

# Eaton® ESF Series Surge Filters

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



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.

### 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, I<sub>max</sub>
- Exceptionally low let through voltage <600V @ 3kA/8/20us, <800V @ 50kA / 8/20us, I<sub>nom</sub>
- 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

### 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, I<sub>nom</sub> (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.

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# Eaton® ESF Series Surge Filters

## Specifications

Technical Specifications	Available Models
Model part numbering guide: ESFXXX-YY-Z	Enclosed versions : TN-S, TN C-S SYSTEMS.
ESF E model Surge Filter	ESF501-TN-E, ESF503-TN-E, ESF631-TN-E, ESF633-TN-E, ESF801-TN-E, ESF803-TN-E
WW Current. 50, 63 or 80 Amp	
X Phases 1 or 3	
-YY TN for TN based systems. TT for TT based systems	Gear tray versions : TN-S, TN C-S SYSTEMS.
-Z E for enclosed units. Blank for gear tray units	ESF501-TN, ESF503-TN, ESF631-TN, ESF633-TN, ESF801-TN, ESF803-TN
Input voltage – Uc	220 – 250VAC 1∅ 380 – 440VAC 3∅
Maximum continuous voltage – MCOV	320VAC L-N
Service type	TN-S, TN C-S SYSTEMS
Nominal discharge current	Class II In L-N 50kA, N-E 50 kA
Current rating – continuous	50, 63 or 80A
Recommended maximum over current protection	HRC gL fuse rated according to the unit's rating.
Residual current	<10 mA
Short circuit withstand (1 sec)	29kA
Primary protection modes – TN models	Line-Neutral, Neutral-Earth
Primary protection modes – TT models	Line-Earth, Neutral-Earth
In 8/20us (Line-Neutral or Line-Earth)	50kA
In 8/20us (Neutral-Earth)	50kA
Ismax 8/20us ( Line – Neutral )	100kA
Nominal surge lifetime	15 hits @ 50kA (8/20uS, each mode)
Filter attenuation	48dB nominal above 1MHz
Initial clamp voltage (Line-Neutral)	510V
Initial clamp voltage (Line-earth – TT models)	680V
Initial clamp voltage (Neutral-Earth)	TN = 255V

Technical Specifications	
Residual voltage (Vpl) Line-Neutral	<600V (3kA, 8/20uS)
Residual voltage (Vpl) Neutral-Earth	<1000V (3kA, 8/20uS)
Residual voltage (Vpl) Line-Neutral	<800V (50kA, 8/20uS)
Residual voltage (Vpl) Neutral-Earth	<1100V (50kA, 8/20uS)
Internal protection (fusing)	All surge diverter elements are thermally fused.
External disconnector requirements	Line side: 1 or 3 pole, HRC gL fuse, 500v, 50KAIC. Load side: 10kAIC or better MCB.
Terminations	Bolted lug. 8mm bolts for phase and neutral connections. 6mm PE (earth) stud provided on gear tray. All connections identified on unit.
Alarms/indicators	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.
Location Category	Internal mounting location only. Must be installed within a suitable enclosed space, allowing for cooling airflow.
Thermal dissipation	Max 200W @ full load, 3 phase, 80A model.
Standards. Designed in accordance with :	IEC61643-1:2005, IEC61006-1,2,3,4 ANSI/IEEE C62.41, AS/NZS1768, AS/NZS3000:2007, AS3100
Installation instructions	Supplied with unit.
Dimensions – 1 phase including hinges	Enclosed models : 520H x 240W x 220D (mm) Gear tray models : 350H x 200W x 190D
Dimensions – 3 phase including hinges	Enclosed models : 520H x 400W x 220D (mm) Gear tray models : 350H x 360W x 190D
Weight	6kg (single phase), 10kg (3 phase)
Environment	-10 to 65°C, 10 to 90%RH (non-condensing) IP42 Enclosed IP20 Gear tray
Warranty	5 years, workmanship and materials

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

### Surge Category

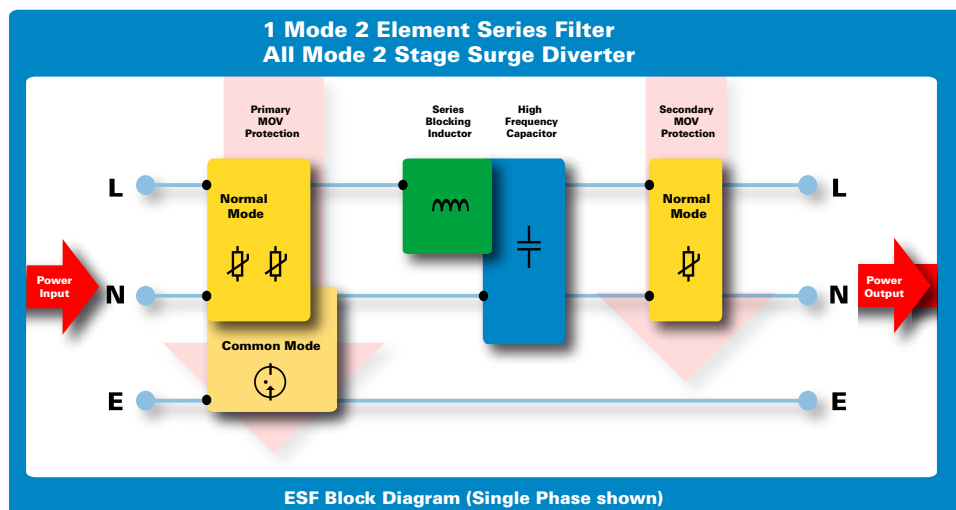
The ESF is suitable for use in category locations:

#### Class II/Cat C

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

#### Class II/Cat B

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



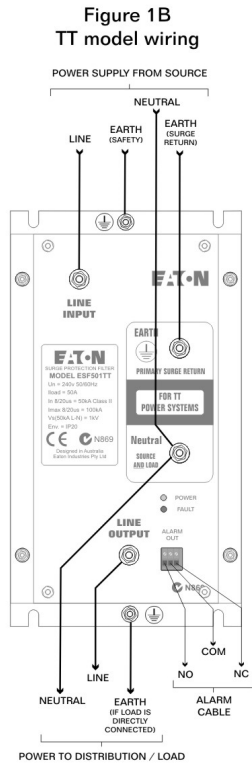
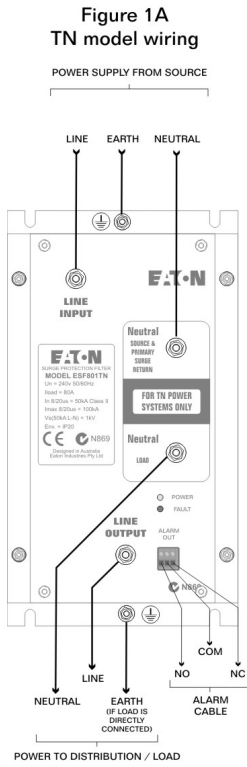
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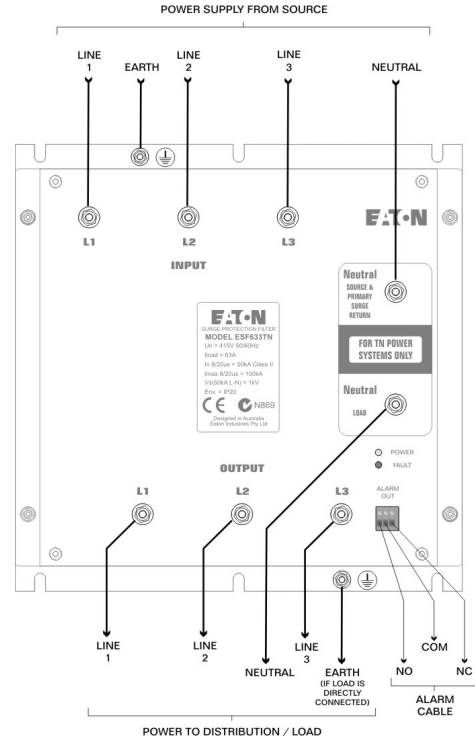
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# Connection Diagrams

**Figure 1 - Single-phase models**



**Figure 2 -  
3-phase TN models**



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



ESF (Gear tray model)



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