

# Multi-stage General Purpose EMI Filter



- | Rated currents from 1 to 30 A
- | High differential and common-mode attenuation
- | Optional medical versions (B type)
- | Optional safety versions (A type)



## Approvals



## Technical specifications

|                                                  |                                                                                              |
|--------------------------------------------------|----------------------------------------------------------------------------------------------|
| <b>Operating voltage</b>                         | 110/250 VAC, 50/60 Hz                                                                        |
| <b>Operating frequency</b>                       | dc to 400 Hz                                                                                 |
| <b>Rated currents</b>                            | 1 to 30 A @ 40 °C max.                                                                       |
| <b>High potential test voltage</b>               | P → PE 2000 VAC for 2 sec<br>P → N 1100 VDC for 2 sec<br>P → PE 2500 VAC for 2 sec (B types) |
| <b>Temperature range (operation and storage)</b> | -25 °C to +100 °C (25/100/21)                                                                |
| <b>Flammability corresponding to</b>             | UL 94 V-2 or better                                                                          |
| <b>Design corresponding to</b>                   | UL 1283, CSA 22.2 No. 8 1986, IEC/EN 60939                                                   |
| <b>MTBF @ 40°C/230V (Mil-HB-217F)</b>            | 950,000 hours<br>1,650,000 hours (B types)                                                   |

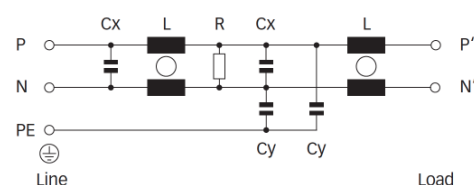
## Features and benefits

- | FN 2060 two-stage filters are designed for easy and fast chassis mounting
- | FN 2060 filters are also available as B versions without Y-capacitors for medical applications as well as A version with low capacitance for safety critical applications with necessity for low leakage currents
- | All filters provide a high conducted attenuation performance, based on chokes with high saturation resistance and excellent thermal behavior
- | FN 2060 two-stage filters are designed for noisy applications requiring good differential and common-mode attenuation
- | FN 2060 filters are also available as single-stage filters (FN 2010 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 good filter performance

## Typical electrical schematic



## Filter selection table

| Filter*               | Rated current<br>@ 40 °C (25 °C) | Leakage current**<br>@ 230 VAC/50 Hz | Inductance<br>L | Capacitance            |                        | Resistance<br>R | Input/Output<br>connections                                                         |                                                                                     |                                                                                     | Weight |
|-----------------------|----------------------------------|--------------------------------------|-----------------|------------------------|------------------------|-----------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------|
|                       | [A]                              | [mA]                                 | [mH]            | C <sub>x</sub><br>[μF] | C <sub>y</sub><br>[nF] | [kΩ]            |  |  |  | [g]    |
| <b>FN 2060-1-..</b>   | 1 (1.2)                          | 0.734                                | 12              | 0.22                   | 4.7                    | 1000            | -06                                                                                 | -07                                                                                 |                                                                                     | 120    |
| <b>FN 2060-3-..</b>   | 3 (3.5)                          | 0.734                                | 2.5             | 0.22                   | 4.7                    | 1000            | -06                                                                                 | -07                                                                                 |                                                                                     | 120    |
| <b>FN 2060-6-..</b>   | 6 (6.9)                          | 0.734                                | 0.97            | 0.22                   | 4.7                    | 1000            | -06                                                                                 | -07                                                                                 |                                                                                     | 120    |
| <b>FN 2060-10-..</b>  | 10 (11.5)                        | 0.734                                | 0.8             | 0.47                   | 4.7                    | 470             | -06                                                                                 | -07                                                                                 |                                                                                     | 190    |
| <b>FN 2060-12-..</b>  | 12 (13.8)                        | 0.734                                | 0.58            | 0.47                   | 4.7                    | 470             | -06                                                                                 | -07                                                                                 |                                                                                     | 190    |
| <b>FN 2060-16-..</b>  | 16 (18.4)                        | 0.734                                | 0.65            | 0.33                   | 4.7                    | 1000            | -06                                                                                 | -07                                                                                 | -08                                                                                 | 260    |
| <b>FN 2060-20-..</b>  | 20 (23)                          | 0.734                                | 0.6             | 1                      | 4.7                    | 220             | -06                                                                                 |                                                                                     | -08                                                                                 | 480    |
| <b>FN 2060-30-08</b>  | 30 (34.5)                        | 0.867                                | 0.6             | 1                      | 10                     | 220             |                                                                                     |                                                                                     | -08                                                                                 | 950    |
| <b>FN 2060A-1-..</b>  | 1 (1.2)                          | 0.074                                | 12              | 0.22                   | 0.47                   | 1000            | -06                                                                                 | -07                                                                                 |                                                                                     | 120    |
| <b>FN 2060A-3-..</b>  | 3 (3.5)                          | 0.074                                | 2.5             | 0.22                   | 0.47                   | 1000            | -06                                                                                 | -07                                                                                 |                                                                                     | 120    |
| <b>FN 2060A-6-..</b>  | 6 (6.9)                          | 0.074                                | 0.97            | 0.22                   | 0.47                   | 1000            | -06                                                                                 | -07                                                                                 |                                                                                     | 120    |
| <b>FN 2060A-10-..</b> | 10 (11.5)                        | 0.074                                | 0.8             | 0.47                   | 0.47                   | 470             | -06                                                                                 | -07                                                                                 |                                                                                     | 190    |
| <b>FN 2060A-12-..</b> | 12 (13.8)                        | 0.074                                | 0.58            | 0.47                   | 0.47                   | 470             | -06                                                                                 | -07                                                                                 |                                                                                     | 190    |
| <b>FN 2060A-16-..</b> | 16 (18.4)                        | 0.074                                | 0.65            | 0.33                   | 0.47                   | 1000            | -06                                                                                 | -07                                                                                 | -08                                                                                 | 260    |
| <b>FN 2060A-20-..</b> | 20 (23)                          | 0.074                                | 0.6             | 1                      | 0.47                   | 220             | -06                                                                                 |                                                                                     | -08                                                                                 | 480    |
| <b>FN 2060A-30-08</b> | 30 (34.5)                        | 0.074                                | 0.6             | 1                      | 0.47                   | 220             |                                                                                     |                                                                                     | -08                                                                                 | 950    |
| <b>FN 2060B-1-..</b>  | 1 (1.2)                          | 0.002                                | 12              | 0.22                   |                        | 1000            | -06                                                                                 | -07                                                                                 |                                                                                     | 120    |
| <b>FN 2060B-3-..</b>  | 3 (3.5)                          | 0.002                                | 2.5             | 0.22                   |                        | 1000            | -06                                                                                 | -07                                                                                 |                                                                                     | 120    |
| <b>FN 2060B-6-..</b>  | 6 (6.9)                          | 0.002                                | 0.97            | 0.22                   |                        | 1000            | -06                                                                                 | -07                                                                                 |                                                                                     | 120    |
| <b>FN 2060B-10-..</b> | 10 (11.5)                        | 0.002                                | 0.8             | 0.47                   |                        | 470             | -06                                                                                 | -07                                                                                 |                                                                                     | 190    |
| <b>FN 2060B-12-..</b> | 12 (13.8)                        | 0.002                                | 0.58            | 0.47                   |                        | 470             | -06                                                                                 | -07                                                                                 |                                                                                     | 190    |
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| <b>FN 2060B-20-..</b> | 20 (23)                          | 0.002                                | 0.6             | 1                      |                        | 220             | -06                                                                                 |                                                                                     | -08                                                                                 | 480    |
| <b>FN 2060B-30-08</b> | 30 (34.5)                        | 0.002                                | 0.6             | 1                      |                        | 220             |                                                                                     |                                                                                     | -08                                                                                 | 950    |

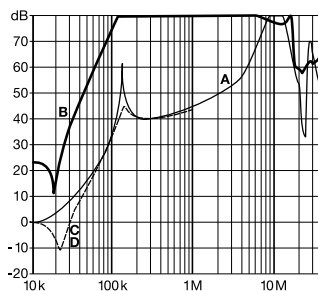
\* To compile a complete part number, please replace the .. with the required I/O connection style (e.g. FN 2060-30-08, FN 2060B-10-06).

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

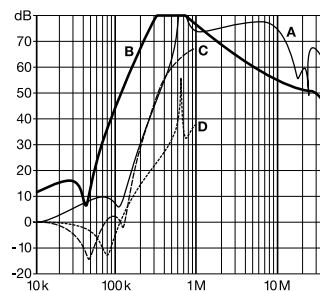
## Typical filter attenuation

dB 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

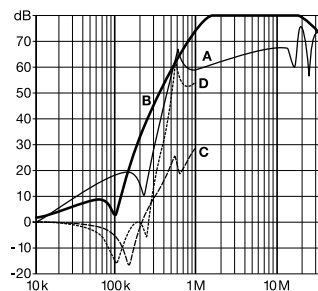
1 A types



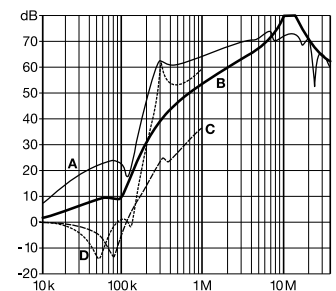
3 to 12 A types



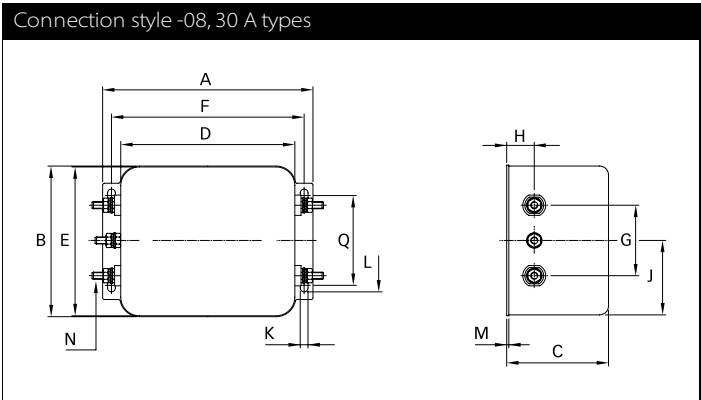
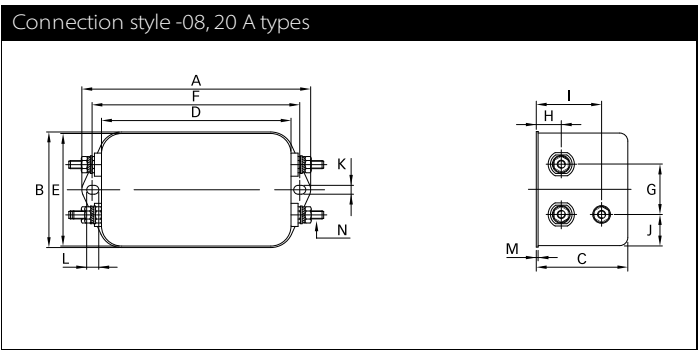
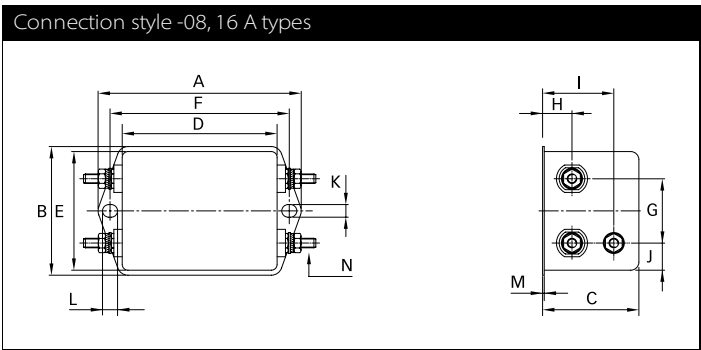
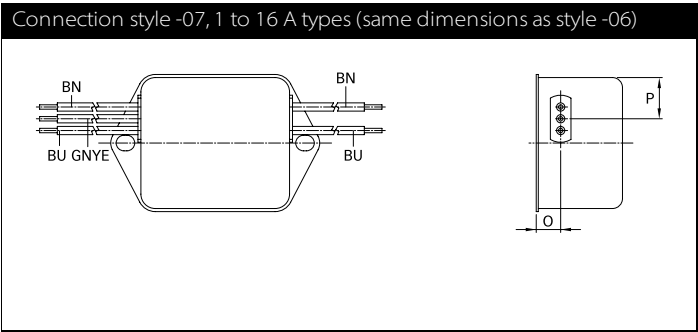
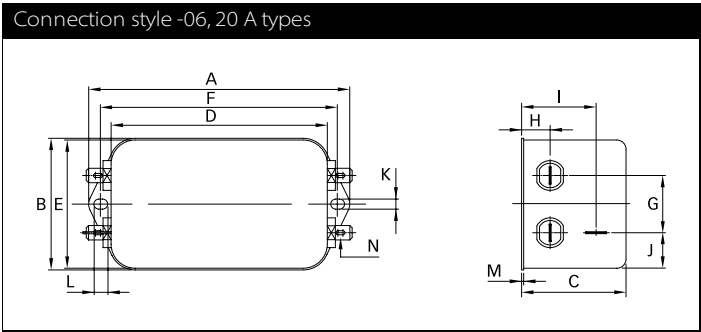
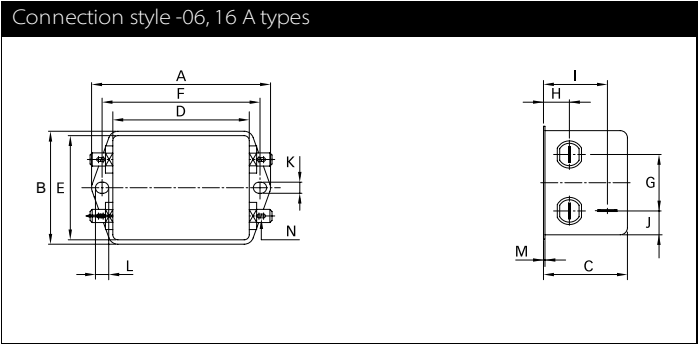
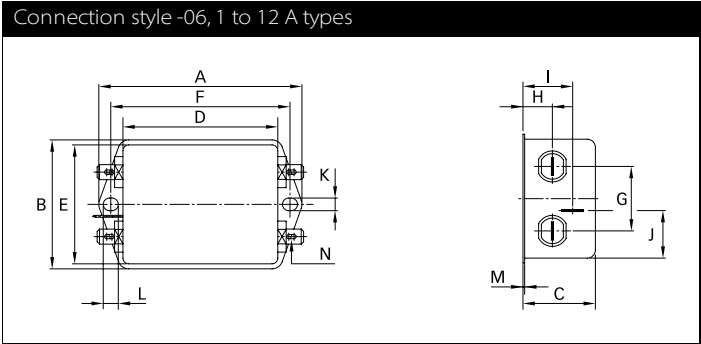
16 A types



20 and 30 A types



Mechanical data



|                             | 1 A       | 3 A       | 6 A       | 10 A      | 12 A      | 16 A      | 20 A      | 30 A      | Tolerances |
|-----------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| <b>A</b>                    | 71        | 71        | 71        | 85        | 85        | 85        | 113.5 ±1  | 119 ±1    | ±0.5       |
| <b>B</b>                    | 46.6      | 46.6      | 46.6      | 54        | 54        | 54        | 57.5 ±1   | 85.5 ±1   | ±0.5       |
| <b>C</b>                    | 29.3      | 29.3      | 29.3      | 30.3      | 30.3      | 40.3      | 45.4 ±1   | 57.6 ±1   | ±0.5       |
| <b>D</b>                    | 50.5      | 50.5      | 50.5      | 64.8      | 64.8      | 64.8      | 94 ±1     | 98.5 ±1   | ±0.5       |
| <b>E</b>                    | 44.5      | 44.5      | 44.5      | 49.8      | 49.8      | 49.8      | 56        | 84.5      | ±0.5       |
| <b>F</b>                    | 61        | 61        | 61        | 75        | 75        | 75        | 103       | 109       | ±0.3       |
| <b>G</b>                    | 21        | 21        | 21        | 27        | 27        | 27        | 25        | 40        | ±0.2       |
| <b>H</b>                    | 10.8      | 10.8      | 10.8      | 12.3      | 12.3      | 12.3      | 12.4      | 15.6      | ±0.5       |
| <b>I</b>                    | 19.3      | 19.3      | 19.3      | 20.8      | 20.8      | 29.8      | 32.4      |           | ±0.5       |
| <b>J</b>                    | 20.1      | 20.1      | 20.1      | 19.9      | 19.9      | 11.4      | 15.5      | 42.25     | ±0.5       |
| <b>K</b>                    | 5.3       | 5.3       | 5.3       | 5.3       | 5.3       | 5.3       | 4.4       | 4.4       |            |
| <b>L</b>                    | 6.3       | 6.3       | 6.3       | 6.3       | 6.3       | 6.3       | 6         | 7.4       |            |
| <b>M</b>                    | 0.7       | 0.7       | 0.7       | 0.7       | 0.7       | 0.7       | 0.9       | 1.2       |            |
| <b>Connection style -06</b> |           |           |           |           |           |           |           |           |            |
| <b>N</b>                    | 6.3 x 0.8 | 6.3 x 0.8 | 6.3 x 0.8 | 6.3 x 0.8 | 6.3 x 0.8 | 6.3 x 0.8 | 6.3 x 0.8 | 6.3 x 0.8 |            |
| <b>Connection style -07</b> |           |           |           |           |           |           |           |           |            |
| <b>O</b>                    | 8.3       | 8.3       | 8.3       | 8.3       | 8.3       | 8.3       |           |           | ±0.5       |
| <b>P</b>                    | 14        | 14        | 14        | 14.9      | 14.9      | 14.9      |           |           |            |
| <b>AWG type wire</b>        | AWG 20    | AWG 20    | AWG 18    | AWG 18    | AWG 16    | AWG 16    |           |           |            |
| <b>Wire length</b>          | 140       | 140       | 140       | 140       | 140       | 140       |           |           | +5         |
| <b>Connection style -08</b> |           |           |           |           |           |           |           |           |            |
| <b>N</b>                    |           |           |           |           |           | M4        | M4        | M4        |            |
| <b>Q</b>                    |           |           |           |           |           |           |           | 51        | ±0.2       |

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 connections.



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