Guidance Notes for the Installation of Power Filters

EEP Filters

EEP
European EMC Products

Technical Datasheet

General Installation Information

For optimum EMI performance, correct mounting of any filter is essential. It is important to ensure low earth bond impedance to the unpainted base or mounting flange of the filter. This is necessary to obtain the best insertion loss from the filter, and also to dissipate high pulse currents in transient suppressed filters.

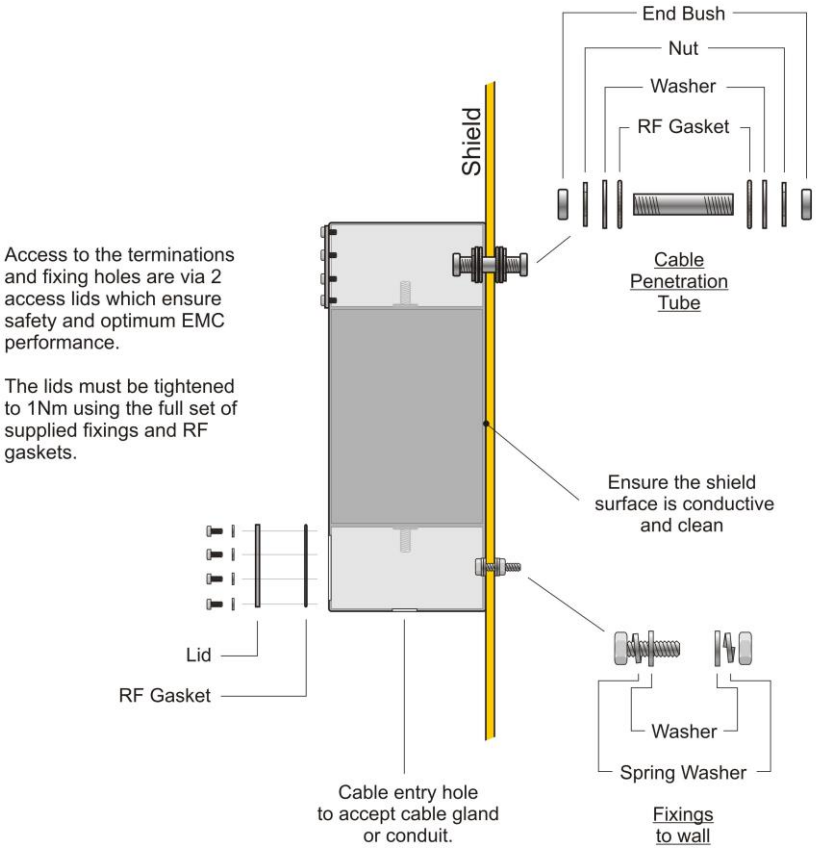
It is recommended that the filters are mounted on a steel surface which has been electroplated with tin or zinc. This should be unpainted and must be flat or smooth. Whilst other materials and finishes may be acceptable, the user should give consideration to the shielding and earth bonding properties and possible galvanic corrosion effects of any materials used. In most cases, “conductive paint” finishes are unacceptable as they do not permit a sufficiently good earth bond to be made. Penetration tubes are used to pass cables through the base of the filter and the mounting surface. These must provide a complete RF seal.

EEP can supply penetrations tubes and dedicated fixings kits to suit all filters.

The correct fitting of terminal compartment lids and gaskets is important, as shown on detail below. Gaskets must be fitted in the specified positions, ensuring all lid screws are fitted and tightened to the specified torque.
Where several filters are installed together, it is recommended that they are installed vertically with at least 25mm spacing to assist with convection cooling.

All conductors should pass through single cable entries in accordance with the IEE regulations to avoid eddy current heating effects.

Typical Filter Installation



Cable Connection Torque Settings :

M5	2 Nm
M6	2.5 Nm
M8	5 Nm
M10	8 Nm
M12	11 Nm
M16	20 Nm
M20	25 Nm

Filter Lid Torque Settings:

M4	1Nm
M6	1Nm

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For Further Information Visit: www.eep-filters.com
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Installation of Wiring Power Filters:

1) Electrical filters shall be used to filter dedicated / permanent supplies:

Once a filter has been installed, the load side of the filter shall be connected directly to the equipment or distribution board to feed specific circuits or equipment. By installing a distribution board provides more avenues to utilise the load of the filtering unit, providing its current rating is not exceeded.

2) Electrical supply configuration:

Normally, the electrical supply will have already been configured for the general use of an electrical system. This is normally undertaken at the distribution transformer.

Where the distribution transformer's power line has not been configured, the filter may have the neutral connected directly to earth on the supply side of the filter only.

By having a good connection to neutral and earth helps with the filter's performance.

With general installations the filter shall not have the neutral connected to earth on the load side of the filter. This is because the likelihood of this connection will have already been undertaken on the supply side, and that it is unconventional to conduct this connection in general practice. If the neutral is connected to earth on the load side of the filtering unit and has already been done upstream of the filtering unit, this will cause the filter to short and will place the filter in a fault condition. It is the responsibility of the designer and installer to determine the best suitable method of installation, and that they should consult with their Distribution Network Operator (DNO) or with the Electrical Duty Holder to ensure the configuration is conducted in both the manufacturers and supply transformers requirements.

If you are still uncertain about the filter's configurations, please seek technical advice from our team at EEP Filters.

3) Cable selection:

Ensure that the correct size and rating of the power cables for supply and load are selected for the Filter, together with the correctly sized circuit breaker.
Cable selection shall be sought to minimise the voltage drop as much as reasonably practicable. By utilising a higher cross-sectional area (CSA) will in turn reduce heating effects on cables and reduce resistance across the conductor's length. A shielded cable on the load side of the filter is recommended to maintain the cleanliness of the filtering output. A shielded cable on the supply side of the filter can be used but is unlikely to be required as the incoming cables are more likely to be "dirty". It shall be determined by the designer and Installer to pick a suitably sized cable and to comply with local governing and statutory regulations.

4) Cable connections:

Always ensure the Electrical Supply is isolated and locked off before connection to Filter. Additionally, always check for Zero voltage with test equipment to confirm.
Ensure suitable cable glands are used to terminate the supply to the filter. Ensure glands are tightening in accordance with manufacturers guidelines. Ensure all cables are installed using either soldered or crimped cable lug connectors.

Remove outermost full nut, spring washer, and plain washer from each of the filter terminals and earth studs. Present connectors to each filter terminal and earth stud at supply and load ends of filter. Refit plain washer, spring washer and full nut to each filter terminal and earth stud. Firmly hold innermost **full nut** with an open-ended spanner and tighter outermost **full nut -** NB; please refer to the filter specification for correct torque size**. Do not** allow spanner to move or rotate during tightening procedure. Inspect cable to terminal interface and confirm no evidence of mechanical damage to any component.

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Check Polarity and continuity of wiring connections, correct Phasing as marked on the Filter terminals and terminal security.
Always ensure Filter is connected to a good known Earth before switching on and applying power to the filter with all covers in place and secured.

5) Torque settings:

Unless already specified by EEP Filters, the torque settings of filter terminals shall be undertaken by the installer of the electrical filter. Torque settings shall comply with the manufactures instructions, as listed within the diagram above, to help reduce the effect of high resistances from a loose connection.

Important

After the Filter has been powered up, if any further work or maintenance work is required, the filter must be electrically isolated, and MUST be discharged fully by grounding all lines to earth using the correct equipment.

Do not touch any terminals until the filter has been discharged.

Failure to adhere to this may result in electrical shock and possible fatal injury.

Issues with RCD Use & Earth Leakage in Power Filters

The following rules apply to installation of Performance Power Line Filters which incorporate comparatively large values of capacitance coupled with a discharge resistor.

An RCD should not be used ahead of the filter as the leakage current will cause the RCD to trip and interrupt operation of equipment connected. A standard suitably rated MCB should be used for supply. This is also applicable to Low leakage filters which will also trip an RCD due to inrush current and variable leakage current resulting from harmonics on the neutral supply.

RCD's will normally function correctly when connected on the load side of a Filter.

With reference to earth leakage, whilst this can be measured on the bench, it is a maximum theoretical value given the true earth leakage figure will be different once installed and connected to its supply and Load. The actual figure will be influenced by factors such as; Distortion in the grid and incoming supply (voltage, current, frequency), the Load connected, cable length, insulation/capacitance of cables and transient leakage voltages during switching.

As a guide, for Standard, High Performance and Very High-Performance Filters the earth leakage value will range from 30mA to 500mA before installation at site and connected.

Qualified and skilled workers must be sought to install such filters as poor wiring practices may increase the likelihood of a less efficient filter, potentially decreasing performance, or causing instability if installed incorrectly.

General rules and requirements shall be determined by the designer & installer and where applicable, statutory regulation and non-statutory guidance should be followed.

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