

## High Performance EMC/EMI Filter with Earth Line Choke



- | Rated currents up to 15 A
- | Excellent attenuation performance
- | Integrated earth line choke
- | Complies with IEC/EN 60601-1
- | Snap-in versions (S and S1 type)
- | Hot inlet versions (HI type)



### Approvals



### RoHS

(CQC except HI-types)

### Performance indicators

Attenuation performance



Rated current [A]



The FN 9233E IEC inlet filter combines an IEC inlet and mains filter with excellent filter attenuation in a small form factor. The FN 9233E high performance power entry module offers additional EMI suppression on the earth line. Choosing the FN 9233E product line brings you the rapid availability of a standard filter associated with the necessary safety acceptances. Standard IEC connector filters are a practical solution helping you to pass EMI system approval in a short time. A wide selection on amperage ratings, output connections, mounting possibilities and filters for medical applications are designed to offer you the desired solution. For types without additional earth line choke please consult the FN 9233 data sheet.

### Technical specifications

|                                                  |                                                                                                               |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| <b>Maximum continuous operating voltage</b>      | 250 VAC, 50/60 Hz                                                                                             |
| <b>Operating frequency</b>                       | dc to 400 Hz                                                                                                  |
| <b>Rated currents</b>                            | 1 to 15 A @ 50 °C                                                                                             |
| <b>Approvals by rated current</b>                | 1 to 10 A (ENEC, CQC)<br>1 to 15 A (UL, CSA)                                                                  |
| <b>High potential test voltage</b>               | P → PE 2000 VAC for 2 sec (standard types)<br>P → N 1000 VAC for 2 sec<br>P → PE 2500 VAC for 2 sec (B types) |
| <b>Protection category</b>                       | IP40 according to IEC 60529                                                                                   |
| <b>Temperature range (operation and storage)</b> | -25 °C to +85 °C (25/85/21)                                                                                   |
| <b>Design corresponding to</b>                   | UL 1283, CSA 22.2 No. 8 1986, IEC/EN 60939                                                                    |
| <b>Flammability corresponding to</b>             | UL 94 V-2 or better                                                                                           |
| <b>MTBF @ 40°C/230V (Mil-HB-217F)</b>            | 1,710,000 hours                                                                                               |

### Features and benefits

- | Exceptional conducted attenuation performance, based on chokes with high saturation resistance and excellent thermal behavior
- | Rear/front or snap-in mounting
- | Without earth line choke see FN 9233 data sheet
- | Optional medical versions (B type) comply with the requirements of IEC/EN 60601-1 for creepage and clearance, leakage current and high potential testing
- | Wide mounting flanges available
- | Different output connections offering maximum flexibility for assembly
- | Custom-specific versions are available on request

### Typical applications

- | Portable electrical and electronic equipment
- | Small to medium-sized machines and household equipment
- | Single-phase power supplies, switch-mode power supplies
- | Test and measurement equipment
- | Medical equipment
- | Rack mounting equipment

## Filter selection table

| Filter                    | Rated current<br>@ 50 °C (25 °C) | Leakage current*<br>@ 250 VAC/50 Hz | Inductance |            | Capacitance |            | Resistance<br>R | Output connections<br> | Weight<br>[g] |
|---------------------------|----------------------------------|-------------------------------------|------------|------------|-------------|------------|-----------------|-----------------------------------------------------------------------------------------------------------|---------------|
|                           |                                  |                                     | L1<br>[mH] | L2<br>[mH] | Cx<br>[μF]  | Cy<br>[nF] |                 |                                                                                                           |               |
| <b>FN 9233Ex-1-06</b>     | 1 (1.2)                          | 373                                 | 22.5       | 0.4        | 0.1         | 2.2        |                 | -06                                                                                                       | 46            |
| <b>FN 9233Ex-3-06</b>     | 3 (3.5)                          | 373                                 | 4.6        | 0.4        | 0.1         | 2.2        |                 | -06                                                                                                       | 46            |
| <b>FN 9233Ex-6-06</b>     | 6 (7.2)                          | 373                                 | 1.6        | 0.4        | 0.1         | 2.2        |                 | -06                                                                                                       | 46            |
| <b>FN 9233Ex-8-06</b>     | 8 (10.6)                         | 373                                 | 0.9        | 0.4        | 0.1         | 2.2        |                 | -06                                                                                                       | 46            |
| <b>FN 9233Ex-10-06</b>    | 10 (11.6)                        | 373                                 | 0.45       | 0.4        | 0.1         | 2.2        |                 | -06                                                                                                       | 46            |
| <b>FN 9233Ex-12-06</b>    | 12 (12)                          | 373                                 | 0.27       | 0.1        | 0.1         | 2.2        |                 | -06                                                                                                       | 46            |
| <b>FN 9233Ex-15-06</b>    | 15 (15)                          | 373                                 | 0.2        | 0.1        | 0.1         | 2.2        |                 | -06                                                                                                       | 46            |
| <b>FN 9233Ex-12-06HI</b>  | 12 (12)                          | 373                                 | 0.27       | 0.1        | 0.1         | 2.2        |                 | -06                                                                                                       | 46            |
| <b>FN 9233Ex-15-06HI</b>  | 15 (15)                          | 373                                 | 0.2        | 0.1        | 0.1         | 2.2        |                 | -06                                                                                                       | 46            |
| <b>FN 9233ExR-1-06</b>    | 1 (1.2)                          | 373                                 | 22.5       | 0.4        | 0.1         | 2.2        | 1000            | -06                                                                                                       | 46            |
| <b>FN 9233ExR-3-06</b>    | 3 (3.5)                          | 373                                 | 4.6        | 0.4        | 0.1         | 2.2        | 1000            | -06                                                                                                       | 46            |
| <b>FN 9233ExR-6-06</b>    | 6 (7.2)                          | 373                                 | 1.6        | 0.4        | 0.1         | 2.2        | 1000            | -06                                                                                                       | 46            |
| <b>FN 9233ExR-8-06</b>    | 8 (10.6)                         | 373                                 | 0.9        | 0.4        | 0.1         | 2.2        | 1000            | -06                                                                                                       | 46            |
| <b>FN 9233ExR-10-06</b>   | 10 (11.6)                        | 373                                 | 0.45       | 0.4        | 0.1         | 2.2        | 1000            | -06                                                                                                       | 46            |
| <b>FN 9233ExR-12-06</b>   | 12 (12)                          | 373                                 | 0.27       | 0.1        | 0.1         | 2.2        | 1000            | -06                                                                                                       | 46            |
| <b>FN 9233ExR-15-06</b>   | 15 (15)                          | 373                                 | 0.2        | 0.1        | 0.1         | 2.2        | 1000            | -06                                                                                                       | 46            |
| <b>FN 9233ExR-12-06HI</b> | 12 (12)                          | 373                                 | 0.27       | 0.1        | 0.1         | 2.2        | 1000            | -06                                                                                                       | 46            |
| <b>FN 9233ExR-15-06HI</b> | 15 (15)                          | 373                                 | 0.2        | 0.1        | 0.1         | 2.2        | 1000            | -06                                                                                                       | 46            |
| <b>FN 9233ExB-1-06</b>    | 1 (1.2)                          | 2                                   | 22.5       | 0.4        | 0.1         |            | 1000            | -06                                                                                                       | 46            |
| <b>FN 9233ExB-3-06</b>    | 3 (3.5)                          | 2                                   | 4.6        | 0.4        | 0.1         |            | 1000            | -06                                                                                                       | 46            |
| <b>FN 9233ExB-6-06</b>    | 6 (7.2)                          | 2                                   | 1.6        | 0.4        | 0.1         |            | 1000            | -06                                                                                                       | 46            |
| <b>FN 9233ExB-8-06</b>    | 8 (10.6)                         | 2                                   | 0.9        | 0.4        | 0.1         |            | 1000            | -06                                                                                                       | 46            |
| <b>FN 9233ExB-10-06</b>   | 10 (11.6)                        | 2                                   | 0.45       | 0.4        | 0.1         |            | 1000            | -06                                                                                                       | 46            |
| <b>FN 9233ExB-12-06</b>   | 12 (12)                          | 2                                   | 0.27       | 0.1        | 0.1         |            | 1000            | -06                                                                                                       | 46            |
| <b>FN 9233ExB-15-06</b>   | 15 (15)                          | 2                                   | 0.2        | 0.1        | 0.1         |            | 1000            | -06                                                                                                       | 46            |
| <b>FN 9233ExB-12-06HI</b> | 12 (12)                          | 2                                   | 0.27       | 0.1        | 0.1         |            | 1000            | -06                                                                                                       | 46            |
| <b>FN 9233ExB-15-06HI</b> | 15 (15)                          | 2                                   | 0.2        | 0.1        | 0.1         |            | 1000            | -06                                                                                                       | 46            |

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

## Product selector

FN 9233Exx-yy-..HI-zz

Snap-in range for S version only

Blank: Snap-in range 0.7 to 1.5mm

20: Snap-in range 1.5 to 2.2mm

Blank: Standard IEC inlet type C14

HI: Hot IEC inlet type C16 (12 and 15A types only)

06: Faston 6.3 x 0.8mm (spade/soldering)

1 to 15: Rated current

Blank: Standard version

R: Bleed resistor

B: Medical version (with bleed resistor and without Y2-capacitor)

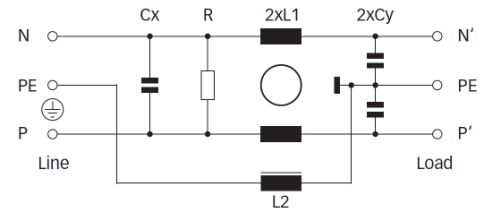
Blank: Standard housing with mounting flanges

U: Housing with wider mounting flanges

S: Snap-in version, snapper on vertical side

S1: Snap-in version, snapper on horizontal side

## Typical electrical schematic

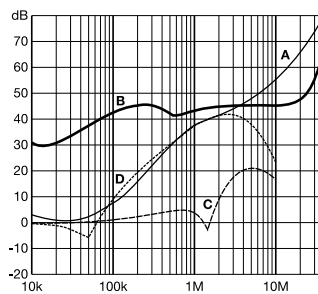


For example: FN 9233E-15-06, FN 9233ES1B-10-06-20, FN 9233ER-12-06HI, FN 9233EUB-8-06-20

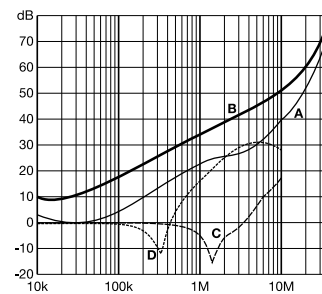
## Typical filter attenuation

Per CISPR 17; A = 50  $\Omega$ /50  $\Omega$  sym; B = 50  $\Omega$ /50  $\Omega$  asym; C = 0.1  $\Omega$ /100  $\Omega$  sym; D = 100  $\Omega$ /0.1  $\Omega$  sym

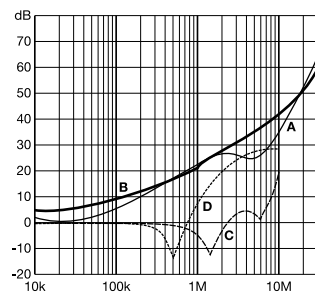
1 and 3 A types

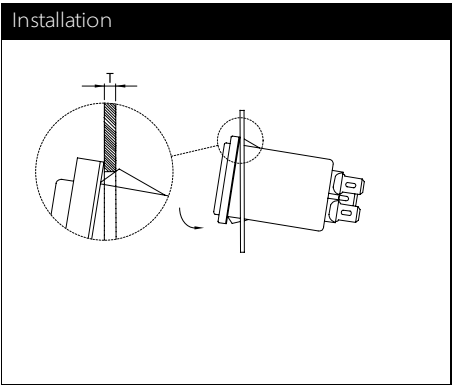
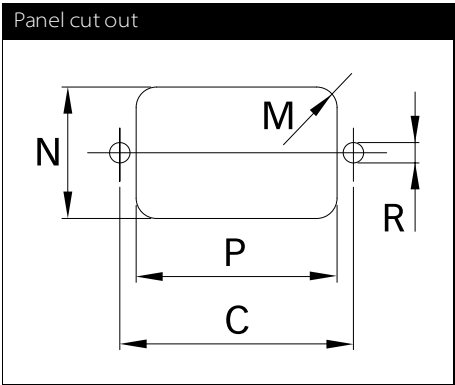
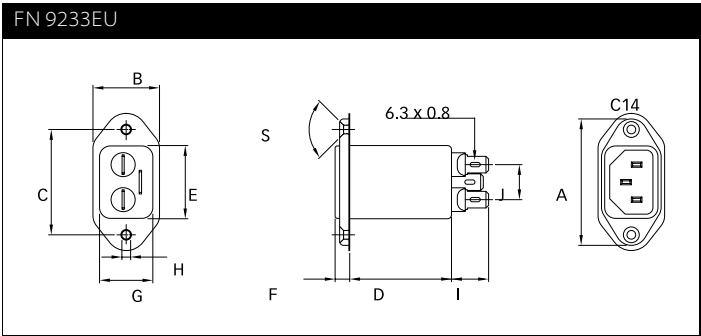
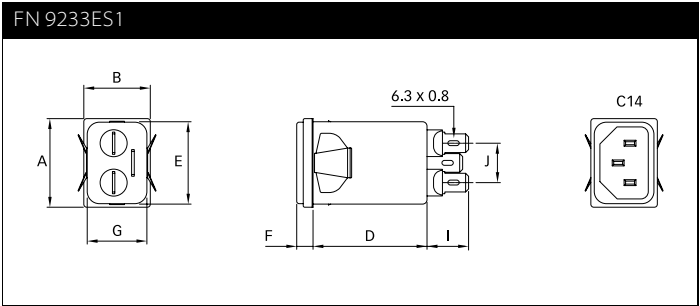
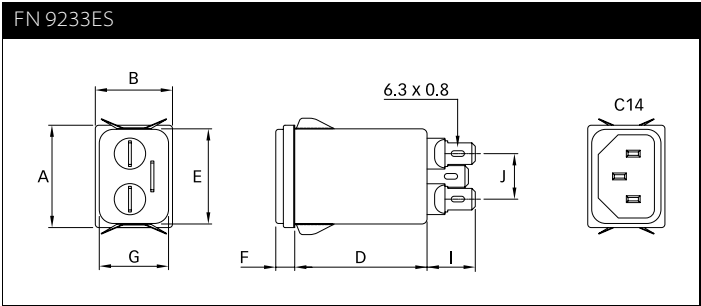
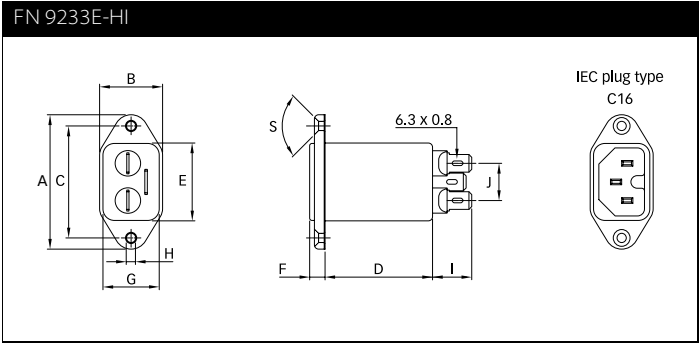
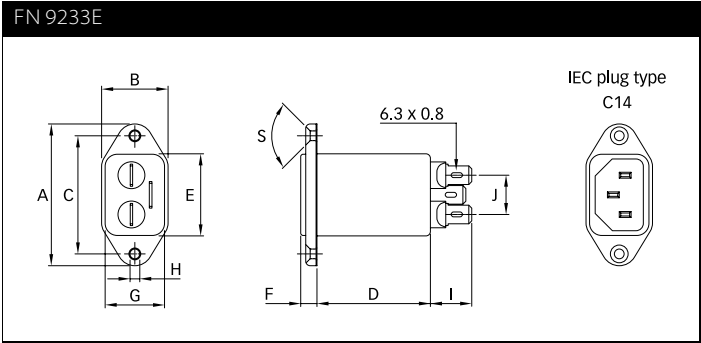


6 to 10 A types



12 and 15 A types





|           | FN 9233E | FN 9233EU | FN 9233ES | FN 9233ES1 | FN 9233E-HI |
|-----------|----------|-----------|-----------|------------|-------------|
| <b>A</b>  | 48       | 51.85     | 29.9      | 29.9       | 48          |
| <b>B</b>  | 22.5     | 25        | 22.4      | 22.4       | 22.5        |
| <b>C</b>  | 40 ±0.2  | 40 ±0.2   |           |            | 40 ±0.2     |
| <b>D</b>  | 46.8     | 46.8      | 46.8      | 46.8       | 46.8        |
| <b>E</b>  | 27.8     | 27.8      | 27.8      | 27.8       | 27.8        |
| <b>F</b>  | 5.5      | 5.5       | 5.5       | 5.5        | 5.5         |
| <b>G</b>  | 20.1     | 20.1      | 20.1      | 20.1       | 20.1        |
| <b>H</b>  | Ø 3.3    | Ø 3.3     |           |            | Ø 3.3       |
| <b>I</b>  | 14       | 14.1      | 14        | 14         | 14          |
| <b>J</b>  | 13.3     | 13.3      | 13.3      | 13.3       | 13.3        |
| <b>M</b>  | R ≤ 3    | R ≤ 3     | R ≤ 1.5   | R ≤ 1.5    | R ≤ 3       |
| <b>N</b>  | 21.5     | 21.5      | 20.8      | 21.9       | 21.5        |
| <b>P</b>  | 28.5     | 28.5      | 29.4      | 28.5       | 28.5        |
| <b>R</b>  | M3       | M3        |           |            | M3          |
| <b>S</b>  | 90°      | 90°       |           |            | 90°         |
| <b>T*</b> |          |           | 0.7 - 1.5 | 0.7 - 1.5  |             |
| <b>T*</b> |          |           | 1.5 - 2.2 | 1.5 - 2.2  |             |

\* For selecting the panel thickness, please refer to the filter selector table.

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 connectors.



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