LC Sine Wave Filter for 600 VAC and 690 VAC Motor Drives Applications

- Smooth sine wave without voltage peaks
- Motor protection against pulse pattern stress
- Improvement of system reliability
- Reduces bearing currents
- Ideal for retrofit installations
- Fits for long motor cable lengths (≤2000 m)
- Motor drive power range up to 1,200 kW

Performance indicators

<table>
<thead>
<tr>
<th>Typical motor power [kW]</th>
<th>0</th>
<th>200</th>
<th>400</th>
<th>600</th>
<th>800</th>
<th>&gt;1000</th>
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<tbody>
<tr>
<td>Rated current [A]</td>
<td>13</td>
<td>200</td>
<td>400</td>
<td>600</td>
<td>800</td>
<td>1320</td>
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</table>

Features and benefits

- Converts the rectangular PWM output voltage of motor drives into a smooth sine wave with low residual ripple
- Elimination of premature motor damage caused by high dv/dt, overvoltages, cable ringing, motor overheating, and eddy current losses
- Improves bearing life time because of bearing currents caused by circulating currents
- Reduces electromagnetic emissions and acoustic noise levels
- Eliminates pulse reflections in the motor cable

Typical applications

- HVAC applications
- Pumps
- Ventilators
- Conveyors
- Compressors
- Elevators
- Cranes
- Medium voltage applications, deployed in front of the step-up transformer
- Retrofit installations with motor drives
- Motor drive with long motor cable
- Motor drive with multiple motors in parallel

Technical specifications

- Nominal operating voltage: 3x690 VAC (UL: 3x600 VAC)
- Motor frequency: 0...70 Hz (up to 200 Hz with derating according graph)
- Rated currents: 13 to 1320 A
- Temperature range (operation and storage): -25°C to 70°C (25/070/21), 13 to 45 A: -25 to +30°C, 75 to 1320 A: -25 to +45°C
- Motor cable length: Up to 2,000 m (see graph)
- Impedance (uk): 8 to 10% @ 690 V, 50 Hz and rated current
- Residual ripple voltage: <5%
- High potential test voltage: P -> E 3600 VAC, 1 minute, P -> P 3600 VAC (without Caps), 1 minute, P -> P 3600 VDC, 1 minute

Approvals

- UL (up to 300 A)

Typical electrical schematic
## Filter selection table

<table>
<thead>
<tr>
<th>Filter****</th>
<th>Rated temp.</th>
<th>Rated current</th>
<th>Typical motor drive power rating</th>
<th>Typical motor drive power rating</th>
<th>Nominal inductance</th>
<th>Nominal capacitance ***</th>
<th>Min. switching frequency **</th>
<th>Typical power loss</th>
<th>Input/Output connections</th>
<th>Weight</th>
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<td>[°C]</td>
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* At rated current, voltage and frequency. The proper power selection depends on the drive specification, the motor and the application requirements.
** With reduced motor cable length, the max. switching frequency is 16 kHz.
*** The capacitance connection is Y.
**** Filters up to 300 A are with UL approval. 430 A ... 1320 A are without UL approval.

### Required drives settings

Ensure the drive's switching frequency is set to the required minimum switching frequency (see filter selection table). The mode of operation must be “scalar” (V/Hz) with a fixed switching frequency. Check the drives manufacturer manual whether special settings are necessary. In any doubt contact the drives manufacturer. CAUTION: If the motor drives settings are not correct the filter may be damaged.
**Typical block schematic**

![Typical block schematic diagram]

**Motor frequency derating**

![Motor frequency derating graph]

**Max. motor cable length**

![Max. motor cable length graph]

*In case a step-up transformer is used, then the length is meant to be between the filter and transformer.
Mechanical data FN 5040 HV

13 to 45 A types

75 to 165 A types
260 to 940 A types

320 A type
### Dimensions FN 5040 HV

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Capacitor bank cable length (m)

1 m 1 m 1 m 1.5 m 1.5 m 1.5 m 2 m 2 m 2 m

### Filter input/output connector cross sections

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<td>3.4-5.6 Nm (30-50 lb-in)</td>
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Please visit [www.schaffner.com](http://www.schaffner.com) to find more details on filter connectors.

**Note:**

For additional information please consult the documents „Basis in EMC and Power Quality“ and the sine wave filter „Mounting and Installation Guidelines“, published in the download section „Installation Instructions“ of [www.schaffner.com](http://www.schaffner.com).
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