



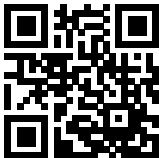
# THE DATASHEET OF FN2070-10-06



# Multi-stage Performance AC/DC EMI Filter



- Rated currents from 1 to 36 A
- High differential and common-mode attenuation
- High frequency attenuation
- Optional medical versions (B type)
- Optional safety versions (A type)



## Approvals & Compliances



## Features and Benefits

- FN2070 two-stage filters are designed for easy and fast chassis mounting
- FN2070 B versions without capacitors to earth comply to 1MOP for ME (medical equipment) acc. IEC 60601-1
- FN2070 A version with low capacitance to earth 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
- FN2070 two-stage filters are designed for high frequency attenuation
- FN2070 filters are also available as single- stage filters (FN2030 series)
- FN2070 filters are also available with differential mode choke (FN2080 series)
- Various terminal options allow you to select the desired connection style

## Technical Specifications

|                                           |                                                                                                                           |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Maximum continuous operating voltage      | 250 VAC, 50/60 Hz<br>250 VDC                                                                                              |
| Nominal operating voltage                 | 230 VAC                                                                                                                   |
| Rated currents                            | 1 to 36 A @ 40°C                                                                                                          |
| Operating frequency                       | DC to 400 Hz                                                                                                              |
| High potential test voltage               | P → PE 2000 VAC for 2 sec<br>P → PE 2500 VAC for 2 sec (B types)<br>P → N 1100 VDC for 2 sec                              |
| Overvoltage category                      | II acc. IEC 60664-1                                                                                                       |
| Pollution degree                          | 2 acc. IEC 60664-1                                                                                                        |
| 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<br>Terminal plastic for -06/-08 version: UL 94 V-0<br>Grommet for -07 version: UL 94V-0 |
| Certified to                              | UL 1283, CSA 22.2 No. 8 1986, IEC/EN 60939 (applies to AC and DC applications)                                            |
| Design corresponding to                   | UL 1283, CSA 22.2 No. 8 1986, IEC/EN 60939                                                                                |
| MTBF (Mil-HB-217F)                        | >1,550,000 h @ 40°C/230 V<br>1,600,000 h (B types) @ 40°C/230 V                                                           |

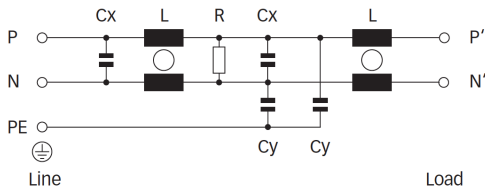
\* maximum RMS operating voltage at rated frequency or the maximum DC operating voltage

\*\* 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 good filter performance
- Single Phase Motor Drives

## Typical electrical schematic



Filter Selection Table

| Filter*              | Buy                                                                                 | Rated current<br>@ 40°C (25°C) | Leakage current**<br>@ 250 VAC/50 Hz<br>(@ 120 VAC/60 Hz) | Power Loss<br>@25°C/DC | Inductance***<br>L | Capacitance*** |      | Resistance***<br>R | Input/Output<br>connections                                                         |                                                                                     |                                                                                     | Weight |
|----------------------|-------------------------------------------------------------------------------------|--------------------------------|-----------------------------------------------------------|------------------------|--------------------|----------------|------|--------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------|
|                      |                                                                                     |                                |                                                           |                        |                    | Cx             | Cy   |                    |                                                                                     |                                                                                     |                                                                                     |        |
|                      |                                                                                     | [A]                            | [mA]                                                      | [W]                    | [mH]               | [µF]           | [nF] | [kΩ]               |  |  |  | [g]    |
| FN2070-1-..          |    | 1 (1.2)                        | 0.66 (0.38)                                               | 2.4                    | 22                 | 0.33           | 4.7  | 1000               | -06                                                                                 | -07                                                                                 |                                                                                     | 190    |
| FN2070-3-..          |    | 3 (3.5)                        | 0.66 (0.38)                                               | 2.2                    | 9.8                | 0.47           | 4.7  | 470                | -06                                                                                 | -07                                                                                 |                                                                                     | 250    |
| FN2070-6-..          |    | 6 (6.9)                        | 0.66 (0.38)                                               | 3.2                    | 7.8                | 1              | 4.7  | 220                | -06                                                                                 | -07                                                                                 |                                                                                     | 450    |
| FN2070-10-..         |    | 10 (11.5)                      | 0.66 (0.38)                                               | 9.1                    | 4.5                | 1              | 4.7  | 220                | -06                                                                                 | -07                                                                                 | -08                                                                                 | 670    |
| FN2070-12-..         |    | 12 (13.8)                      | 0.66 (0.38)                                               | 13.1                   | 3.25               | 1              | 4.7  | 220                | -06                                                                                 | -07                                                                                 | -08                                                                                 | 670    |
| FN2070-16-..         |    | 16 (18.4)                      | 0.66 (0.38)                                               | 9.6                    | 2.8                | 1              | 4.7  | 220                | -06                                                                                 | -07                                                                                 | -08                                                                                 | 1000   |
| FN2070-25-08         |    | 25 (28.8)                      | 0.66 (0.38)                                               | 11.6                   | 2                  | 2.2            | 4.7  | 220                |                                                                                     |                                                                                     | -08                                                                                 | 760    |
| FN2070-36-08         |    | 36 (41.4)                      | 0.66 (0.38)                                               | 13.1                   | 1.23               | 2.2            | 4.7  | 220                |                                                                                     |                                                                                     | -08                                                                                 | 790    |
|                      |                                                                                     |                                |                                                           |                        |                    |                |      |                    |                                                                                     |                                                                                     |                                                                                     |        |
| FN2070A-1-..         |    | 1 (1.2)                        | 0.07 (0.04)                                               | 2.4                    | 22                 | 0.33           | 0.47 | 1000               | -06                                                                                 | -07                                                                                 |                                                                                     | 190    |
| FN2070A-3-..         |    | 3 (3.5)                        | 0.07 (0.04)                                               | 2.2                    | 9.8                | 0.47           | 0.47 | 470                | -06                                                                                 | -07                                                                                 |                                                                                     | 250    |
| FN2070A-6-..         |    | 6 (6.9)                        | 0.07 (0.04)                                               | 3.2                    | 7.8                | 1              | 0.47 | 220                | -06                                                                                 | -07                                                                                 |                                                                                     | 450    |
| FN2070A-10-..        |    | 10 (11.5)                      | 0.07 (0.04)                                               | 9.1                    | 4.5                | 1              | 0.47 | 220                | -06                                                                                 | -07                                                                                 | -08                                                                                 | 670    |
| FN2070A-12-..        |    | 12 (13.8)                      | 0.07 (0.04)                                               | 13.1                   | 3.25               | 1              | 0.47 | 220                | -06                                                                                 | -07                                                                                 | -08                                                                                 | 670    |
| FN2070A-16-..        |    | 16 (18.4)                      | 0.07 (0.04)                                               | 9.6                    | 2.8                | 1              | 0.47 | 220                | -06                                                                                 | -07                                                                                 | -08                                                                                 | 1000   |
| FN2070A-25-08        |   | 25 (28.8)                      | 0.07 (0.04)                                               | 11.6                   | 2                  | 2.2            | 0.47 | 220                |                                                                                     |                                                                                     | -08                                                                                 | 760    |
| FN2070A-36-08        |  | 36 (41.4)                      | 0.07 (0.04)                                               | 13.1                   | 1.23               | 2.2            | 0.47 | 220                |                                                                                     |                                                                                     | -08                                                                                 | 790    |
|                      |                                                                                     |                                |                                                           |                        |                    |                |      |                    |                                                                                     |                                                                                     |                                                                                     |        |
| FN2070B-1-..         |  | 1 (1.2)                        | 0.00                                                      | 2.4                    | 22                 | 0.33           |      | 1000               | -06                                                                                 | -07                                                                                 |                                                                                     | 190    |
| FN2070B-3-..         |  | 3 (3.5)                        | 0.00                                                      | 2.2                    | 9.8                | 0.47           |      | 470                | -06                                                                                 | -07                                                                                 |                                                                                     | 250    |
| FN2070B-6-..         |  | 6 (6.9)                        | 0.00                                                      | 3.2                    | 7.8                | 1              |      | 220                | -06                                                                                 | -07                                                                                 |                                                                                     | 450    |
| FN2070B-10-..        |  | 10 (11.5)                      | 0.00                                                      | 9.1                    | 4.5                | 1              |      | 220                | -06                                                                                 | -07                                                                                 | -08                                                                                 | 670    |
| FN2070B-12-..        |  | 12 (13.8)                      | 0.00                                                      | 13.1                   | 3.25               | 1              |      | 220                | -06                                                                                 | -07                                                                                 | -08                                                                                 | 670    |
| FN2070B-16-..        |  | 16 (18.4)                      | 0.00                                                      | 9.6                    | 2.8                | 1              |      | 220                | -06                                                                                 | -07                                                                                 | -08                                                                                 | 1000   |
| FN2070B-25-08        |  | 25 (28.8)                      | 0.00                                                      | 11.6                   | 2                  | 2.2            |      | 220                |                                                                                     |                                                                                     | -08                                                                                 | 760    |
| FN2070B-36-08        |  | 36 (41.4)                      | 0.00                                                      | 13.1                   | 1.23               | 2.2            |      | 220                |                                                                                     |                                                                                     | -08                                                                                 | 790    |
|                      |                                                                                     |                                |                                                           |                        |                    |                |      |                    |                                                                                     |                                                                                     |                                                                                     |        |
| Enhanced performance |                                                                                     |                                |                                                           |                        |                    |                |      |                    |                                                                                     |                                                                                     |                                                                                     |        |
| FN2070M-1-06         |  | 1 (1.2)                        | 3.69 (2.13)                                               | 2.4                    | 22                 | 0.33           | 47   | 1000               | -06                                                                                 |                                                                                     |                                                                                     | 170    |
| FN2070M-3-06         |  | 3 (3.5)                        | 3.69 (2.13)                                               | 2.2                    | 9.8                | 0.47           | 47   | 470                | -06                                                                                 |                                                                                     |                                                                                     | 250    |
| FN2070M-6-06         |  | 6 (6.9)                        | 3.69 (2.13)                                               | 3.2                    | 7.8                | 1              | 47   | 220                | -06                                                                                 |                                                                                     |                                                                                     | 450    |
| FN2070M-10-..        |  | 10 (11.5)                      | 3.69 (2.13)                                               | 9.1                    | 4.5                | 1              | 47   | 220                | -06                                                                                 |                                                                                     | -08                                                                                 | 670    |
| FN2070M-12-..        |  | 12 (13.8)                      | 3.69 (2.13)                                               | 13.1                   | 3.25               | 1              | 47   | 220                | -06                                                                                 |                                                                                     | -08                                                                                 | 670    |
| FN2070M-16-..        |  | 16 (18.4)                      | 3.69 (2.13)                                               | 9.6                    | 2.8                | 1              | 47   | 220                | -06                                                                                 |                                                                                     | -08                                                                                 | 1000   |
| FN2070M-25-08        |  | 25 (28.8)                      | 3.69 (2.13)                                               | 11.6                   | 2                  | 2.2            | 47   | 220                |                                                                                     |                                                                                     | -08                                                                                 | 750    |
| FN2070L-36-08        |  | 36 (41.4)                      | 2.59 (1.49)                                               | 13.1                   | 1.23               | 2.2            | 33   | 220                |                                                                                     |                                                                                     | -08                                                                                 | 790    |

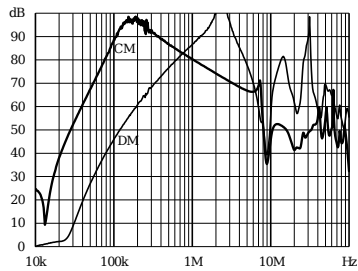
\* To compile a complete part number, please replace the -.. with the required I/O connection style (e.g. FN 2070-25-08, FN 2070B-10-06).

\*\* Maximum leakage under usual AC operating conditions (acc. IEC60939-3). Note: if the neutral line is interrupted, worst case leakage could reach twice this level.

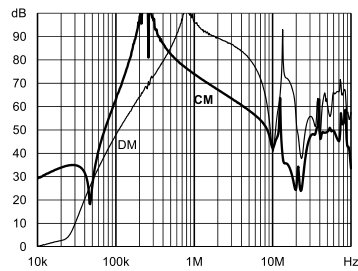
\*\*\* Tolerances apply: Inductance: -30/+50%, Capacitance: ±20%, Resistance: ±10%

## Typical Filter Attenuation

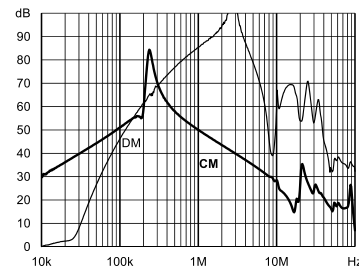
Per CISPR 17: symmetrical 50  $\Omega$ /50  $\Omega$  -> Differential Mode (DM); asymmetrical 50  $\Omega$ /50  $\Omega$  -> Common Mode (CM)



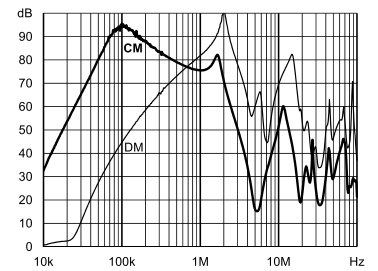
### 1 A: Standard type



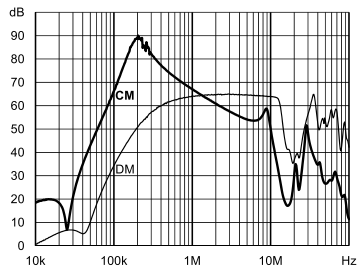
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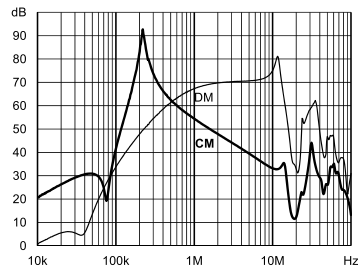
B type



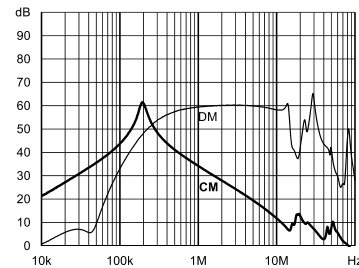
### Enhanced performance



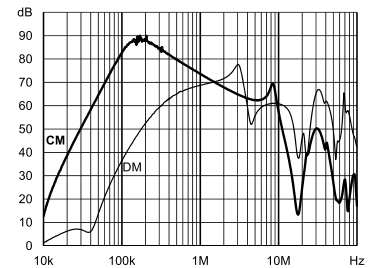
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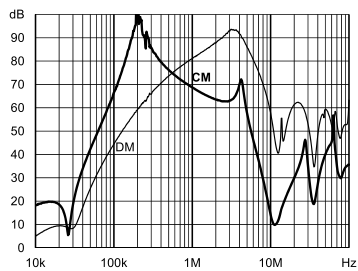
A type



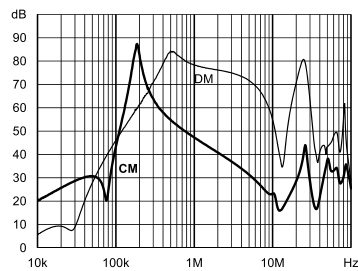
B type



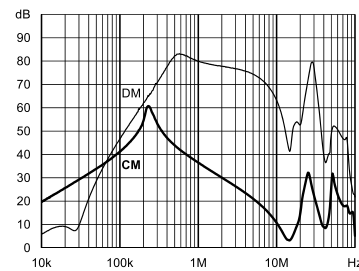
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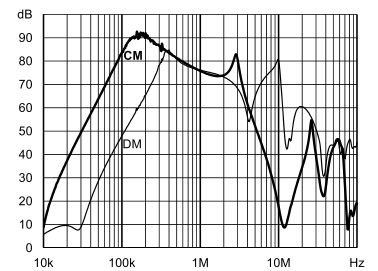
### 6 A: Standard type



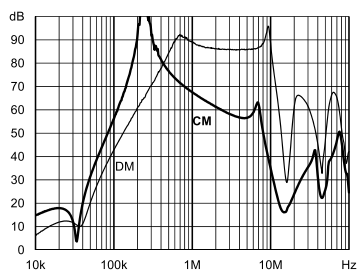
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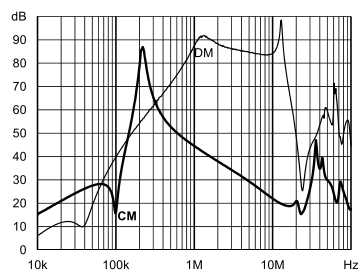
B type



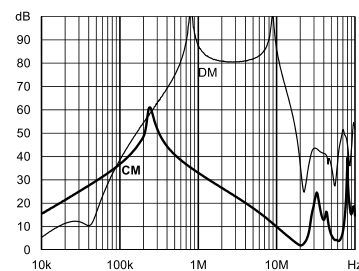
### Enhanced performance



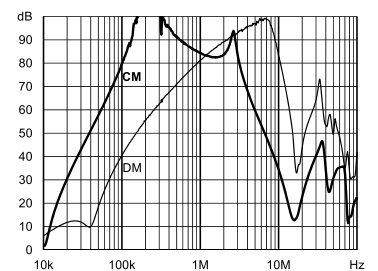
**10 A:** Standard type



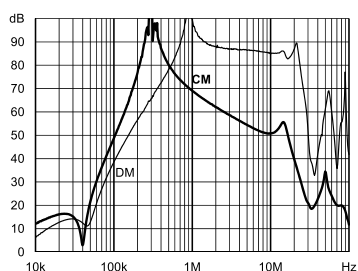
A type



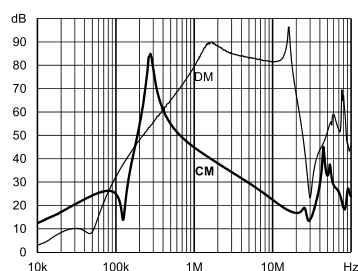
B type



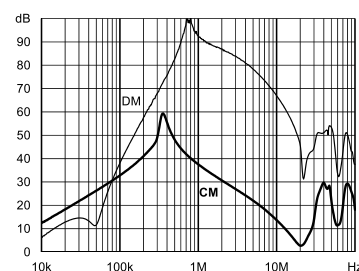
### Enhanced performance



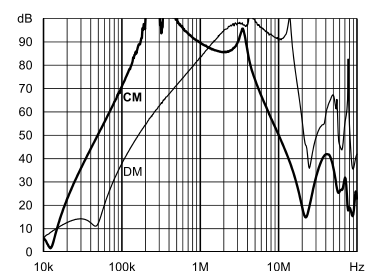
**12 A:** Standard type



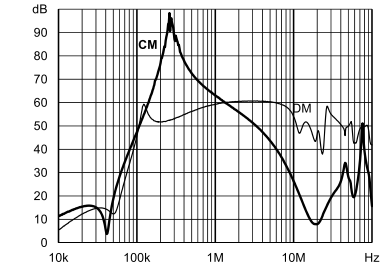
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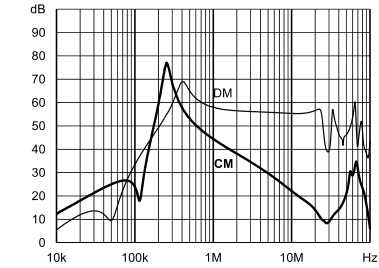
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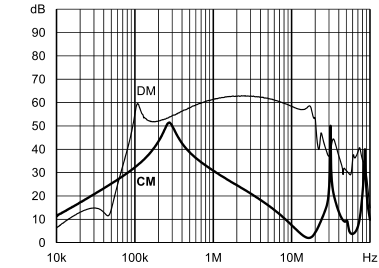
### Enhanced performance



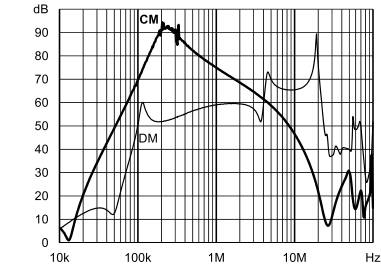
16 A: Standard type



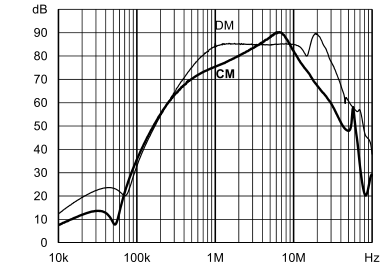
A type



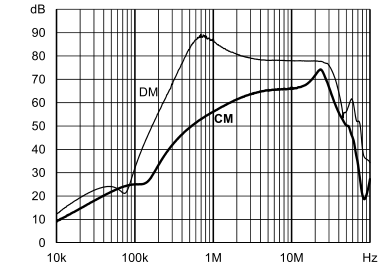
B type



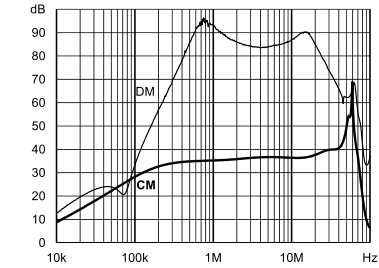
Enhanced performance



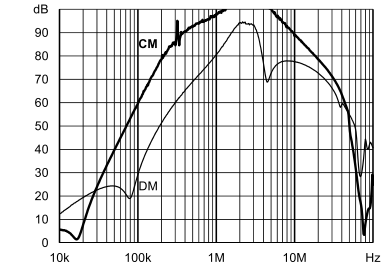
25 A: Standard type



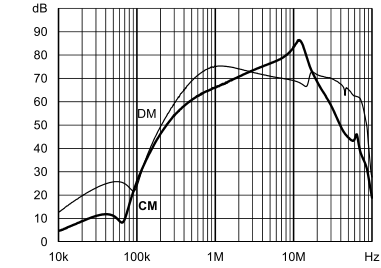
A type



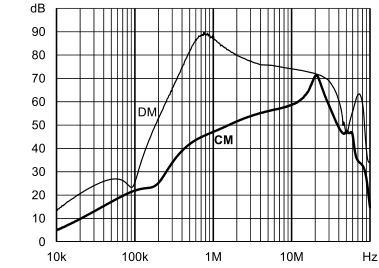
B type



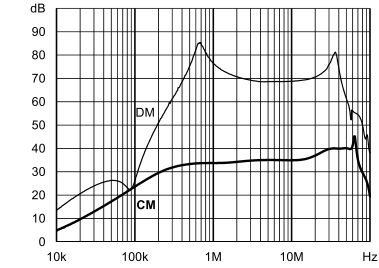
Enhanced performance



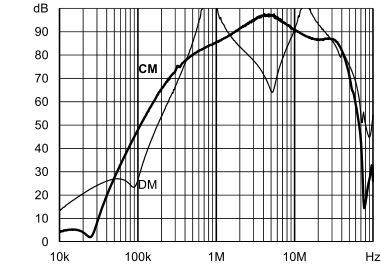
36 A: Standard type



A type



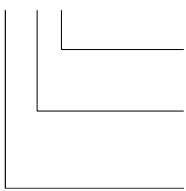
B type



Enhanced performance

Product selector

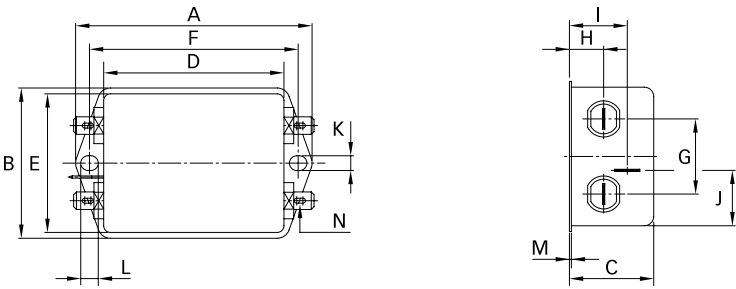
FN 2070 x -xx-yy



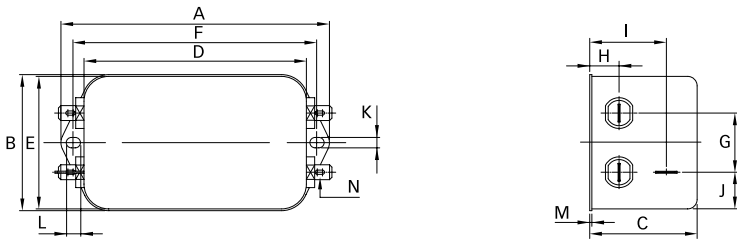
|         |                                       |
|---------|---------------------------------------|
| 06      | Faston 6.3 × 0.8 mm (spade/soldering) |
| 07      | Wire leads                            |
| 08      | Studs (M4 screws)                     |
| 1 to 36 | Rated current                         |
| Blank   | Standard version                      |
| A       | Safety version                        |
| B       | Medical version                       |
| L/M     | High performance version              |

Mechanical Data

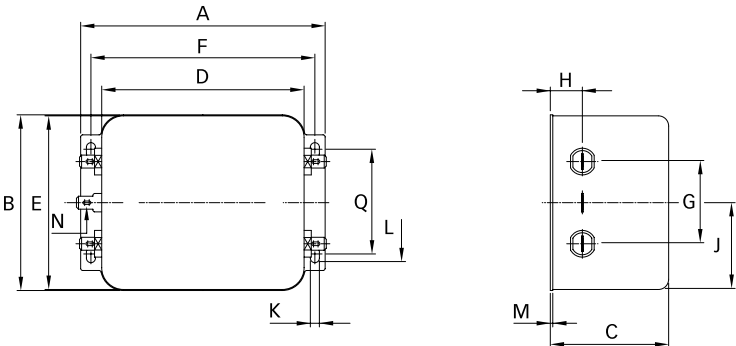
Connection style -06, 1 and 3 A types



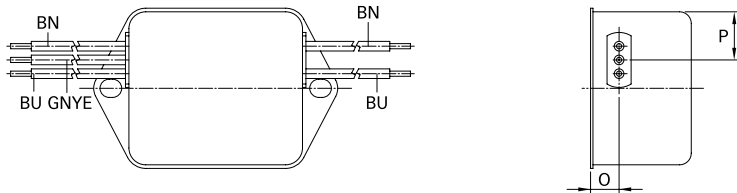
Connection style -06, 6 to 12 A types



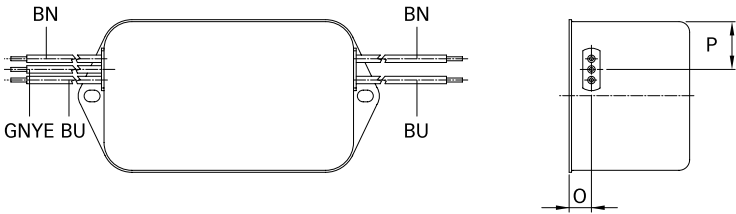
Connection style -06, 16 A types



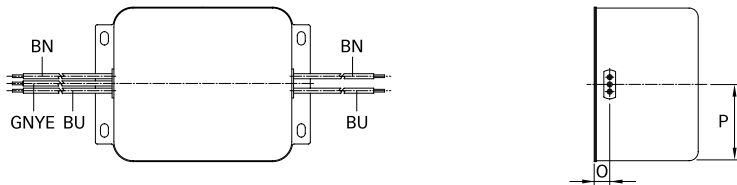
Connection style -07, 1 to 16 A types (same dimensions as style -06)



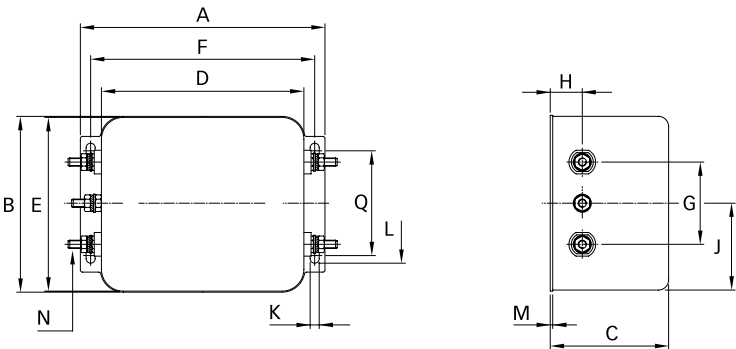
Connection style -07, 6 to 12 A types (same dimensions as style -06)



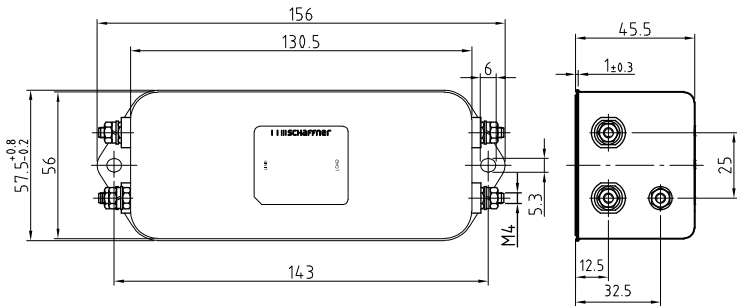
Connection style -07, 16 A types (same dimensions as style -06)



Connection style -08, 16 A type



Connection style -08, 10 A, 12 A, 25 A and 36 A types



Dimensions

|                         | 1 A       | 3 A       | 6 A       | 10 A      | 12 A      | 16 A      | 25 A      | 36 A      | Tolerances |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| A                       | 85 ±0.5   | 85 ±0.5   | 113.5     | 156       | 156       | 119       | 156       | 156       | ±1         |
| B                       | 54 ±0.5   | 54 ±0.5   | 57.5      | 57.5      | 57.5      | 85.5      | 57.5      | 57.5      | ±1         |
| C                       | 30.3 ±0.5 | 40.3 ±0.5 | 45.4      | 45.4      | 45.4      | 57.6      | 45.4      | 45.4      | ±1         |
| D                       | 64.8 ±0.5 | 64.8 ±0.5 | 94        | 130.5     | 130.5     | 98.5      | 130.5     | 130.5     | ±1         |
| E                       | 49.8      | 49.8      | 56        | 56        | 56        | 84.5      | 56        | 56        | ±0.5       |
| F                       | 75        | 75        | 103       | 143       | 143       | 109       | 143       | 143       | ±0.3       |
| G                       | 27        | 27        | 25        | 25        | 25        | 40        | 25        | 25        | ±0.2       |
| H                       | 12.3      | 12.3      | 12.4      | 12.4      | 12.4      | 15.6      | 12.4      | 12.4      | ±0.5       |
| I                       | 20.8      | 29.8      | 32.4      | 32.5      | 32.5      |           | 32.5      | 32.5      | ±0.5       |
| J                       | 19.9      | 11.4      | 15.5      | 15.5      | 15.5      | 42.25     | 15.5      | 15.5      | ±0.5       |
| K                       | 5.3       | 5.3       | 4.4       | 5.3       | 5.3       | 4.4       | 5.3       | 5.3       |            |
| L                       | 6.3       | 6.3       | 6         | 6         | 6         | 7.4       | 6         | 6         |            |
| M                       | 0.7       | 0.7       | 1         | 1         | 1         | 1.2       | 1         | 1         | ±0.3       |
|                         |           |           |           |           |           |           |           |           |            |
| Connection style -06    |           |           |           |           |           |           |           |           |            |
| N                       | 6.3 × 0.8 | 6.3 × 0.8 | 6.3 × 0.8 | 6.3 × 0.8 | 6.3 × 0.8 | 6.3 × 0.8 |           |           |            |
| Connection style -07    |           |           |           |           |           |           |           |           |            |
| O                       | 8.3       | 8.3       | 8.4       | 8.4       | 8.4       | 8.6       |           |           | ±0.5       |
| P                       | 14.9      | 14.9      | 18        | 18        | 18        | 42.25     |           |           | ±0.5       |
| AWG type wire           | AWG 20    | AWG 20    | AWG 18    | AWG 18    | AWG 16    | AWG 16    |           |           |            |
| Wire length             | 140       | 140       | 140       | 140       | 140       | 140       |           |           | +5         |
| Connection style -08    |           |           |           |           |           |           |           |           |            |
| N                       |           |           |           | M4        | M4        | M4        | M4        | M4        |            |
| Q                       |           |           |           |           |           | 51        |           |           | ±0.2       |
| 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

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