

Cross currents

APRIL, 2008

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econix SPDs : Surge Protection Devices - PART II

econix Surge Protective Devices: Part 1 (Cross Currents: Feb 08 issue) describes the types and nature of over voltages, and their causes. One of the most frequent causes of transient over voltages is the inductive switching in low voltage network. However various other causes of transient over voltages have been also recognized such as: capacitor bank switching, grid switching (supply side transients), switching for restoring power following power failure, arcing faults etc., and of course, transient over voltages due to lightning strikes.

Different causes of transient over voltages, generate high voltage transients with different frequencies and magnitude of voltage. The maximum discharge current, flowing through surge protective device when it operates, is another characteristic parameter generally controlled by the source and the cause of over voltage.

The **econix** surge protective devices, named **ECTRATECH**, are designed to protect the equipment or the supply lines where they are installed, from all types of transient over voltages. **ECTRATECH** products have therefore a wide range to select from and are classified on the basis of their ratings and applications. Overview of **econix** SPDs for various applications is presented in Fig. 1 overleaf.

In selection of Surge Protective Devices it becomes very important that following requirements are fulfilled:

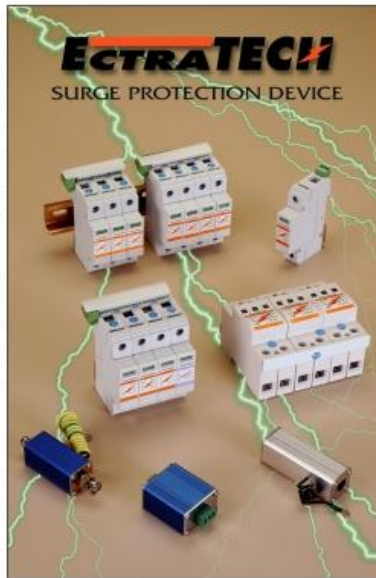
- ⇒ **Survivability**
- ⇒ **Transient Control**
- ⇒ **System compatibility**

Survivability : SPD chosen must be capable of surviving worst case transient appearing at the point of installation. Also it is to be ensured that after withstanding worst case transient, its characteristics do not change nor it is required to be derated drastically.

Transient Control : SPD must be able to restrict transients well below the level of susceptibility and vulnerability of the equipment they are protecting. For example if an equipment can withstand say 900 V, then SPD should be capable enough to restrict transient well below 900 V.

System Compatibility : SPDs are designed to remain in dormant state under normal condition, and they must not impair or interfere with normal operation of the protected system.

The high energy varistors used in **econix** ECTRATECH SPDs ensures very good survivability. As required by design use of gas discharge tube and the high energy varistors provide excellent transient control. The logarithmic non linear characteristics of the varistors having wide range of protection voltages provides high system compatibility of **econix** SPDs. They are therefore an excellent choice



for surge protection of low voltage power systems, communication systems, as well as instrumentation systems.

Salient features of **econix** SPDs:

ECTRATECH SPDs are designed with following salient features:

1. Fully enclosed polyamide housing ensuring no exposure to the conductive elements of the device.
2. Response time of less than 25 nanoseconds
3. Remote monitoring, potential free, alarm terminals for interlocking and annunciation with auxiliary control system.
4. Flag indication to indicate failure of the device.
5. Detachable elements which can be serviced and/or replaced.

ECTRATECH Power System Protection:

This range of **ECTRATECH** Surge Protective Devices is suitable for operation at 50 / 60 Hz., for various electrical networks like TT / TN / IT / TN - S / TN - C / TN - C - S (see Box for explanation of T, N, I, etc.). It protects the electrical network and utilities from surges due to effects of direct strike, or due to inductive switching, or due to electrical faults on the network.

The SPDs are designed for various modes of operation such as: Phase - to - earth, or Phase - to - neutral, or Neutral - to - earth, depending upon the mode of operation. 'Ectratech' SPDs for power system protection can be used for different kinds of protection configuration, such as: 3+1, 3+0, 4+0, 1+0 and Hybrid protection mode of single phase power supply protection, as illustrated in Fig. 2 overleaf.

ECTRATECH SPDs for power system are available in various discharge current rating from 10 KA to 100 KA for different kinds of applications.

ECTRATECH Communication System Protection:

ECTRATECH communication system protection are designed for various communication system like;

- ⇒ **ETAT - C - BNC** for BNC termination
- ⇒ **ETAT - C - RJ11** for RJ11 termination
- ⇒ **ETAT - C - RJ45** for RJ45 termination

ETAT - C - BNC series are designed for the protection of video devices from surges. It has standard BNC interface to make it convenient for customers to install and can be extensively applied to the protection of final equipment.

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econix SPDs : Surge Protection Devices

ETAT - C - BNC are designed for interface of 50 Ω and 75 Ω termination impedance and provides wire to wire and wire to earth protection. Response time for wire to wire protection is in order of nano second and wire to earth is in order of hundreds of nano second. These devices are designed for various operating voltage level from 6 to 24 V and maximum frequency of 30 MHz. with discharge current of maximum 5 KA.

ETAT-C-RJ 11 are designed for protecting telecommunication equipment with RJ 11 termination. These devices are designed for fast response and low clamping voltages. These devices are available in various operating voltage starting from 15 V to 48 V

ETAT-C-RJ 45 are designed for protecting computer and other networking devices with RJ 45 termination. Various configurations like 8p8c are available. Its inherent features are high response and greater accuracy of operation. These devices are rated for 5 V only.

ECTRATECH Instrumentation System Protection:

ETAT-F are designed for protection of electronic equipments, data transmission, data monitoring and control equipments. Response time is in order of nano seconds. The ETAT - F supports transmission of 1 MHz.

FIG. 1 : econix SPDs FOR VARIOUS APPLICATIONS

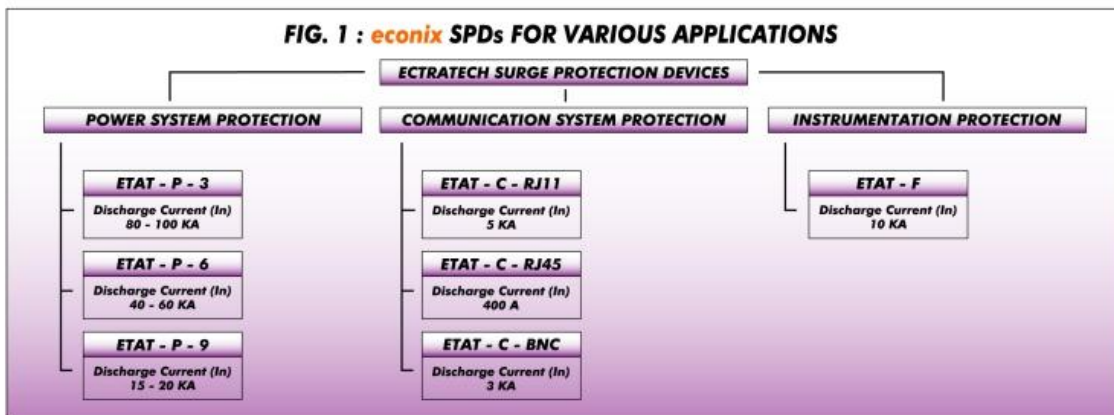
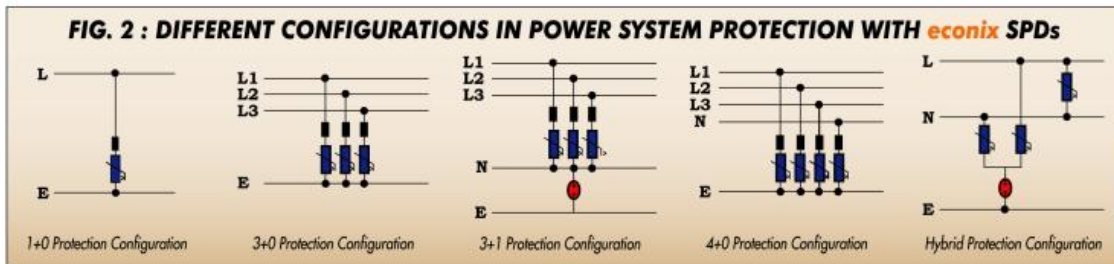


FIG. 2 : DIFFERENT CONFIGURATIONS IN POWER SYSTEM PROTECTION WITH econix SPDs



SPD PARAMETERS

- U_c : Max continuous operating voltage - Max value of RMS AC voltage, or DC voltage, which can be applied to the device protected by SPD.
- U_n : Nominal voltage of the system - The voltage to which operating characteristics are referred to.
- U_p : Voltage protection level - Defines SPD performance in limiting the voltage of the device it protects.
- U_{res} : Residual voltage - Peak value of voltage appearing at SPD terminals due to passage of discharge current.
- I_n : Nominal discharge current- Peak value of 8/20 micro sec discharge current wave through SPD.
- I_{max} : Max. discharge current - Max discharge current which the SPD can handle with 8/20 microsecond current wave. Beyond this value, the SPD undergoes thermal runaway condition.
- I_f : Follow current - Current flowing through the SPD after the discharge current impulse.

GENERIC TERMS FOR ELECTRICAL NETWORK

- Electrical Network can be identified in terms of earthing conditions of supply source and those of the equipment installed. It is expressed by two or more letters, The first letter describes earthing condition of supply source as follows:
- T : Direct earthing (generally neutral point)
 - I : Earthing through impedance
- The second letter describes earthing of equipment in electrical installation as follows:
- T : Body of equipment is directly earthed.
 - N : Body of equipment is directly connected to power system earthing.
- Subsequent letters describe arrangement of neutral conductor and protective conductor (earthing)
- S : Neutral and protective conductors are separate from each other
 - C : Neutral and protective conductors are combined.

EX APPROVAL FOR *elmex* TERMINALS

THE ATEX DIRECTIVE

In Petroleum Industry, Chemical Industry and other such Industries the probability of explosive material in atmosphere is high and can also be actually present to some degree in different areas. Occurrence of high temperature or spark in an electrical device may lead to severe explosion hazard. The ATEX directive 94/9/EC essentially aims at preventing such mishaps, and it is applicable to the equipment for use in potentially explosive atmospheres.

The directive requires that equipment and its components have to be approved for use in potentially explosive environments.

elmex terminal blocks, offered for verification as per respective standards IEC/EN 60079-0 & IEC/EN 60079 / 7, have been verified, tested and approved by Det Norske Veritas (DNV) - Norway for use in potentially explosive environments. Further, the ATEX-Directive also requires Quality System to comply with EN13980-Application of Quality System to Potentially Explosive Atmospheres. *elmex* quality system as per ISO 9001 was audited and compliance of *elmex* with EN13980 was verified. *elmex* Terminal Blocks with ATEX approval are marked with EX logo in the detailed catalogue.

The test requirements as per EN 50014 and EN 50019, which are now superseded by IEC/EN 60079-0 and IEC/EN 60079-7 respectively, are more severe particularly for the following:





















- Creepage Distances** : For 1000V rating the creepage distance as per IEC 60947-7-1 is 12.5mm, whereas according to above IEC/EN standards the required creepage distance is 20 mm (material group-1)
- Dielectric Test** : Test voltage for 800 V rating is 2000v / 1 min. as per IEC 60947 - 7 - 1, whereas according to the above IEC / EN standards required test voltage is 2600 V / 1 min.
- Range of Service Temperatures:**
IEC 60947 - 7 - 1 : -5 to + 40 °C
IEC/EN 60079-0 : -20 to + 40 °C

The maximum surface temperature of 85 °C controls Temperature Rise limits. Performance at sub Zero temperatures (-20 °C) have also to be verified, as per IEC/EN 60079-0 / 60079-7.

elmex terminal blocks, which have been approved for application in potentially explosive atmospheres, are classified as follows:-

- for surface installation
- Group II and Category II
- Zones 1 and 2
- Increased safety "e", type of protection "n"

Summary of *elmex* terminals with EX approval. For details, refer to our catalogue.

"K" Series, Feed Through  2.5 - 95 sq mm	Multi-Level, Double Deck  2.5 sq mm	Multi-Level, Triple Deck  2.5 sq mm	Stud Type, KAT  10 & 16 sq mm	Stud Type, KBT  10 & 16 sq mm
Earth, ET  6 - 35 sq mm	Earth, EB  2.5 - 6 sq mm	Melamine Power, CST  70 & 185 sq mm	Power (Bus Bar), DPBB  50 - 120 sq mm	Micro, SUT/NET  4 sq mm
Panel Mounted, PET  4 sq mm	Spring Loaded, KULT 1  10 sq mm, Feed Through	Spring Loaded, KUTSD 6  6 sq mm, Disconnect	Spring Loaded, KSTD 6WS  6 sq mm, Disconnect	Spring Loaded, KUTD 10  10 sq mm, Disconnect
Fuse Terminals  2.5 sq mm	Fuse Feed Through  2.5 sq mm	Fuse Terminals  10 sq mm	Fuse Terminals, Brass  4 sq mm	Earth, EBT 4 TWIN  4 sq mm



cross currents



elmex Bus Bar Termination Solutions :

Safe, Proven, Advanced, Hi-tech options...



BUS BAR TERMINALS :

- ✓ New Finger Safe and Shrouded Design
- ✓ Suitable for upto 120 sq mm conductor
- ✓ Polyamide 6,6 version with safe mounting lock on DIN Rail
- ✓ Wide Range : SPT 35, SPT 70, DPBB 50/70/120, CBT 100/110/170/250/300



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elmex : The name you have come to trust

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We welcome your suggestions and queries regarding our products and feedback about CROSS CURRENTS. Write to us at ask@elmex.net



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TECHNICAL SPECIFICATIONS MAY CHANGE IN LINE WITH TECHNICAL ADVANCES AND INDUSTRY STANDARDS.