Series Filters vs Parallel Connected Devices

Among the Protective Devices (Surge Protection Device, or SPD) also called TVSS (Transient Voltage Surge Suppressor) there are two distinct types of configuration: Series Connection and Parallel Connection.

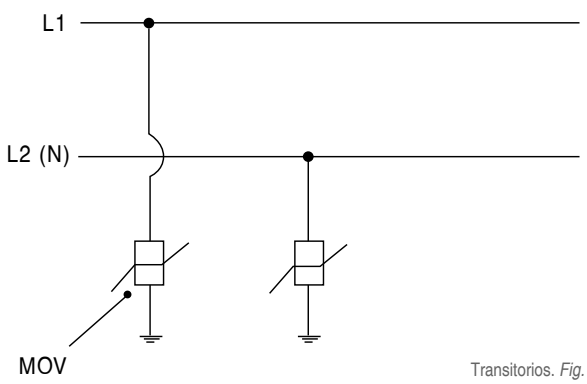
1. PARALLEL CONNECTED DEVICES
These devices include components such as SAD's (Silicon Avalanche Diode) or MOV's (Metal Oxide Varistor) being these the most used elements nowadays.
Fig. 1 shows the connection scheme.

2. SERIES FILTERS
These protective devices are series connected integrated with components, such as inductors and capacitors (L-C Circuit).
These types of devices are connected according to Fig. 6.

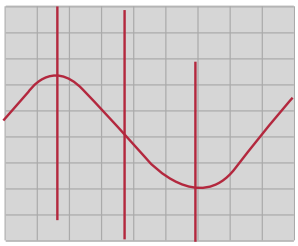
This type of circuit enables the effective attenuation, in a filter that is efficient in the diverse frequencies, that are components of the electrical noise (Ringwave) and the wave peaks caused by atmospheric discharges, but lack of high energy shunt elements. They are included in the category A, according to IEEE C6241.

3. PARALLEL + SERIES CONNECTED DEVICES
These devices combine both protection systems with a primary stage with MOV's in parallel, and a series circuit, achieving a superior attenuation performance. These types of protectors take advantage of the great shunt capacity of the MOV's and the high efficiency of the series connection. This are included in categories A, B & C, according to IEEE C6241.

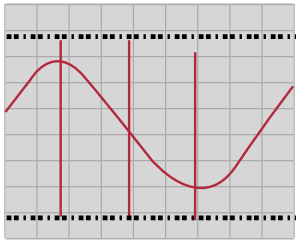
Within the parallel + Series connected devices, we find the Active Filters, which hold the best performance in protecting the critical load. Some examples of application of these devices are as follows, remote telecommunications sites, electromedicine, industrial automation, robotics, aero-space industry, etc.



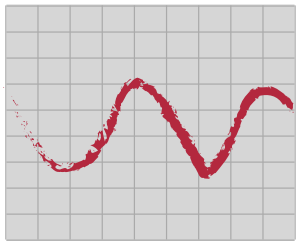
Transitorios. *Fig. 2*



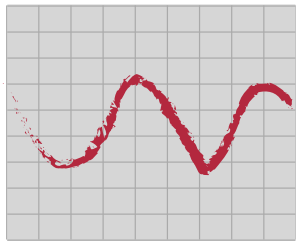
Transitorios. *Fig. 2*



Recorte logrado por Mov. *Fig. 3*



Rinwave. *Fig. 4*



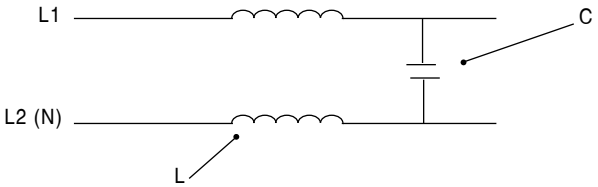
No existe atenuación del Rinwave. *Fig. 5*

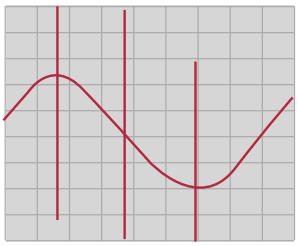
Fig. 1 displays the typical application circuit of the parallel devices
Fig. 2 Displays a set of transients that normally are present in the sine wave.
Fig. 3 The same transients as in Fig. 2, suppressed by the parallel connected device.
Figs. 4 & 5 recreate the before and after, respectively, the parallel connection (no variation).

The MOV's can be used in high energy applications but with no critical load, due to this devices have a high residual tension. They are included in categories B & C, according to IEEE C6241.

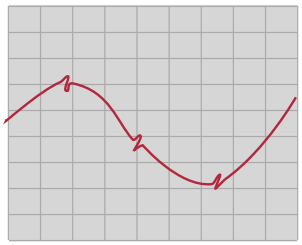
Active Filters with integrated primary and secondary stages

EC-Series devices with active filter are composed by two stages of protection, primary and secondary. The type of connection for these devices is series connection.
The first stage consists of shunting, whilst the second one involves active filtering, and it eliminates transients and disturbances both in Normal Mode (disturbances between phases or phase and neutral, also called Differential Mode) and in Common Mode (disturbances between phase and ground or neutral and ground).
EC-Series active filters provide of attenuation for

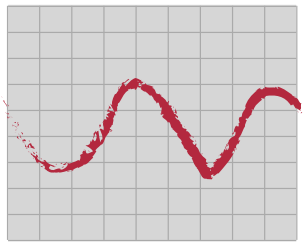




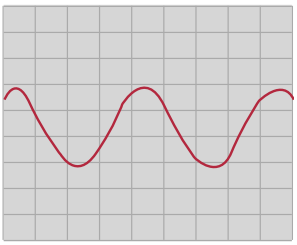
Transitorios. *Fig. 7*



Atenuación lograda por el filtro L-C. *Fig. 8*



Rinwave. *Fig. 9*



Atenuación lograda por el filtro L-C. *Fig. 10*

Este tipo de circuito permite la atenuación efectiva en un filtro eficiente a las variadas frecuencias, componentes principales del ruido eléctrico (Ringwave) y de los frentes de onda provocados por inducciones en descargas atmosféricas, pero carecen de derivadores para la alta energía. Se encuadran en la categoría A según la IEEE C6241.