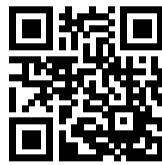


Multi-stage AC/DC EMC/RFI Filter with Excellent Attenuation Performance



- 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)

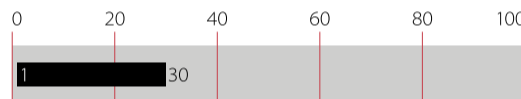


Performance indicators

Attenuation performance



Rated current [A]



Approvals & Compliances



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.

Technical Specifications

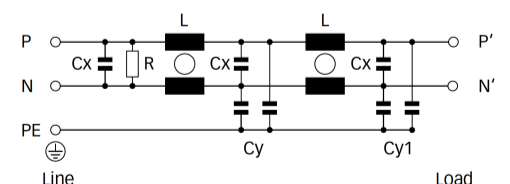
| | |
|--|---|
| Maximum continuous operating voltage | 250 VAC, 50/60 Hz 250 VDC |
| Nominal operating voltage | 230 VAC |
| Rated currents | 1 to 30 A @ 40°C |
| Operating frequency | DC to 400 Hz |
| High potential test voltage | P → N 1100 VDC for 2 sec P → PE 2000 VAC for 2 sec (equiv. cap <88 nF) P → PE 2550 VDC for 2 sec (equiv. cap >88 nF) P → PE 2500 VAC for 2 sec (B types) |
| Overvoltage category | II acc. IEC 60664-1 |
| Pollution degree | 2 acc. IEC 60664-1 |
| Surge pulse protection (Z type) | Helps compliance to IEC61000-4-5 (Differential Mode only) |
| Temperature range (operation and storage) | -25°C to +100°C (25/100/21)** |
| Altitude | 2000m (above derating applies)** |
| Flammability corresponding to | Laces for -07 version: UL 94 VW-1 Terminal plastic for -06/-08 version: UL 94 V-0 Grommet for -07 version: UL 94 V-0 |
| Certified to | UL 1283, CSA 22.2 No. 8 1986, IEC/EN 60939 (applies to AC and DC applications) |
| MTBF (Mil-HB-217F) | ≤10 A: >1,300,000 h @ 40°C/230 V ≥12 A: >1,100,000 h @ 40°C/230 V |

* 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

Typical electrical schematic



Filter Selection Table

| Filter* | Buy | Rated current @ 40°C (25°C) [A] | Leakage current** @ 250V AC/50 Hz (@ 120V AC/60 Hz) [mA] | Power Loss @ 25°C/DC [W] | Inductance*** L [mH] | Capacitance*** | | | Resistance*** R [kΩ] | Input/Output connections | | | Weight [g] |
|-----------------------------|-----|---------------------------------------|---|--------------------------------|----------------------------|----------------|-------------|-------------|----------------------------|-----------------------------|-----|-----|---------------|
| | | | | | | Cx [μF] | Cy1 [nF] | Cy2 [nF] | | | | | |
| FN2090-1-.. | | 1 (1.1) | 0.45 (0.26) | 1.8 | 20 | 0.22 | 2.2 | 1.0 | 680 | -06 | -07 | | 73 |
| FN2090-3-.. | | 3 (3.4) | 0.45 (0.26) | 3.7 | 14 | 0.33 | 2.2 | 1.0 | 470 | -06 | -07 | | 158 |
| FN2090-4-.. | | 4 (4.5) | 0.45 (0.26) | 6.4 | 14 | 0.33 | 2.2 | 1.0 | 470 | -06 | -07 | | 176 |
| FN2090-6-.. | | 6 (6.7) | 0.61 (0.35) | 7.1 | 8 | 0.47 | 3.3 | 1.0 | 330 | -06 | -07 | -08 | 191 |
| FN2090-8-.. | | 8 (8.9) | 0.61 (0.35) | 7.7 | 8 | 0.47 | 3.3 | 1.0 | 330 | -06 | -07 | | 330 |
| FN2090-10-.. | | 10 (11.2) | 0.61 (0.35) | 8.4 | 8 | 0.47 | 3.3 | 1.0 | 330 | -06 | -07 | -08 | 369 |
| FN2090-12-.. | | 12 (13.4) | 0.93 (0.54) | 12.1 | 4 | 1 | 10 | 1.0 | 220 | -06 | -07 | -08 | 391 |
| FN2090-16-.. | | 16 (17.9) | 0.93 (0.54) | 10.7 | 4 | 1 | 10 | 1.0 | 220 | -06 | -07 | | 425 |
| FN2090-20-.. | | 20 (22.4) | 0.93 (0.54) | 8.2 | 2.7 | 1 | 10 | 1.0 | 220 | -06 | | -08 | 530 |
| FN2090-30-08 | | 30 (33.5) | 0.93 (0.54) | 10.1 | 1.5 | 1 | 10 | 1.0 | 220 | | | -08 | 548 |
| Enhanced performance | | | | | | | | | | | | | |
| FN2090A-1-.. | | 1 (1.1) | 0.13 (0.07) | 1.8 | 20 | 0.22 | 0.47 | 0.47 | 680 | -06 | -07 | | 73 |
| FN2090A-3-.. | | 3 (3.4) | 0.13 (0.07) | 3.7 | 14 | 0.33 | 0.47 | 0.47 | 470 | -06 | -07 | | 158 |
| FN2090A-4-.. | | 4 (4.5) | 0.13 (0.07) | 6.4 | 14 | 0.33 | 0.47 | 0.47 | 470 | -06 | -07 | | 176 |
| FN2090A-6-.. | | 6 (6.7) | 0.13 (0.07) | 7.1 | 8 | 0.47 | 0.47 | 0.47 | 330 | -06 | -07 | -08 | 191 |
| FN2090A-8-.. | | 8 (8.9) | 0.13 (0.07) | 7.7 | 8 | 0.47 | 0.47 | 0.47 | 330 | -06 | -07 | | 330 |
| FN2090A-10-.. | | 10 (11.2) | 0.13 (0.07) | 8.4 | 8 | 0.47 | 0.47 | 0.47 | 330 | -06 | -07 | -08 | 369 |
| FN2090A-12-.. | | 12 (13.4) | 0.13 (0.07) | 12.1 | 4 | 1 | 0.47 | 0.47 | 220 | -06 | -07 | -08 | 391 |
| FN2090A-16-.. | | 16 (17.9) | 0.13 (0.07) | 10.7 | 4 | 1 | 0.47 | 0.47 | 220 | -06 | -07 | | 425 |
| FN2090A-20-.. | | 20 (22.4) | 0.13 (0.07) | 8.2 | 2.7 | 1 | 0.47 | 0.47 | 220 | -06 | | -08 | 530 |
| FN2090A-30-08 | | 30 (33.5) | 0.13 (0.07) | 10.1 | 1.5 | 1 | 10 | 10 | 220 | | | -08 | 548 |
| FN2090B-1-.. | | 1 (1.1) | 0.00 | 1.8 | 20 | 0.22 | | | 680 | -06 | -07 | | 73 |
| FN2090B-3-.. | | 3 (3.4) | 0.00 | 3.7 | 14 | 0.33 | | | 470 | -06 | -07 | | 158 |
| FN2090B-4-.. | | 4 (4.5) | 0.00 | 6.4 | 14 | 0.33 | | | 470 | -06 | -07 | | 176 |
| FN2090B-6-.. | | 6 (6.7) | 0.00 | 7.1 | 8 | 0.47 | | | 330 | -06 | -07 | -08 | 191 |
| FN2090B-8-.. | | 8 (8.9) | 0.00 | 7.7 | 8 | 0.47 | | | 330 | -06 | -07 | | 330 |
| FN2090B-10-.. | | 10 (11.2) | 0.00 | 8.4 | 8 | 0.47 | | | 330 | -06 | -07 | -08 | 369 |
| FN2090B-12-.. | | 12 (13.4) | 0.00 | 12.1 | 4 | 1 | | | 220 | -06 | -07 | -08 | 391 |
| FN2090B-16-.. | | 16 (17.9) | 0.00 | 10.7 | 4 | 1 | | | 220 | -06 | -07 | | 425 |
| FN2090B-20-.. | | 20 (22.4) | 0.00 | 8.2 | 2.7 | 1 | | | 220 | -06 | | -08 | 530 |
| FN2090B-30-08 | | 30 (33.5) | 0.00 | 10.1 | 1.5 | 1 | | | 220 | | | -08 | 548 |
| FN2090KK-1-06 | | 1 (1.15) | 3.46 (1.99) | 1.8 | 20 | 0.22 | 22 | 22 | 680 | -06 | -07 | | 95 |
| FN2090NN-3-06 | | 3 (3.4) | 15.71 (9.05) | 3.7 | 14 | 0.33 | 100 | 100 | 470 | -06 | | | 200 |
| FN2090NN-4-06 | | 4 (4.5) | 15.71 (9.05) | 6.4 | 14 | 0.33 | 100 | 100 | 470 | -06 | | | 210 |
| FN2090NN-6-06 | | 6 (6.7) | 15.71 (9.05) | 7.1 | 8 | 0.47 | 100 | 100 | 330 | -06 | | | 220 |
| FN2090NN-8-06 | | 8 (8.9) | 15.71 (9.05) | 7.7 | 8 | 0.47 | 100 | 100 | 330 | -06 | | | 340 |
| FN2090LL-10-.. | | 10 (11.2) | 5.18 (2.98) | 8.4 | 8 | 0.47 | 33 | 33 | 330 | -06 | | -08 | 470 |
| FN2090LL-12-.. | | 12 (13.4) | 5.18 (2.98) | 12.1 | 4 | 1 | 33 | 33 | 220 | -06 | | -08 | 500 |
| FN2090LL-16-06 | | 16 (17.9) | 5.18 (2.98) | 10.7 | 4 | 1 | 33 | 33 | 220 | -06 | | | 530 |
| FN2090LL-20-.. | | 20 (23) | 5.18 (2.98) | 8.2 | 2.7 | 1 | 33 | 33 | 220 | -06 | | -08 | 580 |
| FN2090LL-30-08 | | 30 (33.5) | 5.18 (2.98) | 10.1 | 1.5 | 1 | 33 | 33 | 220 | | | -08 | 600 |

* 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.

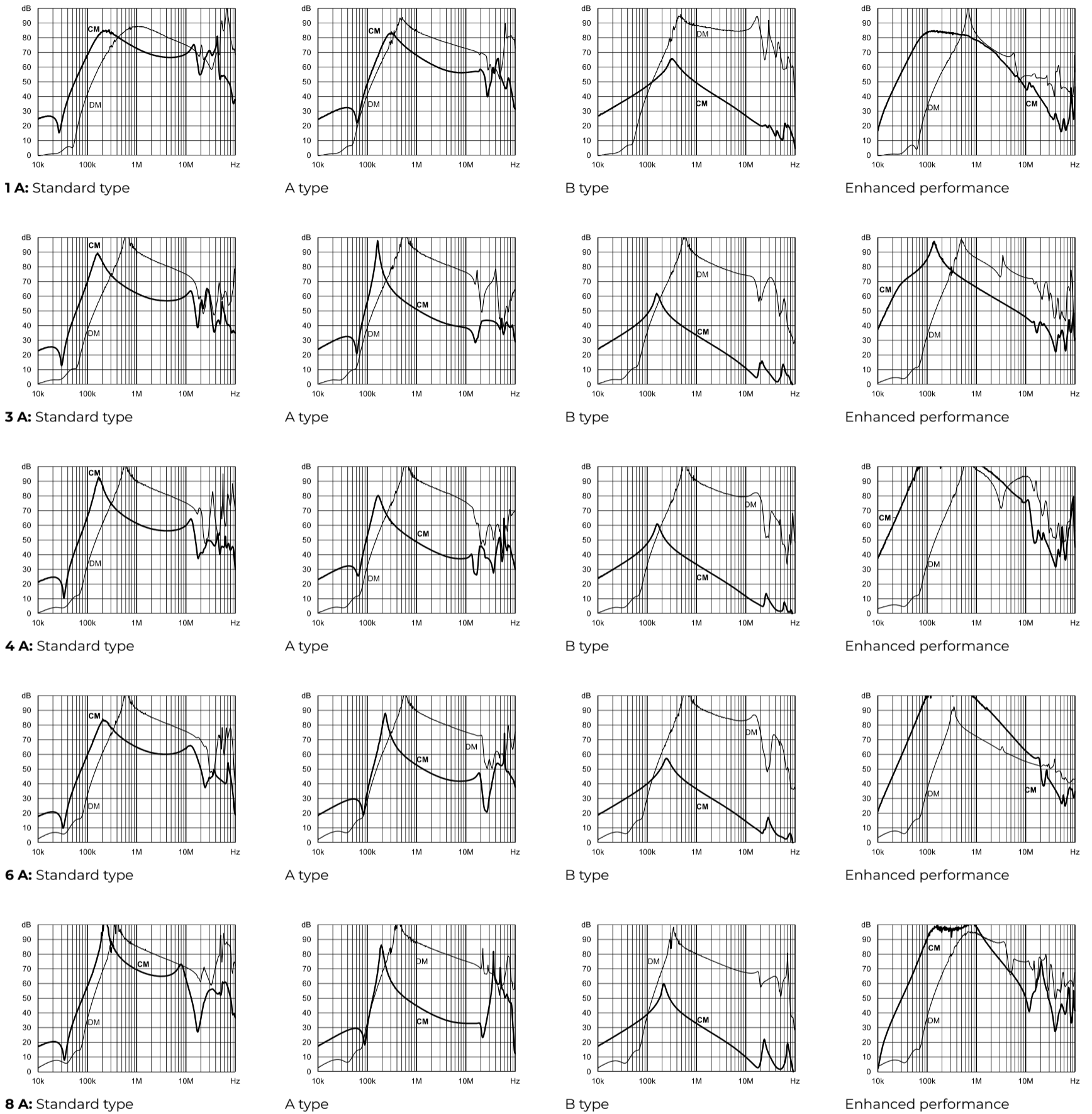
FN2090Z-10-06, FN2090BZ-20-08). The different letters code the used Cy values in the filter type (A = 0.47nF; K = 22nF; L = 33nF; N = 100nF; as the FN2090 is a dual stage filter each letter stands for one stage of Cy)

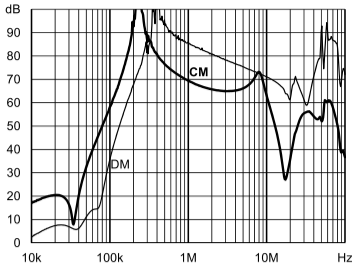
** Maximum leakage under usual AC operating conditions (acc. IEC 60939-3). Note: if the neutral line is interrupted, worst case leakage could reach twice this level. Leakage current for DC application is 0mA

*** Tolerances apply: Inductance: -30/+50%, Capacitance: ±20%, Resistance: ±10%

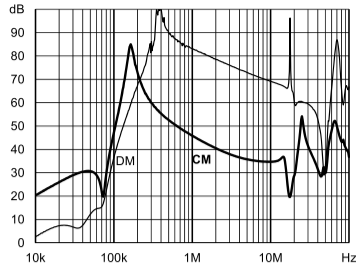
Typical Filter Attenuation

Per CISPR 17: symmetrical 50 Ω/50 Ω -> Differential Mode (DM); asymmetrical 50 Ω/50 Ω -> Common Mode (CM)

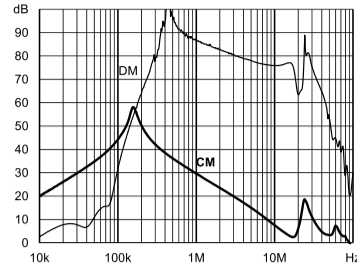




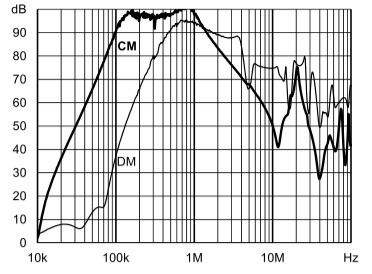
10 A: Standard type



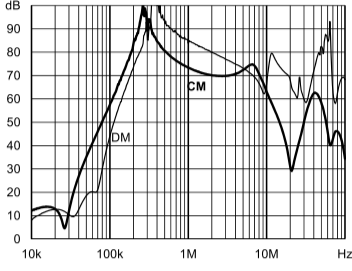
A type



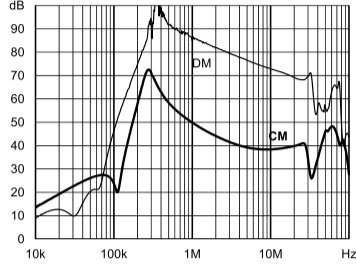
B type



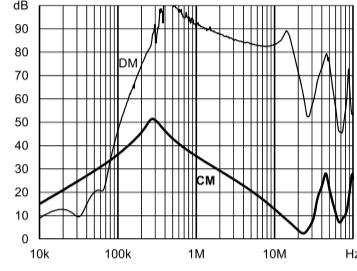
Enhanced performance



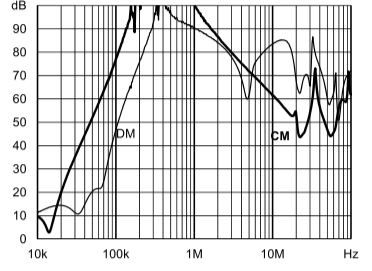
12 A: Standard type



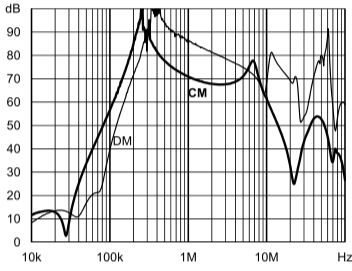
A type



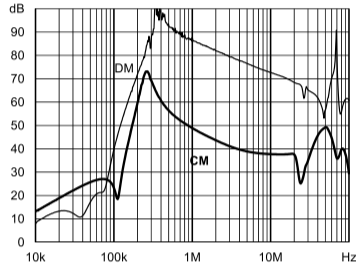
B type



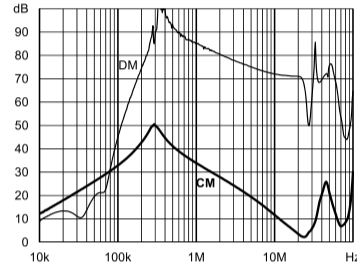
Enhanced performance



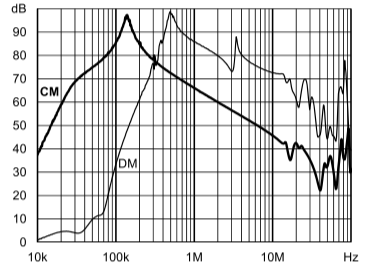
16 A: Standard type



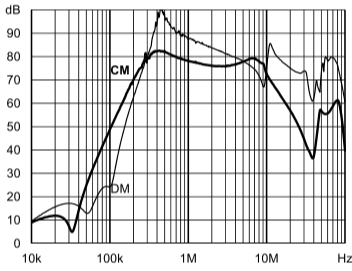
A type



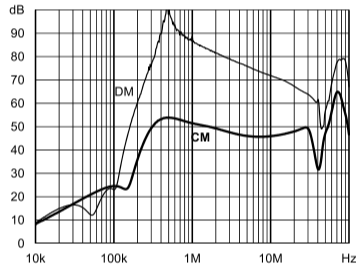
B type



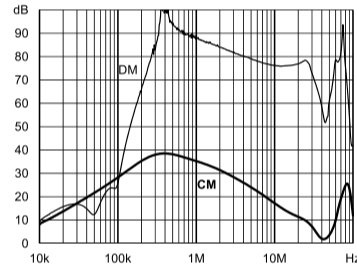
Enhanced performance



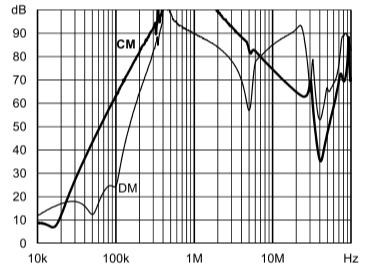
20 A: Standard type



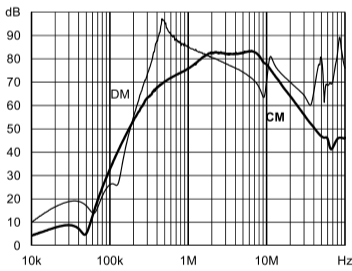
A type



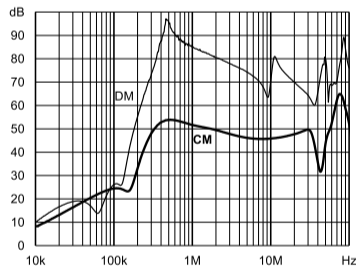
B type



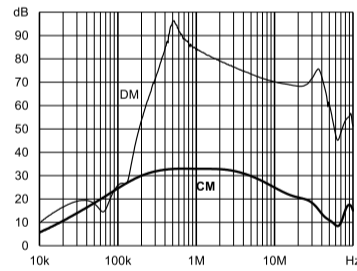
Enhanced performance



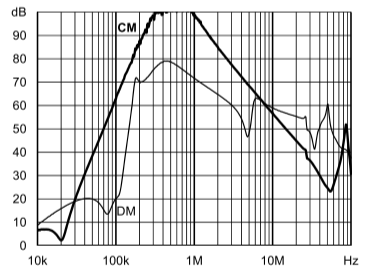
30 A: Standard type



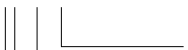




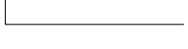

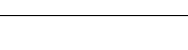

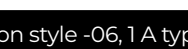
A type



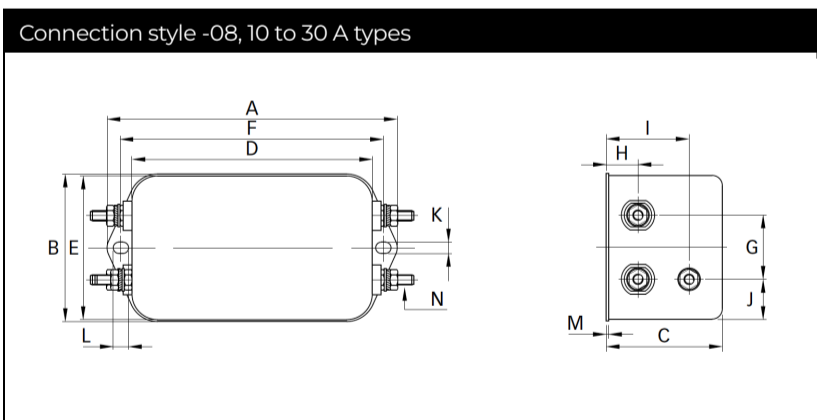
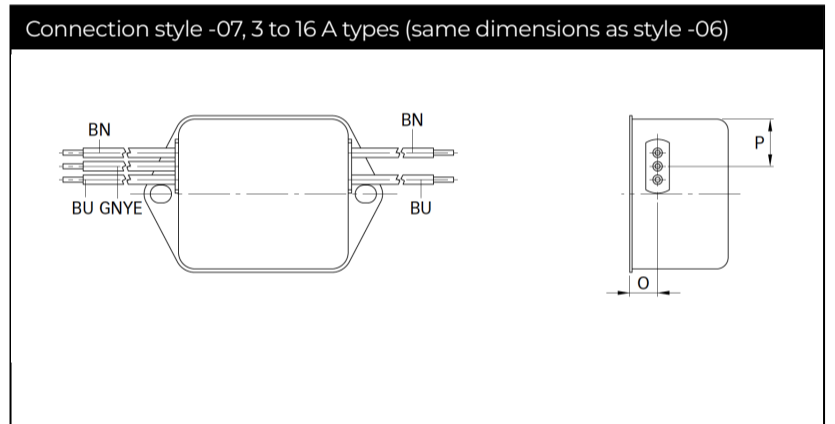
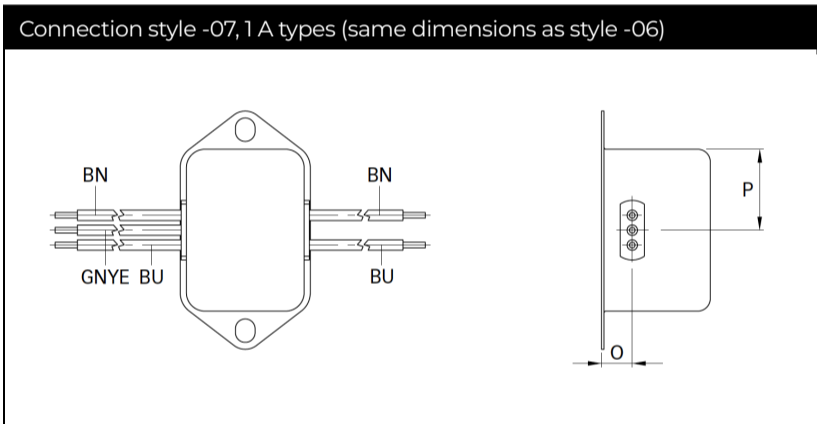
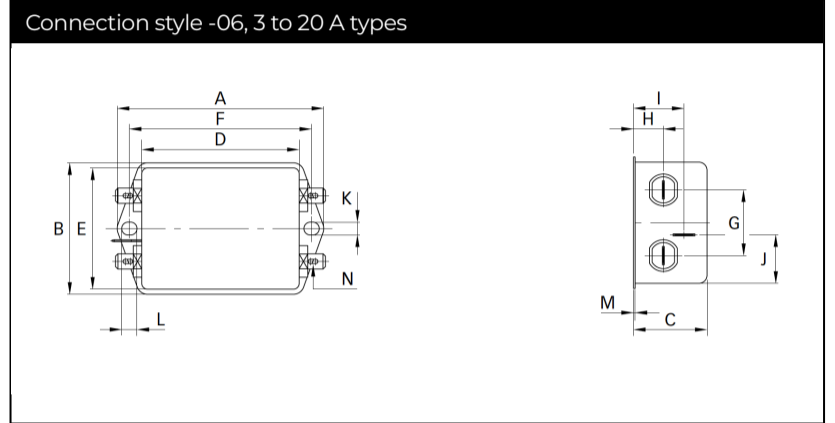
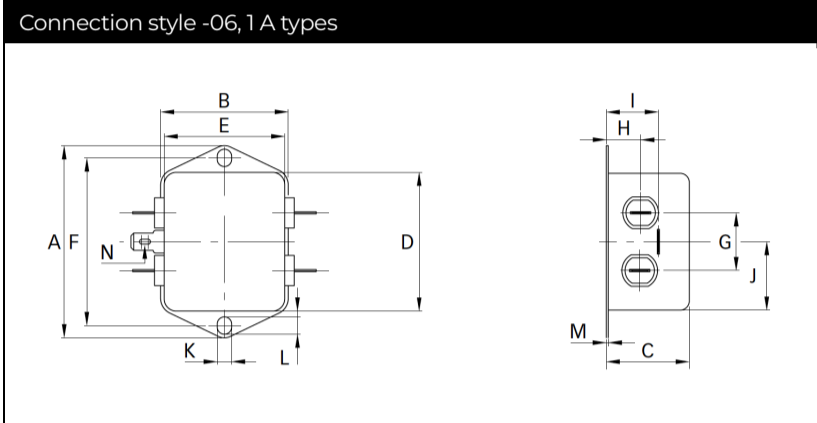
B type



Enhanced performance

| Product Selector | | |
|---|----------|---------------------------------------|
| FN 2090 xy-xx-yy | | |
|  | 06 | Faston 6.3 × 0.8 mm (spade/soldering) |
|  | 07 | Wire leads |
|  | 08 | Studs (M4 screws) |
|  | 1 to 30 | Rated current |
|  | Blank | Standard version |
|  | Z | With surge protection |
|  | Blank | Standard version |
|  | A | Safety version |
|  | B | Medical version |
|  | KK/LL/NN | High performance version |

Mechanical Data



Dimensions

| | 1 A | 3 A | 4 A | 6 A | 8 A | 10 A | 12 A | 16 A | 20 A | 30 A | Tolerances |
|--------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| A | 71 | 85 | 85 | 85 | 113.5 ±1 | 113.5 ±1 | 113.5 ±1 | 113.5 ±1 | 113.5 ±1 | 113.5 ±1 | ±0.5 |
| B | 46.6 | 54 | 54 | 54 | 57.5 ±1 | 57.5 ±1 | 57.5 ±1 | 57.5 ±1 | 57.5 ±1 | 57.5 ±1 | ±0.5 |
| C | 22.3 | 30.3 | 30.3 | 30.3 | 45.4 ±1 | 45.4 ±1 | 45.4 ±1 | 45.4 ±1 | 45.4 ±1 | 45.4 ±1 | ±0.5 |
| D | 50.5 | 64.8 | 64.8 | 64.8 | 94 ±1 | 94 ±1 | 94 ±1 | 94 ±1 | 94 ±1 | 94 ±1 | ±0.5 |
| E | 44.5 | 49.8 | 49.8 | 49.8 | 56 | 56 | 56 | 56 | 56 | 56 | ±0.5 |
| F | 61 | 75 | 75 | 75 | 103 | 103 | 103 | 103 | 103 | 103 | ±0.3 |
| G | 21 | 27 | 27 | 27 | 25 | 25 | 25 | 25 | 25 | 25 | ±0.2 |
| H | 10.8 | 12.3 | 12.3 | 12.3 | 12.4 | 12.4 | 12.4 | 12.4 | 12.4 | 12.4 | ±0.5 |
| I | 16.8 | 20.8 | 20.8 | 20.8 | 32.4 | 32.4 | 32.4 | 32.4 | 32.4 | 32.4 | ±0.5 |
| J | 25.25 | 19.9 | 19.9 | 19.9 | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 | ±0.5 |
| K | 5.3 | 5.3 | 5.3 | 5.3 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | |
| L | 6.3 | 6.3 | 6.3 | 6.3 | 6 | 6 | 6 | 6 | 6 | 6 | |
| M | 0.7 | 0.7 | 0.7 | 0.7 | 1 | 1 | 1 | 1 | 1 | 1 | ±0.3 |
| Connection style -06 | | | | | | | | | | | |
| N | 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 | 6.3 x 0.8 | 6.3 x 0.8 | |
| Connection style -07 | | | | | | | | | | | |
| O | 8.3 | 8.3 | 8.3 | 8.3 | 8.4 | 8.4 | 8.4 | 8.4 | | | ±0.5 |
| P | 14 | 14.9 | 14.9 | 14.9 | 18 | 18 | 18 | 18 | | | ±0.5 |
| AWG type wire | AWG 20 | AWG 20 | AWG 20 | AWG 18 | AWG 18 | AWG 18 | AWG 16 | AWG 16 | | | |
| Wire length | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | | | +5 |
| Connection style -08 | | | | | | | | | | | |
| N | | | | | | M4 | M4 | M4 | M4 | M4 | |
| Recommended torque (Nm) | | | | | | 1.2 - 1.3 | 1.2 - 1.3 | 1.2 - 1.3 | 1.2 - 1.3 | 1.2 - 1.3 | |
| Earth terminal | | | | | | 1.5 - 1.7 | 1.5 - 1.7 | 1.5 - 1.7 | 1.5 - 1.7 | 1.5 - 1.7 | |

All dimensions in mm; 1 inch = 25.4 mm

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

Please visit www.schaffner.com to find more details on filter connectors.

We are here to help



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ED 01/25

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- ✓ Obsolete Management
- ✓ Cost Control Management
- ✓ Shortage Management
- ✓ Alternative Solution
- ✓ Excess Inventory Management