









## Sine Wave Filter Series FN 5040, FN 5045 and FN 5040 HV

# Mounting and Installation Guidelines

Please read and follow the safety, application and installation notes.

### Important safety notes

	Filter installation, start-up, operation and maintenance (if any) has to be carried out by a trained and certified electrician or technician, who is familiar with safety procedures in electrical systems.
	Danger of electrical shock! High voltage potentials are involved in the operation of this product. Always remove power before handling energized parts of the filter, and let ample time elapse for the capacitors to discharge to safe levels (<42 V). Residual voltages are to be measured both line to line and line to earth.
	Always connect the filter to protective earth (PE) first, then continue with the wiring of phase terminals. When decommissioning the filter, remove the PE connection at the end. The sine wave filter must not be operating without connected motor.
	Follow the general installation notes closely. Ensure that cooling slots, openings or grids (if any) are free from obstructions that could inhibit efficient air circulation. Operate the filter within its electrical, mechanical, thermal and ambient specifications at all times.
	For safety reasons, LC sine wave filters must be installed in a way to prevent access of non-qualified persons to the filters.
	Sine wave filters are lossy electrical components. Filter surfaces and terminals may get hot under full load operating conditions and can exceed surface temperature >80 °C.
	Always practice the safety procedures defined by your company and by applicable national electric codes when handling, installing, operating or maintaining electrical equipment.
	In case of uncertainty and questions please contact your local Schaffner partner for assistance.

## General application notes

<b>NOTICE</b>	Filter suitability for a given application must ultimately be determined by the user (the party that is putting the filter into operation) on a case-by-case basis. Schaffner will not assume liability for any consequential downtimes or damages resulting from use of filters outside their specifications.
<b>NOTICE</b>	Sine wave filters must be mounted in a clean, dry location (enclosures, cabinets, closed rooms). Contaminants such as oils, liquids, corrosive vapors, abrasive debris, dust and aggressive gases must be kept out of the filter enclosure.
<b>Standard products</b>	Standard catalog filters must be used for the published applications and operated within the published technical specifications.
<b>Custom products</b>	Custom filters must be used for the bespoke application and operated within the provided and mutually agreed technical specifications.
<b>NOTICE</b>	Sine wave filters are design-in products by definition. Their functionality and suitability must be determined with a proper design-in process, involving electrical, mechanical and thermal verification within the final equipment.

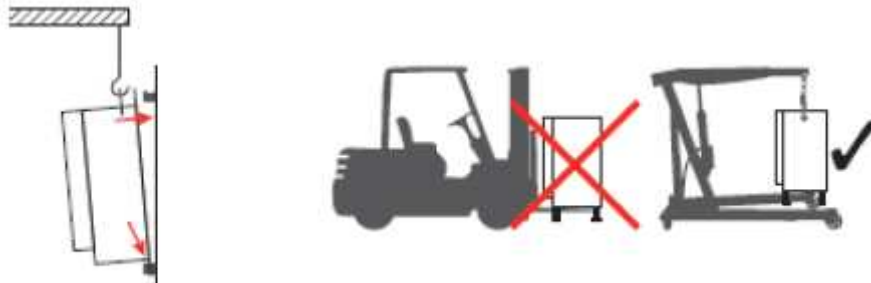
## General installation notes

- Carefully inspect the shipping container and the product prior to the installation. In case of visual damage, don't install the filter and file a claim with the freight carrier involved.
- Filters may be heavy. Follow the instructions for lifting heavy equipment defined by your company.
- Use an appropriately sized threaded bolt for every mounting hole/slot provided by the filter flange. The strength class of the bolt must be determined by the installer, depending upon filter weight and the material of the mounting surface.
- Connect the filter to the protective earth (PE) terminal(s).
- Remove all line side power, then connect the phase terminal(s) and neutral terminal (if any) of the filter.
- For the electrical connection of the filter terminals, apply the torques recommended on the filter label and/or in the published filter datasheets. For the bus bar connections do apply the corresponding tightening torque of the screws.
- Cable or busbar cross sections have to be chosen in accordance with national and international electric codes and applicable product standards governing the equipment that will incorporate the filter.
- Special attention should be paid to cable dimensioning, fuses, grounding, shutdown, disconnection, and overcurrent protection.

In order to get the maximum benefit out of the Schaffner filters, please also consult "Basics in EMC and Power Quality", published in the download section of [www.schaffner.com](http://www.schaffner.com). These additional guidelines provide helpful hints for HF-grounding, shielding, proper cable routing, etc.

## Filter placement

Lift the IP20-filter of series FN 5045 with appropriate crane using lifting eye bolts – smaller types may be lifted manually by two persons (no lifting eye bolt applicable).

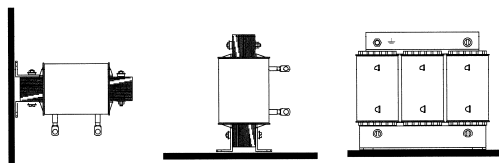


Never attempt to handle the filter with a forklift!

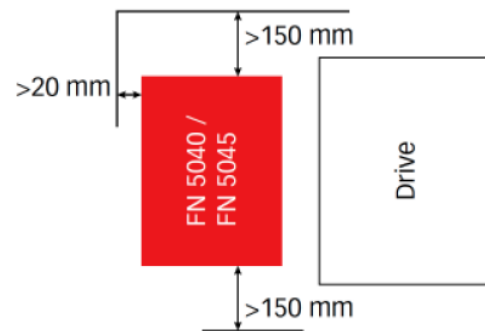


The sine wave filter or the inductance unit (with separate capacitor bank) shall in principle be mounted horizontally in order to respect a proper heat dissipation flow. To ensure an optimum ventilation and thermal radiation, it is recommended to leave enough space towards surrounding equipment, walls or components in all directions. A minimum free space below and above the filter of >150 mm and >50 mm aside is required. The separate capacitor bank can be mounted aside the inductance with a minimum air distance of 150 mm. Due to the heat dissipation of the inductance it is not recommended to mount the capacitor bank above or on top of the inductance.

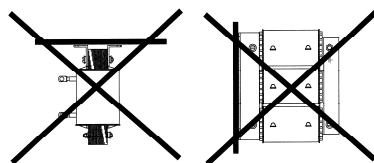
Permitted mounting positions:



FN 5045 up to 115 A:



Prohibited mounting positions:

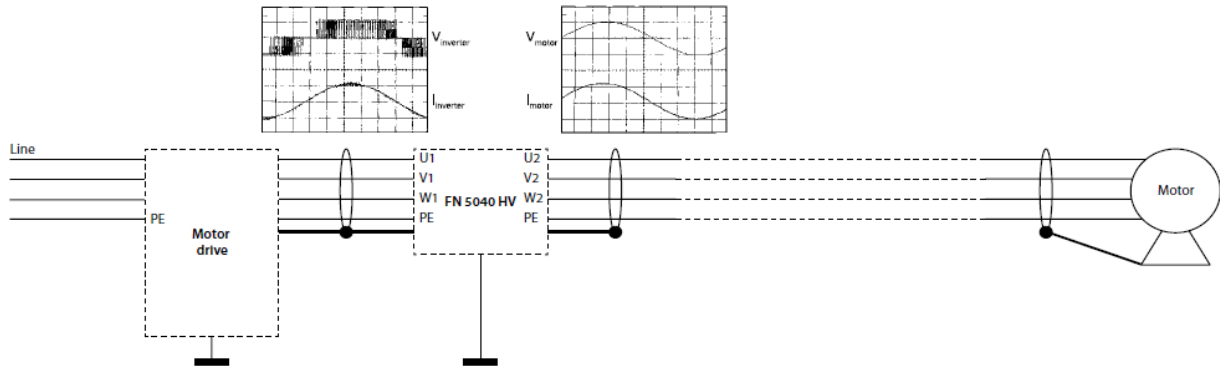


The pictures above show permitted and prohibited mounting positions. The mounting on a vertical plate (top left picture) is limited to IP00 products with a maximum weight of 25 kg or for IP20 products of FN 5045 series (far right picture) up to 115 A. Use all available mounting holes and select the correct screws and washers in order to ensure a reliable mounting and to do justice to the weight of these products. Apply torques appropriate for the strength class of the screws and washers you are using. Specifications can be obtained from the supplier of the screws and washers.

## Wiring and connections

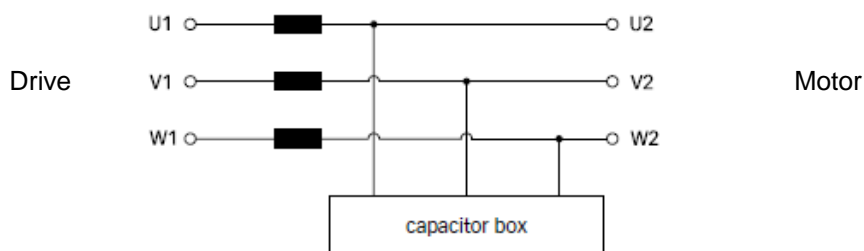
The filter rating has to be compatible with the drives to which it is to be connected. All drives manufacturer installation and safety instructions must be fulfilled. The typical block schematic is shown for a motor load, but the load can be also multiple motors or a transformer. Drives and load cable selection/placement should be in accordance with all local electrical standards and regulations.

### Typical block schematic



In many applications a shielded motor cable may not be required when a sine wave filter is applied with a motor drive. Anyhow, due to other possible influences of common mode disturbances Schaffner does recommend to use shielded motor cables. This is to avoid back-coupling of radiated interferences to the mains cable at the frequency range from 1–30 MHz. This EMC measure however can only be considered to be efficient, if the ends of the cable shield of the motor cable are put in proper HF low-impedance contact with the ground of the motor and the frequency converter.

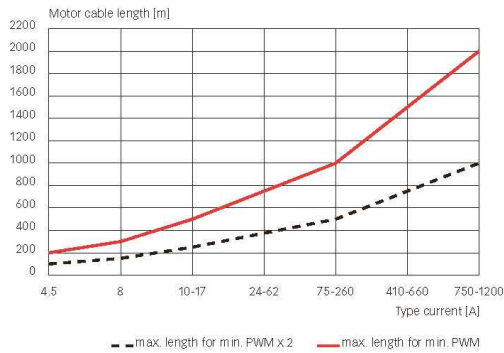
Sine wave filters with separate capacitor bank must be connected as follows:



Please respect following motor cable length and PWM switching frequency dependency:

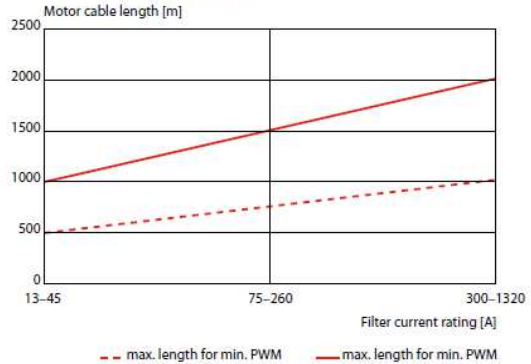
**FN 5040 / FN 5045**

Max. motor cable length\*



**FN 5040 HV**

Max. motor cable length\*



\*In case a step-up transformer is used, then the length is meant to be between the filter and transformer.

**Required drives settings**

Ensure the motor drive switching frequency is set to the required minimum switching frequency (see filter selection table). Higher frequencies are allowed. The mode of operation must be “scalar” (V/Hz). Check the drives manual whether special settings are necessary. For any questions please contact the drives manufacturer.



If the drives settings are not correct, the filter may be damaged!