

Guidance Notes for the Installation of Power Filters



General Installation Information

For optimum EMI performance, proper mounting of any filter is essential. It is important to ensure as low as possible 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 carry away high pulse currents in transient suppressed filters.

It is normally 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 dedicated fixings kits.

Filter sizes and cable entries are designed to be a minimum for the filter current rating. The user is advised to verify that the standard filter terminal compartment and cable entry sizes are suitable for this application, especially where oversized cables may be used to minimise cable volt drop.

Proper 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.

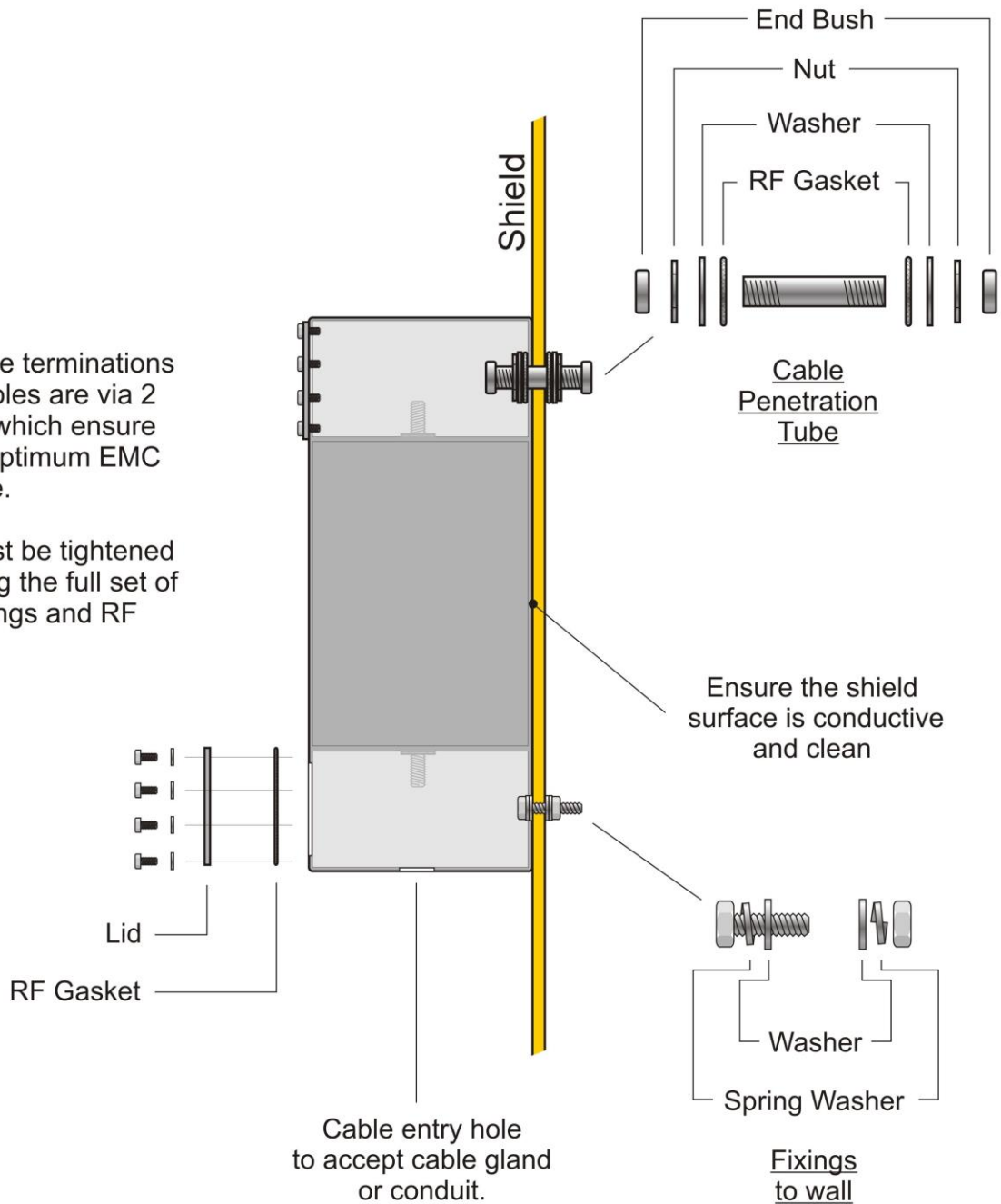
All conductors should pass through single cable entries in accordance with the IEE regulations to avoid eddy current heating effects.

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Typical Install on the Shield

Access to the terminations and fixing holes are via 2 access lids which ensure safety and optimum EMC performance.

The lids must be tightened to 1Nm using the full set of supplied fixings and RF gaskets.



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RCD Use & Earth Leakage in Power Filters

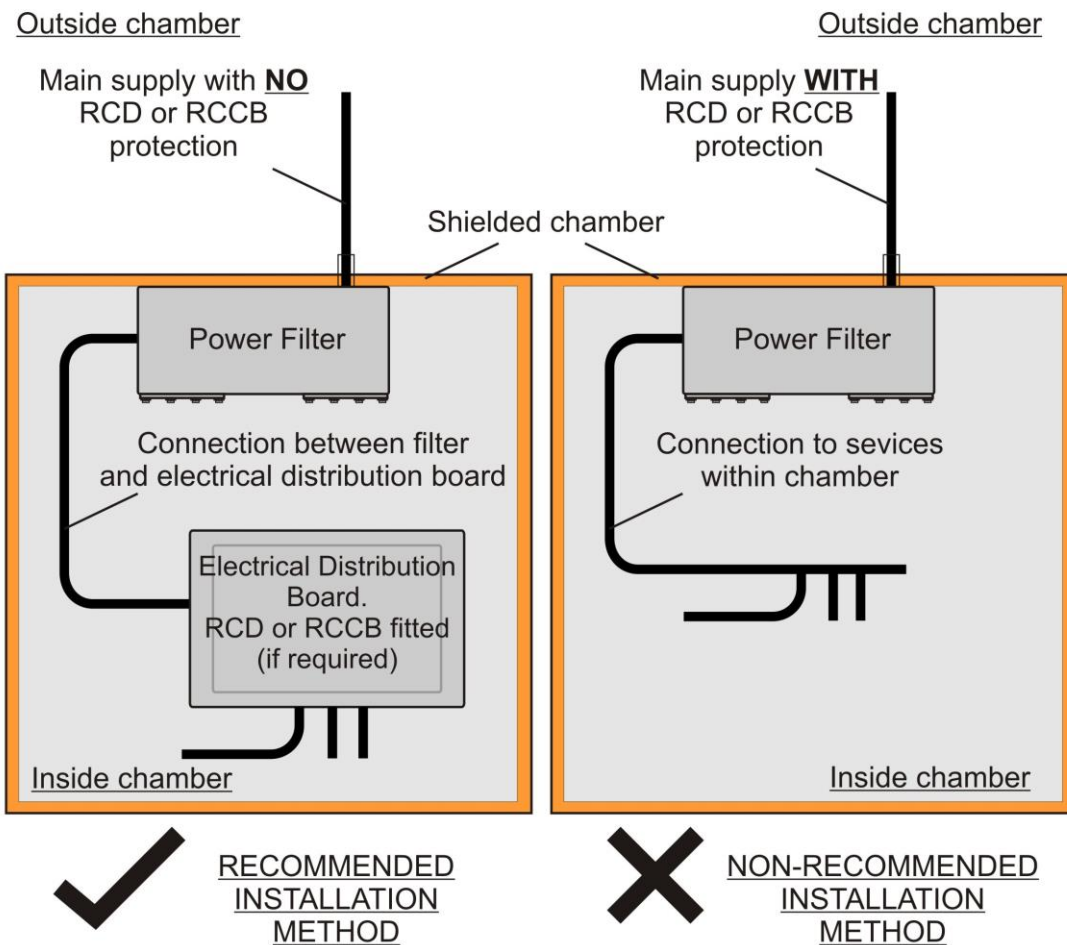
The following rules apply to installation of Performance Power Line Filters which incorporate comparatively large values of capacitance coupled with a discharge resistor.

This means that 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 to name a few.

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.



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Guidance Notes on the Wiring of Power Line Filters

Good wiring practices can help maintain an electrical system in accordance with legislation and that of requirements to specific wiring regulations. It should be noted that when bad wiring practices or poor procedures / unconventional techniques are introduced, it can raise uncertainty to the maintenance or installation of an electrical system.

Competent 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.

Installation of Wiring Power Line Filters:

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

Once a filter has been installed, the load side of the filtering unit shall be connected directly to the equipment or distribution board to feed specific circuits or equipment. By utilising 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 filtering unit may have the neutral connection connected directly to earth on the supply side of the filtering unit only.

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

The filtering unit shall not have the neutral connected to earth on the load side of the filtering unit. 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:

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 filtering unit is recommended to maintain the cleanliness of the filtering output. A shielded cable on the supply side of the filtering unit 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.

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4) 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 to help reduce the effect of high resistances from a loose connection. Where applicable, depending on the material of spindle or fixing, different torque settings may apply for: Brass, Copper, Stainless Steel etc.

Precautions

1. Ensure that the correct size and rating of the Power cables for supply and Load are selected for the rating of Power of Filter along with correctly sized Circuit Breaker.
2. With reference to consumer glands and incoming field cables to the supply side and load side conduit holes of the filter. Cut cores of cables to appropriate lengths, strip insulation, and crimp correct sized, uninsulated, high conductivity copper, tin plated, compression connectors.
3. 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.
4. 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.
5. Check Polarity and continuity of wiring connections, correct Phasing as marked on the Filter terminals and terminal security.
6. 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.

Important

After the Filter has been Powered up, if any further work or maintenance work is required on filter install, the unit must be electrically isolated, and the filter **MUST** be discharged fully by grounding all lines to earth using the correct equipment and before touching any terminals. Failure to adhere to this will result in electrical shock and possible fatal injury.

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About Us

Established in 1996, European EMC Products (EEP) are an established British company whose experience and understanding of the science of shielding makes it an ideal partner in whom you can place your trust with confidence. The purpose of installing EEP shielding systems is to protect people and equipment against the threats posed by electromagnetic and radio frequency (RF) interference, radiation, magnetic fields and electromagnetic pulses. Our diverse range of turnkey products and services, including design, project management, testing and consultancy are delivered across multiple sectors to an international client base.

Quality

European EMC Products Limited are registered to BS EN ISO 9001:2015, Certificate Number FS38901.
Registered Scope: The design, assembly, installation, servicing and testing of RF Shielded Structures and equipment including EMI Shielding, Blast Doors, Gas Tight Doors and specialised mobile Electromagnetic Pulse Protection (EMPP) containers.
Radio Frequency, Magnetic Shielding and Quench systems for MRI (Magnetic Resonance Imaging) scanners.
The design, assembly and installation of Ionising Radiation Protection facilities.
The design, manufacture and installation of LED lighting systems for medical applications.
EEP Filters Limited are registered to BS EN ISO 9001:2015, Certificate Number FS38901.
Registered Scope: The design, manufacture, management of installation and testing of high performance EMC and EMP Power and Data Line Filters.

Disclaimer

NB: All the information provided within this datasheet is for reference only. Product specifications are subject to change without notice.