

## Output filters FN 5010

### Universal sine wave output filter for motor drives



- Smoothing of PWM drive output voltage
- Efficient motor protection
- Increase of motor service life
- Reduction of audible motor noise
- Reduction of parasitic losses
- Improvement of system reliability

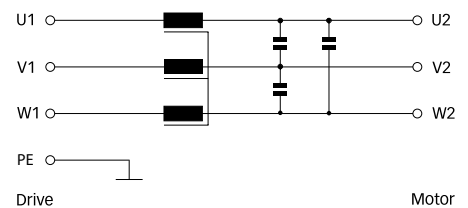
#### Approvals



#### Technical specifications

|                                            |                                                                                                 |
|--------------------------------------------|-------------------------------------------------------------------------------------------------|
| Nominal operating voltage:                 | 3x 400/230VAC $\pm 10\%$                                                                        |
| Motor frequency:                           | 0 to 70Hz                                                                                       |
| Switching frequency:                       | 4 to 16kHz                                                                                      |
| Rated currents:                            | 2.5 to 610A @ 40°C                                                                              |
| Motor cable length:                        | 400m max.                                                                                       |
| Impedance (uk):                            | 10% @ nominal voltage, 50Hz & rated current                                                     |
| Residual ripple voltage:                   | <5%                                                                                             |
| High potential test voltage:               | P $\rightarrow$ E 3000VAC for 3 sec<br>P $\rightarrow$ P 2000VAC for 3 sec                      |
| Protection category:                       | IP00 (filters up to 150A according to VBG 4)                                                    |
| Overload capability:                       | 2x rated current at switch on for 30 seconds,<br>1.5x rated current for 1 minute, once per hour |
| Temperature range (operation and storage): | -25°C to +85°C (25/085/21)                                                                      |
| Insulation class:                          | T40/F (155°C)                                                                                   |
| Flammability corresponding to:             | UL 94V-2 or better                                                                              |
| Design corresponding to:                   | EN 61558-2-20 (VDE 0570-2-20)                                                                   |

#### Typical electrical schematic



#### Features and benefits

- Conversion of the PWM output signal (symmetrical voltage components) of motor drives into a smooth sine wave with low residual ripple.
- Elimination of premature motor damage caused by high dv/dt, overvoltages, motor overheating and eddy current losses.
- Significantly increased service life of electric motors.
- Reduction of the pulse load of motor drive IGBTs and the parasitic losses on long shielded motor cables.
- Cost-effective and space-saving open frame filter design.
- Vacuum impregnation ensures less humming noise and high durability.

#### Typical applications

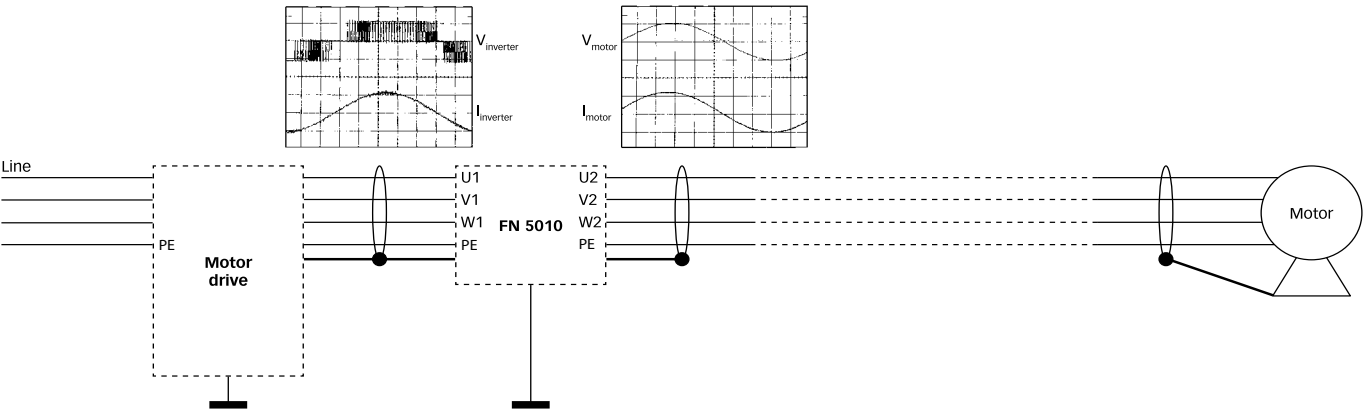
- Motor drive applications with long motor cables
- Pumps
- Conveyors
- HVAC applications
- Elevators
- General automation tasks
- Applications with multiple motors in parallel

Filter selection table

| Filter         | Rated current<br>@ 40°C | Typical motor<br>power rating* | Nominal<br>inductance | Nominal<br>capacitance | Typical<br>power loss** | Input/Output<br>connections                                                         |                                                                                     | Total | Cu.  | Weight<br>Al. |
|----------------|-------------------------|--------------------------------|-----------------------|------------------------|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------|------|---------------|
|                | [A]                     | [kW]                           | [mH]                  | [μF]                   | [W]                     |  |  | [kg]  | [kg] | [kg]          |
| FN 5010-2.5-99 | 2.5                     | 1.1                            | 22.4                  | 1.5 Δ                  | 50                      | -99                                                                                 |                                                                                     | 2.6   | 0.68 |               |
| FN 5010-4.5-99 | 4.5                     | 2.2                            | 11                    | 1.5 Δ                  | 66                      | -99                                                                                 |                                                                                     | 3     | 1.1  |               |
| FN 5010-8-99   | 8                       | 4                              | 7.2                   | 1.5 Δ                  | 73                      | -99                                                                                 |                                                                                     | 6.6   | 2.2  |               |
| FN 5010-10-99  | 10                      | 5.5                            | 4.2                   | 1.5 Δ                  | 91                      | -99                                                                                 |                                                                                     | 6.6   | 2.6  |               |
| FN 5010-13-99  | 13                      | 7.5                            | 4.2                   | 1.5 Δ                  | 124                     | -99                                                                                 |                                                                                     | 7.3   | 3.2  |               |
| FN 5010-18-99  | 18                      | 11                             | 3.5                   | 1.5 Δ                  | 144                     | -99                                                                                 |                                                                                     | 11.5  | 3.6  |               |
| FN 5010-24-99  | 24                      | 15                             | 2.4                   | 1.5 Δ                  | 191                     | -99                                                                                 |                                                                                     | 14    | 5    |               |
| FN 5010-32-99  | 32                      | 18.5                           | 2                     | 2 Δ                    | 273                     | -99                                                                                 |                                                                                     | 16    | 6.8  |               |
| FN 5010-42-99  | 42                      | 22                             | 1.58                  | 7 Y                    | 252                     | -99                                                                                 |                                                                                     | 22    | 7.4  |               |
| FN 5010-48-99  | 48                      | 30                             | 1.5                   | 7 Y                    | 340                     | -99                                                                                 |                                                                                     | 28    | 8.8  |               |
| FN 5010-60-99  | 60                      | 30                             | 1.1                   | 4 Δ                    | 290                     | -99                                                                                 |                                                                                     | 35    | 10.9 |               |
| FN 5010-75-99  | 75                      | 37                             | 0.9                   | 4 Δ                    | 340                     | -99                                                                                 |                                                                                     | 42    | 11.5 |               |
| FN 5010-90-99  | 90                      | 45                             | 0.8                   | 5 Δ                    | 360                     | -99                                                                                 |                                                                                     | 46    | 12.8 |               |
| FN 5010-110-99 | 110                     | 55                             | 0.7                   | 5 Δ                    | 400                     | -99                                                                                 |                                                                                     | 58    | 13   |               |
| FN 5010-150-99 | 150                     | 75                             | 0.5                   | 7 Δ                    | 716                     | -99                                                                                 |                                                                                     | 75    | 14.8 |               |
| FN 5010-180-99 | 180                     | 90                             | 0.4                   | 10 Δ                   | 820                     |                                                                                     | -99                                                                                 | 88    | 1.4  | 10.9          |
| FN 5010-210-99 | 210                     | 110                            | 0.4                   | 10 Δ                   | 1065                    |                                                                                     | -99                                                                                 | 115   | 2.1  | 11.2          |
| FN 5010-270-99 | 270                     | 132                            | 0.3                   | 12 Δ                   | 1230                    |                                                                                     | -99                                                                                 | 150   | 2.1  | 14            |
| FN 5010-325-99 | 325                     | 160                            | 0.3                   | 12 Δ                   | 1820                    |                                                                                     | -99                                                                                 | 194   | 5.2  | 21            |
| FN 5010-410-99 | 410                     | 200                            | 0.2                   | 18 Δ                   | 1830                    |                                                                                     | -99                                                                                 | 206   | 5.2  | 23.8          |
| FN 5010-510-99 | 510                     | 315                            | 0.17                  | 20 Δ                   | 2255                    |                                                                                     | -99                                                                                 | 290   | 6.5  | 32            |
| FN 5010-610-99 | 610                     | 355                            | 0.14                  | 25 Δ                   | 2520                    |                                                                                     | -99                                                                                 | 330   | 7.7  | 37.5          |

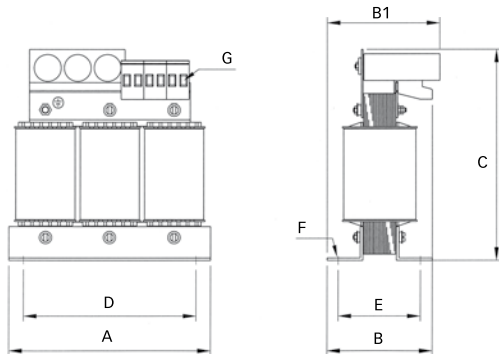
\* General purpose four-pole (1500r/min) AC induction motor rated 400V/50Hz.  
\*\* Exact value depends upon the motor cable type and length, switching frequency, motor frequency and further stray parameters within the system.

Typical block schematic

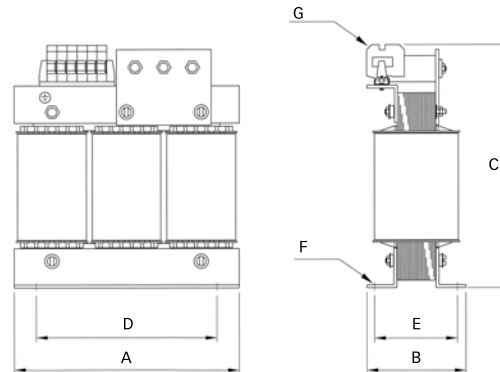


## Mechanical data

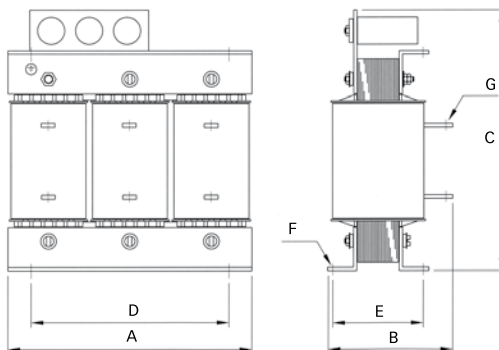
2.5 to 42A types



48 to 150A types



180 to 610A types



## Dimensions

|                  | A   | B   | B1  | C   | D   | E   | F       | G                  |
|------------------|-----|-----|-----|-----|-----|-----|---------|--------------------|
| <b>2.5A</b>      | 125 | 65  | 110 | 180 | 100 | 45  | 5 x 8   | 2.5mm <sup>2</sup> |
| <b>4.5A</b>      | 125 | 75  | 110 | 180 | 100 | 55  | 5 x 8   | 2.5mm <sup>2</sup> |
| <b>8 and 10A</b> | 155 | 95  | 118 | 205 | 130 | 70  | 8 x 12  | 4mm <sup>2</sup>   |
| <b>13A</b>       | 190 | 100 | 125 | 230 | 170 | 58  | 8 x 12  | 4mm <sup>2</sup>   |
| <b>18A</b>       | 190 | 120 | 125 | 230 | 170 | 78  | 8 x 12  | 10mm <sup>2</sup>  |
| <b>24A</b>       | 210 | 125 | 135 | 260 | 175 | 85  | 8 x 12  | 10mm <sup>2</sup>  |
| <b>32A</b>       | 210 | 135 | 135 | 260 | 175 | 95  | 8 x 12  | 10mm <sup>2</sup>  |
| <b>42A</b>       | 230 | 170 | 150 | 285 | 180 | 122 | 8 x 12  | 10mm <sup>2</sup>  |
| <b>48A</b>       | 240 | 210 | <B  | 290 | 190 | 125 | 8 x 12  | 16mm <sup>2</sup>  |
| <b>60A</b>       | 240 | 220 | <B  | 290 | 190 | 135 | 8 x 12  | 16mm <sup>2</sup>  |
| <b>75A</b>       | 300 | 210 | <B  | 345 | 240 | 134 | 11 x 15 | 35mm <sup>2</sup>  |
| <b>90A</b>       | 300 | 215 | <B  | 345 | 240 | 139 | 11 x 15 | 35mm <sup>2</sup>  |
| <b>110A</b>      | 300 | 237 | <B  | 345 | 240 | 161 | 11 x 15 | 50mm <sup>2</sup>  |
| <b>150A</b>      | 420 | 217 | <B  | 470 | 370 | 142 | 11 x 15 | 50mm <sup>2</sup>  |
| <b>180A</b>      | 420 | 235 | <B  | 470 | 370 | 157 | 11 x 15 | Ø11                |
| <b>210A</b>      | 420 | 260 | <B  | 470 | 370 | 182 | 11 x 15 | Ø11                |
| <b>270A</b>      | 420 | 295 | <B  | 470 | 370 | 217 | 11 x 15 | Ø11                |
| <b>325A</b>      | 480 | 310 | <B  | 580 | 430 | 238 | 13 x 18 | Ø11                |
| <b>410A</b>      | 480 | 320 | <B  | 550 | 430 | 238 | 13 x 18 | Ø11                |
| <b>510A</b>      | 500 | 350 | <B  | 580 | 430 | 255 | 13 x 18 | Ø11                |
| <b>610A</b>      | 500 | 370 | <B  | 670 | 430 | 268 | 13 x 18 | Ø18                |

All dimensions in mm; 1 inch = 25.4mm

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