



THOR SYSTEMS, INC.

SURGE APPS SA-015: HOW MANY MODES OF SURGE PROTECTION (Guidelines and application tools to promote improved Power Quality)

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How Many Modes of Surge Protection

INTRODUCTION

There are many factors to be considered in the specification of Surge Protective Devices (SPDs). These include system ampacity, voltage configuration, location within the power system, load criticality, and the number of protection modes required. Various methodologies have been used for protecting the multiple modes within the electrical system and there has been much confusion regarding what is needed to protect these modes.

PROTECTION MODES

Multiple protection modes can be applied to a power system. These modes can vary from one to ten, depending on the power system configuration. Surge suppression manufacturers choose how to populate these modes based on the suppression strategy of the company.

Ref. Standards:

UL 1449 4th Ed.
UL 1283 5th Ed.
C62.41.1: 2002 IEEE
C62.41.2: 2002 IEEE
C62.45: 2002 IEEE
C62.62: 2010 IEEE
C62.72: 2007 IEEE
NEMA
NEC 2014
EMERALD BOOK,
IEEE Std. 1100-1999

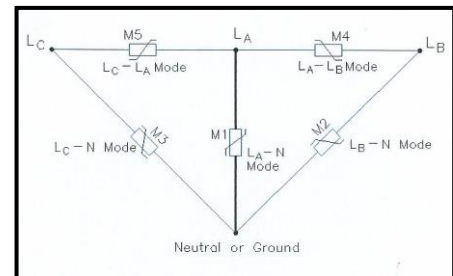
ALL MODE PROTECTION

Claims are made that reference IEEE and NEMA standards (listed below) indicating that *all modes need to be protected – not that all modes have to have discreet protection elements to be most effective.*

- IEEE Emerald Book (IEEE Standard 1100-1999)
- IEEE Trilogy (IEEE C62.41.1 – 2002 [Ref. 3], C62.41.2 – 2002 [Ref. 4], C62.45 – 2002)
- NEMA Publication LS-1 – 1992

PROTECTION MODE BENEFITS

Reference the VECTOR DIAGRAM shown here in which [L-L] surge elements are provided and surge is injected into the line L_A node. There are three paths to reach Ground or Neutral: through the single element [M1] or through the two series paths involving the combination of elements [M5] and [M3] or [M4] and [M2]. This diagram confirms the preferred path (lowest impedance) would be through element [M1] making [M4] and [M5] superfluous.



VECTOR DIAGRAM

CONCLUSION

A seven mode surge suppression system (for Wye/4 Wire + Ground applications) has been used and accepted within the industry for many years. Ten modes of discreet protection elements is merely a different population configuration. Is it not feasible that this design was not looked at much earlier in the design of surge suppression products and determined that the additional cost, space, and investment did not warrant any realized benefits? In reality, the surge components in the L-L modes of a Wye configuration provide no justified value other than a marketing tactic.

We would like to become an information resource for your surge protection applications. THOR SYSTEMS offers products and services that provide protection from the more *obvious external* to the more *frequent internal* transient voltage sources.

Ref. Documents:

SA-004 Risk Assessment/Sizing SPD
TSI AG35 Appl'n Guide 35, Protected Modes
SA-006 Define Effective Surge Protection
TSI 0119 Site Risk Assessment Spreadsheet
TSI 068 Product Overview
3G TSr Product Spec Sheet
3G TSn Product Spec Sheet

Our consistent focus on improved product performance and increased value to the customer is conveyed by our products' transparent cover enclosures, showcasing the TILE Architecture, Innovative Design Configurations, and per Mode Status Indication. Should you have any questions, please feel free to contact us (804.355.1100) or visit our Web site, www.ThorSystems.us.