Eaton® ESF Series Surge Filters

Class II/Cat C & B
1 & 3 Phase 50-80A Series Surge Filters

Typical applications:
- Telecommunications systems
- Medical equipment
- Industrial equipment
- Data centres
- Control systems
- Switch boards

Key Features:
- Compact solution for Class II / Cat B,C & D, Point of Entry, distribution board and sub board surge protection
- All mode protection L-N, L-E & N-E
- High kA rating per phase 100kA, Imax
- Exceptionally low let through voltage <600V @ 3kA/8/20us, <800V @ 50kA / 8/20us, Inom
- 50A to 80A single and three phase models
- Fully enclosed and gear tray versions to suit switch boards
- Can be configured for 3:1 phase bypass loads
- Available in TN & TT systems versions
- 5 Year Warranty

ESF 1 & 3 phase enclosed models

Functional Description
The ESF series surge filters are Class II, single and three phase, 2 port SPDs, designed to provide complete site surge protection in a compact footprint. These models utilize UL1449 ed3 certified thermally-fused MOV devices in conjunction with air-wound inductors to provide a current-limited output, coordinated to surge levels below 3kA. This means that all downstream power circuits are protected to ANSI/IEEE C62.41 Category B level, the common level that medium power LV loads (UPS, rectifier, industrial machines) are designed to accept. The design results in an exceptionally low let through voltage, ( <600V, 3kA, 8/20us ). In addition, the units also provide filtering of line harmonics, noise and RF transmitters with a cut off frequency of <10KHz and a nominal attenuation of 48dB above 1MHz.

The units can be supplied in gear-tray format for installation into a switchboard, or enclosed in an IP54 enclosure. When installed in compliance with the manufacturer’s instructions and applicable standards, this unit provides a high degree of protection to connected loads. Models are offered in 1 or 3 phase for TT or TN-based power systems in the range of 50A to 80A.

Principle of Operation
Excess potentials are captured by the primary protection stage, resulting in a protection level of <600V @ 3kA, (8/20us) and <800V @ 50kA, Inom (8/20us). The filter components reduce rise-time of the remaining surge and control current to the secondary MOVs. A ‘Low Q’ filter design is utilized to avoid resonance effects. When the secondary MOVs conduct, the unit’s output is clamped and the inductor provides current-limiting of the surge into the externally-connected load circuits. TN models use Neutral as the primary and secondary surge return paths and provide Neutral-Earth protection via a high-energy gas arrester. TT models use Earth as the primary surge return and Neutral as the secondary surge return path. TT models use MOV devices for Neutral-Earth protection. These units are applicable to TT, TN-C, TN-S and TNC-S power systems nominally rated between 380 and 440V.
## Eaton® ESF Series Surge Filters

### Specifications

#### Technical Specifications

<table>
<thead>
<tr>
<th>Available Models</th>
<th>Technical Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosed versions : TN-S, TN C-S SYSTEMS.</td>
<td>Residual voltage (VpP) Line-Neutral</td>
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<tr>
<td>Gear tray versions : TN-S, TN C-S SYSTEMS.</td>
<td>Residual voltage (VpP) Neutral-Earth</td>
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<tr>
<td></td>
<td>Residual voltage (VpP) Line-Neutral</td>
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<tr>
<td></td>
<td>&lt;800V (3kA, 8/20μS)</td>
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<tr>
<td></td>
<td>Residual voltage (VpP) Neutral-Earth</td>
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<tr>
<td></td>
<td>&lt;&lt;1000V (5kA, 8/20μS)</td>
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<td></td>
<td>Internal protection (fusing)</td>
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<tr>
<td></td>
<td>All surge diverter elements are thermally fused.</td>
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<td></td>
<td>External disconnector requirements</td>
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<tr>
<td></td>
<td>Line side: 1 or 3 pole, HRC gl fuse, 500v, 50kAIC.</td>
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<td></td>
<td>Load side: 10kAIC or better MCB.</td>
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<tr>
<td></td>
<td>Terminations</td>
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<tr>
<td></td>
<td>Bolted lug, 8mm bolts for phase and neutral connections. 6mm PE (earth) stud provided on gear tray. All connections identified on unit.</td>
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<td>Alarms/indicators</td>
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<td></td>
<td>Includes status indicators, dry contact alarm relay output (normally-closed with power applied and all SPD's at 100% capacity). Contact rating 250Vac/32Vdc, 5A, alarm under-voltage cut off 180Vac.</td>
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<td></td>
<td>Location Category</td>
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<tr>
<td></td>
<td>Internal mounting location only. Must be installed within a suitable enclosed space, allowing for cooling airflow.</td>
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<tr>
<td></td>
<td>Thermal dissipation</td>
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<tr>
<td></td>
<td>Max 200W @ full load, 3 phase, 80A model.</td>
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<td></td>
<td>Standards. Designed in accordance with :</td>
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<tr>
<td></td>
<td>IEC61643-1:2005, IEC61000-6-1,2,3,4</td>
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<tr>
<td></td>
<td>Installation instructions</td>
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<tr>
<td></td>
<td>Supplied with unit.</td>
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<tr>
<td></td>
<td>Dimensions – 1 phase including hinges</td>
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<tr>
<td></td>
<td>Enclosed models : 520H x 240W x 220D (mm)</td>
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<tr>
<td></td>
<td>Gear tray models : 350H x 200W x 190D</td>
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<tr>
<td></td>
<td>Dimensions – 3 phase including hinges</td>
</tr>
<tr>
<td></td>
<td>Enclosed models : 520H x 240W x 220D (mm)</td>
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<tr>
<td></td>
<td>Gear tray models : 350H x 360W x 190D</td>
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<tr>
<td></td>
<td>Weight</td>
</tr>
<tr>
<td></td>
<td>8kg (single phase), 10kg (3 phase)</td>
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<td></td>
<td>Environment</td>
</tr>
<tr>
<td></td>
<td>-10 to 65°C, 10 to 90%RH (non-condensing)</td>
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<td></td>
<td>IP42 Enclosed</td>
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<td></td>
<td>Gear tray</td>
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<tr>
<td></td>
<td>Warranty</td>
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<tr>
<td></td>
<td>5 years, workmanship and materials</td>
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</tbody>
</table>

#### Surge Category

The ESF is suitable for use in category locations:

**Class II/Cat C**

(6kV/15kA) Point of Entry/Service Entrance

**Class II/Cat B**

(6kV/3kA) Major sub mains & short final sub circuits

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**1 Mode 2 Element Series Filter**

**All Mode 2 Stage Surge Diverter**

1. **Primary MOV Protection**
2. **Series Blocking Inductor**
3. **High Frequency Capacitor**
4. **Secondary MOV Protection**

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**ESF Block Diagram (Single Phase shown)**

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**Note:** Installation must be carried out by suitably qualified personnel. Please refer to installation instructions prior to proceeding with installation.

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Ideals that Endure
Connection Diagrams

Important: Before installing the device, please read & follow the installation & operating instructions.

ESF (Gear tray model)