  A type  B type  Enhanced performance

8 A: Standard type  A type  B type  Enhanced performance
Product selector

<table>
<thead>
<tr>
<th>FN 2090 sp-nn-yy</th>
<th>06</th>
<th>Factor 6.3 x 0.8 mm (soldering)</th>
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<tbody>
<tr>
<td></td>
<td>07</td>
<td>Wire leads</td>
</tr>
<tr>
<td></td>
<td>08</td>
<td>Stud (M4 screw)</td>
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<td>1 to 10</td>
<td>10</td>
<td>Rated current</td>
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<td>Standard version</td>
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<td>Z</td>
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<td>With surge protection</td>
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<td>A</td>
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<td>Safety version</td>
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<td>B</td>
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<td>Medical version</td>
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<td>IX/L/NN</td>
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<td>High performance version</td>
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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, 10 to 30 A types
### Dimensions

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<tr>
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<th>1 A</th>
<th>3 A</th>
<th>4 A</th>
<th>6 A</th>
<th>8 A</th>
<th>10 A</th>
<th>12 A</th>
<th>16 A</th>
<th>20 A</th>
<th>30 A</th>
<th>Tolerances</th>
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**Connection style -06**

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**AWG type wire**

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**Wire length**

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**Connection style -08**

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**Recommended torque (Nm)**

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**Earth terminal**

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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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