

## Sine wave output filter for motor drives

# SCHAFFNER

energy efficiency and reliability



- 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

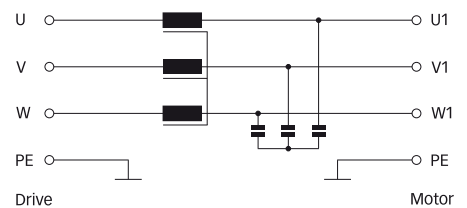
### Approvals



### Technical specifications

|  |  |
|--|--|
| Nominal operating voltage:                 | 3x 500/288VAC                                      |
| Motor frequency:                           | 0 to 200Hz   |
| Switching frequency:                       | 6 to 20kHz   |
| Rated currents:                            | 4 to 16A @ 40°C                                    |
| Motor cable length:                        | 200m max.  |
| Voltage drop:                              | ≤10V @ 50Hz  |
| Residual ripple voltage:                   | <5%  |
| High potential test voltage:               | P → E 2500VDC for 2 sec<br>P → P 1100VDC for 2 sec |
| Protection category:                       | IP20   |
| Overload capability:                       | 1.4x rated current for 1 minute, every 15 minutes  |
| Temperature range (operation and storage): | -25°C to +100°C (25/100/21)                        |
| Flammability corresponding to:             | UL 94V-2 or better                                 |
| Design corresponding to:                   | UL 1283, CSA 22.2 No. 8 1986, IEC/EN 60939         |
| MTBF @ 40°C/400V (Mil-HB-217F):            | >100,000 hours                                     |

### 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.
- Reduction of audible motor noise.
- Less interference propagation towards neighboring equipment or lines.
- IP20 housing and touch-safe terminals contribute to overall equipment safety.

### Typical applications

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

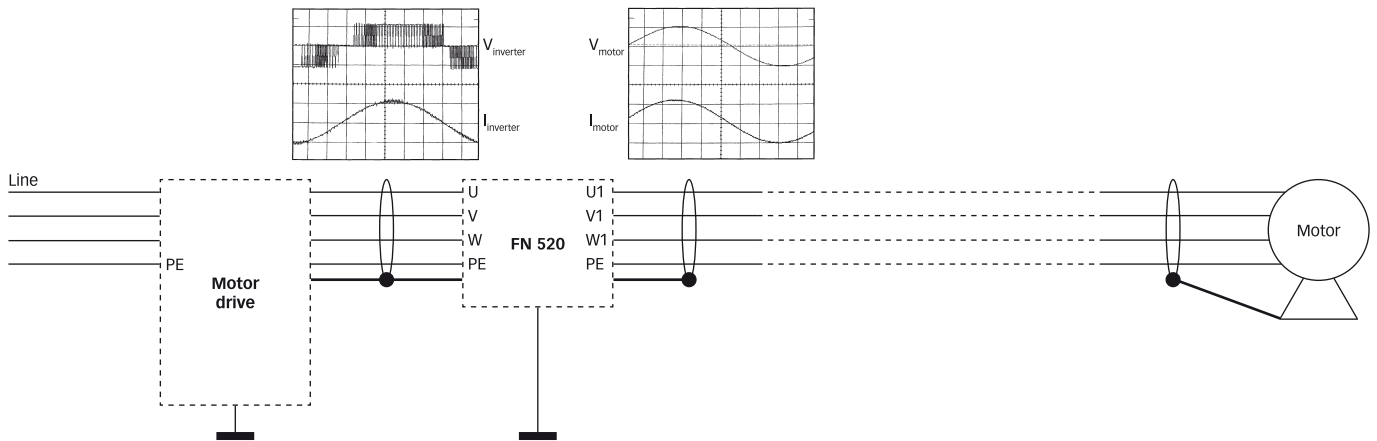
Filter selection table

| Filter       | Rated current<br>@ 40°C<br>[A] | Typical motor<br>power rating*<br>[kW] | Typical<br>power loss**<br>[W] | Input/Output<br>connections<br> | Weight<br>[kg] |
|--------------|--------------------------------|--|--------------------------------|--|----------------|
| FN 520-4-29  | 4                              | 1.5                                    | 13                             | -29  | 8              |
| FN 520-8-29  | 8                              | 3.0                                    | 25                             | -29  | 11             |
| FN 520-12-29 | 12                             | 5.5                                    | 42                             | -29  | 15             |
| FN 520-16-33 | 16                             | 7.5                                    | 33                             | -33  | 18             |

\* 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.

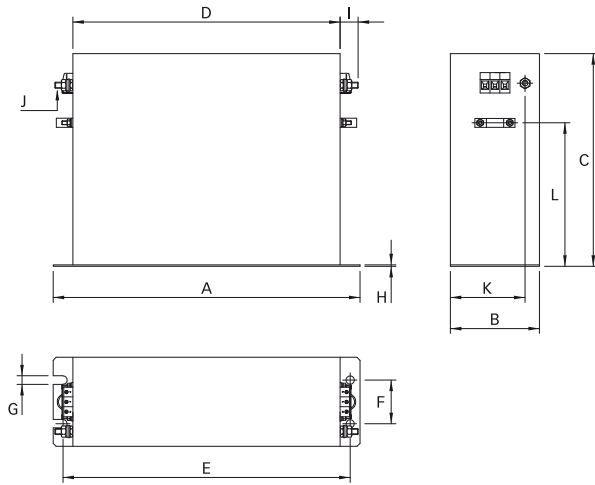
Typical block schematic



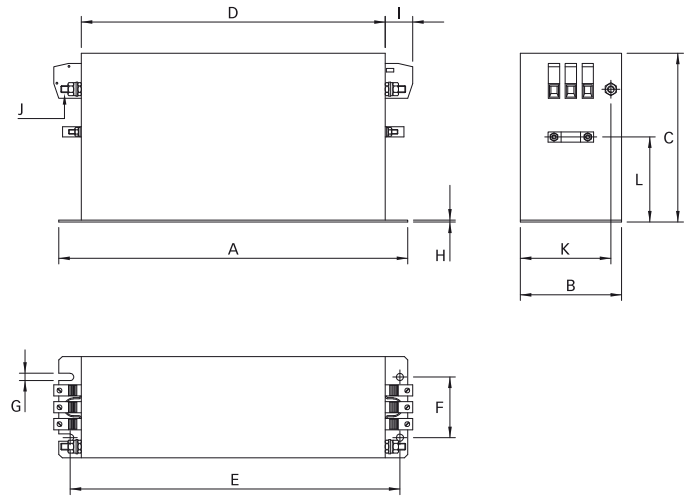
For additional information please ask for FN 520 installation instructions and the Schaffner application note „Output Filters for Use with Frequency Inverters in Motor Drive Applications“.

**Mechanical data**

4 to 12A types



16A types



**Dimensions**

|   | 4A  | 8A  | 12A | 16A   |
|---|-----|-----|-----|-------|
| A | 310 | 310 | 310 | 300   |
| B | 90  | 90  | 90  | 145   |
| C | 150 | 180 | 215 | 190   |
| D | 270 | 270 | 270 | 260   |
| E | 293 | 293 | 290 | 280   |
| F | 44  | 44  | 44  | 105   |
| G | 6.5 | 6.5 | 8.7 | 8.7   |
| H | 1.5 | 1.5 | 1.5 | 2.3   |
| I | 19  | 19  | 19  | 25    |
| J | M6  | M6  | M6  | M6    |
| K | 75  | 75  | 75  | 112.5 |
| L | 80  | 110 | 145 | 100   |

All dimensions in mm; 1 inch = 25.4mm  
Tolerances according: ISO 2768-m / EN 22768-m

**Filter input/output connector cross sections**

|                           | -29              | -33               |
|---------------------------|------------------|-------------------|
| <b>Solid wire</b>         | 6mm <sup>2</sup> | 16mm <sup>2</sup> |
| <b>Flex wire</b>          | 4mm <sup>2</sup> | 10mm <sup>2</sup> |
| <b>AWG type wire</b>      | AWG 10           | AWG 6             |
| <b>Recommended torque</b> | 0.6 - 0.8Nm      | 1.5 - 1.8Nm       |

Please visit [www.schaffner.com](http://www.schaffner.com) to find more details on filter connectors.