

# Coordinated Facility Protection

Selecting Surge Protection



**ERICO**<sup>®</sup>

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# Introduction

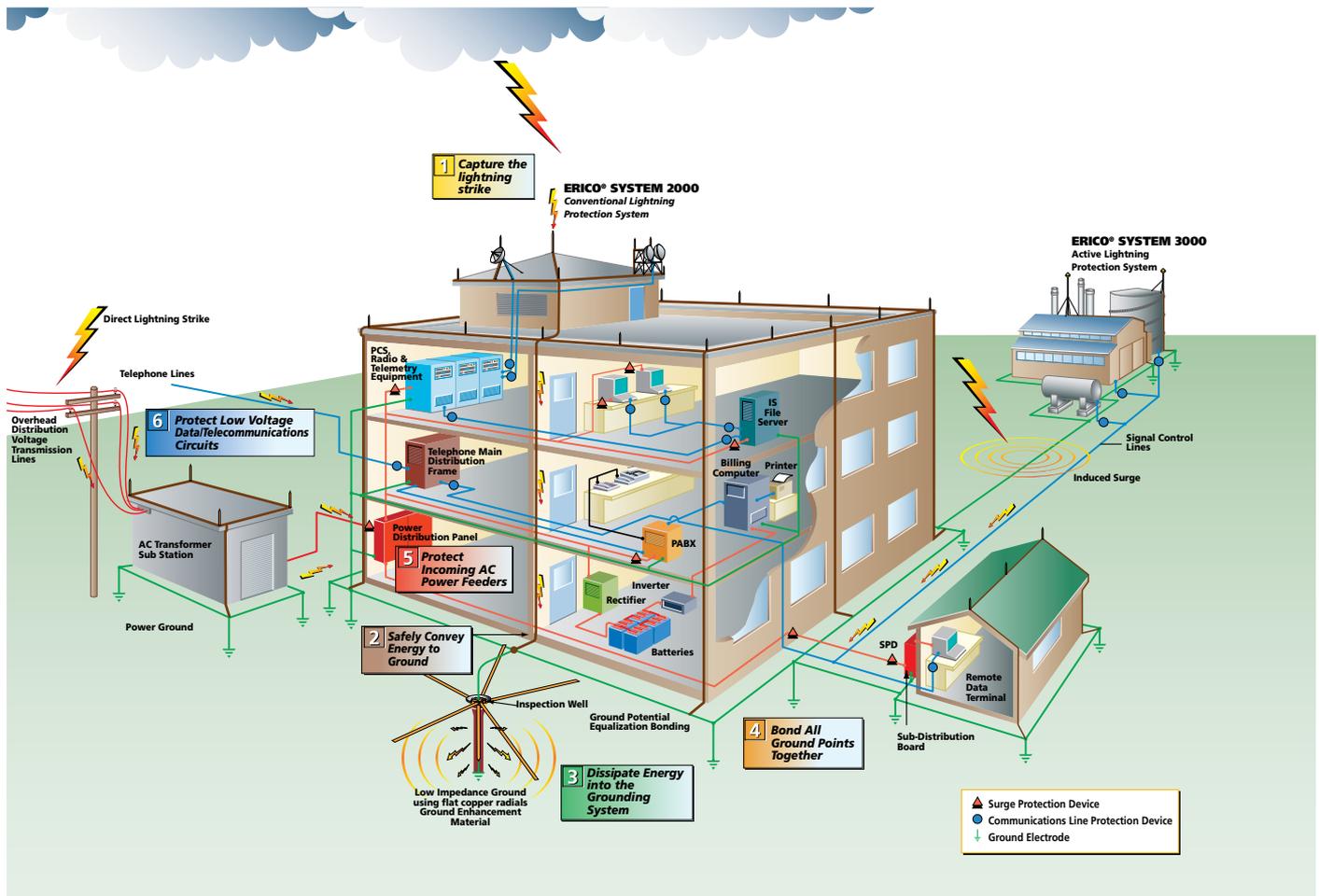
By following the Six Point Plan of Protection, ERICO customers are able to implement the most effective solutions to individual lightning, grounding and surge problems while retaining an integrated protection philosophy.

Point 5 of the Six Point Plan advocates a coordinated approach to surge protection, where the first stage of defense is the installation of primary protection devices at the mains supply service entrance, followed by secondary protection at distribution branch panels and where necessary, at point-of-use applications.

Point 6 recognizes the need to provide effective surge protection on cables supplying telecommunications, signal and data management equipment.

## The Six Point Plan of Protection from ERICO

- 1** Capture the lightning strike.  
Capture the lightning strike to a known and preferred attachment point using a purpose-designed air terminal system.
- 2** Convey this energy to ground.  
Conduct the energy to the ground via a purpose-designed downconductor.
- 3** Dissipate the energy into the grounding system.  
Dissipate the energy into a low impedance grounding system.
- 4** Bond all ground points together.  
Bond all ground points to eliminate ground loops and create an equipotential plane.
- 5** Protect incoming AC power feeders.  
Protect equipment from surges and transients on incoming power lines to prevent equipment damage and costly operational downtime.
- 6** Protect low voltage data/telecommunications circuits.  
Protect equipment from surges and transients on incoming telecommunications and signal lines to prevent equipment damage and costly operational downtime.



# The Need for Coordinated Protection

## Critical Factors

Critical factors need to be considered when determining the need for facility protection. Many factors can be determined by answering the following questions:

- What is the risk to personnel?
- What is the risk of equipment damage?
- What are the consequences of equipment failure?
- Is the equipment associated with an essential service?
- How will equipment failure affect overall facility operation and revenue generation?
- What are the legal implications of providing inadequate protection?

The statistical nature of lightning and the broad spectrum of energy delivered by a lightning flash, the problems created by various power generation and distribution systems, and the continued trend to more sensitive and specialized electronics, requires careful selection of available technologies if adequate protection is to be provided.

## What are the costs of inadequate protection?

The costs that can result from inadequate protection are many and varied. The type of equipment within a facility will have a direct impact on the damage that can occur. Robust equipment, such as lighting and air-conditioning systems, are often able to withstand impulses as high as 1500 volts and are not as sensitive to the rapid rate-of-rise exhibited by the pre-clamped surge waveform as are electronics. These systems are often not critical to the continuing operation of the site and therefore usually do not require the premium level of protection that is essential for more sensitive equipment.

However, significant damage can occur, even to the more robust systems, as a result of lightning induced surges resulting within a radius of several kilometers, or from switching induced surges.

Costs can range from degradation of electrical or electronic systems to data loss, equipment destruction or injury to personnel. Some of these costs can appear relatively minor but the loss of an essential service or revenues associated with a facility or plant shut down can be enormous.

## Sources of Transients and Surges

Although lightning is the most spectacular form of externally generated surges, it is only one source of over-voltage. Other sources include the switching of power circuits, the operation of electrical equipment by neighboring industries, the operation of power factor correction devices, and the switching and clearing of faults on transmission lines. It is important to note that lightning does not need to directly strike a power line for such damage to occur; a strike several hundred meters away can induce large damaging transients, even to underground cables.

It is estimated that 70 to 85% of all transients are generated internally within one's own facility by the switching of electrical loads such as lights, heating systems, motors and the operation of office equipment.

Modern industry is highly reliant on electronic equipment

and automation to increase productivity and safety. The economic benefits of such devices are well accepted. Computers are commonplace and microprocessor-based controllers are used in most manufacturing facilities. Microprocessors can also be found embedded in many industrial machines, security & fire alarms, time clocks and inventory tracking tools. Given the wide range of transient sources and the potential cost of disruption, the initial installed cost of surge protection can readily be justified for any facility.

As a guide, the cost of protection should be approximately 10% of the cost of the facility's economic risk.



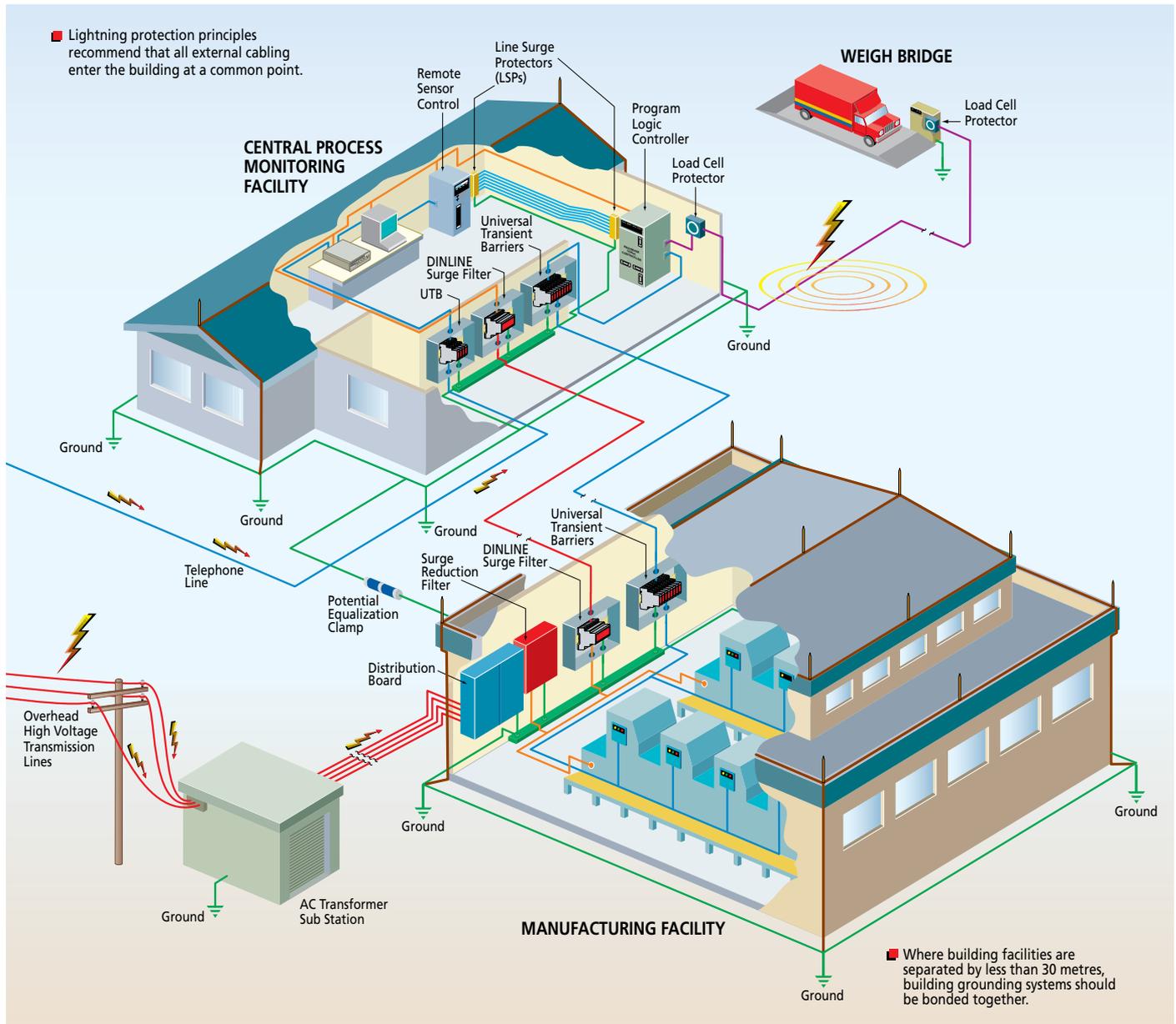
*Damage to vital equipment caused by destructive surges and transients.*

# The Need for Coordinated Protection

Reliable protection of structures, industrial and commercial operations and personnel, demands a systematic and comprehensive approach to minimizing the threats caused by transient over-voltages. Grounding, bonding, lightning protection and surge protection all need to be considered for comprehensive facility electrical protection. Each of these are interdependent disciplines that need a holistic design approach to ensure the facility is not left with a vulnerable "blind spot". The investment in surge protection can be wasted if "blind spots" exist. For example, installing a surge protection device on the power supply to a programmable logic controller is of little value if the I/O lines are not also protected. In addition, an air terminal on the facility may capture the lightning energy but without a dependable ground system, this energy cannot be safely

dissipated. Equally, even the most expensive Surge Protection Devices (SPDs) are poor performers if a low impedance equipotential ground is not provided. These interdependent disciplines are best applied when looking at a total facility rather than at an individual piece of equipment or portion of the facility.

It is for these reasons that ERICO developed the Six Point Plan of Protection. The plan prompts the consideration of a coordinated approach to lightning protection, surge and transient protection and grounding, an approach that embraces all aspects of potential damage, from the more obvious direct strike to the more subtle mechanisms of differential earth potential rises and voltage induction at service entry points.



The Six Point Plan applied to a manufacturing facility. Surge and transient protection principles applied to a total facility rather than individual pieces of equipment.

# Selecting Surge Protection

| RECOMMENDED SURGE RATINGS (8/20 $\mu$ s) |  |   |                                    |  |   |
|--|--|---|------------------------------------|--|---|
| ANSI/IEEE C62.41                         |  |   | CAT C                              | CAT B  | CAT A   |
| IEC 61643 Test Class                     | I  |   | I, II                              | II   | III   |
| VDE Classification                       | A  |   | B                                  | C  | D   |
|  | POINT-OF-ENTRY<br>HIGHLY EXPOSED OR<br>CRITICALLY IMPORTANT<br>SITES | POINT-OF-ENTRY<br>EXPOSED OR RURAL<br>SITES | POINT-OF-ENTRY<br>INNER CITY SITES | SUB CIRCUITS OR<br>NEAR TO<br>POINT-OF-ENTRY | DISTRIBUTED CIRCUITS,<br>POWER OUTLETS,<br>CIRCUITS REMOTE<br>FROM POINT-OF-ENTRY |
| <b>EXPOSURE</b>                          |  |   |                                    |  |   |
| <b>HIGH</b> Ng >2                        | 100kA  | 70kA  | 40kA                               | 20kA   | 10kA  |
| <b>MED.</b> Ng 0.5-2                     | 65kA   | 40kA  | 20kA                               | 20kA   | 5kA   |
| <b>LOW</b> Ng <0.5                       | 65kA   | 40kA  | 15kA                               | 5kA  | 3kA   |

Ng = strikes/km<sup>2</sup>/year.

| RECOMMENDED PRODUCTS  |                             |  |  |  |  |
|-----------------------|-----------------------------|--|--|--|--|
| <b>PRODUCT SERIES</b> | SES200                      |  |  |  |  |
|                       | SES40 120/240               |  |  |  |  |
|                       | TDS MOVTEC & MPM            |  |  |  |  |
|                       | TDX200 / TDX300 / TDX400    |  |  |  |  |
|                       | TDX100                      |  |  |  |  |
|                       | TDX50                       |  |  |  |  |
|                       | TSG - SRF                   |  |  |  |  |
|                       | TSG / SGD                   |  |  |  |  |
|                       | DSD1150                     |  |  |  |  |
|                       | TDS / DSD1100               |  |  |  |  |
|                       | DSD160 & DSD380             |  |  |  |  |
|                       | TDS / DSD140 & TDS / DSD340 |  |  |  |  |
|                       | TDS130                      |  |  |  |  |
|                       | DSD110                      |  |  |  |  |
|                       | TDF                         |  |  |  |  |
|                       | DSF6A                       |  |  |  |  |



# Selecting Surge Protection

## Recommended Surge Ratings – A Comparison between IEC and IEEE® Recommendations

Competition between SPD manufacturers has seen ever-increasing surge ratings being offered to the market, to the point where surges of this magnitude are unlikely to ever occur in nature. A number of sources provide information on the statistical distribution of the current discharge of the direct lightning strike. Many studies have shown that peak lightning discharges above 100kA are likely to occur less than 5% of the time. Combined with the fact that most discharges do not strike the power line directly but are magnetically or capacitively coupled to it, and that even under a direct lightning discharge the energy will split in either direction and be attenuated by the distribution arresters and line losses, it is not difficult to determine that a smaller fraction of the initial lightning energy typically enters the facility in question.

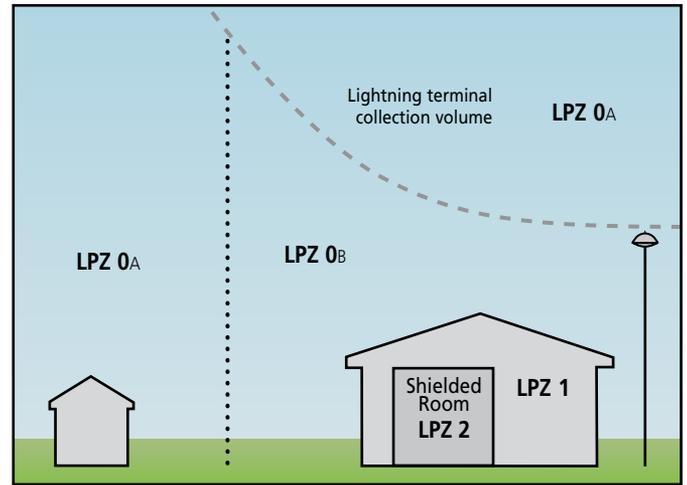
ANSI/IEEE standard C62.41 has classified the “point-of-entry” environment as CAT. B/C. Under this classification the highest expected energy level is 10kA 8/20µs. In contrast, the IEC61312 and DIN VDE 0675 defines some differing guidelines. IEC 61000-5-6 and IEC 61312-1 describe protection zone concepts. This is similar in nature to the ANSI/IEEE C62.41 concept of Category A, B & C locations.

A “Zone” is where the lightning electromagnetic environment can be defined/controlled. The zones are characterized by significant changes of electromagnetic conditions at these boundaries. These will typically be building boundaries, or the point where protection is installed.

- LPZ O<sub>A</sub> Zone subject to direct strikes
- LPZ O<sub>B</sub> Zone not subjected to direct strikes, but un-attenuated electromagnetic fields may occur.
- LPZ 1 Zone not subjected to direct strikes and where currents in this zone are reduced compared to Zone O<sub>B</sub>
- LPZ 2... If further reductions in current from LPZ 1 are achieved/required further zones can be created.

Actual surge ratings required in each of these zones is not exactly defined and is largely determined by some site-specific details. However, to assist with this the VDE0675 Part 6 standard defines the minimum class of product that can be applied to each of these Zones as shown below:

- Class A : Arrester for use in low-voltage overhead lines
- Class B : Arrester for lightning current equipotential bonding (must withstand 100kA 8/20µs or 10As charge, twice). Zones O<sub>B</sub> to 1 (Main distribution Boards, Sub-Boards)
- Class C : Arrester for over-voltage protection (must have a nominal surge rating of at least 5kA 8/20µs) Zones 1 to 2 (mainly sub-boards or low exposure main boards)
- Class D : Arrester for portable use on socket-outlets (must have a nominal surge rating of at least 1.5kA 8/20µs)



Protection zones defined by specific product application.

As it can be shown, protection equipment for power supply systems are classified as follows, according to its task →

- Lightning Current Arrester
- Over-voltage Arrester

Lightning current equipotential bonding arresters must be capable of conducting a portion of the lightning current without being destroyed. Over-voltage arresters are only used for limiting over-voltages at relatively smaller surge currents. The different “protection zones” assume the division of the initial lightning current, from zone 0 to higher zones. For zone 0, it is required for the user to select the lightning protection class, from I - IV : (i.e. these refer to maximum energy within a direct lightning strike).

| Protection Level | Current Magnitude | % Exceeded |
|------------------|-------------------|------------|
| Level I          | 200kA (10/350µs)  | ~ 0.2%     |
| Level II         | 150kA (10/350µs)  | ~ 1.5%     |
| Level III - IV   | 100kA (10/350µs)  | ~ 3%       |

The above levels can be selected based on the statistical level of protection required. A lightning current of 200kA (10/350µs) can be expected for the Protection Level I. This lightning current is divided as follows in the most exposed sites:

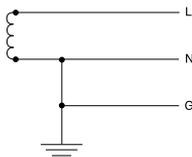
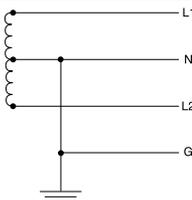
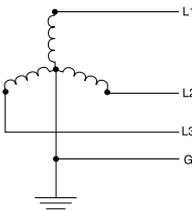
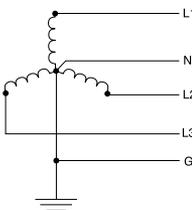
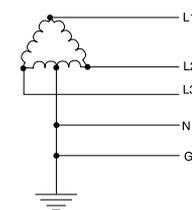
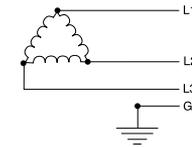
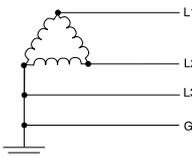
- 50% (100kA, 10/350µs) discharges via the ground system.
- 50% (100kA, 10/350µs) flows into the supply systems connected to it, via the three phase equipotential bonding lightning arresters.

On the other hand IEEE has adopted a Scenario II event, in which the building lightning protection system is subjected to a direct strike and the energy level sustained by the equipotential bonding surge arrester(s) is taken to be 10kA (10/350µs) or approximately 100kA 8/20µs as a worst case.

If we adopt IEC or DIN VDE Standard and assume a level of III-IV lightning protection system, each equipotential bonding surge arrester connected to a three phase, four wire, power system is assumed to experience a 12.5 kA (10/350µs) energy level at the Zone 0 interface due to lightning current sharing.

# A Guide to Common Power Distribution Systems

Throughout the world a number of different power distribution systems are used. This guide identifies the more common of these systems. The individual product specification tables detail system suitability.

| Description   | Source Configuration  | Typical Supply Voltages  |           |
|---|---|--|-----------|
| Single Phase<br>1Ph, 2W+G   |    | 110V<br>120V<br>220V<br>240V   | (L-N)     |
| Single Phase<br>1Ph, 3W+G<br>Also known as<br>Split phase or<br>Edison system |    | 120/240V   | (L-N/L-L) |
| Three Phase WYE<br>without neutral<br>3Ph Y, 3W+G                             |   | 480V   | (L-L)     |
| Three Phase WYE<br>with neutral<br>3Ph Y, 4W+G                                |  | 120/208V<br>220/380V<br>230/400V<br>240/415V<br>277/480V<br>347/600V | (L-N/L-L) |
| Delta<br>High leg<br>3Ph Δ, 4W+G  |  | 120/240V   | (L-N/L-L) |
| Delta Ungrounded<br>3Ph Δ, 3W+G   |  | 240V<br>480V   | (L-L)     |
| Delta<br>Grounded corner<br>3Ph Δ, 3W+G                                       |  | 240V<br>480V   | (L-L)     |

# A Guide to Common Power Distribution Systems

The IEC® 60364 series of standards characterizes low-voltage distribution systems by their grounding method and the arrangement of the neutral and protective earth conductors. The selection of SPDs must consider among other issues, the level of over-voltage that may temporarily occur within the distribution system due to ground faults. IEC 61643-12 details the temporary over-voltages that may occur during fault conditions for these systems. To conform with European wiring rules an SPD with a  $U_c$  rating equal to, or greater than, this

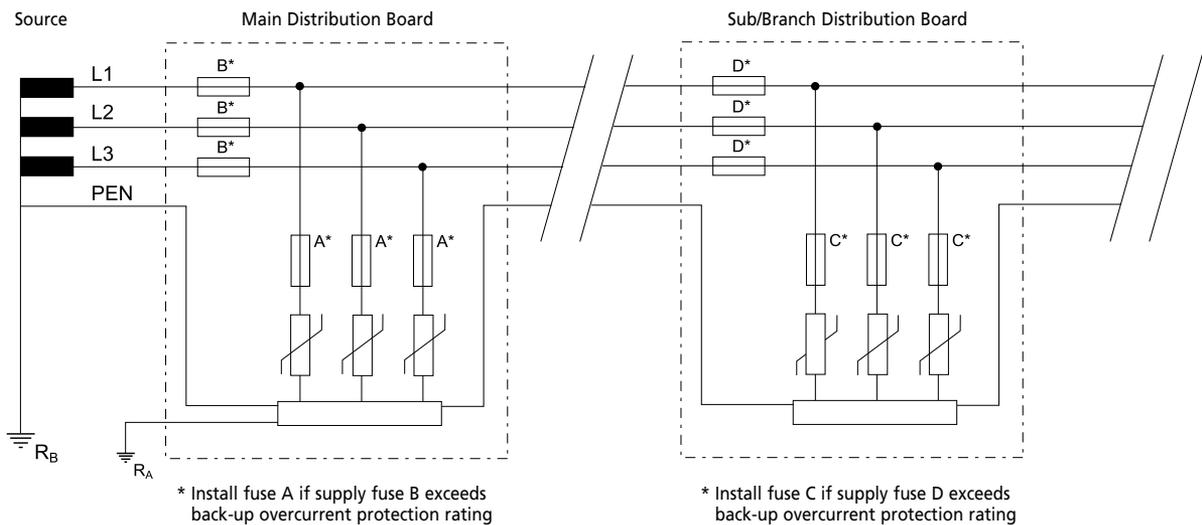
value should be selected. Effective protection does not require SPD's to be installed in all the modes detailed. The following diagrams provide guidance on the selection and installation of SPDs on the more common distribution systems. While three phase WYE systems are shown, similar logic can be applied to single phase, delta and other configuration sources.

$U_o$  = Line to neutral voltage of the system

$U_n$  = Nominal country specific system voltage (typically  $U_o \times 1.10$ )

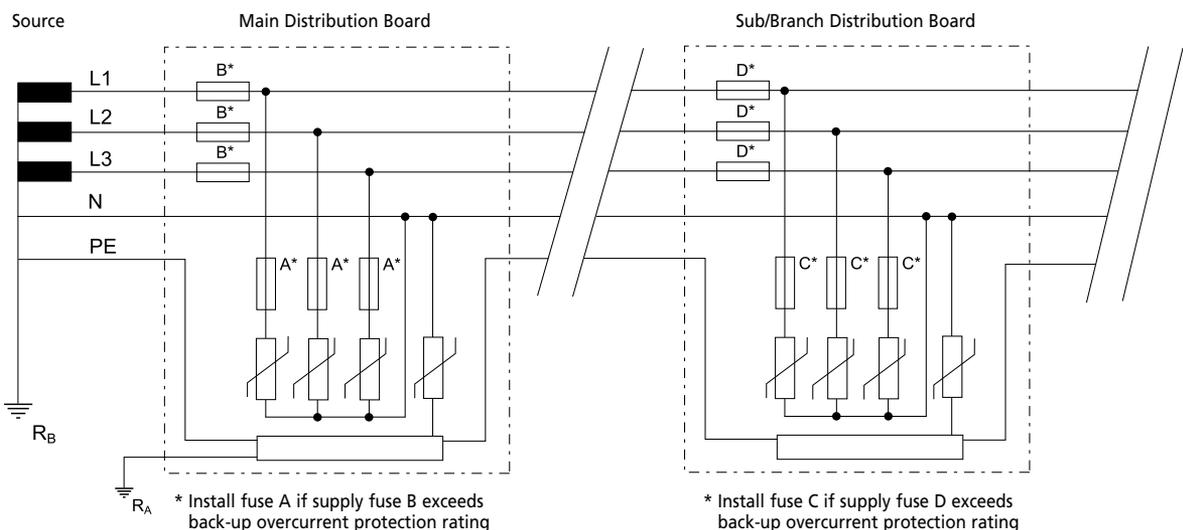
## TN-C System

In this, the neutral and protective earth conductor combine in a single conductor throughout the system. All exposed-conductive-parts are connected to the PEN conductor.



## TN-S System

In this, a separate neutral and protective earth conductor are run throughout. The protective PE conductor can be the metallic sheath of the power distribution cable or a separate conductor. All exposed-conductive-parts of the installation are connected to this PE conductor.

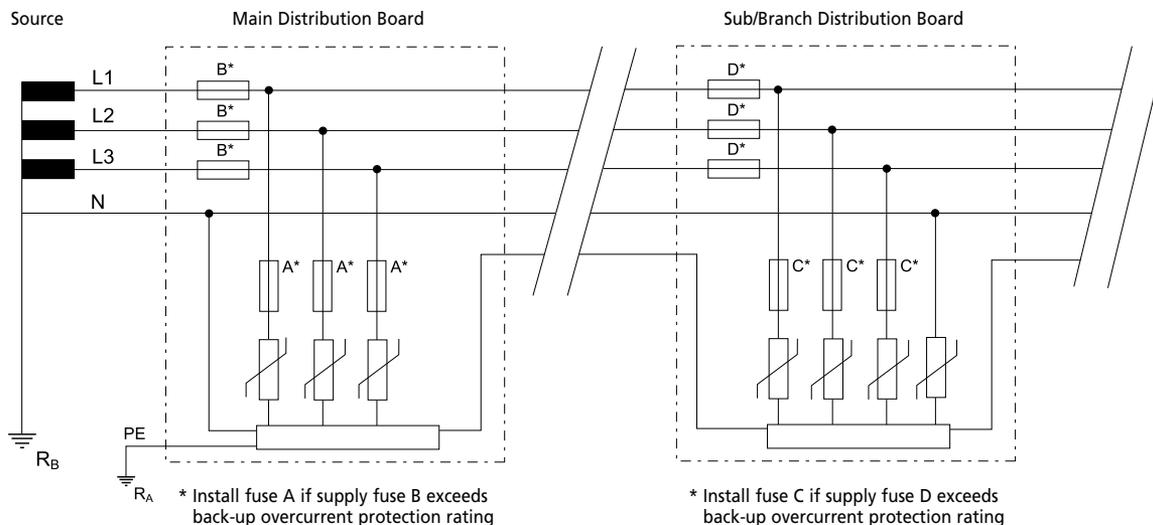


SPDs shown connected L-N and N-PE.  
May also be connected L-PE and N-PE.

# A Guide to Common Power Distribution Systems

## TN-C-S System

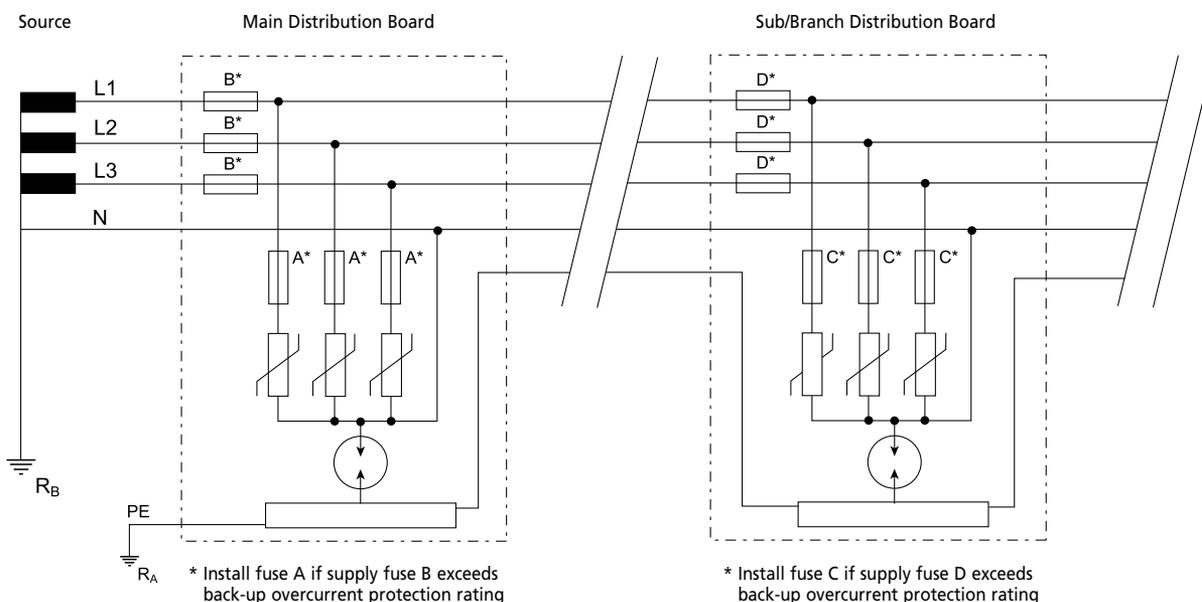
In this, a separate neutral and protective earth combine in a single PEN conductor. This system is also known as a Multiple Earthed Neutral (MEN) system and the protective conductor is referred to as the Combined Neutral Earth (CNE) conductor. The supply PEN conductor is earthed at a number of points throughout the network and generally as close to the consumer's point-of-entry as possible. All exposed-conductive-parts are connected to the CNE conductor.



SPDs shown connected L-PE and N-PE.  
May also be connected L-N and N-PE.

## TT System

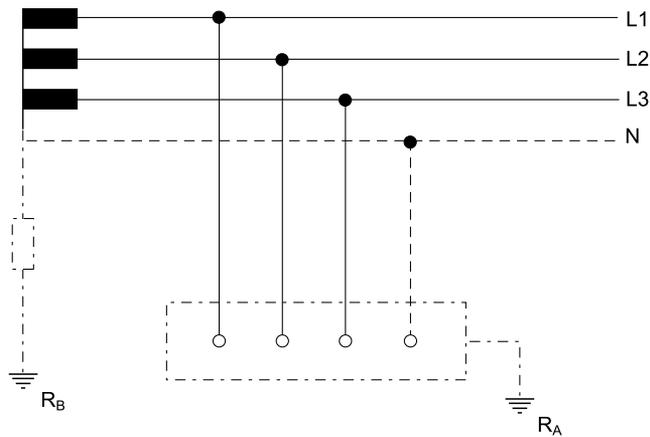
A system having one point of the source of energy earthed and the exposed-conductive-parts of the installation connected to independent earthed electrodes.



# A Guide to Common Power Distribution Systems

## IT System

A system having no direct connection between live parts and earth but all exposed-conductive-parts of the installation being connected to independent earthed electrodes.



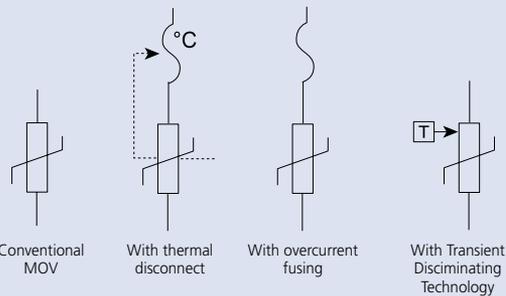
## Distribution Network Configuration

|  | TN-C       | TN-S<br>TN-C-S | TT             | IT<br>with<br>neutral<br>conductor | IT<br>without<br>neutral<br>conductor |
|--|------------|----------------|----------------|------------------------------------|---------------------------------------|
| Between                                |            |                |                |                                    |                                       |
| Phase (line) and<br>Neutral Conductor  | X          | $1.45 U_0$     | $1.45 U_0$     | $1.45 U_0$                         | X                                     |
| Each Phase (line)<br>Conductor and PE  | X          | $1.45 U_0$     | $\sqrt{3} U_0$ | $\sqrt{3} U_0$                     | $\sqrt{3} U_0$                        |
| Neutral Conductor<br>and PE            | X          | $U_0$          | $U_0$          | $U_0$                              | $U_0$                                 |
| Each Phase (line)<br>Conductor and PEN | $1.45 U_0$ | X              | X              | X                                  | X                                     |

SPD  $U_c$  Selection:  
 $U_0$  = Voltage between phase (line) and neutral conductor  
 X = Not applied

SPD selection must consider the level of over-voltage that may occur within the distribution system due to ground faults. The above IEC® table shows over-voltages that may occur during fault conditions for the various systems. An SPD with a  $U_c$  equal or greater than this value should be selected.

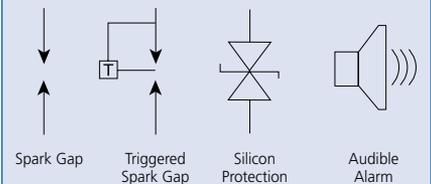
### Metal Oxide Varistors (MOVs)



### Gas Discharge Tubes (GDTs)



### Other Symbols



# Data and Signal Line Protection

## How to select surge protection for data, signalling and control circuits

Knowing where to install surge protection can be difficult. To ensure cost-effective protection is provided for data, signalling and control circuits, two issues need to be considered:

- Where should the SPDs be installed?
- What type of SPD is appropriate for each circuit type and location?

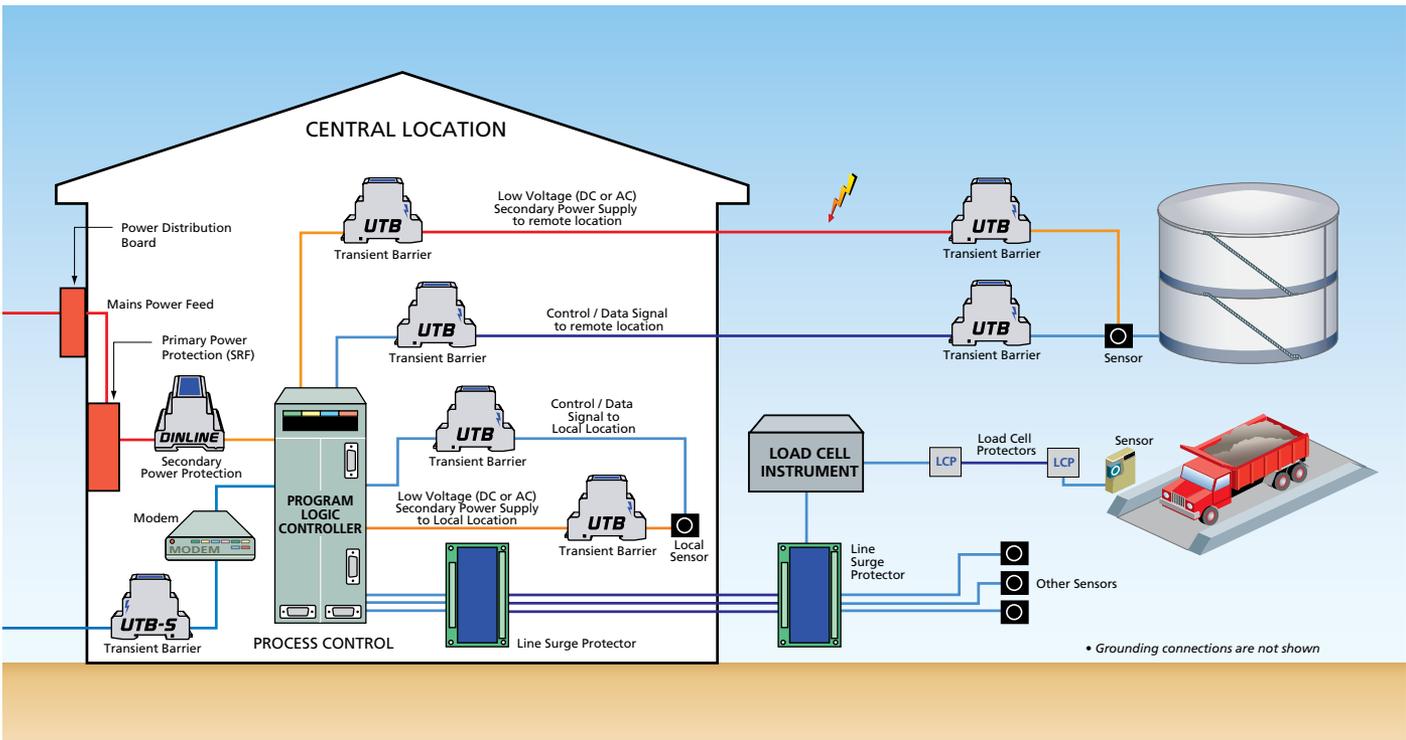
## Where should the SPD(s) be installed?

Communications devices are at risk from transients being induced onto the interconnecting signal lines. The use of surge protection barriers, installed at either end of the lines, provides cost effective protection. Communication or signal lines that enter or exit the building pose the highest risk. In such circumstances, protection devices should be installed at the point-of-entry or at the equipment termination itself. Internal wiring which extends more than 10 to 15m should also be protected. Twisting or shielding of cables provides a level of protection, however this should not be regarded as sufficient for the sensitive interfaces that characterize today's communication devices.

## How to select an SPD for a given location

Five parameters must be considered to ensure that surge protection devices for use on data, signalling or control circuits are effective and do not adversely affect operation of the circuit.

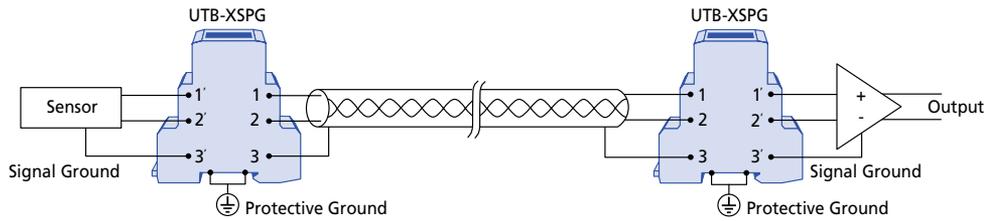
- 1) SPDs are designed to clamp the excess transient voltage to safe levels sustainable by the equipment, yet should not interfere with the normal signalling voltages. As a guide, the SPD clamping voltage should be selected to be approximately 20% higher than peak working voltage of the circuit.
- 2) The line current rating of the SPD should be sufficient to handle the maximum expected signalling current.
- 3) The SPD bandwidth should be sufficient to allow correct operation of the system without adverse attenuation. This ensures that the attenuation of the SPD at the nominal operating frequency of the system does not exceed the stated limit. For most SPDs, frequency attenuation data or a maximum recommended baud rate is generally specified.
- 4) The connection termination, mounting method, number of lines to be protected and other physical aspects must be considered.
- 5) The SPD surge rating should be appropriate for the intended location. For circuits internal to the building, surge ratings of 1-5kA are generally sufficient. For the protection of circuits that connect to exposed lines entering or exiting the facility, 10-20kA is recommended. Alternatively a protocol or standard may be specified that defines the above parameters. All UTB products are rated 20kA for higher exposure areas.



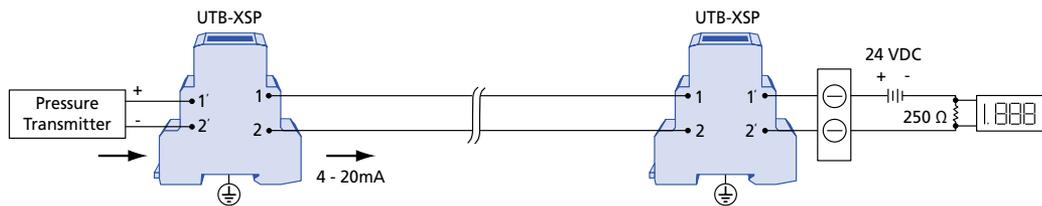
# Data and Signal Line Protection

## Sample Applications

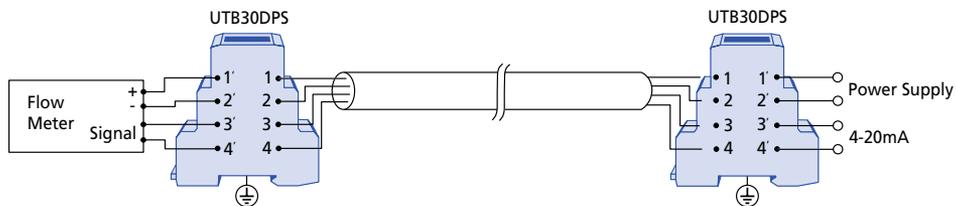
### 2-Wire Isolated Ground Transducers/Sensors



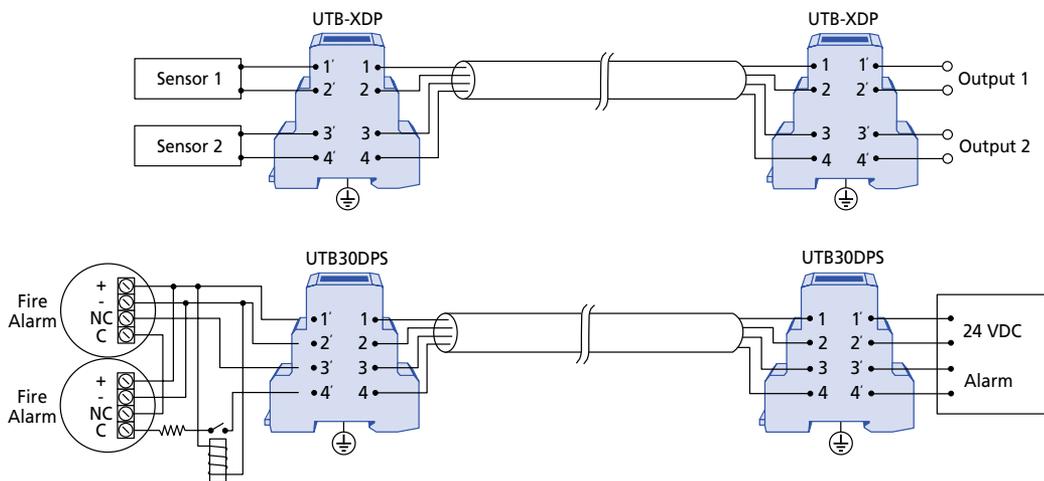
### 2-Wire Sensors



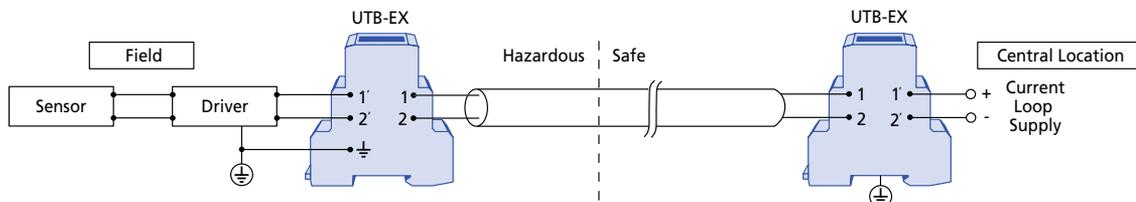
### Powered Sensor Protection



### Multiple Sensor or up to 4-Wire Sensor



### Protecting Sensors in Hazardous Locations



# Data and Signal Line Protection

## Guide to Data and Signaling Circuits

The selection of an SPD for communication and signalling circuits requires knowledge of the:

- 1) Maximum Continuous Operating Voltage ( $U_c$ )
- 2) Maximum line current ( $I_L$ )
- 3) Frequency
- 4) Termination (connector type and/or impedance)

Where a protocol is known, this often eliminates the need to verify product selection criteria 1-3, and occasionally 4. A number of different SPDs often meet the requirements as defined by the protocol, so the final choice of which SPD to use is often determined by its type of physical connection, number of lines to be protected, or its surge rating. Some protocols do not define the actual connector or pin configuration, and in some cases, not all lines defined by the protocol will be used. Please refer to the documentation provided with the equipment requiring protection to ensure the proposed protection modes are adequate and that the SPD's characteristics will not interfere with normal system operation.

| Protocol/Standard                                    | Description   | Applicable SPD Series  |
|--|---|--|
| RS-232 (V.24)  | Unbalanced, bi-directional communication circuit.<br>Although standard allows +/- 25 V signaling, use of more than +/- 12 V is uncommon | UTB 15 SP <sup>(1)</sup> , UTB 15DP <sup>(2)</sup><br>UTB 5 <sup>(1)</sup> |
| RS-422 (V.11)  | Industrial version of RS-232. 0-5 V balanced signaling  | UTB 5 <sup>(1)</sup>   |
| RS-423   | Similar to RS-232 but +/- 5 V signaling used  | UTB 5 <sup>(1)</sup>   |
| RS-485   | Similar to RS-422 but allows multiple devices to communicate.<br>DB-9 connector is common   | UTB 5 <sup>(1)</sup>   |
| Ethernet   | Ethernet is the term used to describe a family of communication protocols.  | LAN RJ45 Series  |
| Cat 4  | * 10BaseT is a 10 MHz system using twisted pair of coax cables  |  |
| Cat 5  | * 100BaseT is a 100 MHz system using twisted pair cables  |  |
| 10BaseT  | Cat 4 is a cable specification that allows operation up to 10BaseT, while Cat 5 allows operation up to 100BaseT frequencies.            |  |
| 100BaseT   |   |  |
| Telephone Lines                                      |   | UTB SA <sup>(2)</sup> , UTB TA <sup>(2)</sup>                              |
| 4-20 mA current loop (with HART)                     | Common industrial communications protocol used to interface with transducers etc  | UTB xDP, UTB 30DPS, UTB xSP  |
| Binary Signals                                       |   | UTB xSP <sup>(1)</sup> , UTB xDP <sup>(1)</sup>                            |
| Bitbus (IEEE 1118)                                   | Digital communications network based on RS-485 and SDLC allowing communication between PLCs and controllers                             | UTB 5 <sup>(1)</sup>   |
| CAN-Bus (data signal line)                           | Differential serial communications protocol defined in ISO 11898 standard   |  |
| DeviceNet (data signal line)                         | Communication protocol used to connect industrial devices such as limit switches, motor starters to PLCs and controllers                |  |
| M-Bus  | Communication protocol for networking and remote reading of heat, gas, water, and energy meters   | UTB 60 <sup>(1)</sup>  |
| Ex (I) - HART, 4-20 mA circuit, measurement circuits | Hazardous locations   | UTB15 Ex , UTB30 Ex  |
| Profibus - PA  | Process field bus - process automation. Ideal for explosion - hazardous areas   | UTB30 Ex   |
| Strain gauge / Load cells                            | As used in weigh bridges etc.   | LCP01A   |
| ASDL   | Asymmetric Digital Subscriber Line. Protocol for data communication over copper telephone lines. Uses single copper wire pair.          | UTB TA <sup>(2)</sup> , UTB SA <sup>(2)</sup>                              |
| HDSL   | High bit rate Digital Subscriber Line. Protocol for data communication over copper telephone lines. Uses two copper wire pairs.         |  |
| ISDN   | Integrated Service Digital Network. Protocol for voice and data over copper telephone lines   |  |

(1) The number of UTB's required is dependent on the number of wires being used in the signalling circuit. UTBs are designed for balanced circuits and each UTB will protect one pair of wires. The UTB can also be used to protect two unbalanced circuits.

(2) The UBT TA is rated to 500 A 8/20 us and intended to meet US NEC requirements. The UTB SA are rated to 20 kA 8/20 μs and specifically designed and approved for use on the Australian telecommunication network.



# Surge Protection And Surge Ratings

The stress, which an SPD will experience under surge conditions, is a function of many complex and interrelated parameters. These include:

- Location of the SPD(s) within the structure – are they located at the main distribution board or within the facility at secondary board, or even in front of the end-user equipment?
- Method of coupling the lightning strike to the facility – for example, is this via a direct strike to the structure's LPS, or via induction onto building wiring due to a nearby strike?
- Distribution of lightning currents within the structure – for example, what portion of the lightning current enters the earthing system and what remaining portion seeks a path to remote grounds via the power distribution system and equipotential bonding SPDs?
- Type of power distribution system – the distribution of lightning current on a power distribution system is strongly influenced by the grounding practice for the neutral conductor. For example, in the TN-C system with its multiple earthed neutral, a more direct and lower impedance path to ground is provided for lightning currents than in a TT system.
- Additional conductive services connected to the facility – these will carry a portion of the direct lightning current and therefore reduce the portion which flows through the power distribution system via the lightning equipotential bonding SPD.
- Type of waveshape – it is not possible to simply consider the peak current which the SPD will have to conduct, one also has to consider the waveshape of this surge. It is also not possible to simply equate the areas under the current-time curves (also referred to as the action integral) for SPDs under different waveshapes.

Many attempts have been made to quantify the electrical environment and "threat level" which an SPD will experience at different locations within a facility. The IEC standard on lightning protection, IEC 62305-4 "Protection against lightning - Part 4: Electrical and electronic systems within structures" has sought to address this issue by considering the highest surge magnitude which may be presented to an SPD based on the lightning protection level (LPL) being considered. For example, this standard postulates that under a LPL I the magnitude of a direct strike to the structure's LPS may be as high as 200 kA 10/350. While this level is possible, its statistical probability of occurrence is approximately 1%. In other words, 99% of discharges will be less than this postulated 200 kA peak current level.

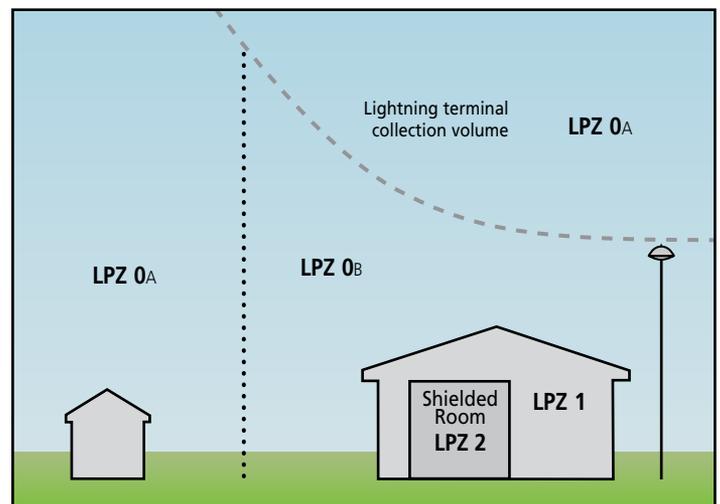
An assumption is made that 50% of this current is conducted via the building's earthing system, and 50% returns via the equipotential bonding SPDs connected to

a three wire plus neutral power distribution system. It is also assumed that no additional conductive service exists. This implies that the portion of the initial 200 kA discharge experienced by each SPD is 25 kA.

Simplified assumptions of current dispersion are useful in considering the possible threat level, which the SPD(s) may experience, but it is important to keep in context the assumptions being made. In the example above, a lightning discharge of 200 kA has been considered. It follows that the threat level to the equipotential bonding SPDs will be less than 25 kA for 99% of the time. In addition, it has been assumed that the waveshape of this current component through the SPD(s) will be of the same waveshape as the initial discharge, namely 10/350, while in reality the waveshape have been altered by the impedance of building wiring, etc.

Many standards have sought to base their considerations on field experience collected overtime. For example, the IEEE® guide to the environment C62.41.1 and the recommended practice C62.41.2 present two scenarios of lightning discharge and different exposure levels under each of these depending on the location where the SPD is installed. In this standard, Scenario II depicts a direct strike to the structure, while Scenario I depicts a nearby strike and the subsequent conducted current into a structure via power and data lines. The highest surge exposure considered feasible to an SPD installed at the service entrance to a facility under Scenario I is 10 kA 8/20, while under Scenario II it is considered to be 10 kA 10/350 (exposure Level 3).

From the above, it is apparent that the selection of the appropriate surge rating for an SPD depends on many complex and interconnected parameters. When addressing such complexities, one needs to keep in mind that one of the more important parameters in selecting an SPD is its limiting voltage performance during the expected surge event, and not the energy withstand which it can handle.



Protection zones defined by specific product application.

# Advanced Technologies – The ERICO Advantage

## Transient Discriminating Technology

To meet the fundamental requirements of performance, longer service life and greater safety under real world conditions, ERICO has developed Transient Discriminating (TD) Technology.

This quantum leap in technology adds a level of “intelligence” to the Surge Protection Device enabling it to discriminate between sustained abnormal over-voltage conditions and true transient or surge events. Not only does this help provide more reliable operation under practical application, but it also prolongs the life of the protector since permanent disconnects are not required as a means of achieving internal over-voltage protection.

## Traditional Technologies

Conventional SPD technologies utilize metal oxide varistors and/or silicon avalanche diodes to clamp or limit transient events. However, these devices are susceptible to sustained 50/60Hz mains over-voltage conditions which often occur during faults to the utility system. Such occurrences present a significant safety hazard when the suppression device attempts to clamp the peak of each half cycle on the mains over-voltage. This condition can cause the device to rapidly accumulate heat and in turn fail with the possibility of inducing a fire hazard.

## The Core of TD Technology

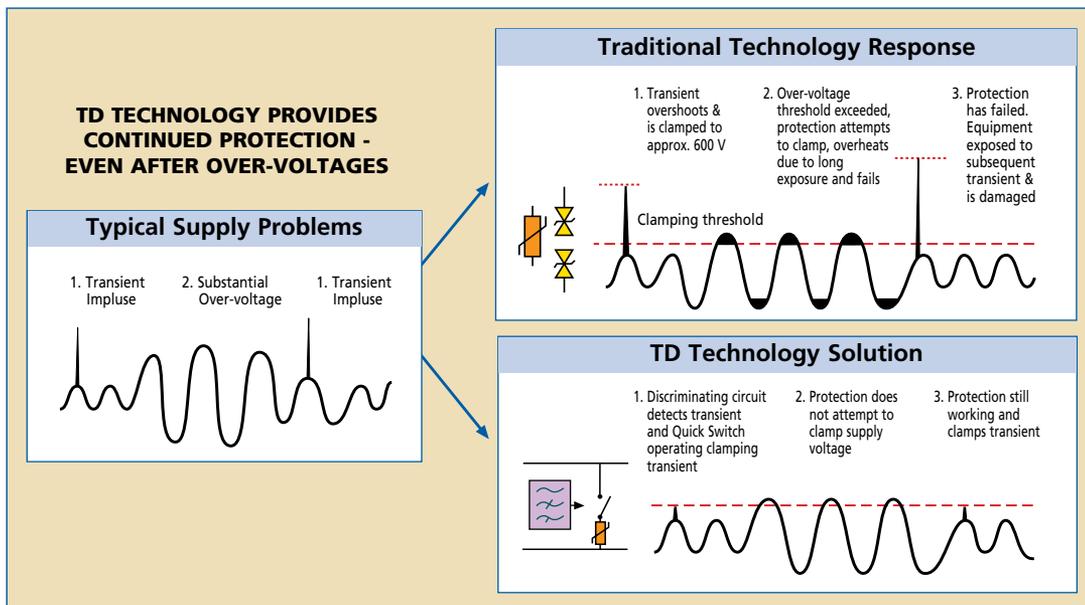
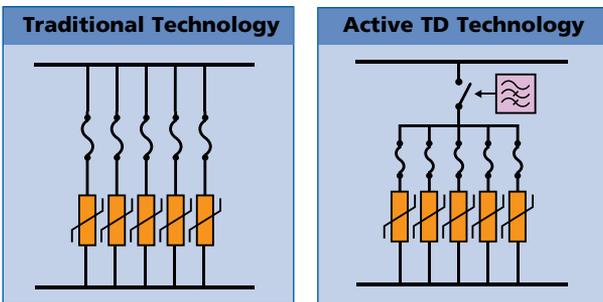
The secret to transient discriminating technology is its *active frequency discrimination* circuit. This patented device can

discriminate between a temporary over-voltage (TOV) condition and a very fast transient, which is associated with lightning or switching-induced surges. When the transient frequencies are detected, the patented Quick-Switch within TD activates to allow the robust protection to limit the incoming transient. The frequency discriminating circuit that controls the Quick-Switch helps ensure that the SPD device is immune to the effects of a sustained 50 or 60Hz TOV. This allows the device to keep operating, in order to help provide safe and reliable transient protection, even after an abnormal over-voltage condition has occurred.

## Meeting & Exceeding UL® Standards

The range of surge protection devices from ERICO employing TD technology has been specifically designed to meet and exceed the new safety requirements of UL 1449 Edition 3. To meet the abnormal over-voltage testing of UL 1449 Edition 3, many manufacturers of SPD devices have incorporated fuse or thermal disconnect devices which permanently disconnect all protection from the circuit during an over-voltage event. Transient discriminating technology on the other hand will allow the SPD device to experience an abnormal over-voltage up to twice its nominal operating voltage and still remain operational even after this event! This allows the device to help provide reliable and continuous protection to your sensitive electronic equipment. TD technology is especially recommended for any site where sustained over-voltages are known to occur, and where failure of traditional SPD technologies cannot be tolerated.

The UL 1449 testing standard addresses the safety of an SPD device under temporary and abnormal overvoltage conditions, but does not specifically mandate a design that will give a reliable, long length of service in the real world. Specifically, UL 1449 tests that the SPD remains operational at 10% above nominal supply voltage, allowing SPD manufacturers to design products that permanently disconnect just above that. Most reputable manufacturer’s designs allow for up to a 25% overvoltage, while TD technology from ERICO gives even greater overhead.



# Glossary of Terminology

## 8/20 $\mu$ s Current Waveshape

A current impulse with a virtual front time of 8 $\mu$ s and a time to half-value of 20 $\mu$ s.

## Aggregate Surge Rating

The sum of the surge ratings of individual voltage limiting components, connected in parallel, in the device.

Note: This figure does not indicate the maximum discharge current ( $I_{max}$ ) of the device. It does however provide an indication of the expected SPD life. Users should be aware that certain manufacturers may incorrectly claim the aggregate surge rating of MOV material used in their device as its  $I_{max}$ . Non-perfect current sharing between parallel MOVs, and the inability of series over-current or thermal disconnects to carry the full surge current, generally means that the maximum discharge current which the SPD can withstand is less than its aggregate surge rating.

## Attenuation

The ability of an SPD to reduce electrical noise interference, measured in decibels. Attenuation varies with frequency, so it is usual to specify the attenuation of the SPD at a particular frequency; commonly 100kHz.

## Backup Overcurrent Protection

An external overcurrent protective device installed prior to the SPD. Such a device may be required if the overcurrent limiting device on the service is larger than that required by the SPD or connecting wiring.

## Class I test

SPD tested with maximum impulse current ( $I_{imp}$ ) and nominal discharge current ( $I_n$ ).

## Class II test

SPD tested with maximum discharge current ( $I_{max}$ ) and nominal discharge current ( $I_n$ ).

## Class III test

SPD tested with combination wave.

## Distribution System

Defines the electrical power distribution system. The distribution system is usually described by configuration of the phases, neutral and ground conductor configuration on the secondary side of the supply transformer. Refer to pages 10-12 for further information.

## Follow Current ( $I_f$ )

The current supplied by the electrical power distribution system which flows through the SPD after a discharge current impulse. The follow current is significantly higher than the operating current, and is normally high for voltage switching type SPDs (e.g. spark gaps) since the arc voltage falls below the AC supply voltage after firing.

## Impulse Current ( $I_{imp}$ )

Peak impulse current withstand with a 10/350 $\mu$ s current waveshape. This is often used for the classification of SPDs tested to Test Class I, but is not the only acceptable waveshape.

## Insertion Loss

The insertion loss of an SPD is usually only stated for two port devices for use on low voltage data systems. It is a measure of the ratio of voltage at the output to the input at the device under test. The insertion loss is usually stated for a given frequency and measured in decibels.

## Leakage Current

The current flowing to the ground conductor when the SPD is connected to the nominal supply voltage  $U_n$ .

## Let-through Voltage

Another term often used to describe the measured limiting voltage.

Note: This measurement may be carried out with, or without, the presence of the nominal AC power ( $U_n$ ) being applied to the SPD. As such, the results may be different and the user should take cognizance of this in making any comparative assessments.

## Location Categories

Various standards attempt to define the electrical environment at which an SPD may be installed, into location categories or zones.

Note: The user should be aware that international consensus has not been reached on these classifications, nor on the size of expected surge activity, which may occur. Further, the user should note that the demarcation of these zones do not form literal boundaries, but are rather a gradual transition.

## Maximum Continuous Operating Voltage ( $U_c$ )

The maximum r.m.s. or d.c. voltage which may be continuously applied to the SPD's mode of protection without degradation or inhibiting its correct operation.

Note: Specifications given in the catalog generally are phase (L-N) voltages.

## Maximum Discharge Current ( $I_{max}$ )

The maximum single shot current, having an 8/20 $\mu$ s waveshape, which the SPD can safely divert.

## Measured Limiting Voltage

The maximum voltage measured across the SPD's terminals during the application of an impulse of specified waveshape and amplitude.

## Modes of Protection

SPDs may provide protection line-to-ground, line-to-neutral, neutral-to-ground or in combinations thereof. These paths are referred to as the modes of protection.

Note: The user is advised that not all modes require protection, and more is not necessarily better when selecting an SPD. As an example, the N-G mode is not required when the SPD is installed at the primary service entrance of a TN-C-S electrical distribution system, due to the Neutral-Ground bond at this point. The L-L mode is generally not provided for systems with neutral conductors since the L-N modes also protect the L-L modes. Similarly, the L-G mode can be protected via the L-N and N-G modes.

## Nominal Discharge Current ( $I_n$ )

The peak value of the current flowing through the SPD during the application an 8/20 $\mu$ s waveshape.

Note: IEC 61643-1 requires SPDs tested to Test Class II, to withstand 15 impulses at  $I_n$  followed by 0.1, 0.25, 0.5, 0.75 and 1.0 times  $I_{max}$ .

## Nominal (System) Voltage ( $U_n$ )

The L-N voltage by which an electrical power system is designated. Under normal system conditions, the voltage at the supply terminals may differ from the nominal voltage as determined by the tolerance of the supply system (normally +/- 10%).

## One-port SPD

An SPD connected in shunt (parallel) with the circuit to be protected. A one port device may have separate input and output terminals, but without a specific series impedance between these terminals. This type of connection is also known as a Kelvin connection.

# Glossary of Terminology

## Operating Current

The current drawn (per phase) by the SPD when energized at the nominal operating voltage  $U_n$ .

Note: For SPDs with integral series filtering, the total current drawn may be greater than the real rms current consumption (i.e. VA may be greater than Watts). This is due to the presence of the internal filtering capacitance.

## Over-current Protection

An over-current device, such as a fuse or circuit-breaker, which could be part of the electrical distribution system located externally and up-stream of the SPD. May provide protection to the SPD, the connecting wiring and provide a means of externally isolating the SPD.

## Protective Earth (PE)

The IEC® 60364 series characterizes low-voltage distribution systems by their grounding methods and the configuration of the neutral and protective conductors. The Protective Earth is commonly referred to as "ground", or "earth", in many regions.

## Rated Load Current (I<sub>L</sub>)

Maximum continuous rated current that can be supplied to a load connected to the protected output of an SPD. Normally only stated for two port, series connected, SPDs.

## Residual Voltage

In IEC terminology this refers to the peak value of the voltage that appears between the terminals of an SPD due to the passage of discharge current  $I_n$ . NZS/AS 1768 refers to this as the let-through voltage, a measurement obtained when the stated test impulse is superimposed on top of the nominal system voltage  $U_n$ .

## Secondary Surge Arrester

A loosely used term given to SPDs intended for operation on medium voltage systems (>1kV). Within the USA, a secondary surge arrester defines an SPD Listed by Underwriters Laboratories Inc. for use on LV and MV systems at locations prior to the main overcurrent disconnect to the facility.

Note: Secondary Surge Arrester Listing is generally considered to have less demanding safety requirements than those for UL® 1449 Transient Voltage Surge Arrester Listing.

## Short Circuit Current Rating (SCCR)

The short-circuit current rating of the SPD. Required by USA National Electric Code (NEC®) for TVSS devices.

## SPD Disconnecter

An IEC term used to describe a device (internal and/or external) for disconnecting an SPD from the electrical power system.

Note: This disconnecting device is not required to have isolating capability. It is to prevent a persistent fault on the system and is used to give an indication of the SPD failure. There may be more than one disconnecter function, for example an over-current protection function and a thermal protection function. These functions may be integrated into one unit or performed in separate units.

## Spark-over Voltage

The voltage at which a switching type SPD (generally of the spark gap type) will initiate conduction. This value is normally specified for a voltage increasing at 1kV/s.

## Stand-off Voltage

The maximum voltage, which can be applied to an SPD, without triggering it into a fully conductive state.

Note: This voltage is normally higher than the maximum continuous operating voltage (MCOV or  $U_c$ ) of the SPD. It is not intended that the SPD be operated at this voltage.

## Status Indicator

A device(s) that indicates the operational status of the SPD, or of a particular mode of its protection.

Note: Such indicators may be local with visual and/or audible alarms and/or may have remote signaling and/or output contact capability.

## Suppressed Voltage Rating (SVR)

A special case of the measured limiting voltage specific to the UL 1449 Listing of an SPD.

Note: This test is performed using a small 500A 8/20 $\mu$ s current limited impulse, and the clamping voltage recorded at the ends of 6" connecting leads. The result obtained is rounded up to the nearest value given in a table.

## Surge Protection Device (SPD)

An IEC term used to describe a device intended to limit transient over-voltages and divert surge currents. It contains at least one non-linear component.

## Surge (Reduction) Filter

A two-port series filtering type of SPD specifically designed to reduce the rate-of-rise of voltage (dv/dt) of the pre-clamped waveform. Such a device normally contains a filter with low-pass performance.

## Transient Voltage Surge Suppressor (TVSS)

An SPD tested to meet the safety requirements of UL 1449 - Standard for Transient Voltage Surge Suppressors. UL 1449 defines the basic safety requirements for TVSS devices installed on electrical circuits up to 600V. The United States National Electric Code (NEC) only permits TVSS devices to be installed after (downstream of) the main over-current disconnect to a facility.

## Two-port SPD

An SPD with two sets of terminals, input and output (line and equipment), and with a specific impedance inserted between these terminals. These are often referred to as series (in-line) connected SPDs and generally contain wave-shaping filters in addition to simple shunt-only protection.

## Voltage Protection Level ( $U_p$ )

Similar to the measured limiting voltage, the voltage protection level characterizes the performance of an SPD in limiting the voltage across its terminals.

Note: The voltage protection level is the measured limiting voltage recorded under a specified current magnitude and waveshape, and rounded up to the next highest voltage selected from a list of preferred values found in IEC 61643-1 Standard for surge protective devices connected to low-voltage power distribution systems. For SPDs tested to Test Class I,  $U_p$  is generally stated using a 10/350  $I_{imp}$  and for SPDs tested to Test Class II, using an 8/20 $\mu$ s  $I_{max}$ .

## Voltage Protection Rating (VPR)

A rating selected from a list of preferred values as given in Table 63.1 of ANSI®/UL 1449 and assigned to each mode of protection. The value of the VPR is determined as the nearest highest value taken from Table 63.1 to the measured limiting voltage determined during the transient-voltage surge suppression test using the combination wave generator at a setting of 6 kV, 3 kA.



## Service Entrance Suppression



### Features

- Compact NEMA®-4X enclosure design can be flush mounted or installed in a small space
- LED status indication flag for status monitoring
- 40 kA 8/20  $\mu$ s maximum surge rating provides protection suitable for service entrance and distribution panels
- CE, UL® 1449 Edition 3 Listed
- Optional bracket for mounting within panel backplane

The SES40 Series of Surge Protection Devices provide economical protection against damaging transients and surge events. These products are UL and cUL® listed to 1449 Edition 3 as Type 1 devices. This allows them to be installed on the line or load side of the service panel in accordance with the NEC® 2011 without the requirement for additional circuit breakers or fuses. The DC models have an additional listing under UL 1449 for use on photovoltaic systems.

Primary applications are service entrance, branch and OEM panels, solar cominer boxes, UL 96A lightning protection installations and light pole applications. The housing is constructed of UV-stabilized thermo-plastic and designed to meet the UL 50 Type 4 rating, making it ideal for both indoor and outdoor NEMA 4X applications. Most models have a 20kA nominal discharge current rating, the highest level recognized under UL 1449 Edition 3 standard. Listed as a Type 1 SPD to UL 1449 3rd Edition, the SES40 Series can be installed in a Type 1 or 2 location in accordance with the NEC 2011.

| Model   | SES40120/240SP  | SES401201P  | SES402083P                    | SES402401P   | SES404803P                    | SES404801P   | SES40300DC                           | SES40600DC                      |
|---|---|-------------|-------------------------------|--------------|-------------------------------|--------------|--------------------------------------|---------------------------------|
| Nominal System Voltage, U <sub>n</sub>        | 120/240 V   | 120 V       | 120/208 V                     | 240 V        | 277/480 V                     | 480 V        | 300 Vdc                              | 600 Vdc                         |
| Distribution System                           | 1Ph 2W+G  | 1Ph 2W+G    | 3Ph 4W+G<br>3Ph $\Delta$ 3W+G | 1Ph 2W+G     | 3Ph 4W+G<br>3Ph $\Delta$ 3W+G | 1Ph 2W+G     | DC 2W G                              | DC 2W+G                         |
| Max Cont. Operating Voltage, U <sub>c</sub>   | 150/300 VAC   | 150 VAC     | 150/300 VAC                   | 300 VAC      | 340/590 VAC                   | 580 VAC      | 360 VDC                              | 600 VDC                         |
| Frequency                                     | 0-60 Hz   |             |                               |              |                               |              |                                      |                                 |
| Max Discharge Current, I <sub>max</sub>       | 40 kA 8/20 $\mu$ s per mode   |             |                               |              |                               |              |                                      |                                 |
| Nominal Discharge Current, I <sub>n</sub>     | 20kA 8/20 $\mu$ s per mode  |             |                               |              |                               |              |                                      | 10 kA 8/20 $\mu$ s per mode     |
| Protection Modes                              | L-N, L-L  | L-G, N-G    | L-N, L-G,<br>N-G, L-L         | L-G, N-G     | L-N, L-G,<br>N-G, L-L         | L-G, N-G     | +ve to G,<br>-ve to G                | +ve to G,<br>-ve to G           |
| Technology                                    | MOV with thermal disconnect   |             |                               |              |                               |              |                                      |                                 |
| Short Circuit Current Rating, I <sub>sc</sub> | 200 kAIC  |             |                               |              |                               |              | 100 kAIC                             |                                 |
| Voltage Protection Rating (VPR)               | 800 V @ 3kA   | 800 V @ 3kA | 800 V @ 3kA                   | 1200 V @ 3kA | 1200 V @ 3kA                  | 1200 V @ 3kA | 1,500V @ 3 kA                        | 2,500V @ 3 kA                   |
| Status  | LED indicator   |             |                               |              |                               |              |                                      |                                 |
| Dimensions H x D x W: mm (in)                 | 62 x 87 x 99 (2.44 x 3.43 x 3.90)   |             |                               |              |                               |              |                                      |                                 |
| Weight: kg (lbs)                              | 0.18 (0.40)   |             | 0.32 (0.70)                   | 0.18 (0.40)  | 0.32 (0.70)                   | 0.18 (0.40)  |                                      |                                 |
| Enclosure                                     | NEMA 4X, UV stabilized thermoplastic  |             |                               |              |                               |              |                                      |                                 |
| Connection                                    | #12 AWG Wiring Leads  |             |                               |              |                               |              |                                      |                                 |
| Mounting                                      | 3/4" straight nipple with conduit nut for mounting through standard 1.14" diameter knockout |             |                               |              |                               |              |                                      |                                 |
| Temperature                                   | -40°C to 80°C (-40°F to 176°F)  |             |                               |              |                               |              |                                      |                                 |
| Approvals                                     | CE, UL 1449 Edition 3 Listed Type 1/2   |             |                               |              |                               | CE           | CE, UL 1449 Ed. 3 for DC general use | CE, UL 1449 Ed. 3 for DC PV use |
| Surge Rated to Meet                           | UL 1449 Edition 3 In 20 kA mode   |             |                               |              |                               |              |                                      | UL 1449 Ed. 3 in 10 kA mode     |
| Available Options                             | Mounting bracket (SES40BRK)   |             |                               |              |                               |              |                                      |                                 |

## Service Entrance Suppression



### Features

- Compact NEMA®-4 enclosure design can be flush mounted or installed in a small space
- LED status indication flag for status monitoring
- 120/240 VAC operating voltage suits the most common power distribution system for residential or small commercial buildings
- 40 kA 8/20  $\mu$ s maximum surge rating provides protection suitable for service entrance and distribution panels
- CE, UL® 1449 Edition 3 Listed



Lightning transients and surges are a major cause of expensive electronic equipment failure and business disruption. Damage to computers, data and communications may occur, as well as a loss of revenue and profits. The SES40 Service Entrance Suppression, part of the ERICO line of facility electrical protection products, is designed to protect sensitive electronics at the service entrance for residential or light commercial service panels.

This economical unit is designed for 120/240 VAC power systems and provides surge protection totaling 80 kA 8/20  $\mu$ s total, or 40 kA per phase. The SES40 is UL Listed as a Type 1 device. It offers a simple and hassle-free installation for protection on the line side or load side of the service panel, without additional external protection being required by circuit breakers or fuses.

|  |  |
|--|--|
| <b>Model</b>   | SES40120/240   |
| <b>Nominal System Voltage, U<sub>n</sub></b>                   | 120/240 V  |
| <b>Distribution System</b>                                     | 1Ph 3W+G   |
| <b>Max Cont. Operating Voltage, U<sub>c</sub></b>              | 170/340 VAC  |
| <b>Frequency</b>   | 50/60 Hz   |
| <b>Max Discharge Current, I<sub>max</sub></b>                  | 40 kA 8/20 $\mu$ s   |
| <b>Nominal Discharge Current, I<sub>n</sub></b>                | 20kA 8/20 $\mu$ s  |
| <b>Protection Modes</b>  | L-G  |
| <b>Technology</b>  | MOV with thermal disconnect  |
| <b>Short Circuit Current Rating, I<sub>sc</sub></b>            | 200 kAIC (I <sub>sc</sub> )  |
| <b>Voltage Protection Rating (VPR) (8/20<math>\mu</math>s)</b> | L-N<br>800 V @ 3 kA<br>1.2 kV @ 20 kA  |
| <b>Status</b>  | LED indicator  |
| <b>Dimensions H x D x W: mm (in)</b>                           | 83 x 73 x 83 (3.27 x 2.87 x 3.27)  |
| <b>Weight: kg (lbs)</b>  | 0.7 (1.54)   |
| <b>Enclosure</b>   | Aluminum, IP 65 (NEMA-4)   |
| <b>Connection</b>  | Line: 762 mm of 5.26 mm <sup>2</sup> (30" of # 10 AWG) flying leads<br>Neutral/Ground: 900 mm of 5.26 mm <sup>2</sup> (36" of # 10 AWG) flying leads   |
| <b>Mounting</b>  | 3/4" straight nipple   |
| <b>Temperature</b>   | -40°C to 80°C (-40°F to 176°F)   |
| <b>Approvals</b>   | CE, UL 1449 Edition 3 Listed Type 1/2  |
| <b>Surge Rated to Meet</b>                                     | ANSI/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI/IEEE® C62.41.2-2002 Scenario II, Exposure 1, 20 kA 8/20 $\mu$ s,<br>2 kA 10/350 $\mu$ s<br>EC 61643-1 Class II<br>UL 1449 Edition 3 In 20 kA mode |
| <b>Available Options</b>                                       | Flush Mount Kit (Order SES40FP)<br>Side Mount Kit (Order TDXSM)  |



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## Transient Discriminating Service Entrance Suppressor



### Features

- 200kA 8/20 $\mu$ s primary protection – rated for service entrance applications
- NEMA<sup>®</sup>-4X enclosure – for harsh environments
- Internal high interrupt capacity fusing – for added safety
- Modular design – allows easy replacement of surge modules
- Built in disconnect and fusing eliminates need for external fusing
- Transient Discriminating (TD) Technology – provides increased service life
- Optional Filter and Surge Counter – for enhanced protection
- UL<sup>®</sup> 1449 Edition 3 Listed

The SES200 series of Transient Voltage Surge Suppressors deliver specification grade performance and features at an affordable price. The versatile and compact design provides high quality protection for a wide variety of commercial and industrial applications where sensitive electronic equipment is to be protected.

Internal electronics continuously monitor SPD protection, and the status is displayed on 5 segment LED bar graphs. Alarm contacts for remote monitoring are a standard feature.

The SES200 provides up to 200kA 8/20 $\mu$ s per mode of surge material, making it ideal for the protection of service entrance panels and helping to ensure a long operational life under severe lightning conditions.

The replaceable surge modules provide protection to L-N and N-G modes, delivering effective protection from both common mode and differential transients in single phase and three phase WYE systems. Models for grounded delta power systems provide L-L protection.

Transient Discriminating (TD) Technology, which meets the safety standards of UL 1449 Edition 3, provides a superior life by eliminating the common temporary over-voltage failure mode of most SPDs.

The SES is designed to mount adjacent to the service entrance panel with the connection being made via a small length of conduit.



SES200 metal enclosure option



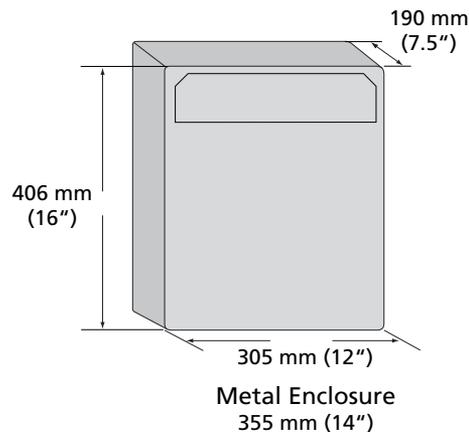
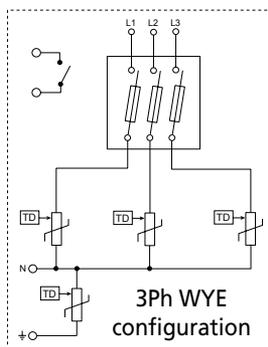
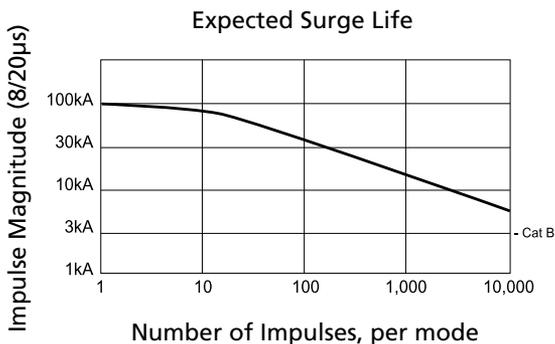
SES200 without filter or surge counter options

**Note:** Ensure that installation of this model of the SES200 is not exposed to direct sunlight as solar radiation may cause internal temperatures to exceed the maximum specified and damage will result to the surge protective modules. A sun shield should be fitted if this unit is to be installed outdoors and exposed to sunlight.

|   |  |                                       |                                       |                                       |  |                                       |                                       |                                       |
|---|--|---------------------------------------|---------------------------------------|---------------------------------------|--|---------------------------------------|---------------------------------------|---------------------------------------|
| <b>Model</b>                                      | SES200<br>120/208  | SES200<br>120/240                     | SES200<br>240D                        | SES200<br>277/480                     | SES200<br>120/208CM                              | SES200<br>120/240CM                   | SES200<br>240DCM                      | SES200<br>277/480CM                   |
| <b>Nominal Voltage, U<sub>n</sub></b>             | 120/208 V  | 120/240 V                             | 220/240 V                             | 277/480 V                             | 120/208 V  | 120/240 V                             | 220/240 V                             | 277/480 V                             |
| <b>Distribution System</b>                        | 3Ph Y 4W+G   | 1Ph 3W+G                              | 3Ph Δ 3W+G                            | 3Ph Y 4W+G                            |  | 1Ph 3W+G                              | 3Ph Δ 3W+G                            | 3Ph Y 4W+G                            |
| <b>System Compatibility<sup>(1)</sup></b>         | TN-C, TN-S, TN-C-S   |                                       |                                       |                                       |  |                                       |                                       |                                       |
| <b>Max Cont. Operating Voltage, U<sub>c</sub></b> | 170/295 VAC  | 170/340 VAC                           | 400 VAC                               | 400/692 VAC                           | 170/295 VAC                                      | 170/340 VAC                           | 400 VAC                               | 400/692 VAC                           |
| <b>Stand-off Voltage</b>                          | 240/415 V  | 240/480 V                             | 275 V                                 | 480/831 V                             | 240/415 V  | 240/480 V                             | 275 V                                 | 480/831 V                             |
| <b>Frequency</b>                                  | 50/60 Hz   |                                       |                                       |                                       |  |                                       |                                       |                                       |
| <b>Operating Current @ U<sub>n</sub></b>          | 25 mA  |                                       |                                       |                                       |  |                                       |                                       |                                       |
| <b>Aggregate Surge Rating</b>                     | 200kA (8/20μs per line)  |                                       |                                       |                                       |  |                                       |                                       |                                       |
| <b>Impulse Current, I<sub>imp</sub></b>           | 20 kA 10/350 μs  |                                       |                                       |                                       |  |                                       |                                       |                                       |
| <b>Max Discharge Current, I<sub>max</sub></b>     | 100 kA 8/20 μs   |                                       |                                       |                                       |  |                                       |                                       |                                       |
| <b>Nominal Discharge Current, I<sub>n</sub></b>   | 80 kA 8/20 μs  |                                       |                                       |                                       |  |                                       |                                       |                                       |
| <b>Protection Modes</b>                           | All modes protected  |                                       | L-L                                   | All modes protected                   |  |                                       | L-L                                   | All modes protected                   |
| <b>Technology</b>                                 | MOV/Silicon with over-current fusing<br>TD Technology  |                                       |                                       |                                       |  |                                       |                                       |                                       |
| <b>Short Circuit Current Rating</b>               | 200 kAIC   |                                       |                                       |                                       |  |                                       |                                       |                                       |
| <b>Voltage Protection Rating (VPR)</b>            | L-N<br>600 V @ 3 kA<br>800 V @ 20 kA   | L-L<br>900 V @ 3 kA<br>1.0 kV @ 20 kA | L-N<br>900 V @ 3 kA<br>1.0 kV @ 20 kA | L-N<br>900 V @ 3 kA<br>1.0 kV @ 20 kA | L-N<br>600 V @ 3 kA<br>800 V @ 20 kA             | L-L<br>900 V @ 3 kA<br>1.0 kV @ 20 kA | L-N<br>900 V @ 3 kA<br>1.0 kV @ 20 kA | L-N<br>900 V @ 3 kA<br>1.0 kV @ 20 kA |
| <b>Filtering</b>                                  |  |                                       |                                       |                                       | -40 dB @ 100 kHz                                 |                                       |                                       |                                       |
| <b>Status<sup>(2)</sup></b>                       | 5 segment LED bar graph per phase  |                                       |                                       |                                       | 5 segment LED bar graph per phase, surge counter |                                       |                                       |                                       |
| <b>Dimensions H x D x W: mm (in)</b>              | 406 x 190 x 305 (16 x 7.5 x 12)  |                                       |                                       |                                       | 406 x 190 x 355 (16 x 7.5 x 14)                  |                                       |                                       |                                       |
| <b>Weight: kg (lbs)</b>                           | 8 (17.64)  |                                       |                                       |                                       | 13 (28.66)                                       |                                       |                                       |                                       |
| <b>Enclosure</b>                                  | IP66 (NEMA®-4X), Polycarbonate   |                                       |                                       |                                       | IP66 (NEMA-4), Metal (Steel)                     |                                       |                                       |                                       |
| <b>Connection</b>                                 | 3mm <sup>2</sup> to 35mm <sup>2</sup> (#12AWG to #2AWG)  |                                       |                                       |                                       |  |                                       |                                       |                                       |
| <b>Mounting</b>                                   | Wall mount   |                                       |                                       |                                       |  |                                       |                                       |                                       |
| <b>Back-up Overcurrent Protection</b>             | Fused disconnect included in enclosure   |                                       |                                       |                                       |  |                                       |                                       |                                       |
| <b>Temperature</b>                                | -10°C to 60°C (14°F to 140°F)  |                                       |                                       |                                       |  |                                       |                                       |                                       |
| <b>Approvals</b>                                  | NOM, UL® 1449 Edition 3 Listed Type 1/2  |                                       |                                       |                                       |  |                                       |                                       |                                       |
| <b>Surge Rated to Meet</b>                        | ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI®/IEEE® C62.41.2-2002 Scenario II, Exposure 3, 100 kA 8/20 μs, 10 kA 10/350 μs<br>UL 1449 Edition 3 In 20 kA mode |                                       |                                       |                                       |  |                                       |                                       |                                       |

(1) Grounded systems only. SES200 240D should not be used on high leg or underground systems.

(2) Normally open contact, 250V~10A, ≤1.5 mm<sup>2</sup> (#16AWG) connecting wire.



## TDX400S Transient Discriminating Panel Protection



### Features

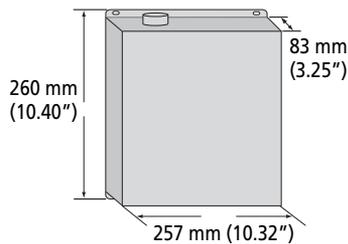
- Transient Discriminating (TD) Technology provides increased service life
- Modular design allows individual modes to be field replaceable, built-in disconnect and fusing eliminates need for external fusing
- Built-in features include TD Technology, thermal protection, short circuit current cartridge fusing and a surge counter
- Status indication flag per mode, voltage presence LED's, audible alarm and voltage-free contacts providing remote status monitoring
- Available in various operating voltages to suit most common power distribution systems
- 400kA 8/20 $\mu$ s maximum surge rating provides protection suitable for service entrance, main-distribution panels and highly exposed applications
- CE, UL® 1449 Edition 3 Listed

The TDX400 Series of Transient Voltage Surge Suppressors is designed for critical protection applications. The 400kA 8/20 $\mu$ s of surge protection exceeds the IEEE® C62.41.2 Scenario II single shot surge rating requirements for exposed service entrance locations – Exposure 3.

The NEMA®-1 weather-tight housing allows the TDX to be installed on indoor panels.

The preconfigured connecting leads simplify installation. The unique narrow construction allows the SPD to fit between adjacent panel boards and connect via a 90-degree elbow.

Listed as a Type 1 SPD to UL 1449 Edition 3, the TDX400 Series can be installed within a Type 1 or 2 location in accordance with the NEC® 2008.



| Model  | TDX400S120/208  | TDX400S120/240 | TDX400S277/480       | TDX400S277/480T           |
|--|---|----------------|----------------------|---------------------------|
| Nominal Voltage, U <sub>n</sub>                | 120/208 V   | 120/240 V      | 277/480 V            |                           |
| Distribution System                            | 3Ph 4W+G  | 1Ph 3W+G       | 3Ph 4W+G             |                           |
| Max Cont. Operating Voltage, U <sub>c</sub>    | 170/295 VAC   | 170/340 VAC    | 320/536 VAC          |                           |
| Stand-off Voltage                              | 240/415 VAC   | 240/480 VAC    | 480/831 VAC          |                           |
| Frequency                                      | 50/60 Hz  |                |                      |                           |
| Short Circuit Current Rating, I <sub>sc</sub>  | 200 kAIC  |                |                      |                           |
| Technology                                     | Over-current Replaceable Cartridge Fusing<br>TD Technology with thermal disconnect  |                |                      |                           |
| Max Discharge Current I <sub>max</sub>         | 400 kA 8/20 $\mu$ s per phase   |                |                      |                           |
| Impulse Current, I <sub>imp</sub>              | 25 kA 10/350 $\mu$ s per mode   |                |                      |                           |
| Nominal Discharge Current                      | 160 kA 8/20 $\mu$ s   |                |                      |                           |
| Protection Modes                               | All modes protected via L-G, L-N, N-G   |                |                      | L-N, N-G                  |
| Voltage Protection Rating (VPR) (8/20 $\mu$ s) | L-N<br>800 V @ 3 kA   |                | L-N<br>1.2 kV @ 3 kA |                           |
| Status   | Audible Alarm<br>LED status indication per phase, mechanical flag per mode, all modes monitored<br>Form A remote contacts, max 1.5 mm <sup>2</sup> (#14 AWG) terminals  |                |                      |                           |
| Dimensions H x D x W: mm (in)                  | 260 x 83 x 257 (10.40 x 3.25 x 10.32)   |                |                      |                           |
| Weight: kg (lbs)                               | 6.35 (14.00)  |                |                      |                           |
| Enclosure                                      | Aluminum, IP 65 (NEMA®-1)   |                |                      |                           |
| Connection                                     | Line: 762 mm of 5.26 mm <sup>2</sup> (30" of # 10 AWG) flying leads<br>Neutral/Ground: 900 mm of 5.26 mm <sup>2</sup> (36" of # 10 AWG) flying leads  |                |                      |                           |
| Mounting                                       | 3/4" straight nipple  |                |                      |                           |
| Temperature                                    | -40°C to 80°C (-40°F to 176°F)  |                |                      |                           |
| Approvals                                      | C-Tick, CE, IEC® 61643-1,<br>UL 1449 Edition 3 Listed Type 1/2  |                |                      |                           |
| Surge Rated to Meet                            | ANSI/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI/IEEE® C62.41.2-2002 Scenario II, Exposure 3, 100 kA 8/20 $\mu$ s, 10 kA 10/350 $\mu$ s<br>IEC 61643-1 Class I, Class II<br>UL 1449 Edition 3 In 20 kA mode |                |                      |                           |
| Available Options                              | Replacement Fuse Cartridge (Order TDXFUSE)<br>Replacement Surge Module (Order TDS150M150 or TDS150M277), please refer to installation instructions  |                |                      |                           |
| Replacement Modules                            | TDS150M150  | TDS150M150     | TDS150M277           | SGD125M (N-G), TDS150M277 |

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## TDX300S Transient Discriminating Panel Protection



### Features

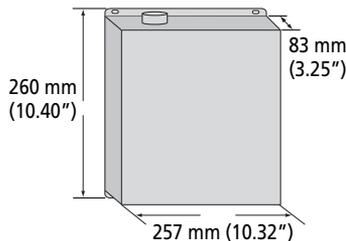
- Transient Discriminating (TD) Technology provides increased service life
- Modular design allows individual modes to be field replaceable, built-in disconnect and fusing eliminates need for external fusing
- Built-in features include TD Technology, thermal protection, short circuit current cartridge fusing and surge counter
- Status indication flag per mode, voltage presence LED's, audible alarm and voltage-free contacts providing remote status monitoring
- Available in various operating voltages to suit most common power distribution systems
- 300kA 8/20 $\mu$ s maximum surge rating provides protection suitable for service entrance, main-distribution panels and highly exposed applications
- CE, UL® 1449 Edition 3 Listed

The TDX300 Series of Transient Voltage Surge Suppressors is designed for critical protection applications. The 300kA 8/20 $\mu$ s of surge protection exceeds the IEEE® C62.41.2 Scenario II single shot surge rating requirements for exposed service entrance locations – Exposure 3.

The NEMA®-1 weather-tight housing allows the TDX to be installed on indoor panels.

The preconfigured connecting leads simplify installation. The unique narrow construction allows the SPD to fit between adjacent panel boards and connect via a 90-degree elbow.

Listed as a Type 1 SPD to UL 1449 Edition 3, the TDX300 Series can be installed within a Type 1 or 2 location in accordance with the NEC® 2008.



| Model  | TDX300S120/208  | TDX300S120/240 | TDX300S277/480       |
|--|---|----------------|----------------------|
| Nominal Voltage, U <sub>n</sub>                | 120/208 V   | 120/240 V      | 277/480 V            |
| Distribution System                            | 3Ph 4W+G  | 1Ph 3W+G       | 3Ph 4W+G             |
| Max Cont. Operating Voltage, U <sub>c</sub>    | 170/295 V AC  | 170/340 V AC   | 320/536 V AC         |
| Stand-off Voltage                              | 240/415 V   | 240/480 V      | 480/831 V            |
| Frequency                                      | 50/60 Hz  |                |                      |
| Short Circuit Current Rating, I <sub>sc</sub>  | 200 kAIC  |                |                      |
| Technology                                     | Over-current Replaceable Cartridge Fusing<br>TD Technology with thermal disconnect  |                |                      |
| Max Discharge Current I <sub>max</sub>         | 300 kA 8/20 $\mu$ s per phase   |                |                      |
| Impulse Current, I <sub>imp</sub>              | 22.5 kA 10/350 $\mu$ s per mode   |                |                      |
| Nominal Discharge Current                      | 120 kA 8/20 $\mu$ s   |                |                      |
| Protection Modes                               | All modes protected via L-G, L-N, N-G   |                |                      |
| Voltage Protection Rating (VPR) (8/20 $\mu$ s) | L-N<br>800 V @ 3 kA   |                | L-N<br>1.2 kV @ 3 kA |
| Status   | Audible Alarm<br>LED status indication per phase, mechanical flag per mode, all modes monitored<br>Form A remote contacts, max 1.5 mm <sup>2</sup> (#14 AWG) terminals  |                |                      |
| Dimensions H x D x W: mm (in)                  | 260 x 83 x 257 (10.40 x 3.25 x 10.32)   |                |                      |
| Weight: kg (lbs)                               | 5.9 (13.00)   |                |                      |
| Enclosure                                      | Aluminum, IP 65 (NEMA®-1)   |                |                      |
| Connection                                     | Line: 762 mm of 5.26 mm <sup>2</sup> (30" of # 10 AWG) flying leads<br>Neutral/Ground: 900 mm of 5.26 mm <sup>2</sup> (36" of # 10 AWG) flying leads  |                |                      |
| Mounting                                       | 3/4" straight nipple  |                |                      |
| Temperature                                    | -40°C to 80°C (-40°F to 176°F)  |                |                      |
| Approvals                                      | C-Tick, CE, IEC® 61643-1, UL 1449 Edition 3 Listed Type 1/2   |                |                      |
| Surge Rated to Meet                            | ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI®/IEEE® C62.41.2-2002 Scenario II, Exposure 3, 100 kA 8/20 $\mu$ s, 10 kA 10/350 $\mu$ s<br>IEC 61643-1 Class I, Class II<br>UL 1449 Edition 3 In 20 kA mode |                |                      |
| Available Options                              | Replacement Fuse Cartridge (Order TDXFUSE)<br>Replacement Surge Module (Order TDS150M150 or TDS150M277),<br>please refer to installation instructions   |                |                      |
| Replacement Module                             | TDS150M150  |                | TDS150M277           |



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## TDX200 Transient Discriminating Panel Protection



### Features

- Transient Discriminating (TD) Technology provides increased service life
- Modular design allows individual modes to be field replaceable, built-in disconnect and fusing eliminates need for external fusing
- Built-in features include TD Technology, thermal protection and short circuit current cartridge fusing
- Compact NEMA®-4 enclosure design can be flush mounted or installed in a small space
- Status indication flag per mode, voltage presence LED's, audible alarm and voltage-free contacts providing remote status monitoring
- 200kA 8/20µs maximum surge rating provides protection suitable for service entrance, main-distribution panels and highly exposed applications
- Available in various operating voltages to suit most common power distribution systems
- CE, UL® 1449 Edition 3 Listed

The TDX200 Series of Transient Voltage Surge Suppressors is designed for critical protection applications. The 200kA 8/20µs of surge protection exceeds the IEEE® C62.41.2 Scenario II single shot surge rating requirements for exposed service entrance locations – Exposure 3.

The NEMA-4 weather-tight housing allows the TDX to be installed on indoor or outdoor service panels. The

preconfigured connecting leads simplify installation. The unique narrow construction allows the SPD to fit between adjacent panel boards and connect via a 90-degree elbow. A flush mounting kit is also available for installing the SPD in drywall applications.

Listed as a Type 1 SPD to UL 1449 Edition 3, the TDX200 Series can be installed within a Type 1 or 2 location in accordance with the NEC® 2008



Typical installation



TDX200M Enclosure



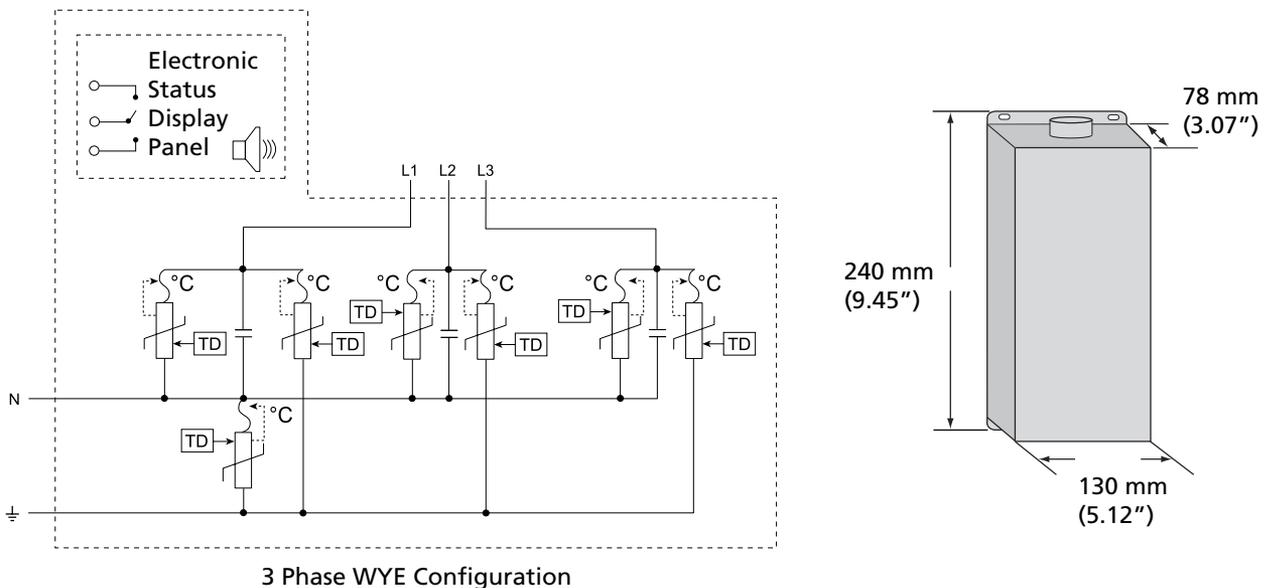
TDX Replaceable Modules



TDX Replaceable Module backplane fully removed

|   |  |                          |                     |  |  |                          |  |  |
|---|--|--------------------------|---------------------|--|--|--------------------------|--|--|
| Model   | TDX200M<br>120/208   | TDX200M<br>120/240       | TDX200M<br>120/240D | TDX200M<br>240D                        | TDX200M<br>277/480                     | TDX200M<br>277/480TT*    | TDX200M<br>347/600                     | TDX200M<br>480D                        |
| Nominal Voltage, U <sub>n</sub>               | 120/208 V  | 120/240 V                |                     | 240 V                                  | 277/480 V                              |                          | 347/600 V                              | 480 V                                  |
| Distribution System                           | 3Ph 4W+G   | 1Ph 3W+G                 | 3Ph Δ 4W+G          | 3Ph Δ 3W+G                             | 3Ph 4W+G                               |                          |  | 3Ph Δ 3W+G                             |
| Max Cont. Operating Voltage, U <sub>c</sub>   | 170/295 VAC  | 170/340 VAC              |                     | 275 VAC                                | 320/536 VAC                            |                          | 610/970 VAC                            | 610 VAC                                |
| Stand-off Voltage                             | 240/415 VAC  | 240/480 VAC              | 240/415 VAC         | 415 VAC                                | 480/831 VAC                            |                          | 790/1370 VAC                           | 790 VAC                                |
| Frequency                                     | 50/60 Hz   |                          |                     |  |  |                          |  |  |
| Short Circuit Current Rating, I <sub>sc</sub> | 200 kAIC   |                          |                     |  |  |                          |  |  |
| Technology                                    | Over-current Replaceable Cartridge Fusing<br>TD Technology with thermal disconnect   |                          |                     |  |  |                          |  |  |
| Max Discharge Current, I <sub>max</sub>       | 200 kA 8/20 μs per phase   |                          |                     |  |  |                          |  |  |
| Impulse Current, I <sub>imp</sub>             | 20 kA 10/350 μs per mode   |                          |                     |  |  | 20 kA 10/350 μs per mode | 20 kA 10/350 μs per mode               |  |
|   |  |                          |                     |  |  | 50 kA 10/350 μs N-PE     |  |  |
| Nominal Discharge Current, I <sub>n</sub>     | 100 kA 8/20 μs   |                          |                     | 80 kA 8/20 μs                          |  |                          |  |  |
| Protection Modes                              | All modes protected via L-N, L-G & N-G   |                          |                     |  |  |                          |  |  |
| Voltage Protection Rating (VPR)               | L-N<br>600 V @ 3 kA<br>1.2 kV @ 20 kA  |                          |                     | L-L<br>1.0 kV @ 3 kA<br>1.8 kV @ 20 kA | L-N<br>1.0 kV @ 3 kA<br>1.8 kV @ 20 kA |                          | L-N<br>1.8 kV @ 3 kA<br>2.6 kV @ 20 kA | L-L<br>1.8 kV @ 3 kA<br>2.6 kV @ 20 kA |
| Status  | Audible Alarm<br>LED status indication per phase, mechanical flag per mode, all modes monitored<br>Form A remote contacts, max 1.5 mm <sup>2</sup> (#14 AWG) terminals                                   |                          |                     |  |  |                          |  |  |
| Dimensions H x D x W: mm (in)                 | 240 x 78 x 130 (9.45 x 3.07 x 5.12)  |                          |                     |  |  |                          |  |  |
| Weight: kg (lbs)                              | 2.0 (4.4)  |                          |                     |  |  |                          |  |  |
| Enclosure                                     | Aluminum, IP 65 (NEMA®-4)  |                          |                     |  |  |                          |  |  |
| Connection                                    | Line: 762 mm of 5.26 mm <sup>2</sup> (30" of # 10 AWG) flying leads<br>Neutral/Ground: 900 mm of 5.26 mm <sup>2</sup> (36" of # 10 AWG) flying leads   |                          |                     |  |  |                          |  |  |
| Mounting                                      | 3/4" straight nipple; Optional flush mounting plate for drywall  |                          |                     |  |  |                          |  |  |
| Temperature                                   | -40°C to 80°C (-40°F to 176°F)   |                          |                     |  |  |                          |  |  |
| Approvals                                     | C-Tick, CE, IEC® 61643-1, UL 1449 Edition 3 Listed Type 1/2  |                          |                     |  |  |                          |  |  |
| Surge Rated to Meet                           | ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI®/IEEE® C62.41.2-2002 Scenario II, Exposure 3, 100 kA 8/20 μs, 10 kA 10/350 μs<br>IEC 61643-1 Class I, Class II<br>UL® 1449 Edition 3 In 20 kA mode |                          |                     |  |  |                          |  |  |
| Available Options                             | Flush Mount Kit (Order TDXM200FP)<br>Replacement Fuse Cartridge (Order TDXFUSE)<br>Side Mount Kit (Order TDXSM)<br>Surge Counter and Filtering insert "S" in Order Code, example TDX100S277/480          |                          |                     |  |  |                          |  |  |
| Replacement Module                            | TDS150M150   | TDS150M150<br>TDS150M240 | TDS150M240          | TDS150M277                             | TDS150M277 (L-N)<br>SGD125M (N-G)      | TDS150M560               |  |  |

Delta and "S" models are Type 2 devices.



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## TDX100 Transient Discriminating Panel Protection



### Features

- Transient Discriminating (TD) Technology provides increased service life
- Modular design allows individual modes to be field replaceable, built-in disconnect and fusing eliminates need for external fusing
- Built-in features include TD Technology, thermal protection and short circuit current cartridge fusing
- Compact NEMA®-4 enclosure design can be flush mounted or installed in a small space
- Status indication flag per mode, voltage presence LEDs, audible alarm and voltage-free contacts providing remote status monitoring
- 100kA 8/20µs maximum surge rating provides protection suitable for smaller main-distribution panels and an extended operational life
- Available in various operating voltages to suit most common power distribution systems
- CE, UL® 1449 Edition 3 Listed

The TDX100 Series of Transient Voltage Surge Suppressors is designed for critical protection applications. The 100kA 8/20µs of surge protection meets the IEEE® C62.41.2 Scenario II single shot surge rating requirements for exposed service entrance locations – Exposure 3.

The NEMA-4 weather tight housing allows the TDX to be installed on indoor or outdoor service panels. The

preconfigured connecting leads simplify installation. The unique narrow construction allows the SPD to fit between adjacent panel boards and connect via a 90-degree elbow. A flush mounting kit is also available for installing the SPD in drywall applications.

Listed as a Type 1 SPD to UL 1449 Edition 3, the TDX100 Series can be installed within a Type 1 or 2 location in accordance with the NEC® 2008



Typical Installation



Output contacts



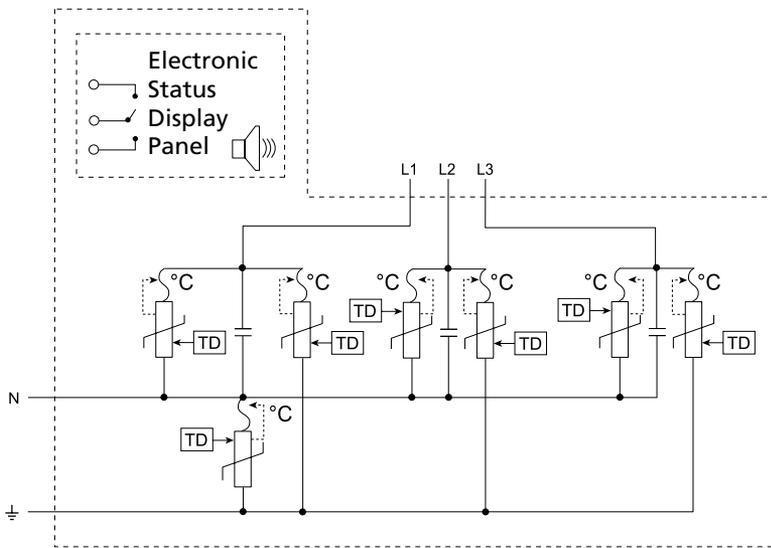
TDX Replaceable Cartridge  
overcurrent fuse protection



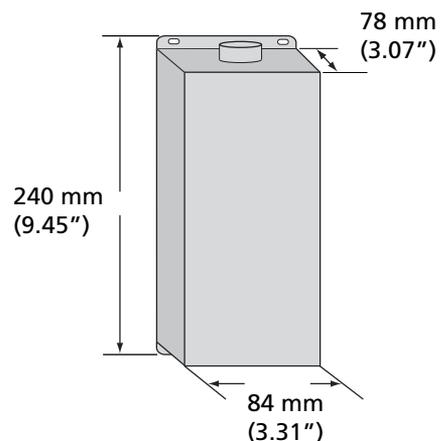
TDX Replaceable Modules

| Model   | TDX100M 120/208  | TDX100M 120/240 | TDX100M 120/240D         | TDX100M 240D                           | TDX100M 277/480          | TDX100M 277/480TT*                     | TDX100M 347/600                   | TDX100M 480D                           |  |
|---|--|-----------------|--------------------------|--|--------------------------|--|-----------------------------------|--|--|
| Nominal Voltage, U <sub>n</sub>               | 120/208 V  |                 | 120/240 V                |  | 240 V                    |  | 277/480 V                         |  |  |
| Distribution System                           | 3Ph 4W+G   |                 | 1Ph 3W+G                 |  | 3Ph Δ 4W+G               |  | 3Ph Δ 3W+G                        |  |  |
| Max Cont. Operating Voltage, U <sub>c</sub>   | 170/295 VAC  |                 | 170/340 VAC              |  | 275 VAC                  |  | 320/536 VAC                       |  |  |
| Stand-off Voltage                             | 240/415 VAC  |                 | 240/480 VAC              |  | 240/415 VAC              |  | 415 VAC                           |  |  |
| Frequency                                     | 50/60 Hz   |                 |                          |  |                          |  |                                   |  |  |
| Short Circuit Current Rating, I <sub>sc</sub> | 200 kAIC   |                 |                          |  |                          |  |                                   |  |  |
| Technology                                    | Over-current Replaceable Cartridge Fusing<br>TD Technology with thermal disconnect   |                 |                          |  |                          |  |                                   |  |  |
| Max Discharge Current, I <sub>max</sub>       | 100 kA 8/20 μs per phase   |                 |                          |  |                          |  |                                   |  |  |
| Impulse Current, I <sub>imp</sub>             | 12 kA 10/350 μs per mode   |                 |                          |  |                          | 12 kA 10/350 μs per mode               |                                   | 12 kA 10/350 μs per mode               |  |
| Nominal Discharge Current, I <sub>n</sub>     | 50 kA 8/20 μs  |                 |                          |  | 40 kA 8/20 μs            |  |                                   |  |  |
| Protection Modes                              | All modes protected via L-N, L-G & N-G   |                 |                          |  |                          |  |                                   |  |  |
| Voltage Protection Rating (VPR)               | L-N<br>600 V @ 3 kA<br>1.2 kV @ 20 kA  |                 |                          | L-L<br>1.0 kV @ 3 kA<br>1.8 kV @ 20 kA |                          | L-N<br>1.2 kV @ 3 kA<br>1.8 kV @ 20 kA |                                   | L-N<br>1.8 kV @ 3 kA<br>2.6 kV @ 20 kA |  |
| Status  | Audible Alarm<br>LED status indication per phase, mechanical flag per mode, all modes monitored<br>Form A remote contacts, max 1.5 mm <sup>2</sup> (#14 AWG) terminals                                 |                 |                          |  |                          |  |                                   |  |  |
| Dimensions H x D x W: mm (in)                 | 240 x 78 x 84 (9.45 x 3.07 x 3.31)   |                 |                          |  |                          |  |                                   |  |  |
| Weight: kg (lbs)                              | 1.41 (3.1)   |                 |                          |  |                          |  |                                   |  |  |
| Enclosure                                     | Aluminum, IP 65 (NEMA®-4)  |                 |                          |  |                          |  |                                   |  |  |
| Connection                                    | Line: 762 mm of 5.26 mm <sup>2</sup> (30" of # 10 AWG) flying leads<br>Neutral/Ground: 900 mm of 5.26 mm <sup>2</sup> (36" of # 10 AWG) flying leads   |                 |                          |  |                          |  |                                   |  |  |
| Mounting                                      | 3/4" straight nipple; Optional flush mounting plate for drywall  |                 |                          |  |                          |  |                                   |  |  |
| Temperature                                   | -40°C to 80°C (-40°F to 176°F)   |                 |                          |  |                          |  |                                   |  |  |
| Approvals                                     | C-Tick, CE, IEC® 61643-1, UL 1449 Edition 3 Listed Type 1/2  |                 |                          |  |                          |  |                                   |  |  |
| Surge Rated to Meet                           | ANSI/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI/IEEE® C62.41.2-2002 Scenario II, Exposure 3, 100 kA 8/20 μs, 10 kA 10/350 μs<br>IEC 61643-1 Class I, Class II<br>UL® 1449 Edition 3 In 20 kA mode |                 |                          |  |                          |  |                                   |  |  |
| Available Options                             | Flush Mount Kit (Order TDXM100FP)<br>Replacement Fuse Cartridge (Order TDXFUSE)<br>Side Mount Kit (Order TDXSM)<br>Surge Counter and Filtering insert "S" in Order Code, example TDX100S277/480        |                 |                          |  |                          |  |                                   |  |  |
| Replacement Module                            | TDS150M150   |                 | TDS150M150<br>TDS150M240 |  | TDS150M240<br>TDS150M277 |  | TDS150M277 (L-N)<br>SGD125M (N-G) |  |  |

Delta and "S" models are Type 2 devices.



3 Phase WYE Configuration



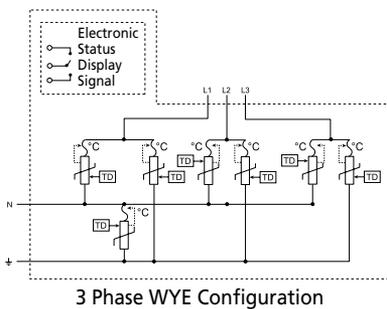
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## TDX200C Transient Discriminating Panel Protection



### Features

- Transient Discriminating (TD) Technology provides increased service life
- Built-in features include TD Technology, thermal protection and short circuit current fusing
- Compact NEMA®-4 enclosure design can be flush mounted or installed in a small space
- LED status indication and voltage-free contacts provide remote status monitoring
- 200kA 8/20µs maximum surge rating provides protection suitable for smaller main-distribution panels and an extended operational life
- Available in various operating voltages to suit most common power distribution systems
- CE, UL® 1449 Edition 3 Listed

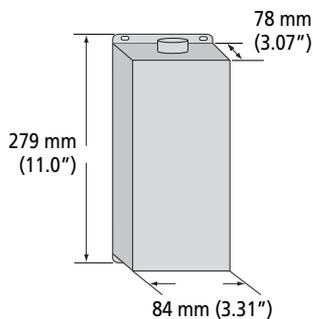


The TDX200 Series of Transient Voltage Surge Suppressors is designed for critical protection applications. The 200kA 8/20µs of surge protection exceeds the IEEE® C62.41.2 Scenario II single shot surge rating requirements for exposed service entrance locations – Exposure 3.

The NEMA-4 weather-tight housing allows the TDX to be installed on indoor or outdoor service panels. The preconfigured connecting leads

simplify installation. The unique narrow construction allows the SPD to fit between adjacent panel boards and connect via a 90-degree elbow. A flush mounting kit is also available for installing the SPD in drywall applications.

Listed as a Type 1 SPD to UL 1449 Edition 3, the TDX200 Series can be installed within a Type 1 or 2 location in accordance with the NEC® 2008



Typical Installation

| Model   | TDX200C120/208  | TDX200C120/240 | TDX200C277/480       |
|---|---|----------------|----------------------|
| Nominal Voltage, U <sub>n</sub>               | 120/208 V   | 120/240 V      | 277/480 V            |
| Distribution System                           | 3Ph 4W+G  | 1Ph 3W+G       | 3Ph 4W+G             |
| Max Cont. Operating Voltage, U <sub>c</sub>   | 170/295 V AC  | 170/340 V AC   | 320/536 V AC         |
| Stand-off Voltage                             | 240/415 V   | 240/480 V      | 480/831 V            |
| Frequency                                     | 50/60 Hz  |                |                      |
| Short Circuit Current Rating, I <sub>sc</sub> | 200 kAIC  |                |                      |
| Technology                                    | TD Technology with thermal disconnect<br>Over-current Fusing  |                |                      |
| Max Discharge Current I <sub>max</sub>        | 200 kA 8/20 µs per phase  |                |                      |
| Impulse Current, I <sub>imp</sub>             | 25 kA 10/350 µs per mode  |                |                      |
| Nominal Discharge Current                     | 80 kA 8/20 µs   |                |                      |
| Protection Modes                              | All modes protected via L-N, L-G, & N-G   |                |                      |
| Voltage Protection Rating (VPR) (8/20µs)      | L-N<br>800 V @ 3 kA   |                | L-N<br>1.2 kV @ 3 kA |
| Status  | LED status indication per phase, all modes monitored<br>Remote contacts, change-over, 125 V~ / 3 A, max 1.5 mm <sup>2</sup> (#14 AWG) terminals   |                |                      |
| Dimensions H x D x W: mm (in)                 | 279 x 78 x 84 (11 x 3.07 x 3.31)  |                |                      |
| Weight: kg (lbs)                              | 2.04 (4.50)   |                |                      |
| Enclosure                                     | Aluminum, IP 65 (NEMA®-4)   |                |                      |
| Connection                                    | Line: 762 mm of 5.26 mm <sup>2</sup> (30" of # 10 AWG) flying leads<br>Neutral/Ground: 900 mm of 5.26 mm <sup>2</sup> (36" of # 10 AWG) flying leads  |                |                      |
| Mounting                                      | 3/4" straight nipple  |                |                      |
| Temperature                                   | -40°C to 80°C (-40°F to 176°F)  |                |                      |
| Approvals                                     | C-Tick, CE, IEC® 61643-1, UL 1449 Edition 3 Listed Type 1/2   |                |                      |
| Surge Rated to Meet                           | ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI®/IEEE® C62.41.2-2002 Scenario II, Exposure 3, 100 kA 8/20 µs, 10 kA 10/350 µs<br>IEC 61643-1 Class I, Class II<br>UL 1449 Edition 3 In 20 kA mode |                |                      |
| Available Options                             | Side Mount Kit (Order TDXSM), Flush Mount Kit (Order TDX200CFPP)  |                |                      |

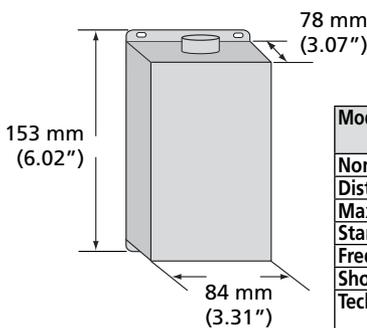
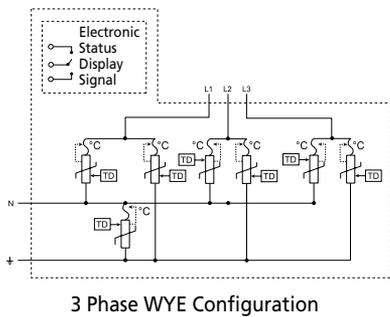
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## TDX100C Transient Discriminating Panel Protection



### Features

- Transient Discriminating (TD) Technology provides increased service life
- Built-in features include TD Technology, thermal protection and short circuit current fusing
- Compact NEMA®-4 enclosure design can be flush mounted or installed in a small space
- LED status indication and voltage-free contacts provide remote status monitoring
- 100kA 8/20µs maximum surge rating provides protection suitable for smaller main-distribution panels and an extended operational life
- Available in various operating voltages to suit most common power distribution systems
- CE, UL® 1449 Edition 3 Listed



Typical Installation

The TDX100 Series of Transient Voltage Surge Suppressors is designed for critical protection applications. The 100kA 8/20µs of surge protection meets the IEEE® C62.41.2 Scenario II single shot surge rating requirements for exposed service entrance locations – Exposure 3.

The NEMA-4 weather tight housing allows the TDX to be installed on indoor or outdoor service panels. The preconfigured connecting leads

simplify installation. The unique narrow construction allows the SPD to fit between adjacent panel boards and connect via a 90-degree elbow. A flush mounting kit is also available for installing the SPD in drywall applications.

Listed as a Type 1 SPD to UL 1449 Edition 3, the TDX100 Series can be installed within a Type 1 or 2 location in accordance with the NEC® 2008

| Model   | TDX100C<br>120  | TDX100C<br>120/208 | TDX100C<br>120/240                     | TDX100C<br>240 | TDX100C<br>277/480                     | TDX100C<br>347/600 |
|---|---|--------------------|--|----------------|--|--------------------|
| Nominal Voltage, U <sub>n</sub>               | 120 V   | 120/208 V          | 120/240 V                              | 240 V          | 277/480 V                              | 347/600 V          |
| Distribution System                           | 1Ph 2W+G  | 3Ph 4W+G           | 1Ph 3W+G                               | 1Ph 2W+G       | 3Ph 4W+G                               | 3Ph 4W+G           |
| Max Cont. Operating Voltage, U <sub>c</sub>   | 170 VAC   | 170/295 VAC        | 170/340 VAC                            | 275 VAC        | 320/536 VAC                            | 610/830 VAC        |
| Stand-off Voltage                             | 240 VAC   | 240/415 VAC        | 240/480 VAC                            | 480 VAC        | 480/831 VAC                            | 600/1040 VAC       |
| Frequency                                     | 50/60 Hz  |                    |  |                |  |                    |
| Short Circuit Current Rating, I <sub>sc</sub> | 200 kAIC  |                    |  |                |  |                    |
| Technology                                    | Over-current Fusing<br>TD Technology with thermal disconnect  |                    |  |                |  |                    |
| Max Discharge Current, I <sub>max</sub>       | 100 kA 8/20 µs per phase  |                    |  |                |  |                    |
| Impulse Current, I <sub>imp</sub>             | 12 kA 10/350 µs per mode  |                    |  |                |  |                    |
| Nominal Discharge Current, I <sub>n</sub>     | 40 kA 8/20 µs   |                    |  |                |  |                    |
| Protection Modes                              | All modes protected via L-N, L-G, & N-G   |                    |  |                |  |                    |
| Voltage Protection Rating (VPR)               | L-N<br>600 V @ 3 kA<br>1.2 kV @ 20 kA   |                    | L-N<br>1.0 kV @ 3 kA<br>1.8 kV @ 20 kA |                | L-N<br>1.8 kV @ 3 kA<br>2.6 kV @ 20 kA |                    |
| Status  | LED status indication per phase, all modes monitored<br>Remote contacts, change-over, 125 V~ / 3 A, max 1.5 mm <sup>2</sup> (#14 AWG) terminals   |                    |  |                |  |                    |
| Dimensions H x D x W: mm (in)                 | 153 x 78 x 84 (6.02 x 3.07 x 3.31)  |                    |  |                |  |                    |
| Weight: kg (lbs)                              | 0.80 (1.76)   |                    |  |                |  |                    |
| Enclosure                                     | Aluminum, IP 65 (NEMA®-4)   |                    |  |                |  |                    |
| Connection                                    | Line: 762 mm of 5.26 mm <sup>2</sup> (30" of # 10 AWG) flying leads<br>Neutral/Ground: 900 mm of 5.26 mm <sup>2</sup> (36" of # 10 AWG) flying leads  |                    |  |                |  |                    |
| Mounting                                      | 3/4" straight nipple; Optional flush mounting plate for drywall   |                    |  |                |  |                    |
| Temperature                                   | -40°C to 80°C (-40°F to 176°F)  |                    |  |                |  |                    |
| Approvals                                     | C-Tick, CE, IEC® 61643-1, UL 1449 Edition 3 Listed Type 1/2   |                    |  |                |  |                    |
| Surge Rated to Meet                           | ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI®/IEEE® C62.41.2-2002 Scenario II, Exposure 3, 100 kA 8/20 µs, 10 kA 10/350 µs<br>IEC 61643-1 Class I, Class II<br>UL 1449 Edition 3 In 20 kA mode |                    |  |                |  |                    |
| Available Options                             | Flush Mount Kit (Order TDXCFP)<br>Side Mount Kit (Order TDXSM)  |                    |  |                |  |                    |



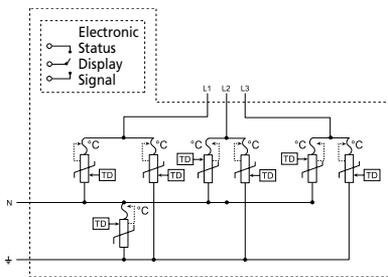
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## TDX50C Transient Discriminating Panel Protection

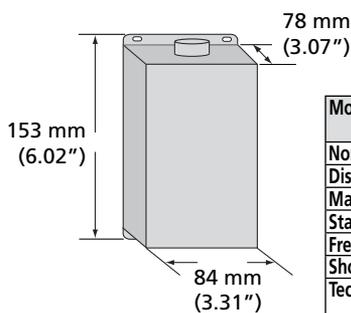


### Features

- Transient Discriminating (TD) Technology provides increased service life
- Built-in features include TD Technology, thermal protection and short circuit current fusing
- Compact NEMA®-4 enclosure design can be flush mounted or installed in a small space
- LED status indication and voltage-free contacts provide remote status monitoring
- 50kA 8/20µs maximum surge rating provides protection suitable for sub-distribution panels and a long operational life
- Available in various operating voltages to suit most common power distribution systems
- CE, UL® 1449 Edition 3 Listed



3 Phase WYE Configuration



Typical Installation

The TDX50 Series of Transient Voltage Surge Suppressors for equipment, panel and motor protection applications is specifically designed to provide long life, even under the most adverse over-voltage conditions.

The NEMA®-4 weather tight housing allows the TDX to be installed on indoor or outdoor service panels. The preconfigured connecting leads

simplify installation. The unique narrow construction allows the SPD to fit between adjacent panel boards. A flush mounting kit is also available for installing the SPD in drywall applications.

Listed as a Type 1 SPD to UL 1449 Edition 3, the TDX50 Series can be installed within a Type 1 or 2 location in accordance with the NEC® 2008

| Model                                  | TDX50C 120  | TDX50C 120/208 | TDX50C 120/240                         | TDX50C 120/240D | TDX50C 240                             | TDX50C 277/480 | TDX50C 347/600 |
|--|---|----------------|--|-----------------|--|----------------|----------------|
| Nominal Voltage, $U_n$                 | 120 V   | 120/208 V      | 120/240 V                              | 120/240 V       | 240 V                                  | 277/480 V      | 347/600 V      |
| Distribution System                    | 1Ph 2W+G  | 3Ph 4W+G       | 1Ph 3W+G                               | 3Ph Δ 4W+G      | 1Ph 2W+G                               | 3Ph 4W+G       | 3Ph 4W+G       |
| Max Cont. Operating Voltage, $U_c$     | 170 VAC   | 170/295 VAC    | 170/340 VAC                            |                 | 275 VAC                                | 320/536 VAC    | 610/830 VAC    |
| Stand-off Voltage                      | 240 VAC   | 240/415 VAC    | 240/480 VAC                            | 240/415 VAC     | 480 VAC                                | 480/831 VAC    | 600/1040 VAC   |
| Frequency                              | 50/60 Hz  |                |  |                 |  |                |                |
| Short Circuit Current Rating, $I_{sc}$ | 200 kAIC  |                |  |                 |  |                |                |
| Technology                             | Over-current Fusing<br>TD Technology with thermal disconnect  |                |  |                 |  |                |                |
| Max Discharge Current, $I_{max}$       | 50 kA 8/20 µs per phase   |                |  |                 |  |                |                |
| Nominal Discharge Current, $I_n$       | 20 kA 8/20 µs   |                |  |                 |  |                |                |
| Protection Modes                       | All modes protected via L-N, L-G, & N-G   |                |  |                 |  |                |                |
| Voltage Protection Rating (VPR)        | L-N<br>600 V @ 3 kA<br>1.2 kV @ 20 kA   |                | L-N<br>1.0 kV @ 3 kA<br>1.8 kV @ 20 kA |                 | L-N<br>1.8 kV @ 3 kA<br>2.6 kV @ 20 kA |                |                |
| Status                                 | LED status indication per phase, all modes monitored<br>Remote contacts, change-over, 125 V- / 3 A, max 1.5 mm <sup>2</sup> (#14 AWG) terminals                           |                |  |                 |  |                |                |
| Dimensions H x D x W: mm (in)          | 153 x 78 x 84 (6.02 x 3.07 x 3.31)  |                |  |                 |  |                |                |
| Weight: kg (lbs)                       | 0.70 (1.54)   |                |  |                 |  |                |                |
| Enclosure                              | Aluminum, IP 65 (NEMA®-4)   |                |  |                 |  |                |                |
| Connection                             | Line: 762 mm of 5.26 mm <sup>2</sup> (30" of # 10 AWG) flying leads<br>Neutral/Ground: 900 mm of 5.26 mm <sup>2</sup> (36" of # 10 AWG) flying leads                      |                |  |                 |  |                |                |
| Mounting                               | 3/4" straight nipple; Optional flush mounting plate for drywall   |                |  |                 |  |                |                |
| Temperature                            | -40°C to 80°C (-40°F to 176°F)  |                |  |                 |  |                |                |
| Approvals                              | C-Tick, CE, IEC® 61643-1, UL 1449 Edition 3 Listed Type 1/2   |                |  |                 |  |                |                |
| Surge Rated to Meet                    | ANSI/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI/IEEE® C62.41.2-2002 Scenario II, Exposure 2, 50 kA 8/20 µs<br>EC 61643-1 Class II<br>UL 1449 Edition 3 In 10 kA mode |                |  |                 |  |                |                |
| Available Options                      | Flush Mount Kit (Order TDXCFP)<br>Side Mount Kit (Order TDXSM)  |                |  |                 |  |                |                |

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## Transient Discriminating MOVTEC Protection Module

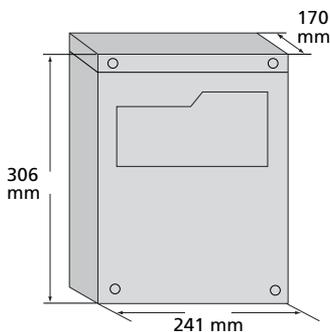
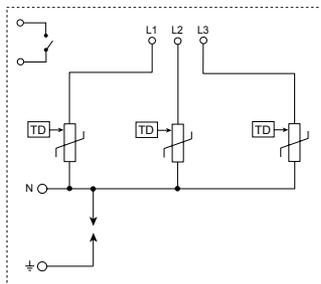
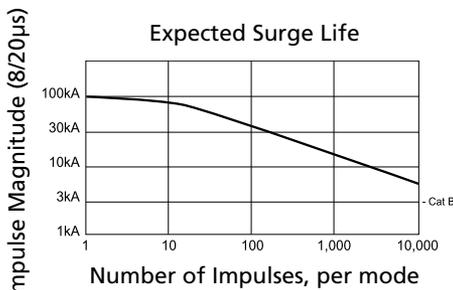


### Features

- Primary protection – suitable for high exposure sites and point-of-entry facility protection
- Modular design – allows easy replacement of surge modules
- 5 segment electronic status indication – displays percentage of capacity remaining
- Lug connection – allows Kelvin (in and out) connection of large cables
- Transient Discriminating (TD) Technology – provides increased service life

The Transient Discriminating MOVTEC Protection Module (TDS-MPM) integrates three TDS-MOVTEC units into one enclosure to simplify three phase protection applications.

The TDS-MPM is ideal for primary point-of-entry protection applications where it is connected to the main service panel.



|  |   |
|--|---|
| <b>Model</b>   | TDSMPM277   |
| <b>Nominal System Voltage, <math>U_n</math></b>      | 240/415 V & 277/480 V   |
| <b>Distribution System</b>                           | 3Ph Y 4W+G  |
| <b>System Compatibility</b>                          | TN-C, TN-S, TN-C-S, TT  |
| <b>Max Cont. Operating Voltage, <math>U_c</math></b> | 400/692 V AC  |
| <b>Stand-off Voltage</b>                             | 440 V N-PE; 480/831 V L-N   |
| <b>Frequency</b>                                     | 50/60 Hz  |
| <b>Operating Current @ <math>U_n</math></b>          | 25 mA   |
| <b>Aggregate Surge Rating</b>                        | 200 kA 8/20 $\mu$ s (L-N)   |
| <b>Max Discharge Current, <math>I_{max}</math></b>   | 100 kA 8/20 $\mu$ s L-N (NEMA®-LS1)<br>130 kA 8/20 $\mu$ s N-PE (NEMA-LS1)  |
| <b>Nominal Discharge Current, <math>I_n</math></b>   | 80 kA 8/20 $\mu$ s  |
| <b>Impulse Current, <math>I_{imp}</math></b>         | 20 kA 10/350 $\mu$ s L-N<br>50 kA 10/350 $\mu$ s L-PE   |
| <b>Protection Modes</b>                              | All modes protected   |
| <b>Technology</b>                                    | TD Technology and MOV/Silicon L-N<br>Triggered Spark Gap N-PE   |
| <b>Status</b>  | (#16 AWG) connecting wire<br>5 segment LED bar graph per phase<br>Normally open contact, 250 V~/10 A, $\leq 1.5\text{mm}^2$ |
| <b>Dimensions H x D x W: mm (in)</b>                 | 306 x 170 x 241 (12.05 x 6.69 x 9.49)   |
| <b>Weight: kg (lbs)</b>                              | 5 (11)  |
| <b>Enclosure</b>                                     | Metal, IP33 (NEMA-2)  |
| <b>Connection</b>                                    | $\leq 16\text{ mm}^2$ (#6AWG) connecting to M6 bolt   |
| <b>Mounting</b>                                      | Wall mount  |
| <b>Back-up Overcurrent Protection</b>                | 100 A   |
| <b>Temperature</b>                                   | -35°C to 55°C (-31°F to 131°F)  |
| <b>Approvals</b>                                     | AS3260, C-Tick, IEC® 950  |
| <b>Surge Rated to Meet</b>                           | ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C   |

| Voltage Protection Level, $U_p$ | L-N    | N-PE    |
|---------------------------------|--------|---------|
| @Cat B3, 3 kA 8/20 $\mu$ s      | <750 V | <1.5 kV |
| @20 kA 8/20 $\mu$ s             | <980 V | <2.3 kV |

Transient Discriminating MOVTEC



**Features**

- Transient Discriminating (TD) Technology provides increased service life
- Built-in features include TD Technology, thermal protection and short circuit current fusing
- Compact NEMA®-4 enclosure design can be flush mounted or installed in a small space
- LED status indication and voltage-free contacts provide remote status monitoring
- 100kA 8/20µs maximum surge rating provides protection suitable for smaller main-distribution panels and an extended operational life
- Available in various operating voltages to suit most common power distribution systems
- CE, UL® 1449 Edition 3 Listed

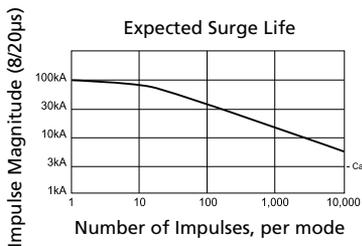
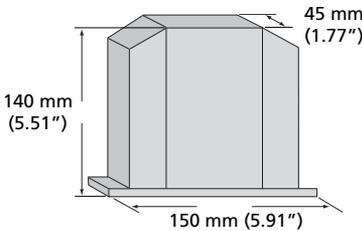
The TDS-MOVTEC family of surge diverters offers economical and reliable protection from voltage transients in even the most strenuous applications.

The small footprint provides integrators and OEMs with an effective use of real estate when installing within panels and equipment.

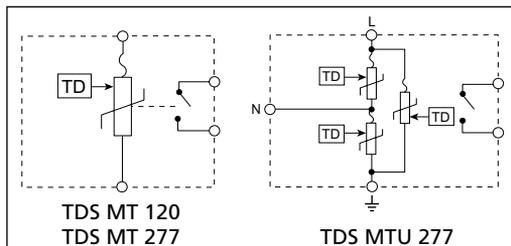
Transient Discriminating (TD) Technology, which meets the UL 1449 Edition 3 standards, provides a superior life by

eliminating the common temporary over-voltage failure mode of most SPDs. TD Technology is essential for any site where abnormal over-voltages can occur or where the possible catastrophic failure of traditional technologies can not be tolerated.

Alarm contacts are provided which may be used to shut down the system or to activate an external warning if the internal surge material is below optimum condition.



|   |   |                               |  |
|---|---|-------------------------------|--|
| <b>Model</b>                                      | TDSMT120  | TDSMT277                      | TDSMTU277  |
| <b>Nominal Voltage, U<sub>n</sub></b>             | 110-120 V   | 230-277 V                     | 230-277 V  |
| <b>System Compatibility</b>                       | TN-C, TN-S, TN-C-S, IT, TT  |                               |  |
| <b>Max Cont. Operating Voltage, U<sub>c</sub></b> | 170 VAC   | 400 VAC                       |  |
| <b>Stand-off Voltage</b>                          | 240 V   | 480 V                         |  |
| <b>Frequency</b>                                  | 50/60 Hz  |                               |  |
| <b>Operating Current @ U<sub>n</sub></b>          | 25 mA   |                               |  |
| <b>Aggregate Surge Rating</b>                     | 200 kA 8/20 µs  |                               | See table  |
| <b>Max Discharge Current, I<sub>max</sub></b>     | 100 kA 8/20 µs  |                               | See table  |
| <b>Nominal Discharge Current, I<sub>n</sub></b>   | 80 kA 8/20 µs   |                               |  |
| <b>Impulse Current, I<sub>imp</sub></b>           | 20 kA 10/350 µs   |                               |  |
| <b>Protection Modes</b>                           | Single mode (L-L, L-N, L-G or N-G)  |                               | L-G, L-N, N-G                                    |
| <b>Technology</b>                                 | MOV/Silicon, TD Technology  |                               |  |
| <b>Voltage Protection Rating (VPR)</b>            | 760 V @ 20 kA<br>400 V @ 3 kA   | 980 V @ 20 kA<br>700 V @ 3 kA | See table  |
| <b>Status</b>                                     | 5 segment LED bar graph per phase, Normally Open Contact  |                               |  |
| <b>Dimensions H x D x W: mm (in)</b>              | 140 x 45 x 150 (5.51 x 1.77 x 5.91)   |                               |  |
| <b>Weight: kg (lbs)</b>                           | 0.6 (1.32)  |                               |  |
| <b>Enclosure</b>                                  | UL®94V-0 thermoplastic  |                               |  |
| <b>Connection</b>                                 | ≤16 mm <sup>2</sup> (#6AWG) connecting to M6 bolt   |                               |  |
| <b>Back-up Overcurrent Protection</b>             | 100 A   |                               |  |
| <b>Temperature</b>                                | -35°C to 55°C (-31°F to 131°F)  |                               |  |
| <b>Approvals</b>                                  | AS3260, C-Tick, IEC® 950, UL 1449 Edition 3 Recognized Component Type 2   |                               |  |
| <b>Surge Rated to Meet</b>                        | ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI®/IEEE® C62.41.2-2002 Scenario II,<br>Exposure 3, 100 kA 8/20 µs, 10 kA 10/350 µs<br>UL 1449 Edition 3 In 20 kA mode |                               | ANSI®/IEEE® C62.41.2-2002<br>Cat A, Cat B, Cat C |



|  |         |         |               |
|--|---------|---------|---------------|
|  | L-N     | L-G     | N-G           |
| <b>Aggregate Surge Rating</b>                  | 80 kA   | 80 kA   | 40 kA 8/20 µs |
| <b>Max. Discharge Current, I<sub>max</sub></b> | 40 kA   | 40 kA   | 20 kA 8/20 µs |
| <b>Voltage Protection Level, U<sub>p</sub></b> |         |         |               |
| @500 A 8/20 µs (UL SVR)                        | 700 V   | 700 V   | 600 V         |
| @Cat B3, 3 kA 8/20 µs                          | <750 V  | <870 V  | <850 V        |
| @20 kA 8/20 µs                                 | <1200 V | <1290 V | <1200 V       |

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# Triggered Spark Gap

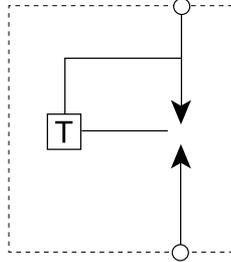
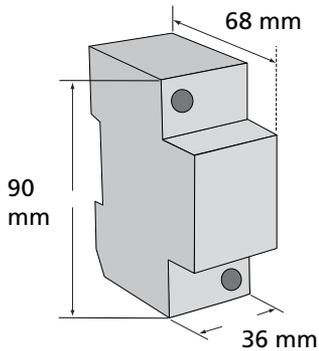


## Features

- Triggering air gap technology provides low let-through voltage – offers superior protection compared to traditional spark gaps
- Effective equipotential bonding – provides N-PE equalization protection bond on TT power distribution systems
- Meets IEC 61643-1 test class I, II
- Can be used L-PE, or L-N due to follow current control

The TSG is a vented spark gap with triggering circuit that typically allows let-through voltage of less than 1500V to be achieved. The superior follow current performance allows the TSG to be used on “active”

circuits such as L-L, L-N, L-PE as well as N-PE. The high surge rating is ideal for Neutral-Earth bonding of TT power systems, as per IEC 60364-5-534.



## Back-up overcurrent protection for non N-PE applications:

| Supply Rating   | Minimum Circuit Breaker Rating | Minimum Fuse Rating |
|-----------------|--------------------------------|---------------------|
| 500A (<10kAIC)  | 100A                           | 40A                 |
| 750A (<15kAIC)  | 100A                           | 63A                 |
| 1000A (<20kAIC) | 125A                           | 80A                 |
| 2000A (<43kAIC) | 160A                           | 100A                |

Although the Backup Overcurrent Protection table above indicates minimum values of overcurrent protection to prevent nuisance tripping, it is recommended that the overcurrent protection not exceed 200A Circuit Breaker or a 125A fuse.

|   |  |               |
|---|--|---------------|
| <b>Model</b>  | TSG11302S  | TSG11302S120V |
| <b>Nominal Voltage, <math>U_n</math></b>            | 220 - 240 V  | 120 V         |
| <b>Distribution System<sup>(1)</sup></b>            | TN-C, TN-C-S, TN-S, TT   |               |
| <b>Max Cont. Operating Voltage <math>U_c</math></b> | 440 VAC  | 240 VAC       |
| <b>Frequency</b>                                    | 50/60 Hz   |               |
| <b>Operating Current @ <math>U_n</math></b>         | 2.2 mA   |               |
| <b>Max Discharge Current, <math>I_{max}</math></b>  | 130 kA 8/20 $\mu$ s  |               |
| <b>Impulse Current, <math>I_{imp}</math></b>        | 50 kA 10/350 $\mu$ s   |               |
| <b>Protection Modes</b>                             | Single mode (L-L, L-N, L-PE or N-PE)   |               |
| <b>Technology</b>                                   | Triggered Spark Gap  |               |
| <b>Follow Current Extinguishing Capability</b>      | 43kA @ $U_n$   |               |
| <b>Voltage Protection Level, <math>U_p</math></b>   | <2.3 kV @ 20 kA<br><1.5k V @ 3 kA  |               |
| <b>Status</b>                                       | LED for Line connected modes   |               |
| <b>Dimensions H x D x W: mm (in)</b>                | 90 x 68 x 36 (3.54 x 2.68 x 1.42)  |               |
| <b>Module Width</b>                                 | 2 M  |               |
| <b>Weight: kg (lbs)</b>                             | 0.3 (0.66)   |               |
| <b>Enclosure</b>                                    | DIN 43 880, UL® 94V-0 thermoplastic, IP 20 (NEMA®-1)   |               |
| <b>Connection</b>                                   | 2.5 mm <sup>2</sup> to 50 mm <sup>2</sup> (#14AWG to 1/0) or 12 mm x 2.5 mm busbar<br>Bi connect terminal  |               |
| <b>Mounting</b>                                     | 35 mm top hat DIN rail   |               |
| <b>Temperature</b>                                  | -40°C to 80°C (-40°F to 176°F)   |               |
| <b>Approvals</b>                                    | C-Tick, CE   |               |
| <b>Surge Rated to Meet</b>                          | ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI®/IEEE® C62.41.2-2002 Scenario II, Exposure 3, 100 kA 8/20 $\mu$ s,<br>10 kA 10/350 $\mu$ s |               |

(1) Should not be connected in all modes of these systems.



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## Spark Gap Diverter



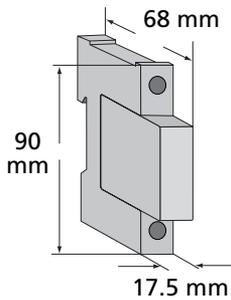
### Features

- Effective equipotential bonding – provides N-E protection bond on TT power distribution systems
- The SGD1100 and SGD125 models meet the IEC 61643-1 test class I and II
- The SGD125 and SGD112 models provide compact modular replaceable units with remote contacts as standard

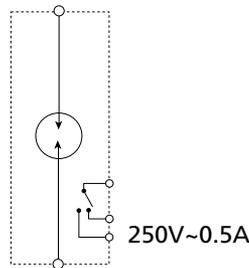
The SGD1100 spark gap surge diverter has been specifically designed to provide equipotential bonding between the Neutral and Earth terminals of TT power distribution systems, as per IEC 60364-5-534. Its high surge rating makes it suitable to IEC zones 0A-1 and VDE classification B locations.

The SGD112 spark gap surge diverter is a compact modular SPD for applications where the lower surge ratings are acceptable.

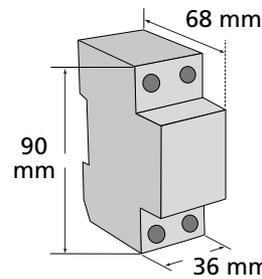
The SGD125 spark gap surge diverter is a compact modular SPD for applications where a medium surge rating is required.



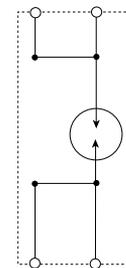
**SGD112/125**



**SGD112/125**



**SGD1100**



**SGD1100**

| Model   | SGD1121SRNE   | SGD1251SRNE  | SGD11002SNE  |
|---|---|--|--|
| Part Number for Europe                        | 702402  | 702426   | 702400   |
| System Compatibility                          | TN-S, TN-C-S, TT for N-PE applications  |  |  |
| Frequency                                     | 50/60 Hz  |  |  |
| Operating Current @ U <sub>n</sub>            | 0.50 mA   |  |  |
| Max Discharge Current, I <sub>max</sub>       | 40 kA 8/20 μs   | 60 kA 8/20 μs  | 140 kA 8/20 μs                                       |
| Impulse Current, I <sub>imp</sub>             | 12 kA 10/350 μs   | 25 kA 10/350 μs  | 100 kA 10/350 μs                                     |
| Protection Modes                              | N-PE  |  |  |
| Technology                                    | Encapsulated Spark Gap  |  |  |
| Short Circuit Current Rating, I <sub>sc</sub> | 25 kA   |  |  |
| Voltage Protection Level, U <sub>p</sub>      | 1.6 kV @ I <sub>n</sub>   |  | 1.2 kV @ I <sub>n</sub><br>0.6 kV @ I <sub>imp</sub> |
| Follow Current Extinguishing Capability       | 100A @ U <sub>n</sub>   | 100A @ U <sub>n</sub>  | 200A @ U <sub>n</sub>                                |
| Dimensions H x D x W: mm (in)                 | 90 x 68 x 18<br>(3.54 x 2.68 x 0.69)  |  | 90 x 68 x 36<br>(3.54 x 2.68 x 1.42)                 |
| Module Width                                  | 1 M   |  | 2 M  |
| Weight: kg (lbs)                              | 0.12 (0.26)   |  | 0.3 (0.66)   |
| Enclosure                                     | DIN 43 880, UL® 94V-0 thermoplastic, IP 20 (NEMA®-1)  |  |  |
| Connection                                    | ≤25 mm <sup>2</sup> (#3AWG) stranded<br>≤35 mm <sup>2</sup> (#2AWG) solid   |  |  |
| Mounting                                      | 35 mm top hat DIN rail  |  |  |
| Temperature                                   | -40°C to 80°C (-40°F to 176°F)  |  |  |
| Approvals                                     | CE, IEC® 61643-1  |  |  |
| Surge Rated to Meet                           | ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI®/IEEE® C62.41.2-2002 Scenario II,<br>Exposure 1, 20 kA 8/20 μs, 2 kA 10/350 μs<br>IEC® 61643-1 Class II | ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI®/IEEE® C62.41.2-2002 Scenario II, Exposure 3,<br>100 kA 8/20 μs, 10 kA 10/350 μs<br>IEC® 61643-1 Class I, Class II |  |
| Replacement Module                            | SGD112M (702403)  | SGD125M (702427)   |  |

(1) Should not be used in all modes of these systems. Refer to reverse side for Power Distribution Systems and SPD Installation.

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## TDS Surge Diverter – TDS130 Series



### Features

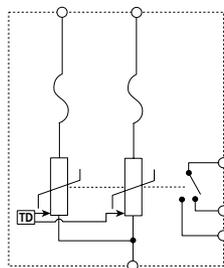
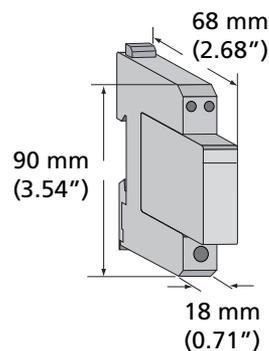
- TD Technology with thermal disconnect protection
- Compact package, modular DIN rail mounting for limited space requirements
- Three modes of protection: L-N, L-PE & N-PE
- Indication flags and voltage-free contacts provide remote status monitoring
- Separate plug and base design facilitates replacement of a failed surge module
- 20kA 8/20 $\mu$ s surge rating per mode
- CE, UL® 1449 Edition 3 Recognized Component Type 2

Surges and voltage transients are a major cause of expensive electronic equipment failure and business disruption. Damage may result in the loss of capital outlays, such as computers and communications equipment, as well as consequential loss of revenue and profits due to unscheduled system down-time.

The TDS130 series of surge suppressors is designed to provide economical and reliable protection from voltage transients on power distribution systems. The TDS130 is specifically designed for the protection of single phase power supplies within instrumentation and control applications. They are conveniently packaged for easy installation on 35 mm DIN rail within control panels.

Transient Discriminating (TD) technology helps ensure reliable and continued operation during sustained and abnormal over-voltage events. Internal thermal disconnect devices help ensure controlled behavior at end-of-life. A visual indicator flag provides user-feedback in the event of such operation. The TDS130 provides a set of optional voltage-free contacts for remote signaling that maintenance is required.

The convenient plug-in module and separate base design facilitates replacement of a failed surge module without needing to undo installation wiring.



| Model                                  | TDS1301TR150  | TDS1301T150 | TDS1301TR240                                 | TDS1301T240 |
|--|---|-------------|--|-------------|
| Item Number for Europe                 | 702421  | -           | 702422                                       | -           |
| Nominal Voltage, $U_n$                 | 120-150 VAC   |             | 220-240 VAC                                  |             |
| Max Cont. Operating Voltage, $U_c$     | 170 VAC   |             | 275 VAC                                      |             |
| Stand-off Voltage                      | 230 VAC   |             | 440 VAC                                      |             |
| Frequency                              | 0-100 Hz  |             |  |             |
| Nominal Discharge Current, $I_n$       | 8 kA 8/20 $\mu$ s per mode  |             |  |             |
| Max Discharge Current, $I_{max}$       | 20 kA 8/20 $\mu$ s L-N<br>20 kA 8/20 $\mu$ s L-PE   |             |  |             |
| Protection Modes                       | L-G, L-N, N-G   |             |  |             |
| Technology                             | TD Technology with thermal disconnect   |             |  |             |
| Short Circuit Current Rating, $I_{sc}$ | 200 kAIC  |             |  |             |
| Back-up Overcurrent Protection         | 63 AgL, if supply > 63 A  |             |  |             |
| Voltage Protection Rating (VPR)        | 500 V @ 3 kA (L+N-G)<br>800 V @ 3 kA (L-N)  |             | 800 V @ 3 kA (L+N-G)<br>1,500 V @ 3 kA (L-N) |             |
| Status                                 | N/O, N/C Change-over contact, 250 V~/0.5 A, max 1.5 mm <sup>2</sup> (#14 AWG) terminals<br>Mechanical flag / remote contacts (R model only)   |             |  |             |
| Dimensions H x D x W: mm (in)          | 90 x 68 x 18 (3.54 x 2.68 x 0.71)   |             |  |             |
| Module Width                           | 1 M   |             |  |             |
| Weight: kg (lbs)                       | 0.12 (0.26)   |             |  |             |
| Enclosure                              | DIN 43 880, UL 94V-0 thermoplastic, IP 20 (NEMA®-1)   |             |  |             |
| Connection                             | 1 mm <sup>2</sup> to 6 mm <sup>2</sup> (#18AWG to #10AWG)<br>Line and Neutral Terminals<br>$\leq$ 25 mm <sup>2</sup> (#4AWG) stranded<br>$\leq$ 35 mm <sup>2</sup> (#2AWG) solid<br>PE Terminal |             |  |             |
| Mounting                               | 35 mm top hat DIN rail  |             |  |             |
| Temperature                            | -40°C to 80°C (-40°F to 176°F)  |             |  |             |
| Approvals                              | CE, IEC® 61643-1, UL 1449 Edition 3 Recognized Component Type 2   |             |  |             |
| Surge Rated to Meet                    | ANSI®/IEEE® C62.41.2 Cat A, Cat B<br>IEC 61643-1 Class III<br>UL 1449 Edition 3 In 3 kA mode  |             |  |             |
| Replacement Module                     | TDS130M150  |             | TDS130M240                                   |             |
| Replacement Module (Europe)            | 702432  |             | 702424                                       |             |



## TDS Surge Diverter – TDS150 Series



### Features

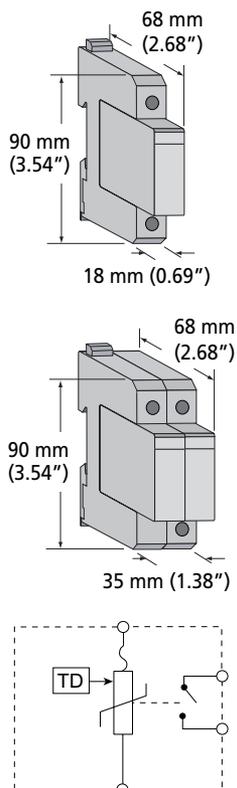
- TD Technology with thermal disconnect protection
- Compact design fits into DIN distribution panel boards and motor control centers
- 35 mm DIN rail mount – DIN 43 880 profile matches common circuit breakers
- Indication flags and voltage-free contacts provide remote status monitoring
- Separate plug and base design facilitates replacement of a failed surge module
- 50kA 8/20µs maximum surge rating provides protection suitable for sub-distribution panels and a long operational life
- Available in various operating voltages to suit most common power distribution systems
- CE, UL® 1449 Edition 3 Recognized Component Type 2

Surges and voltage transients are a major cause of expensive electronic equipment failure and business disruption. Damage may result in the loss of capital outlays, such as computers and communications equipment, as well as consequential loss of revenue and profits due to unscheduled system down-time.

The TDS150 series of surge suppressors is designed to provide economical and reliable protection from voltage transients on power distribution systems. They are conveniently packaged for easy installation on 35 mm DIN rail within main distribution panelboards.

Transient Discriminating (TD) technology helps ensure reliable and continued operation during sustained and abnormal over-voltage events. Internal thermal disconnect devices help ensure controlled behavior at end-of-life. A visual indicator flag provides user-feedback in the event of such operation. As standard, the TDS150 provides a set of voltage-free contacts for remote signaling that maintenance is required.

The convenient plug-in module and separate base design facilitates replacement of a failed surge module without needing to undo installation wiring.



| Model   | TDS1501SR150   | TDS1501SR240                            | TDS1501SR277                            | TDS1501SR560                             | TDS1502BR150                            | TDS1502BR240                            |
|---|--|---|---|--|---|---|
| Item Number for Europe                        | 702404   | 702406                                  | 702407                                  | 702408                                   | –                                       | –                                       |
| Nominal Voltage, U <sub>n</sub>               | 120-150 VAC  | 220-240 VAC                             | 240-277 VAC                             | 480-560 VAC                              | 120-150 VAC                             | 220-240 VAC                             |
| Max Cont. Operating Voltage, U <sub>c</sub>   | 170 VAC  | 275 VAC                                 | 320 VAC                                 | 610 VAC                                  | 170 VAC                                 | 275 VAC                                 |
| Stand-off Voltage                             | 240 VAC  | 440 VAC                                 | 480 VAC                                 | 700 VAC                                  | 240 VAC                                 | 440 VAC                                 |
| Frequency                                     | 0-100 Hz   |   |   |  |   |   |
| Short Circuit Current Rating, I <sub>sc</sub> | 200 kAIC   |   |   |  |   |   |
| Back-up Overcurrent Protection                | 125 AgL, if supply > 100 A   |   |   |  |   |   |
| Technology                                    | TD Technology with thermal disconnect  |   |   |  |   |   |
| Max Discharge Current, I <sub>max</sub>       | 50 kA 8/20 µs  |   |   |  |   |   |
| Nominal Discharge Current, I <sub>n</sub>     | 25 kA 8/20 µs  | 20 kA 8/20                              |   |  | 20 kA 8/20 µs                           |   |
| Protection Modes                              | Single mode (L-G, L-N or N-G)  |   |   |  | L-N, N-PE                               |   |
| Voltage Protection Rating (VPR)               | 400 V @ 3 kA<br>1.0 kV @ I <sub>n</sub>  | 700 V @ 3 kA<br>1.2 kV @ I <sub>n</sub> | 800 V @ 3 kA<br>1.6 kV @ I <sub>n</sub> | 1.8 kV @ 3 kA<br>2.4 kV @ I <sub>n</sub> | 400 V @ 3 kA<br>1.0 kV @ I <sub>n</sub> | 700 V @ 3 kA<br>1.2 kV @ I <sub>n</sub> |
| Status  | N/O, N/C Change-over contact, 250 V~/0.5 A, max 1.5 mm <sup>2</sup> (#14 AWG) terminals<br>Mechanical flag / remote contacts (R model only)  |   |   |  |   |   |
| Dimensions H x D x W: mm (in)                 | 90 x 68 x 18 (3.54 x 2.68 x 0.69)  |   |   |  | 90 x 68 x 35 (3.54 x 2.68 x 1.38)       |   |
| Module Width                                  | 1 M  |   |   |  | 2M                                      |   |
| Weight: kg (lbs)                              | 0.12 (0.26)  |   |   |  | 0.24 (0.53)                             |   |
| Enclosure                                     | DIN 43 880, UL 94V-0 thermoplastic, IP 20 (NEMA®-1)  |   |   |  |   |   |
| Connection                                    | ≤25 mm <sup>2</sup> (#4AWG) stranded<br>≤35 mm <sup>2</sup> (#2AWG) solid  |   |   |  |   |   |
| Mounting                                      | 35 mm top hat DIN rail   |   |   |  |   |   |
| Temperature                                   | -40°C to 80°C (-40°F to 176°F)   |   |   |  |   |   |
| Approvals                                     | CE, IEC® 61643-1, UL 1449 Edition 3 Recognized Component Type 2  |   |   |  |   |   |
| Surge Rated to Meet                           | ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C;<br>ANSI®/IEEE® C62.41.2-2002 Scenario II, Exposure 2, 50 kA 8/20 µs; 5 kA 10/350 µs<br>IEC 61643-1 Class II;<br>UL 1449 Edition 3 In 20 kA mode |   |   |  |   |   |
| Replacement Module                            | TDS150M150   | TDS150M240                              | TDS150M277                              | TDS150M560                               | TDS150M150                              | TDS150M240                              |

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## TDS Surge Diverter – TDS1100 Series



### Features

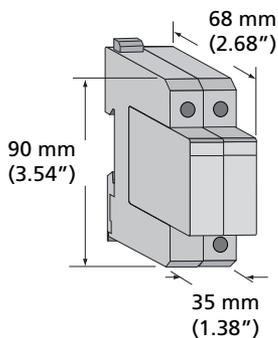
- TD Technology with thermal disconnect protection
- Compact design fits into DIN distribution panel boards and motor control centers
- 35 mm DIN rail mount – DIN 43 880 profile matches common circuit breakers
- Indication flags and voltage-free contacts provide remote status monitoring
- Separate plug and base design facilitates replacement of a failed surge module
- 100kA 8/20 $\mu$ s maximum surge rating provides protection suitable for sub-distribution panels and a long operational life
- Available in various operating voltages to suit most common power distribution systems
- CE, UL® 1449 Edition 3 Recognized Component Type 2

Surges and voltage transients are a major cause of expensive electronic equipment failure and business disruption. Damage may result in the loss of capital outlays, such as computers and communications equipment, as well as consequential loss of revenue and profits due to unscheduled system down-time.

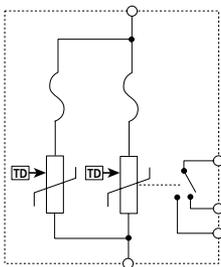
The TDS1100 series of surge suppressors is designed to provide economical and reliable protection from voltage transients on power distribution systems. They are conveniently packaged for easy installation on 35 mm DIN rail within main distribution panelboards.

Transient Discriminating (TD) technology helps ensure reliable and continued operation during sustained and abnormal over-voltage events. Internal thermal disconnect devices help ensure controlled behavior at end-of-life. A visual indicator flag provides user-feedback in the event of such operation. As standard, the TDS1100 provides a set of voltage-free contacts for remote signaling that maintenance is due.

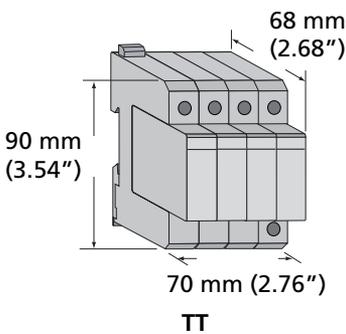
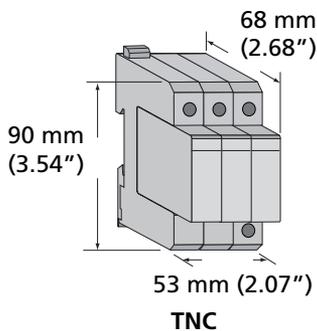
The convenient plug-in module and separate base design facilitates replacement of a failed surge module without needing to undo installation wiring.



| Model                                  | TDS11002SR150  | TDS11002SR240                  | TDS11002SR277                  | TDS11002SR560                   |
|--|--|--------------------------------|--------------------------------|---------------------------------|
| Item Number for Europe                 | 702409   | 702411                         | 702412                         | 702413                          |
| Nominal Voltage, $U_n$                 | 120-150 VAC  | 220-240 VAC                    | 240-277 VAC                    | 480-560 VAC                     |
| Max Cont. Operating Voltage, $U_c$     | 170 VAC  | 275 VAC                        | 320 VAC                        | 610 VAC                         |
| Stand-off Voltage                      | 240 VAC  | 440 VAC                        | 480 VAC                        | 700 VAC                         |
| Frequency                              | 0-100 Hz   |                                |                                |                                 |
| Short Circuit Current Rating, $I_{sc}$ | 200 kAIC   |                                |                                |                                 |
| Back-up Overcurrent Protection         | 125 AgL, if supply > 100 A   |                                |                                |                                 |
| Technology                             | TD Technology with thermal disconnect  |                                |                                |                                 |
| Max Discharge Current, $I_{max}$       | 100 kA 8/20 $\mu$ s  |                                |                                |                                 |
| Impulse Current, $I_{imp}$             | 12.5 kA 10/350 $\mu$ s   |                                |                                |                                 |
| Nominal Discharge Current, $I_n$       | 50 kA 8/20 $\mu$ s   | 40 kA 8/20 $\mu$ s             |                                |                                 |
| Protection Modes                       | Single mode (L-G, L-N or N-G)  |                                |                                |                                 |
| Voltage Protection Rating (VPR)        | 400 V @ 3 kA<br>1.0 kV @ 20 kA   | 700 V @ 3 kA<br>1.2 kV @ 20 kA | 800 V @ 3 kA<br>1.6 kV @ 20 kA | 1.8 kV @ 3 kA<br>2.4 kV @ 20 kA |
| Status                                 | N/O, N/C Change-over contact, 250 V~/0.5 A, max 1.5 mm <sup>2</sup> (#14 AWG) terminals<br>Mechanical flag / remote contacts (R model only)  |                                |                                |                                 |
| Dimensions H x D x W: mm (in)          | 90 x 68 x 35 (3.54 x 2.68 x 1.38)  |                                |                                |                                 |
| Module Width                           | 2 M  |                                |                                |                                 |
| Weight: kg (lbs)                       | 0.24 (0.53)  |                                |                                |                                 |
| Enclosure                              | DIN 43 880, UL 94V-0 thermoplastic, IP 20 (NEMA®-1)  |                                |                                |                                 |
| Connection                             | $\leq$ 25 mm <sup>2</sup> (#4AWG) stranded<br>$\leq$ 35 mm <sup>2</sup> (#2AWG) solid  |                                |                                |                                 |
| Mounting                               | 35 mm top hat DIN rail   |                                |                                |                                 |
| Temperature                            | -40°C to 80°C (-40°F to 176°F)   |                                |                                |                                 |
| Approvals                              | CE, IEC® 61643-1, UL 1449 Edition 3 Recognized Component Type 2  |                                |                                |                                 |
| Surge Rated to Meet                    | ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI®/IEEE® C62.41.2-2002 Scenario II, Exposure 3, 100 kA 8/20 $\mu$ s, 10 kA 10/350 $\mu$ s<br>IEC 61643-1 Class I and Class II<br>UL 1449 Edition 3 In 20 kA mode |                                |                                |                                 |
| Replacement MOV Module                 | TDS150M150   | TDS150M240                     | TDS150M277                     | TDS150M560                      |



## TDS Surge Diverter – TDS350 Series



### Features

- TD Technology with thermal disconnect protection
- Compact design fits into DIN distribution panel boards and motor control centers
- 35 mm DIN rail mount – DIN 43 880 profile matches common circuit breakers
- Indication flags and voltage-free contacts provide remote status monitoring
- Separate plug and base design facilitates replacement of a failed surge module
- 50kA 8/20 $\mu$ s maximum surge rating provides protection suitable for sub-distribution panels and a long operational life
- Available in various operating voltages to suit most common power distribution systems
- CE, UL® 1449 Edition 3 Recognized Component Type 2

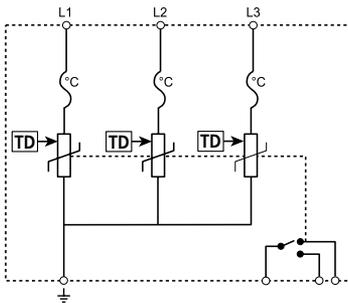
Surges and voltage transients are a major cause of expensive electronic equipment failure and business disruption. Damage may result in the loss of capital outlays, such as computers and communications equipment, as well as consequential loss of revenue and profits due to unscheduled system down-time.

Transient Discriminating (TD) technology helps ensure reliable and continued operation during sustained and abnormal over-voltage events.

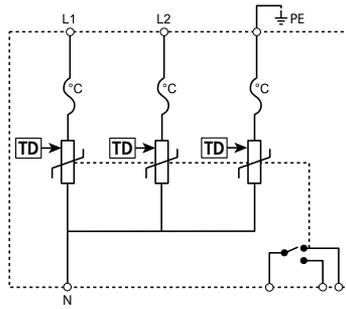
Internal thermal disconnect devices help ensure controlled behavior at end-of-life. A visual indicator flag provides user-feedback in the event of such operation. As standard, the TDS provides a set of voltage-free contacts for remote signaling that maintenance is due.

The convenient plug-in module and separate base design facilitates replacement of a failed surge module without needing to undo installation wiring.

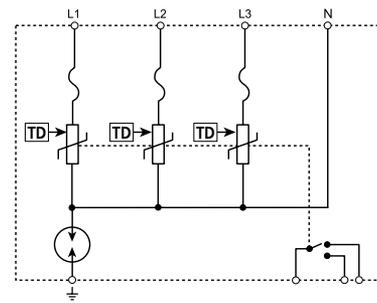
|  |   |              |                                |              |   |             |   |
|--|---|--------------|--------------------------------|--------------|---|-------------|---|
| <b>Model</b>   | TDS350TNC150  | TDS50120/240 | TDS350TNC277                   | TDS350TNC560 | TDS350TT150                                       | TDS350TT277 | TDS350TT560   |
| <b>Item Number for Europe</b>                            | 702414  | 702419       | 702417                         |              | 702416  | 702418      |   |
| <b>Nominal Voltage, <math>U_n</math></b>                 | 120-150 VAC   |              | 240-277 VAC                    |              | 120-150 VAC                                       |             | 480-560 VAC   |
| <b>Max Cont. Operating Voltage, <math>U_c</math></b>     | 170/295 VAC   |              | 320/536 VAC                    |              | 170/295 VAC                                       |             | 610/1055 VAC  |
| <b>Stand-off Voltage</b>                                 | 240/415 VAC   |              | 480/813 VAC                    |              | 240/415 VAC                                       |             | 480/813 VAC   |
| <b>Frequency</b>   | 0-100 Hz  |              |                                |              |   |             |   |
| <b>Short Circuit Current Rating, <math>I_{sc}</math></b> | 200 kAIC  |              |                                |              |   |             |   |
| <b>Back-up Overcurrent Protection</b>                    | 125 AgL, if supply > 100 A  |              |                                |              |   |             |   |
| <b>Technology</b>  | TD Technology with thermal disconnect   |              |                                |              |   |             |   |
| <b>Max Discharge Current, <math>I_{max}</math></b>       | 50 kA 8/20 $\mu$ s  |              |                                |              | 12.5 kA 10/350 $\mu$ s N-PE<br>50 kA 8/20 $\mu$ s |             |   |
| <b>Nominal Discharge Current, <math>I_n</math></b>       | 25 kA 8/20 $\mu$ s  |              | 20 kA 8/20 $\mu$ s             |              | 25 kA 8/20 $\mu$ s                                |             | 20 kA 8/20 $\mu$ s  |
| <b>Protection Modes</b>                                  | L-N   | L-N, N-PE    | L-N                            |              | L-N, N-PE   |             |   |
| <b>Voltage Protection Rating (VPR)</b>                   | 400 V @ 3 kA<br>1.0 kV @ $I_n$  |              | 800 V @ 3 kA<br>1.6 kV @ $I_n$ |              | 1.8 kV @ 3 kA<br>2.4 kV @ 20 kA                   |             | 400 V @ 3 kA<br>800 V @ 3 kA<br>1.6 kV @ $I_n$<br>1.8 kV @ 3 kA<br>2.4 kV @ 20 kA |
| <b>Status</b>  | N/O, N/C Change-over contact, 250 V~0.5 A, max 1.5 mm <sup>2</sup> (#14 AWG) terminals<br>Mechanical flag / remote contacts   |              |                                |              |   |             |   |
| <b>Dimensions H x D x W: mm (in)</b>                     | 90 x 68 x 53 (3.54 x 2.68 x 2.07)   |              |                                |              | 90 x 68 x 70 (3.54 x 2.68 x 2.76)                 |             |   |
| <b>Module Width</b>                                      | 3 M   |              |                                |              | 4 M   |             |   |
| <b>Weight: kg (lbs)</b>                                  | 0.36 (0.79)   |              |                                |              | 0.5 (1.10)  |             |   |
| <b>Enclosure</b>   | DIN 43 880, UL® 94V-0 thermoplastic, IP 20 (NEMA®-1)  |              |                                |              |   |             |   |
| <b>Connection</b>  | $\leq$ 25 mm <sup>2</sup> (#4AWG) stranded<br>$\leq$ 35 mm <sup>2</sup> (#2AWG) solid   |              |                                |              |   |             |   |
| <b>Mounting</b>  | 35 mm top hat DIN rail  |              |                                |              |   |             |   |
| <b>Temperature</b>                                       | -40°C to 80°C (-40°F to 176°F)  |              |                                |              |   |             |   |
| <b>Approvals</b>   | CE, IEC® 61643-1, UL 1449 Edition 3 Recognized Component Type 2   |              |                                |              |   |             |   |
| <b>Surge Rated to Meet</b>                               | ANSI®/IEEE® C62.41.2 Cat A, Cat B, Cat C<br>ANSI®/IEEE® C62.41.2 Scenario II, Exposure 2, 50 kA 8/20 $\mu$ s<br>IEC 61643-1 Class II<br>UL 1449 Edition 3 In 20 kA mode |              |                                |              |   |             |   |
| <b>Replacement MOV Module</b>                            | TDS150M150  |              | TDS150M277                     | TDS150M560   | TDS150M150  | TDS150M277  | TDS150M560  |
| <b>Replacement GDT Module</b>                            | -   |              |                                |              | SGD125M   |             |   |



TDS350TNC



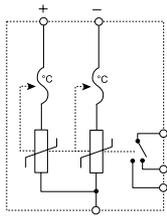
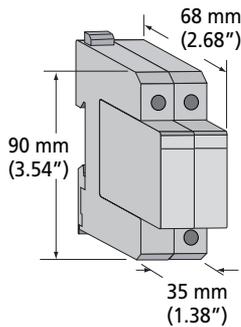
TDS50120/240



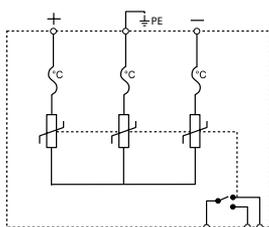
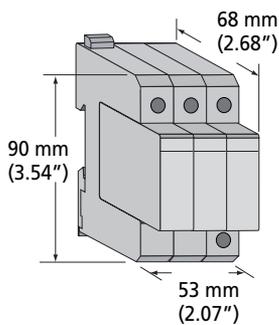
TDS350TT



## TDS Surge Diverter – Photovoltaic



TDS502BR300DC  
TDS502BR600DC



TDS503BR1000DC

### Features

- Designed to provide economical and reliable protection from transients on DC power systems
- Compact design fits into inverters and solar combiner boxes
- Conveniently packaged for easy installation on DIN rail
- Provides remote status monitoring
- Designed with thermal disconnect protection
- Separate plug and base design – hot swappable feature allows ease of module replacement
- CE, UL® 1449 Edition 3 for PV applications

Surges and voltage transients are a major cause of equipment failure and system disruption. The TDS50 series surge protective devices, part of the ERICO line of facility electrical protection products, are designed to provide economical and reliable protection from voltage transients on solar PV systems. They are conveniently packaged for easy installation on 35 mm DIN rail. Internal thermal disconnect devices help ensure safe

behavior at end-of-life. A visual indicator flag provides user feedback in the event of such operation. As standard, the TDS50 provides a set of voltage-free contacts for remote signaling that maintenance is required. The convenient plug-in module and separate base design facilitates replacement of a failed surge module without needing to undo installation wiring.

| Model                                       | TDS502BR300DC   | TDS502BR600DC               | TDS503BR1000DC                       |
|---|---|-----------------------------|--------------------------------------|
| Nominal Voltage - DC                        | 350 V   | 600 V                       | 1,000 V                              |
| Max Cont. Operating Voltage, U <sub>c</sub> | 350 VDC   | 600 VDC                     | 1,000 VDC                            |
| Frequency                                   | 0-100 Hz  |                             |                                      |
| Technology                                  | GDT<br>MOV  |                             |                                      |
| Max Discharge Current, I <sub>max</sub>     | 50 kA 8/20 μs   |                             |                                      |
| Nominal Discharge Current, I <sub>n</sub>   | 20 kA 8/20 μs   |                             |                                      |
| Protection Modes                            | L-L, L-PE   |                             |                                      |
| Voltage Protection Rating (VPR)             | -/G, +/-G<br>1,800 V @ 3 kA   | -/G, +/-G<br>2,000 V @ 3 kA | -/G, +/-G<br>4,000 V @ 3 kA          |
| Status                                      | N/O, N/C Change-over contact, 250 V~/.0.5 A, max 1.5 mm <sup>2</sup> (#14 AWG) terminals<br>Mechanical flag / remote contacts |                             |                                      |
| Dimensions H x D x W: mm (in)               | 90 x 68 x 35<br>(3.54 x 2.68 x 1.38)  |                             | 90 x 68 x 53<br>(3.54 x 2.68 x 2.07) |
| Module Width                                | 2 M   |                             | 3 M                                  |
| Enclosure                                   | DIN 43 880, UL 94V-0 thermoplastic, IP 20 (NEMA®-1)   |                             |                                      |
| Connection                                  | ≤25 mm <sup>2</sup> (#4AWG) stranded<br>≤35 mm <sup>2</sup> (#2AWG) solid   |                             |                                      |
| Mounting                                    | 35 mm top hat DIN rail  |                             |                                      |
| Temperature                                 | -40°C to 80°C (-40°F to 176°F)  |                             |                                      |
| Approvals                                   | CE, IEC 61643-1, UL® 1449 Edition 3 for PV applications   |                             |                                      |
| Surge Rated to Meet                         | ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI®/IEEE® C62.41.2-2002 Scenario II, Exposure 2, 50 kA 8/20 μs             |                             |                                      |
| Replacement Module                          | TDS150M277  | TDS150M560                  | TDS150M277, TDS150M560               |
| Weight: kg (lbs)                            | 0.24 (0.53)   | 0.24 (0.53)                 | 0.36 (0.78)                          |

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## Dinline Surge Diverter



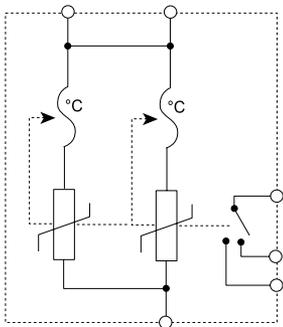
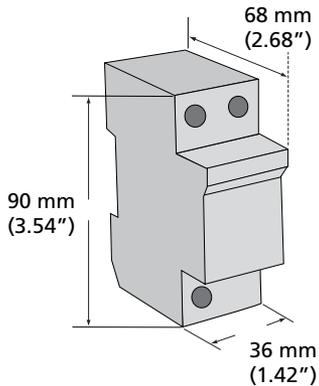
### Features

- 150kA 8/20 $\mu$ s surge rating provides protection suitable for main distribution panels and provides a long operational life
- 35 mm DIN 43 880 profile – matches common circuit breakers
- Indication flag – provides clear visual indication of life status
- Remote contacts – provide remote status monitoring
- Various operating voltages – to suit most common power distribution systems\*
- Simple combinations of the DSD and SGD series allow the protection of TT, TNC, TNC-S and IT systems

\* Other operating voltages may be available upon application.

The DSD1150 series of surge suppressors is designed to provide economical and reliable protection to primary distribution panel boards and power distribution systems. They are intended for locations classified for devices tested to IEC 61643-1 test class I (or VDE classification B). Internal thermal disconnect

devices help ensure safe isolation during sustained and abnormal events on the distribution network, or at end-of-life. A visual indicator flag provides user-feedback in the event of such operation. In addition, a set of voltage-free contacts is provided for remote signaling if replacement is needed.



|  |   |                                |
|--|---|--------------------------------|
| <b>Model</b>   | DSD11502SR150   | DSD11502SR275                  |
| <b>Item Number for Europe</b>                        | 702410  | 702420                         |
| <b>Nominal Voltage, <math>U_n</math></b>             | 110-120 V   | 220-240 V                      |
| <b>Distribution System</b>                           | TN-C, TN-C-S, TN-S, TT  |                                |
| <b>Max Cont. Operating Voltage, <math>U_c</math></b> | 150 VAC, 200 VDC  | 275 VAC, 350 VDC               |
| <b>Frequency</b>                                     | 0-60 Hz   |                                |
| <b>Max Discharge Current <math>I_{max}</math></b>    | 150 kA 8/20 $\mu$ s   |                                |
| <b>Nominal Discharge Current, <math>I_n</math></b>   | 60 kA 8/20 $\mu$ s  |                                |
| <b>Impulse Current, <math>I_{imp}</math></b>         | 25 kA 10/350 $\mu$ s  |                                |
| <b>Protection Modes</b>                              | Single mode   |                                |
| <b>Technology</b>                                    | MOV with thermal disconnect   |                                |
| <b>Voltage Protection Level, <math>U_p</math></b>    | 480 V @ 3 kA<br>1.2 kV @ $I_n$  | 850 V @ 3 kA<br>1.6 kV @ $I_n$ |
| <b>Status</b>  | Mechanical flag<br>Change-over contact (Form C dry) 250V~/0.5A,<br>max 1.5 mm <sup>2</sup> (#14AWG) connecting wire   |                                |
| <b>Dimensions H x D x W: mm (in)</b>                 | 90 x 68 x 36 (3.54 x 2.68 x 1.42)   |                                |
| <b>Module Width</b>                                  | 2 M   |                                |
| <b>Weight: kg (lbs)</b>                              | 0.33 (0.73)   |                                |
| <b>Enclosure</b>                                     | DIN 43 880, UL <sup>®</sup> 94V-0 thermoplastic, IP 20 (NEMA <sup>®</sup> -1)   |                                |
| <b>Connection</b>                                    | $\leq$ 25 mm <sup>2</sup> (#4AWG) stranded<br>$\leq$ 35 mm <sup>2</sup> (#2AWG) solid   |                                |
| <b>Mounting</b>                                      | 35 mm top hat DIN rail  |                                |
| <b>Back-up Overcurrent Protection</b>                | 250 Agl if supply >250 A  |                                |
| <b>Temperature</b>                                   | -40°C to 80°C (-40°F to 176°F)  |                                |
| <b>Approvals</b>                                     | CE, IEC <sup>®</sup> 61643-1  |                                |
| <b>Surge Rated to Meet</b>                           | ANSI <sup>®</sup> /IEEE <sup>®</sup> C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI <sup>®</sup> /IEEE <sup>®</sup> C62.41.2-2002 Scenario II, Exposure 3,<br>100 kA 8/20 $\mu$ s, 10 kA 10/350 $\mu$ s<br>IEC 61643-1 Class I, Class II |                                |



## Dinline Surge Diverter



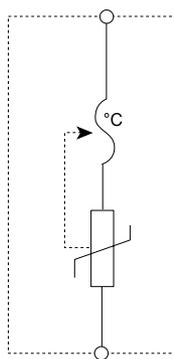
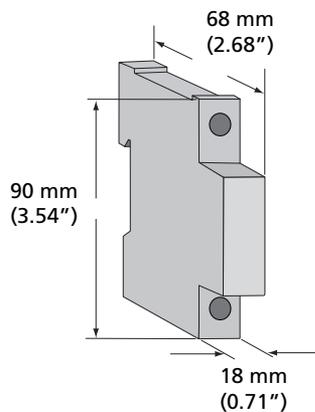
### Features

- 100kA 8/20 $\mu$ s maximum surge rating provides protection suitable for smaller main-distribution panels and an extended operational life
- 35 mm DIN 43 880 profile – matches common circuit breakers
- Indication flag – provides clear visual indication of life status
- Various operating voltages – to suit most common power distribution systems\*

\* Other operating voltages may be available upon application.

The DSD1100 series of surge suppressors is designed to provide a high surge rating within an economical and reliable product for the protection of sub-distribution panel boards. The convenient compact enclosure provides a high level of protection in the smallest possible housing. Internal thermal disconnect

devices help ensure safe isolation during sustained and abnormal events on the distribution network, or at end-of-life. A visual indicator flag provides user feedback in the event of such operation. They are intended for locations classified for devices tested to IEC 61643-1 test class I.



|  |  |                                |
|--|--|--------------------------------|
| <b>Model</b>   | DSD11001S150   | DSD11001S275                   |
| <b>Item Number for Europe</b>                            | 702430   | 702440                         |
| <b>Nominal Voltage, <math>U_n</math></b>                 | 110-120 V  | 220-240 V                      |
| <b>Distribution System</b>                               | TN-C, TN-C-S, TN-S, TT   |                                |
| <b>Max Cont. Operating Voltage, <math>U_c</math></b>     | 150 VAC, 200 VDC   | 275 VAC, 350 VDC               |
| <b>Frequency</b>   | 0-60 Hz  |                                |
| <b>Operating Current @ <math>U_n</math></b>              | 1 mA   |                                |
| <b>Max Discharge Current, <math>I_{max}</math></b>       | 100 kA 8/20 $\mu$ s  |                                |
| <b>Nominal Discharge Current, <math>I_n</math></b>       | 40 kA 8/20 $\mu$ s   |                                |
| <b>Impulse Current, <math>I_{imp}</math></b>             | 12 kA 10/350 $\mu$ s   |                                |
| <b>Protection Modes</b>                                  | Single mode  |                                |
| <b>Technology</b>  | MOV with thermal disconnect  |                                |
| <b>Short Circuit Current Rating, <math>I_{sc}</math></b> | 25 kAIC  |                                |
| <b>Voltage Protection Level, <math>U_p</math></b>        | 480 V @ 3 kA<br>1.2 kV @ $I_n$   | 850 V @ 3 kA<br>1.6 kV @ $I_n$ |
| <b>Status</b>  | Mechanical flag  |                                |
| <b>Dimensions H x D x W: mm (in)</b>                     | 90 x 68 x 18 (3.54 x 2.68 x 0.71)  |                                |
| <b>Module Width</b>                                      | 1 M  |                                |
| <b>Weight: kg (lbs)</b>                                  | 0.12 (0.26)  |                                |
| <b>Enclosure</b>   | DIN 43 880, UL <sup>®</sup> 94V-0 thermoplastic, IP 20 (NEMA <sup>®</sup> -1)  |                                |
| <b>Connection</b>  | $\leq 25$ mm <sup>2</sup> (#4AWG) stranded<br>$\leq 35$ mm <sup>2</sup> (#2AWG) solid  |                                |
| <b>Mounting</b>  | 35 mm top hat DIN rail   |                                |
| <b>Back-up Overcurrent Protection</b>                    | 160 Agl if supply > 160 A  |                                |
| <b>Temperature</b>                                       | -40°C to 80°C (-40°F to 176°F)   |                                |
| <b>Approvals</b>   | CE, IEC <sup>®</sup> 61643-1   |                                |
| <b>Surge Rated to Meet</b>                               | ANSI <sup>®</sup> /IEEE <sup>®</sup> C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI <sup>®</sup> /IEEE <sup>®</sup> C62.41.2-2002 Scenario II, Exposure 3,<br>100 kA 8/20 $\mu$ s, 10 kA 10/350 $\mu$ s<br>IEC <sup>®</sup> 61643-1 Class I, Class II |                                |

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## Dinline Surge Diverter



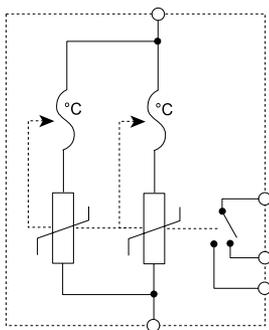
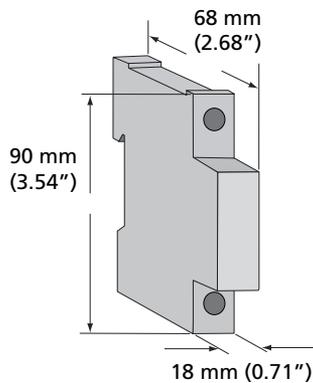
### Features

- 60kA 8/20 $\mu$ s maximum surge rating provides protection suitable for sub-distribution panels and a long operational life
- 35 mm DIN 43 880 profile – matches common circuit breakers
- Indication flag – provides clear visual indication of life status
- Remote contacts – provide remote status monitoring
- Various operating voltages – to suit most common power distribution systems\*

\* Other operating voltages may be available upon application.

The DSD160 series of surge suppressors is designed to provide economical and reliable protection to sub-distribution panel boards. The convenient plug-in module and separate base design facilitates replacement of a failed surge module without needing to undo installation wiring. Internal thermal

disconnect devices help ensure safe isolation during sustained and abnormal events on the distribution network, or at end-of-life. Visual indicator flags show 100% and 50% status with voltage-free contacts to provide user-feedback in the event of reduction of capacity.



|   |  |
|---|--|
| <b>Model</b>  | DSD1601SR275   |
| <b>Item Number for Europe</b>                       | 702460   |
| <b>Nominal Voltage, U<sub>n</sub></b>               | 220-240 V  |
| <b>Distribution System</b>                          | TN-C, TN-C-S, TN-S, TT   |
| <b>Max Cont. Operating Voltage, U<sub>c</sub></b>   | 275 VAC, 350 VDC   |
| <b>Frequency</b>                                    | 0-60 Hz  |
| <b>Operating Current @ U<sub>n</sub></b>            | 1 mA   |
| <b>Max Discharge Current, I<sub>max</sub></b>       | 60 kA 8/20 $\mu$ s   |
| <b>Nominal Discharge Current, I<sub>n</sub></b>     | 30 kA 8/20 $\mu$ s   |
| <b>Impulse Current, I<sub>imp</sub></b>             | 5 kA 10/350 $\mu$ s  |
| <b>Protection Modes</b>                             | Single mode  |
| <b>Technology</b>                                   | MOV with thermal disconnect  |
| <b>Short Circuit Current Rating, I<sub>sc</sub></b> | 25 kA  |
| <b>Voltage Protection Level, U<sub>p</sub></b>      | 850 V @ 3 kA<br>1.5 kV @ I <sub>n</sub>  |
| <b>Status</b>                                       | Mechanical flag with progressive indication<br>Change-over contact (Form C dry) 250V~/0.5A, max 1.5 mm <sup>2</sup> (#14AWG) connecting wire   |
| <b>Dimensions H x D x W: mm (in)</b>                | 90 x 68 x 18 (3.54 x 2.68 x 0.71)  |
| <b>Module Width</b>                                 | 1 M  |
| <b>Weight: kg (lbs)</b>                             | 0.12 (0.26)  |
| <b>Enclosure</b>                                    | DIN 43 880, UL <sup>®</sup> 94V-0 thermoplastic, IP 20 (NEMA <sup>®</sup> -1)  |
| <b>Connection</b>                                   | $\leq$ 25 mm <sup>2</sup> (#4AWG) stranded<br>$\leq$ 35 mm <sup>2</sup> (#2AWG) solid  |
| <b>Mounting</b>                                     | 35 mm top hat DIN rail   |
| <b>Back-up Overcurrent Protection</b>               | 160 Agl if supply >160 A   |
| <b>Temperature</b>                                  | -40°C to 80°C (-40°F to 176°F)   |
| <b>Approvals</b>                                    | CE, IEC <sup>®</sup> 61643-1   |
| <b>Surge Rated to Meet</b>                          | ANSI <sup>®</sup> /IEEE <sup>®</sup> C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI <sup>®</sup> /IEEE <sup>®</sup> C62.41.2-2002 Scenario II, Exposure 2, 50 kA 8/20 $\mu$ s<br>IEC <sup>®</sup> 61643-1 Class I, Class II |
| <b>Replacement Module</b>                           | DSD1601SR275M  |
| <b>Replacement Module (Europe)</b>                  | 702465   |

## Dinline Surge Diverter



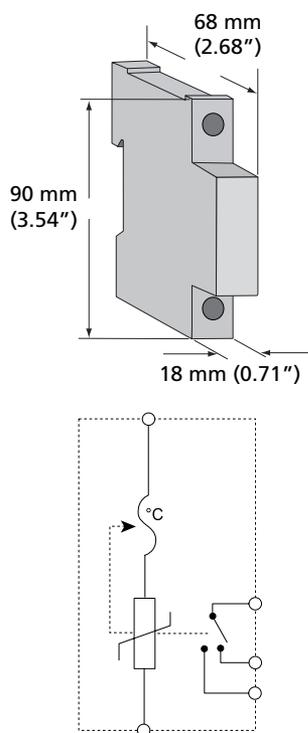
### Features

- 40kA 8/20 $\mu$ s maximum surge rating provides protection suitable for sub-distribution panels and a long operational life
- 35 mm DIN 43 880 profile – matches common circuit breakers
- Indication flag – provides clear visual indication of life status
- Remote contacts – provide remote status monitoring
- Various operating voltages – to suit most common power distribution systems

\* Other operating voltages may be available upon application.

The DSD140 series of surge suppressors is designed to provide economical protection to sub-distribution panel boards in locations classified for devices tested to IEC 61643-1 test Class II (or VDE classification C). The convenient plug-in module and separate base design facilitates replacement of a failed surge module without needing to undo installation wiring.

A visual indicator flag provides user-feedback if the internal thermal disconnect operates. The "R" series provides a set of voltage-free contacts for remote signaling that maintenance is required.



| Model   | DSD1401S150  | DSD1401S275  | DSD1401SR150  | DSD1401SR275   | DSD1401SR440   |
|---|--|--|---|--|--|
| Item Number for Europe                        | 702480   | 702491   | 702510  | 702521   | 702530   |
| Nominal Voltage, U <sub>n</sub>               | 110-120 V  | 220-240 V  | 110-120 V   | 220-240 V  | 380 V  |
| Distribution System                           | TN-C, TN-C-S, TN-S, TT   |  |   |  |  |
| Max Cont. Operating Voltage, U <sub>c</sub>   | 150 VAC<br>200 VDC   | 275 VAC<br>350 VDC                                     | 150 VAC<br>200 VDC  | 275 VAC<br>350 VDC                                     | 440 VAC<br>580 VDC   |
| Frequency                                     | 0-60 Hz  |  |   |  |  |
| Operating Current @ U <sub>n</sub>            | 1 mA   |  |   |  |  |
| Max Discharge Current, I <sub>max</sub>       | 40 kA 8/20 $\mu$ s   |  |   |  |  |
| Nominal Discharge Current, I <sub>n</sub>     | 20 kA 8/20 $\mu$ s   |  |   |  |  |
| Protection Modes                              | Single mode  |  |   |  |  |
| Technology                                    | MOV with thermal disconnect  |  |   |  |  |
| Short Circuit Current Rating, I <sub>sc</sub> | 25 kA  |  |   |  |  |
| Voltage Protection Level, U <sub>p</sub>      | 480 V @ 3 kA<br>550 V @ 5kA<br>0.7 kV @ I <sub>n</sub>   | 850 V @ 3 kA<br>1 kV @ 5 kA<br>1.4 kV @ I <sub>n</sub> | 480 V @ 3 kA<br>550 V @ 5kA<br>0.7 kV @ I <sub>n</sub>  | 850 V @ 3 kA<br>1 kV @ 5 kA<br>1.4 kV @ I <sub>n</sub> | 1.4 kV @ 3 kA<br>1.75 kV @ 5 kA<br>2.2 kV @ I <sub>n</sub> |
| Status  | Mechanical flag  |  | Mechanical flag<br>Change-over contact (Form C dry) 250V~/0.5A,<br>max 1.5 mm <sup>2</sup> (#14AWG) connecting wire |  |  |
| Dimensions H x D x W: mm (in)                 | 90 x 68 x 18 (3.54 x 2.68 x 0.71)  |  |   |  |  |
| Module Width                                  | 1 M  |  |   |  |  |
| Weight: kg (lbs)                              | 0.12 (0.26)  |  |   |  |  |
| Enclosure                                     | DIN 43 880, UL <sup>®</sup> 94V-0 thermoplastic, IP 20 (NEMA <sup>®</sup> -1)  |  |   |  |  |
| Connection                                    | $\leq$ 25 mm <sup>2</sup> (#4AWG) stranded<br>$\leq$ 35 mm <sup>2</sup> (#2AWG) solid  |  |   |  |  |
| Mounting                                      | 35 mm top hat DIN rail   |  |   |  |  |
| Back-up Overcurrent Protection                | 125 Agl if supply >125 A   |  |   |  |  |
| Temperature                                   | -40°C to 80°C (-40°F to 176°F)   |  |   |  |  |
| Approvals                                     | CE, IEC <sup>®</sup> 61643-1   |  |   |  |  |
| Surge Rated to Meet                           | ANSI/IEEE <sup>®</sup> C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI/IEEE <sup>®</sup> C62.41.2-2002 Scenario II, Exposure 1, 20 kA 8/20 $\mu$ s, 2 kA 10/350 $\mu$ s<br>IEC <sup>®</sup> 61643-1 Class II |  |   |  |  |
| Replacement Module                            | DSD140M150   | DSD140M275   | DSD140M150  | DSD140M275   | DSD140M440   |
| Replacement Module (Europe)                   | 702436   | 702496   | 702436  | 702496   | 702506   |

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## Dinline Surge Diverter

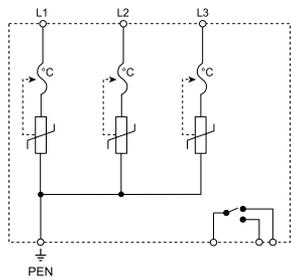


### Features

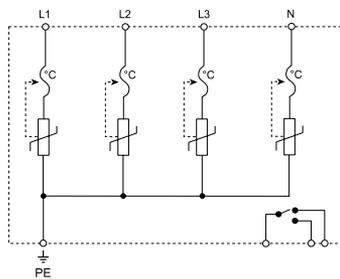
- 40kA 8/20 $\mu$ s maximum surge rating provides protection suitable for sub-distribution panels and a long operational life
- 35 mm DIN 43 880 profile – matches common circuit breakers
- Indication flag – provides clear visual indication of life status
- Remote contacts – provide remote status monitoring
- Various operating voltages – to suit most common power distribution systems

The DSD340 series of surge suppressors is designed to provide economical protection to sub-distribution panel boards in locations classified for devices tested to IEC 61643-1 test Class II (or VDE Classification C). The single module units conveniently protect three phase systems with TNC, TNS and TT options.

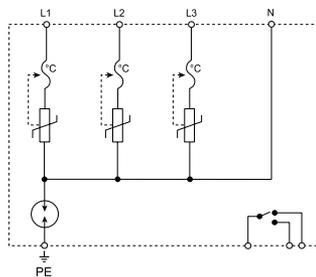
A visual indicator flag provides user-feedback if the internal thermal disconnecter operates. The “R” series provides a set of voltage-free contacts for remote signaling that maintenance is required.



TNC Configuration



TNS Configuration



TT Configuration

| Model   | DSD340TNC275A   | DSD340TNS275A                                   | DSD340TT275A                                   |
|---|---|---|--|
| Item Number for Europe                        | 702581  | 702591  | 702601   |
| Nominal Voltage, U <sub>n</sub>               | 220/380 V - 240/415 V   |   |  |
| Distribution System                           | TN-C  | TN-S  | TT   |
| Max Cont. Operating Voltage, U <sub>c</sub>   | 275 VAC, 350 VDC  |   |  |
| Frequency                                     | 0-60 Hz   |   |  |
| Max Discharge Current, I <sub>max</sub>       | 40 kA 8/20 $\mu$ s  |   |  |
| Nominal Discharge Current, I <sub>n</sub>     | 20 kA 8/20 $\mu$ s  |   |  |
| Protection Modes                              | L-PE  | L-PE, N-PE                                      | L-N, N-PE                                      |
| Technology                                    | MOV (3+0)   | MOV (4+0)                                       | MOV GDT N-PE (3+1)                             |
| Short Circuit Current Rating, I <sub>sc</sub> | 25 kA   |   |  |
| Impulse Current, I <sub>imp</sub>             | 5 kA 10/350 $\mu$ s   |   |  |
| Voltage Protection Level, U <sub>p</sub>      | 850 V @ 3 kA<br>1.4 kV @ I <sub>n</sub>   | L-PE<br>850 V @ 3 kA<br>1.4 kV @ I <sub>n</sub> | L-N<br>850 V @ 3 kA<br>1.4 kV @ I <sub>n</sub> |
| Status  | Mechanical flag<br>Change-over contact (Form C dry) 250V~/0.5A, max 1.5 mm <sup>2</sup> (#14AWG) connecting wire  |   |  |
| Dimensions H x D x W: mm (in)                 | 90 x 68 x 54<br>(3.54 x 2.68 x 2.13)  | 90 x 68 x 72<br>(3.54 x 2.68 x 2.83)            |  |
| Module Width                                  | 3 M   | 4 M   |  |
| Weight: kg (lbs)                              | 0.36 (0.79)   | 0.50 (1.10)                                     |  |
| Enclosure                                     | DIN 43 880, UL <sup>®</sup> 94V-0 thermoplastic, IP 20 (NEMA <sup>®</sup> -1)   |   |  |
| Connection                                    | $\leq$ 25 mm <sup>2</sup> (#4AWG) stranded<br>$\leq$ 35 mm <sup>2</sup> (#2AWG) solid   |   |  |
| Mounting                                      | 35 mm top hat DIN rail  |   |  |
| Back-up Overcurrent Protection                | 125 Agl if supply >125 A  |   |  |
| Temperature                                   | -40°C to 80°C (-40°F to 176°F)  |   |  |
| Approvals                                     | CE, IEC <sup>®</sup> 61643-1  |   |  |
| Surge Rated to Meet                           | ANSI <sup>®</sup> /IEEE <sup>®</sup> C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI <sup>®</sup> /IEEE <sup>®</sup> C62.41.2-2002 Scenario II, Exposure 2,<br>20 kA 8/20 $\mu$ s, 2 kA 10/350 $\mu$ s<br>IEC <sup>®</sup> 61643-1 Class II |   |  |
| Replacement MOV Module                        | DSD140M275  |   |  |
| Replacement MOV Module (Europe)               | 702496  |   |  |



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## Dinline Surge Diverter



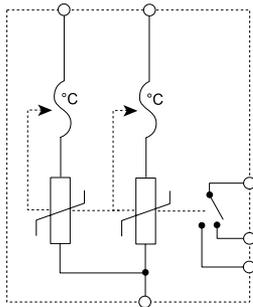
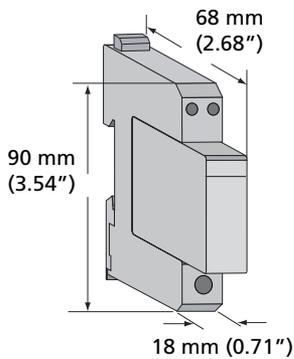
### Features

- 15kA 8/20 $\mu$ s surge rating per mode
- Compact package, modular DIN rail mounting for limited space requirements
- Three modes of protection: L-N, L-PE & N-PE
- Indication flags and voltage-free contacts provide remote status monitoring
- Separate plug and base design facilitates replacement of a failed surge module

\* Other operating voltages may be available upon application.

Surges and voltage transients are a major cause of expensive electronic equipment failure and business disruption. The DSD130 series of surge suppressors is designed to provide economical and reliable protection from voltage transients on power distribution systems. The DSD130 is specifically designed for the protection of single phase power supplies within instrumentation and control applications. They are conveniently packaged for easy

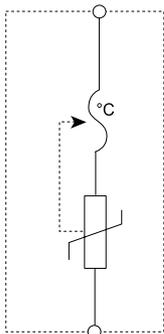
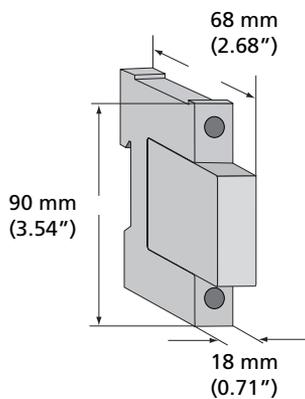
installation on 35mm DIN rail within control panels. Internal thermal disconnect devices help ensure safe disconnection at end-of life. A visual indicator flag provides user-feedback in the event of such operation. The DSD130 provides a set of optional voltage-free contacts for remote signaling that maintenance is required. The convenient plug-in module and separate base design facilitates replacement of a failed surge module without needing to undo installation wiring.



|  |   |
|--|---|
| <b>Model</b>   | DSD1301BR275  |
| <b>Item Number for Europe</b>                            | 702720  |
| <b>Nominal Voltage, <math>U_n</math></b>                 | 220-240 V   |
| <b>Distribution System</b>                               | TN-C, TN-C-S, TN-S, TT  |
| <b>Max Cont. Operating Voltage, <math>U_c</math></b>     | 275 VAC, 350 VDC  |
| <b>Frequency</b>   | 0-100 Hz  |
| <b>Max Discharge Current, <math>I_{max}</math></b>       | 15 kA 8/20 $\mu$ s L-N<br>15 kA 8/20 $\mu$ s L-PE   |
| <b>Nominal Discharge Current, <math>I_n</math></b>       | 8 kA 8/20 $\mu$ s per mode  |
| <b>Protection Modes</b>                                  | L-G, L-N, N-G   |
| <b>Technology</b>  | MOV with thermal disconnect   |
| <b>Short Circuit Current Rating, <math>I_{sc}</math></b> | 25 kAIC   |
| <b>Voltage Protection Level, <math>U_p</math></b>        | 800 V @ 3 kA (L+N-G)<br>1,500 V @ 3 kA (L-N)  |
| <b>Status</b>  | Mechanical flag / remote contacts<br>N/O, N/C Change-over contact, 250 V~/0.5 A,<br>max 1.5 mm <sup>2</sup> (#14 AWG) terminals   |
| <b>Dimensions H x D x W: mm (in)</b>                     | 90 x 68 x 18 (3.54 x 2.68 x 0.71)   |
| <b>Module Width</b>                                      | 1 M   |
| <b>Weight: kg (lbs)</b>                                  | 0.12 (0.26)   |
| <b>Enclosure</b>   | DIN 43 880, UL <sup>®</sup> 94V-0 thermoplastic, IP 20 (NEMA <sup>®</sup> -1)   |
| <b>Connection</b>  | 1 mm <sup>2</sup> to 6 mm <sup>2</sup> (#18AWG to #10AWG)<br>Line and Neutral Terminals<br>$\leq$ 25 mm <sup>2</sup> (#4AWG) stranded<br>$\leq$ 35 mm <sup>2</sup> (#2AWG) solid<br>PE Terminal |
| <b>Mounting</b>  | 35 mm top hat DIN rail  |
| <b>Back-up Overcurrent Protection</b>                    | 63 AgL, if supply > 63 A  |
| <b>Temperature</b>                                       | -40°C to 80°C (-40°F to 176°F)  |
| <b>Approvals</b>   | CE, IEC <sup>®</sup> 61643-1  |
| <b>Surge Rated to Meet</b>                               | ANSI <sup>®</sup> /IEEE <sup>®</sup> C62.41.2 Cat A, Cat B<br>IEC <sup>®</sup> 61643-1 Class III  |
| <b>Replacement Module</b>                                | DSD130M275  |
| <b>Replacement Module (Europe)</b>                       | -   |

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## Dinline Surge Diverter



### Features

- 10kA 8/20 $\mu$ s maximum surge rating – provides protection suitable for small sub-distribution panels or point-of-use applications
- 35 mm DIN 43 880 profile – matches common circuit breakers
- Indication flag – provides clear visual indication of life status
- Various operating voltages – to suit most common power distribution systems\*

\* Other operating voltages may be available upon application.

The DSD110 series of surge suppressors is designed to provide economical protection to small sub-distribution panel boards or locations classified for devices tested to IEC 61643-1 test Class II or III (or VDE classification D). They are also ideal for the installation in wiring termination boxes at the equipment's final point-of-use.

|  |   |
|--|---|
| <b>Model</b>   | DSD1101S275   |
| <b>Item Number for Europe</b>                            | 702560  |
| <b>Nominal Voltage, <math>U_n</math></b>                 | 220-240 V   |
| <b>Distribution System</b>                               | TN-C, TN-C-S, TN-S, TT  |
| <b>Max Cont. Operating Voltage, <math>U_c</math></b>     | 275 VAC, 350 VDC  |
| <b>Frequency</b>   | 0-60 Hz   |
| <b>Max Discharge Current, <math>I_{max}</math></b>       | 10 kA 8/20 $\mu$ s  |
| <b>Nominal Discharge Current, <math>I_n</math></b>       | 5 kA 8/20 $\mu$ s   |
| <b>Protection Modes</b>                                  | Single mode   |
| <b>Technology</b>  | MOV with thermal disconnect   |
| <b>Short Circuit Current Rating, <math>I_{sc}</math></b> | 25 kA   |
| <b>Voltage Protection Level, <math>U_p</math></b>        | 930 V @ 3kA<br>1.0 kV @ $I_n$   |
| <b>Status</b>  | Mechanical flag   |
| <b>Dimensions H x D x W: mm (in)</b>                     | 90 x 68 x 18 (3.54 x 2.68 x 0.71)   |
| <b>Module Width</b>                                      | 1 M   |
| <b>Weight: kg (lbs)</b>                                  | 0.12 (0.26)   |
| <b>Enclosure</b>   | DIN 43 880, UL® 94V-0 thermoplastic, IP 20 (NEMA®-1)                                  |
| <b>Connection</b>  | $\leq 25$ mm <sup>2</sup> (#4AWG) stranded<br>$\leq 35$ mm <sup>2</sup> (#2AWG) solid |
| <b>Mounting</b>  | 35 mm top hat DIN rail  |
| <b>Back-up Overcurrent Protection</b>                    | 100 Agl if supply >100 A  |
| <b>Temperature</b>                                       | -40°C to 80°C (-40°F to 176°F)  |
| <b>Approvals</b>   | CE, IEC® 61643-1  |
| <b>Surge Rated to Meet</b>                               | ANSI®/IEEE® C62.41.2 Cat A, Cat B<br>IEC® 61643-1 Class III                           |
| <b>Replacement Module</b>                                | DSD110M275  |
| <b>Replacement Module (Europe)</b>                       | 702566  |



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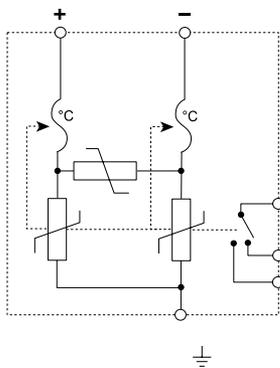
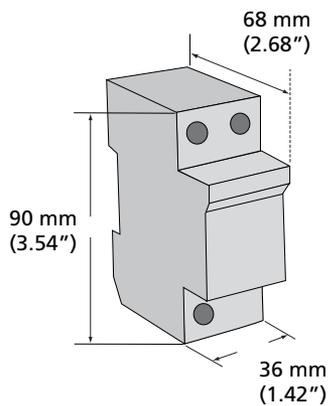
## Dinline Surge Diverter



### Features

- 40kA 8/20µs surge rating per mode, 80kA per line, 120kA total per pair
- Suitable for exposed DC wiring
- 35 mm DIN 43 880 profile – matches common circuit breakers
- Indication flag – provides clear visual indication of life status
- Suitable for both 24VDC and 48VDC distribution systems

The DSD140 2BR 24/48 surge protection device is designed to provide economical and reliable protection to DC power systems used in such applications as photovoltaic and telepower distribution. It is intended for locations classified for devices tested to IEC 61643-1 test Class II (or VDE Classification C). Internal thermal disconnect devices help ensure safe isolation at end-of-life. A visual indication flag provides user feedback in the event of such operation. In addition, a set of voltage-free contacts is provided for remote signaling if replacement is required.



|  |   |
|--|---|
| <b>Model</b>   | DSD1402BR24/48  |
| <b>Item Number for Europe</b>                            | 702750  |
| <b>Nominal Voltage, <math>U_n</math></b>                 | 0 to 48 VDC   |
| <b>Max Cont. Operating Voltage, <math>U_c</math></b>     | 60 VAC & 60 VDC   |
| <b>Frequency</b>   | 0-60 Hz   |
| <b>Max Discharge Current, <math>I_{max}</math></b>       | 40 kA 8/20 µs   |
| <b>Impulse Current, <math>I_{imp}</math></b>             | 4.2 kA 10/350 µs per mode   |
| <b>Nominal Discharge Current, <math>I_n</math></b>       | 20 kA 8/20 µs   |
| <b>Protection Modes</b>                                  | Differential & Common Mode  |
| <b>Technology</b>  | MOV with thermal disconnect   |
| <b>Short Circuit Current Rating, <math>I_{sc}</math></b> | 25 kA   |
| <b>Voltage Protection Level, <math>U_p</math></b>        | 280 V @ 3 kA + to -<br>600 V @ $I_n$ + to -   |
| <b>Status</b>  | Mechanical flag<br>Change-over contact (Form C Dry) 250 V---/0.5 A,<br>max 1.5 mm <sup>2</sup> (#14 AWG) connecting wire                                      |
| <b>Dimensions H x D x W: mm (in)</b>                     | 90 x 68 x 36 (3.54 x 2.68 x 1.42)   |
| <b>Module Width</b>                                      | 2 M   |
| <b>Weight: kg (lbs)</b>                                  | 0.15 (0.33)   |
| <b>Enclosure</b>   | DIN 43 880, UL® 94V-0 thermoplastic, IP 20 (NEMA®-1)  |
| <b>Connection</b>  | ≤25 mm <sup>2</sup> (#4AWG) stranded<br>≤35 mm <sup>2</sup> (#2AWG) solid   |
| <b>Mounting</b>  | 35 mm top hat DIN rail  |
| <b>Back-up Overcurrent Protection</b>                    | 250 Agl if supply >250 A  |
| <b>Temperature</b>                                       | -40°C to 80°C (-40°F to 176°F)  |
| <b>Approvals</b>   | CE, IEC® 61643-1  |
| <b>Surge Rated to Meet</b>                               | ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI®/IEEE® C62.41.2-2002 Scenario II, Exposure 1,<br>20 kA 8/20 µs, 2 kA 10/350 µs<br>IEC® 61643-1 Class II |

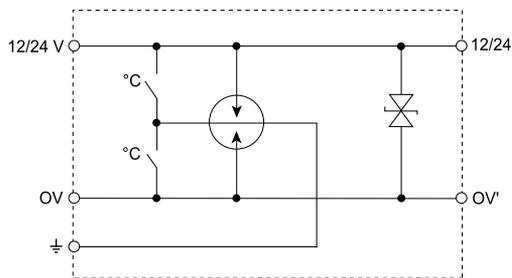
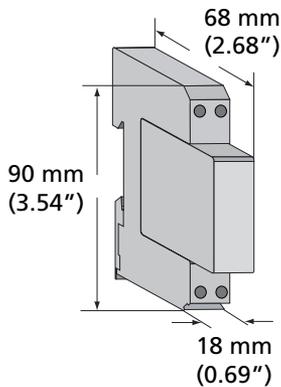
## Dinline Surge Diverter



### Features

- Ease of grounding – through DIN mounting rail or via terminal
- General purpose barrier – protection of 12 / 24V DC systems and equipment
- Large surge rating to 20kA 8/20 $\mu$ s – suitable for exposed DC wiring
- Separate plug and base design – facilitates ease of module replacement
- Two stage protection – suitable for the protection of power supply feeds
- High series current rating of 10A

The DSD120 series is designed to provide protection for higher load current circuits that are exposed to higher transient levels, such as those which exit the facility building. The DSD120 series provides a high series current rating of 10A, making it especially useful on power supply circuits and higher current relay control circuits.

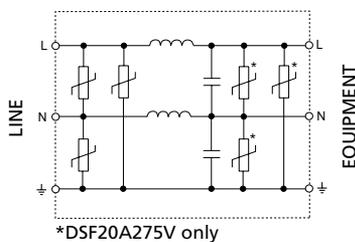
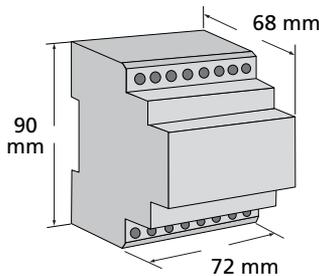
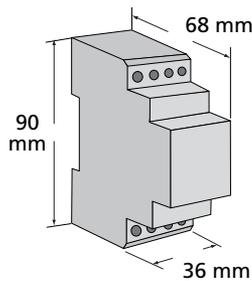


|  |  |                    |
|--|--|--------------------|
| <b>Model</b>   | DSD1201S12   | DSD1201S24         |
| <b>Item Number for Europe</b>                        | 702670   | 702680             |
| <b>Nominal System Voltage, <math>U_n</math></b>      | 12 VDC   | 24 VDC             |
| <b>Max Cont. Operating Voltage, <math>U_c</math></b> | 24 VDC   | 28 VDC             |
| <b>Max Line Current, <math>I_L</math></b>            | 10 A   |                    |
| <b>Max Discharge Current, <math>I_{max}</math></b>   | 20 kA 8/20 $\mu$ s (L+L)-PE  |                    |
| <b>Protection Modes</b>                              | Differential & Common Mode   |                    |
| <b>Technology</b>                                    | GDT<br>Silicon   |                    |
| <b>Voltage Protection Level</b>                      | L-L<br>30 V @ 3 kA   | L-L<br>40 V @ 3 kA |
| <b>Loop Resistance</b>                               | 0.5 $\Omega$   |                    |
| <b>Dimensions H x D x W: mm (in)</b>                 | 90 x 68 x 18 (3.54 x 2.68 x 0.69)  |                    |
| <b>Module Width</b>                                  | 1 M  |                    |
| <b>Weight: kg (lbs)</b>                              | 0.1 (0.22)   |                    |
| <b>Enclosure</b>                                     | DIN 43 880, UL®94V-0 thermoplastic, IP 20 (NEMA®-1)  |                    |
| <b>Connection</b>                                    | 1 mm <sup>2</sup> to 6 mm <sup>2</sup> (#18AWG to #10AWG)<br>Grounding via terminal or DIN rail connection |                    |
| <b>Mounting</b>                                      | 35 mm top hat DIN rail   |                    |
| <b>Temperature</b>                                   | -25°C to 70°C (-13°F to 158°F)   |                    |
| <b>Approvals</b>                                     | CE   |                    |
| <b>Surge Rated to Meet</b>                           | ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C  |                    |
| <b>Replacement Module</b>                            | DSD1201S12M  | DSD1201S24M        |
| <b>Replacement Module (Europe)</b>                   | (702675)   | (702685)           |



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## Dinline Surge Filter



### Features

- In-line series protection
- EMI/RFI noise filtering – protects against industrial electrical noise
- Compact design – fits into motor control and equipment panels
- Three modes of protection: L-N, L-PE & N-PE
- 35 mm DIN rail mount – simple installation
- LED power indicator

The “two port” DSF series has been specifically designed for process control applications to protect the switched mode power supply units on devices such as PLC controllers, SCADA systems and motor controllers. The 30V unit is suitable for 12V and 24VAC/DC signaling and control systems.

The 6A DSF series incorporates a space efficient, low pass, series filter which provides attenuation to high frequency interference. The larger 20A model provides status indication and a higher surge rating, making this ideal for the protection of higher risk equipment.

| Model                                       | DSF6A30V   | DSF6A150V           | DSF6A275V    | DSF20A275V  |
|---|--|---------------------|--------------|---|
| Item Number for Europe                      | 702090   | 701000              | 701030       | 701020  |
| Nominal Voltage, U <sub>n</sub>             | 24 V   | 110 V-120 V         | 220 V-240 V  |   |
| Distribution System                         | 1Ph 2W+G   |                     |              |   |
| System Compatibility                        | TN-S, TN-C-S   |                     |              |   |
| Max Cont. Operating Voltage, U <sub>c</sub> | 30 VAC, 38 VDC   | 150 VAC             | 275 VAC      |   |
| Frequency                                   | 0-60 Hz  | 50/60 Hz            |              |   |
| Max Line Current, I <sub>l</sub>            | 6 A  |                     |              | 20 A  |
| Operating Current @ U <sub>n</sub>          | 7 mA   |                     |              | -   |
| Max Discharge Current, I <sub>max</sub>     | 4 kA 8/20 per mode   | 16 kA 8/20 per mode |              | 15 kA 8/20 µs L-N<br>15 kA 8/20 µs L-PE<br>25 kA 8/20 µs N-PE |
| Protection Modes                            | All modes protected  |                     |              |   |
| Technology                                  | In-line series filter<br>MOV                                   |                     |              |   |
| Voltage Protection Level, U <sub>p</sub>    | 110 V @ 3 kA   | 400 V @ 3 kA        | 750 V @ 3 kA | 710 V @ 3 kA  |
| Filtering                                   | -3 dB @ 300 kHz  |                     |              | -3 dB @ 62 kHz  |
| Status                                      | LED power indicator  |                     |              | Status indicator  |
| Dimensions H x D x W: mm (in)               | 90 x 68 x 36 (3.54 x 2.68 x 1.42)                              |                     |              | 90 x 68 x 72 (3.54 x 2.68 x 2.83)                             |
| Module Width                                | 2 M  |                     |              | 4 M   |
| Weight: kg (lbs)                            | 0.2 (0.44)   |                     |              | 0.7 (1.54)  |
| Enclosure                                   | DIN 43 880, UL® 94V-0 thermoplastic, IP 20 (NEMA®-1)           |                     |              |   |
| Connection                                  | 1 mm <sup>2</sup> to 6 mm <sup>2</sup> (#18AWG to #10AWG)      |                     |              |   |
| Mounting                                    | 35 mm top hat DIN rail   |                     |              |   |
| Back-up Overcurrent Protection              | 6 A  |                     |              | 20 A  |
| Temperature                                 | -35°C to 55°C (-31°F to 131°F)                                 |                     |              |   |
| Approvals                                   | C-Tick, CE, NOM, UL 1449 Edition 3 Recognized Component Type 2 |                     | C-Tick, CE   |   |
| Surge Rated to Meet                         | ANSI®/IEEE® C62.41.2 Cat A, Cat B                              |                     |              |   |

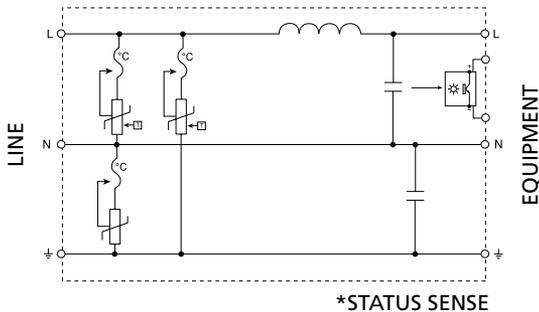
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## Transient Discriminating Filter



### Features

- Transient Discriminating (TD) Technology provides increased service life
- In-line series protection
- High efficiency low pass sine wave filtering – ideal for the protection of switched mode power supplies
- Three modes of protection: L-N, L-PE & N-PE
- 35 mm DIN rail mount – simple installation
- LED status indication and opto-isolated output – for remote status monitoring
- CE, UL® 1449 Edition 3 Listed



The TDF series has been specifically designed for process control applications to protect the switched mode power supply units on devices such as PLC controllers, SCADA systems and motor controllers. Units are UL Recognized and available for 3A, 10A and 20A loads and suitable for 110-120VAC/DC and 220-240VAC circuits.

The TDF is a series connected, single phase surge filter providing an aggregate surge capacity of 50kA (8/20 $\mu$ s) across L-N, L-PE, and N-PE. The low pass filter provides up to 65dB of attenuation to voltage transients. Not only does this reduce the residual let-through voltage, but it also helps further reduce the steep voltage rate-of-rise providing superior protection for sensitive electronic equipment.

| Model                                       | TDF3A120V  | TDF3A240V                     | TDF10A120V                            | TDF10A240V                    | TDF20A120V                    | TDF20A240V                    |
|---|--|-------------------------------|---------------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Item Number for Europe                      | 700001   | 700002                        | 700003                                | 700004                        | 700005                        | 700006                        |
| Nominal Voltage, U <sub>n</sub>             | 110-120 V  | 220-240 V                     | 110-120 V                             | 220-240 V                     | 110-120 V                     | 220-240 V                     |
| Distribution System                         | TN-C-S, TN-S   |                               |                                       |                               |                               |                               |
| Max Cont. Operating Voltage, U <sub>c</sub> | 170 V AC   | 340 V AC                      | 170 V AC                              | 340 V AC                      | 170 V AC                      | 340 V AC                      |
| Stand-off Voltage                           | 240 V  | 400 V                         | 240 V                                 | 400 V                         | 240 V                         | 400 V                         |
| Frequency                                   | 0-60 Hz  | 50/60 Hz                      | 0-60 Hz                               |                               |                               | 50/60 Hz                      |
| Max Line Current, I <sub>l</sub>            | 3 A  |                               | 10 A                                  |                               | 20 A                          |                               |
| Operating Current @ U <sub>n</sub>          | 135 mA   | 250 mA                        | 240 mA                                | 480 mA                        | 240 mA                        | 480 mA                        |
| Max Discharge Current, I <sub>max</sub>     | 10 kA 8/20 μs N-PE<br>20 kA 8/20 μs L-N<br>20 kA 8/20 μs L-PE                                  |                               |                                       |                               |                               |                               |
| Protection Modes                            | All modes protected  |                               |                                       |                               |                               |                               |
| Technology                                  | In-line series low pass sine wave filter<br>TD Technology                                      |                               |                                       |                               |                               |                               |
| Voltage Protection Rating (VPR)             | 500 V @ 500 A<br>330 V @ 3 kA  | 700 V @ 500 A<br>600 V @ 3 kA | 500 V @ 500 A<br>330 V @ 3 kA         | 700 V @ 500 A<br>500 V @ 3 kA | 500 V @ 500 A<br>400 V @ 3 kA | 700 V @ 500 A<br>900 V @ 3 kA |
| Filtering                                   | -62 dB @ 100 kHz   |                               | -65 dB @ 100 kHz                      |                               | -53 dB @ 100 kHz              |                               |
| Status <sup>(1)</sup>                       | Red LED. On=Ok. Isolated opto-coupler output   |                               |                                       |                               |                               |                               |
| Dimensions H x D x W: mm (in)               | 90 x 68 x 72<br>(3.54 x 2.68 x 2.83)   |                               | 90 x 68 x 144<br>(3.54 x 2.68 x 5.67) |                               |                               |                               |
| Module Width                                | 4 M  |                               | 8 M                                   |                               |                               |                               |
| Weight: kg (lbs)                            | 0.7 (1.54)   |                               | 1.48 (3.25)                           |                               | 1.57 (3.46)                   |                               |
| Enclosure                                   | DIN 43 880, UL® 94V-0 thermoplastic, IP 20 (NEMA®-1)   |                               |                                       |                               |                               |                               |
| Connection                                  | 1 mm <sup>2</sup> to 6 mm <sup>2</sup> (#18AWG to #10)   |                               |                                       |                               |                               |                               |
| Mounting                                    | 35 mm top hat DIN rail   |                               |                                       |                               |                               |                               |
| Back-up Overcurrent Protection              | 3 A  |                               | 10 A                                  |                               | 20 A                          |                               |
| Temperature                                 | -35°C to 55°C (-31°F to 131°F)   |                               |                                       |                               |                               |                               |
| Approvals                                   | C-Tick, CE (NOM 3A, 120V), CSA 22.2, UL 1283,<br>UL 1449 Edition 3 Recognized Component Type 2 |                               |                                       |                               |                               |                               |
| Surge Rated to Meet                         | ANSI®/IEEE® C62.41.2 Cat A, Cat B, Cat C   |                               |                                       |                               |                               |                               |

(1) Opto-coupler output can be connected to DINLINE Alarm Relay (DAR275V) to provide Form C dry contacts.

## Triggered Spark Gap Surge Reduction Filter



Backplane version available upon request.

### Features

- Incorporates TSG and TD Technologies – high performance protection
- High surge rating – ideal for exposed critical service entrance applications
- Surge Reduction Filters dramatically reduce let-through voltage – provides optimum protection
- Surge Reduction Filters reduce rate-of-voltage rise (dv/dt) – improved protection for electronic equipment
- Small size/weight – aids installation
- Escutcheon panel – improved safety

Triggered Spark Gap Surge Reduction Filters are designed to provide high-energy surge diversion, making them ideal for primary service protection applications. The units also provide efficient low pass filtering to substantially reduce the risk of physical equipment damage by reducing the rate-of-voltage rise.

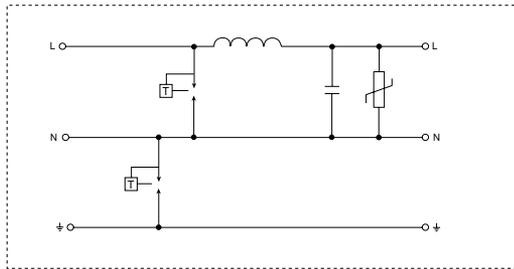
The high energy diversion ability of the spark gap has allowed the size and weight of the units to be considerably reduced.

### Single Phase

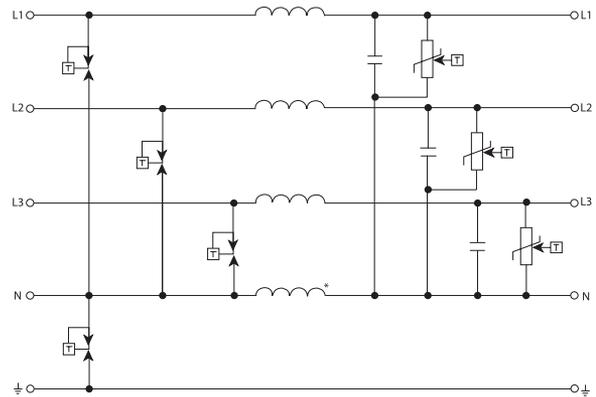
| Model                              | TSG-SRF140  | TSG-SRF163                           | TSG-SRF1125                          |
|------------------------------------|---|--------------------------------------|--------------------------------------|
| Nominal Voltage, $U_n$             | 220-240 V   |                                      |                                      |
| Distribution System                | 1Ph 2W+G  |                                      |                                      |
| System Compatibility               | TN-C, TN-S, TT  |                                      |                                      |
| Max Cont. Operating Voltage, $U_c$ | 275 V AC  |                                      |                                      |
| Stand-off Voltage                  | 440 V   |                                      |                                      |
| Frequency                          | 50/60 Hz  |                                      |                                      |
| Max Line Current, $I_L$            | 40 A  | 63 A                                 | 125 A                                |
| Max Discharge Current $I_{max}$    | 130 kA 8/20 $\mu$ s (NEMA-LS1 per mode)   |                                      |                                      |
| Impulse Current, $I_{imp}$         | 50 kA 10/350 $\mu$ s  |                                      |                                      |
| Protection Modes                   | All modes protected   |                                      |                                      |
| Technology                         | Triggered Spark Gap<br>In-line series, true L-C low pass sine wave tracking filter<br>40kA 8/20 $\mu$ s tertiary TD Technology                |                                      |                                      |
| Voltage Protection Level, $U_p$    | L-N<br>210 V @ 3 kA<br>180 V @ 20 kA  | L-N<br>262 V @ 3 kA<br>247 V @ 20 kA | L-N<br>413 V @ 3 kA<br>392 V @ 20 kA |
| Filtering                          | -40 dB @ 100 kHz  |                                      |                                      |
| Status                             | Change-over contact (Form C dry), 125V/~600mA. 4kV isolation<br>Primary Protection LED<br>Tertiary Protection LED                             |                                      |                                      |
| Dimensions H x D x W: mm (in)      | 400 x 170 x 300<br>(16 x 7 x 12)  |                                      |                                      |
| Weight: kg (lbs)                   | 11 (24)   |                                      | 13 (29)                              |
| Enclosure                          | Metal, IP55 (NEMA®-12)  |                                      |                                      |
| Heat Dissipation @ $I_L$           | 13 W  |                                      | 19 W                                 |
| Connection Input                   | $\leq$ 50 mm <sup>2</sup> (1/0 AWG)   |                                      | 8 mm stud                            |
| Connection Output                  | $\leq$ 35 mm <sup>2</sup> (#2 AWG)  |                                      | 8 mm stud                            |
| Mounting                           | Wall mount  |                                      |                                      |
| Back-up Overcurrent Protection     | See Table   |                                      | 125 A                                |
| Approvals                          | AS3100, C-Tick, Certificate of Suitability  |                                      |                                      |
| Surge Rated to Meet                | ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI®/IEEE® C62.41.2-2002 Scenario II, Exposure 3, 100 kA 8/20 $\mu$ s, 10 kA 10/350 $\mu$ s |                                      |                                      |



## Single Phase



## Three Phase



\* Neutral inductor omitted in 40A and 63A models

### Back-up overcurrent protection for 40A and 63A rated units:

| Supply Rating     | Min. Circuit Breaker Rating | Min. Fuse Rating |
|-------------------|-----------------------------|------------------|
| 500 A (<10 kAIC)  | 100 A                       | 40 A             |
| 750 A (<15 kAIC)  | 100 A                       | 63 A             |
| 1000 A (<20 kAIC) | 125 A                       | 80 A             |
| 2000 A (<43 kAIC) | 160 A                       | 100 A            |

## Three Phase

| Model                              | TSG-SRF340  | TSG-SRF363                           | TSG-SRF3125                            | TSG-SRF3200                            | TSG-SRF3400                              | TSGSRF3630   | TSG-SRF31250                              | TSG-SRF32000 |
|------------------------------------|---|--------------------------------------|--|--|--|--|---|--------------|
| Nominal Voltage, $U_n$             | 220/480 VAC to 240/415 VAC  |                                      |  |  |  |  |   |              |
| Distribution System                | 3Ph Y 4W+G  |                                      |  |  |  |  |   |              |
| System Compatibility               | TN-C, TN-S, TN-C-S, TT  |                                      |  |  |  |  |   |              |
| Max Cont. Operating Voltage, $U_c$ | 275/476 VAC   |                                      |  |  |  |  |   |              |
| Stand-off Voltage                  | 440/762 VAC   |                                      |  |  |  |  |   |              |
| Frequency                          | 50/60 Hz  |                                      |  |  |  |  |   |              |
| Max Line Current, $I_L$            | 40 A  | 63 A                                 | 125 A                                  | 200 A                                  | 400 A                                    | 630 A  | 1,250 A                                   | 2,000 A      |
| Max Discharge Current $I_{max}$    | 130 kA 8/20 $\mu$ s (NEMA-LS1 per mode)   |                                      |  |  |  |  |   |              |
| Impulse Current, $I_{imp}$         | 50 kA 10/350 $\mu$ s  |                                      |  |  |  |  |   |              |
| Protection Modes                   | All modes protected   |                                      |  |  |  |  |   |              |
| Technology                         | Triggered Spark Gap<br>In-line series, true L-C low pass sine wave tracking filter<br>40kA 8/20 $\mu$ s tertiary TD Technology                |                                      |  |  |  | Triggered Spark Gap<br>In-line series, true L-C low pass sine wave tracking filter<br>80kA 8/20 $\mu$ s tertiary TD Technology |   |              |
| Voltage Protection Level, $U_p$    | L-N<br>210 V @ 3 kA<br>180 V @ 20 kA  | L-N<br>352 V @ 3 kA<br>282 V @ 20 kA | L-N<br>325 V @ 3 kA<br>404 V @ 20 kA   | L-N<br>347 V @ 3 kA<br>447 V @ 20 kA   | L-N<br>500 V @ 3 kA<br>500 V @ 20 kA     |  |   |              |
| Filtering                          | -40 dB @ 100 kHz  |                                      |  |  |  |  |   |              |
| Status                             | Change-over contact (Form C dry), 125V/~600mA. 4kV isolation<br>Primary Protection LED<br>Tertiary Protection LED                             |                                      |  |  |  |  |   |              |
| Dimensions H x D x W: mm (in)      | 500 x 170 x 400<br>(19.7 x 6.7 x 15.8)  |                                      | 650 x 175 x 500<br>(25.6 x 6.9 x 19.7) | 780 x 215 x 500<br>(30.7 x 8.5 x 19.7) | 1,100 x 233 x 650<br>(43.3 x 9.2 x 25.6) | 1,300 x 235 x 850<br>(51.2 x 9.3 x 33.5)   | 1,650 x 315 x 1,200<br>(65 x 12.4 x 47.2) |              |
| Weight: kg (lbs)                   | 20 (44)   |                                      | 38 (84)                                | 52 (115)                               | 98 (216)                                 | 115 (254)  | 288 (635)                                 | 360 (794)    |
| Enclosure                          | Metal, IP55 (NEMA®-12)  |                                      |  |  |  | IP32   |   |              |
| Heat Dissipation @ $I_L$           | 29 W  | 36 W                                 | 63 W                                   | 90 W                                   | 175 W                                    | 225 W  | 350 W                                     | 600 W        |
| Connection Input                   | $\leq$ 50 mm <sup>2</sup> (1/0 AWG)   |                                      | 8 mm stud                              | 10 mm stud                             | Inquire                                  |  |   | Inquire      |
| Connection Output                  | $\leq$ 35 mm <sup>2</sup> (#2 AWG)  |                                      | 8 mm stud                              | 10 mm stud                             | Inquire                                  |  |   | Inquire      |
| Mounting                           | Wall mount  |                                      |  |  |  |  |   |              |
| Back-up Overcurrent Protection     | See Table   |                                      | 125 A                                  | 200 A                                  | 400 A                                    | 630 A  | 1250 A                                    | 2000 A       |
| Approvals                          | A53100, C-Tick, Certificate of Suitability  |                                      |  |  |  |  |   |              |
| Surge Rated to Meet                | ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C<br>ANSI®/IEEE® C62.41.2-2002 Scenario II, Exposure 3, 100 kA 8/20 $\mu$ s, 10 kA 10/350 $\mu$ s |                                      |  |  |  |  |   |              |

## Universal Transient Barrier Single Pair



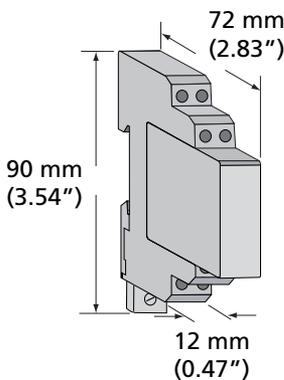
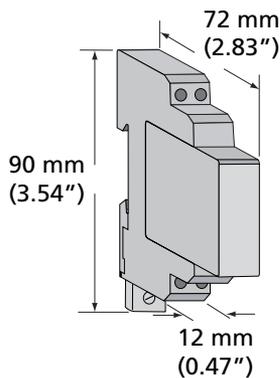
### Features

- General purpose barrier – protection of low-voltage circuits and transducers
- Separate plug and base design – hot swappable feature allows ease of module replacement
- Multi stage protection – fine over-voltage protection, helps ensure lowest residual surge voltages reach sensitive equipment
- Common-mode and differential-mode protection – protects against both possible surge conditions
- Ease of grounding – through DIN mounting rail or via terminal
- Surge rating to 20 kA 8/20  $\mu$ s – ideal for exposed wiring
- Allows for protection of 25 analog signals or 50 digital signals per linear foot of DIN rail space

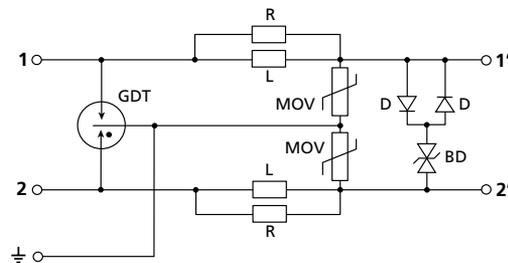
The UTB series is designed to provide transient protection for equipment from surges induced onto balanced pair signal lines. They are well suited to the protection of industrial equipment such as PLCs and SCADA systems. Other uses include the protection of fire and security alarms, industrial monitoring and control equipment.

The UTB-SP (single pair) employs a hybrid multistage clamping circuit, to help ensure the best possible protection to sensitive electronic equipment while maintaining a minimum of line interference and insertion loss.

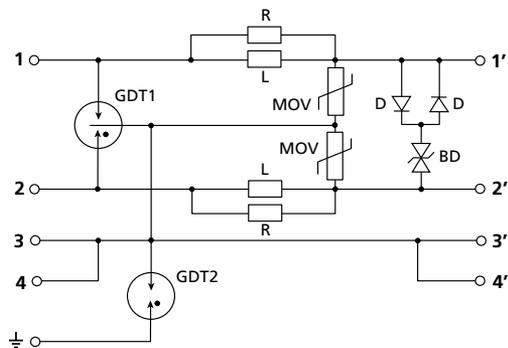
The UTB-SPG (single pair - isolated ground) provides isolation between the shield/common return and protective ground at the point of connection.



### UTB Single Pair



### UTB Single Pair - Isolated Ground



## UTB Single Pair

| Model                                   | UTB55P  | UTB155P                        | UTB30SP                          | UTB60SP                          | UTB110SP                            |
|---|---|--------------------------------|----------------------------------|----------------------------------|-------------------------------------|
| Item Number for Europe                  | 702861  | 702862                         | 702863                           | 702864                           | 702866                              |
| Nominal Voltage                         | 0 V to 3 VAC<br>0 V to 5 VDC  | 3 V to 10 VAC<br>5 V to 15 VDC | 10 V to 21 VAC<br>15 V to 30 VDC | 21 V to 42 VAC<br>30 V to 60 VDC | 100 V to 120 VAC<br>60 V to 154 VDC |
| Max Cont. Operating Voltage, $U_c$      | 5 VAC<br>7 VDC  | 12 VAC<br>18 VDC               | 23 VAC<br>33 VDC                 | 45 VAC<br>64 VDC                 | 150 VAC<br>170 VDC                  |
| Max Line Current, $I_L$                 | 2 A   |                                |                                  |                                  |                                     |
| Frequency                               | 0.5 MHz   | 1 MHz                          | 2 MHz                            | 3 MHz                            |                                     |
| Loop Resistance                         | 1.0 $\Omega$  |                                |                                  |                                  |                                     |
| Max Discharge Current, $I_{max}$        | 20 kA 8/20 $\mu$ s (L+L)-PE   |                                |                                  |                                  |                                     |
| Protection Modes                        | Differential & Common Mode  |                                |                                  |                                  |                                     |
| Technology                              | GDT, MOV, Silicon   |                                |                                  |                                  |                                     |
| Voltage Protection Level (8/20 $\mu$ s) | L-L<br>10 V @ 3 kA  | L-L<br>25 V @ 3 kA             | L-L<br>44 V @ 3 kA               | L-L<br>85 V @ 3 kA               | L-L<br>220 V @ 3 kA                 |
| Dimensions H x D x W: mm (in)           | 90 x 72 x 12 (3.54 x 2.83 x 0.47)   |                                |                                  |                                  |                                     |
| Weight: kg (lbs)                        | 0.07 (0.15)   |                                |                                  |                                  |                                     |
| Enclosure                               | DIN 43 880, UL <sup>®</sup> 94V-0 thermoplastic, IP 20 (NEMA <sup>®</sup> -1)                               |                                |                                  |                                  |                                     |
| Connection                              | 1 mm <sup>2</sup> to 2.5 mm <sup>2</sup> (#18AWG to 14AWG)<br>Grounding via terminal or DIN rail connection |                                |                                  |                                  |                                     |
| Mounting                                | 35 mm top hat DIN rail  |                                |                                  |                                  |                                     |
| Temperature                             | -20°C to 65°C (-4°F to 149°F)   |                                |                                  |                                  |                                     |
| Approvals                               | CE, UL 497B   |                                |                                  |                                  |                                     |
| Surge Rated to Meet                     | ANSI <sup>®</sup> /IEEE <sup>®</sup> C62.41.2-2002 Cat A, Cat B, Cat C                                      |                                |                                  |                                  |                                     |
| Replacement Module                      | UTB55SPM  | UTB155SPM                      | UTB30SPM                         | UTB60SPM                         | UTB110SPM                           |
| Replacement Module (Europe)             | (702867)  | (702868)                       | (702869)                         | (702871)                         | (702872)                            |

## UTB Single Pair - Isolated Ground

| Model                                   | UTB55SPG  | UTB155SPG                      | UTB30SPG                         | UTB60SPG                         | UTB110SPG                           |
|---|---|--------------------------------|----------------------------------|----------------------------------|-------------------------------------|
| Item Number for Europe                  | 702873  | 702874                         | 702876                           | 702877                           | 702878                              |
| Nominal Voltage                         | 0 V to 3 VAC<br>0 V to 5 VDC  | 3 V to 10 VAC<br>5 V to 15 VDC | 10 V to 21 VAC<br>15 V to 30 VDC | 21 V to 42 VAC<br>30 V to 60 VDC | 100 V to 120 VAC<br>60 V to 154 VDC |
| Max Cont. Operating Voltage, $U_c$      | 5 VAC<br>7 VDC  | 12 VAC<br>18 VDC               | 23 VAC<br>33 VDC                 | 45 VAC<br>64 VDC                 | 150 VAC<br>170 VDC                  |
| Max Line Current, $I_L$                 | 2 A   |                                |                                  |                                  |                                     |
| Frequency                               | 0.5 MHz   | 1 MHz                          | 2 MHz                            | 3 MHz                            |                                     |
| Loop Resistance                         | 1.0 $\Omega$  |                                |                                  |                                  |                                     |
| Max Discharge Current, $I_{max}$        | 20 kA 8/20 $\mu$ s (L+L)-PE   |                                |                                  |                                  |                                     |
| Protection Modes                        | Differential & Common Mode  |                                |                                  |                                  |                                     |
| Technology                              | GDT, MOV, Silicon   |                                |                                  |                                  |                                     |
| Voltage Protection Level (8/20 $\mu$ s) | L-L<br>10 V @ 3 kA  | L-L<br>25 V @ 3 kA             | L-L<br>44 V @ 3 kA               | L-L<br>85 V @ 3 kA               | L-L<br>220 V @ 3 kA                 |
| Dimensions H x D x W: mm (in)           | 90 x 72 x 12 (3.54 x 2.83 x 0.47)   |                                |                                  |                                  |                                     |
| Weight: kg (lbs)                        | 0.07 (0.15)   |                                |                                  |                                  |                                     |
| Enclosure                               | DIN 43 880, UL 94V-0 thermoplastic, IP 20 (NEMA <sup>®</sup> -1)  |                                |                                  |                                  |                                     |
| Connection                              | 1 mm <sup>2</sup> to 2.5 mm <sup>2</sup> (#18AWG to 14AWG)<br>Grounding via terminal or DIN rail connection |                                |                                  |                                  |                                     |
| Mounting                                | 35 mm top hat DIN rail  |                                |                                  |                                  |                                     |
| Temperature                             | -20°C to 65°C (-4°F to 149°F)   |                                |                                  |                                  |                                     |
| Approvals                               | CE, UL 497B   |                                |                                  |                                  |                                     |
| Surge Rated to Meet                     | ANSI <sup>®</sup> /IEEE <sup>®</sup> C62.41.2-2002 Cat A, Cat B, Cat C                                      |                                |                                  |                                  |                                     |
| Replacement Module                      | UTB55SPGM   | UTB155SPGM                     | UTB30SPGM                        | UTB60SPGM                        | UTB110SPGM                          |
| Replacement Module (Europe)             | (702879)  | (702881)                       | (702882)                         | (702883)                         | (702884)                            |

## Universal Transient Barrier Dual Pair



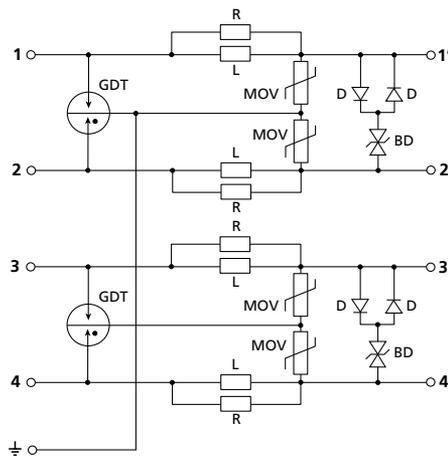
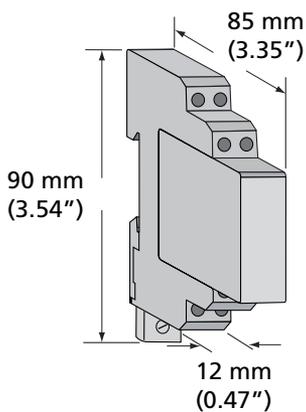
### Features

- Compact design universal transient barrier – protection of low-voltage circuits and transducers
- Separate plug and base design – hot swappable feature allows ease of module replacement
- Compact, slimline two pair housing 12 mm wide
- Multi stage protection – fine over-voltage protection helps ensure lowest residual surge voltages reach sensitive equipment
- Common-mode and differential-mode protection – protects against both possible surge conditions
- Ease of grounding – through DIN mounting rail or via terminal
- Surge rating to 20 kA 8/20  $\mu$ s – ideal for exposed wiring
- “UTB-DPS” model designed for compact protection of signal and power supply in one compact housing
- Allows for protection of 50 analog signals or 100 digital signals per linear foot of DIN rail space

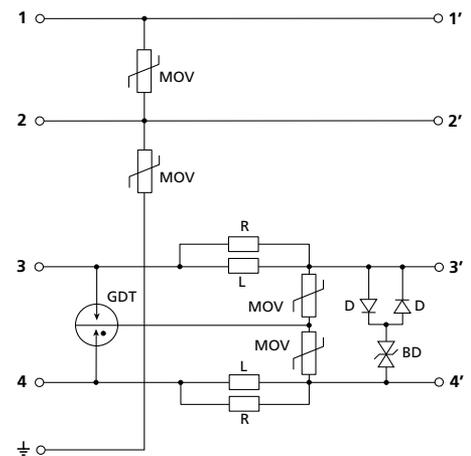
The UTB series is designed to provide transient protection for equipment from surges induced onto balanced pair signal lines or low-voltage AC or DC power supplies. The compact series is well suited to applications where panel space is limited, yet provides similar protection performance when compared to the UTB Modular series. They are well suited to the protection of industrial equipment such as PLCs and SCADA systems.

The UTB-DP (dual pair) employs a hybrid, multi-stage clamping circuit to help ensure the best possible protection to sensitive electronic equipment while maintaining a minimum of line interference and insertion losses.

The UTB-DPS (dual pair - single power supply, single data pair) is specifically designed for applications where compact protection is required for one signal pair and one power supply, common in powered transducer applications. The UTB-DPS combines both these protection circuits in one compact package.



UTB Dual Pair



UTB Dual Pair -  
Single Power Supply,  
Single Data Pair

## UTB Dual Pair

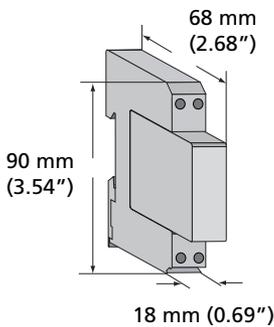
| Model                                       | UTB5DP  | UTB15DP                        | UTB30DP                          | UTB60DP                          | UTB110DP                            | UTB30DPS                         |
|---|---|--------------------------------|----------------------------------|----------------------------------|-------------------------------------|----------------------------------|
| Item Number for Europe                      | 702886  | 702887                         | 702888                           | 702889                           | 702891                              | 702892                           |
| Nominal Voltage                             | 0 V to 3 VAC<br>0 V to 5 VDC  | 3 V to 10 VAC<br>5 V to 15 VDC | 10 V to 21 VAC<br>15 V to 30 VDC | 21 V to 42 VAC<br>30 V to 60 VDC | 100 V to 120 VAC<br>60 V to 154 VDC | 24 V to 48 VAC<br>12 V to 60 VDC |
| Max Cont. Operating Voltage, U <sub>c</sub> | 5 VAC<br>7 VDC  | 12 VAC<br>18 VDC               | 23 VAC<br>33 VDC                 | 45 VAC<br>64 VDC                 | 150 VAC<br>170 VDC                  | 48 V~AC<br>60 VDC                |
| Max Line Current, I <sub>L</sub>            | 800 mA  |                                |                                  |                                  |                                     | 5 A                              |
| Frequency                                   | 0.5 MHz   | 1 MHz                          | 2 MHz                            | 3 MHz                            | 0-60 Hz                             |                                  |
| Loop Resistance                             | 0.6 Ω   |                                |                                  |                                  |                                     | 0.0 Ω                            |
| Max Discharge Current, I <sub>max</sub>     | 20 kA 8/20 μs (L+L)-PE  |                                |                                  |                                  |                                     | 15 kA 8/20 μs/mode               |
| Protection Modes                            | Differential & Common Mode  |                                |                                  |                                  |                                     |                                  |
| Technology                                  | GDT<br>MOV<br>Silicon   |                                |                                  |                                  |                                     | MOV                              |
| Voltage Protection Level (8/20μs)           | L-L<br>10 V @ 3 kA  | L-L<br>25 V @ 3 kA             | L-L<br>44 V @ 3 kA               | L-L<br>85 V @ 3 kA               | L-L<br>220 V @ 3 kA                 |                                  |
| Dimensions H x D x W: mm (in)               | 90 x 85 x 12 (3.54 x 3.35 x 0.47)   |                                |                                  |                                  |                                     |                                  |
| Weight: kg (lbs)                            | 0.09 (0.20)   |                                |                                  |                                  |                                     |                                  |
| Enclosure                                   | DIN 43 880, UL® 94V-0 thermoplastic, IP 20 (NEMA®-1)                                |                                |                                  |                                  |                                     |                                  |
| Connection                                  | 1 mm² to 2.5 mm² (#18AWG to 14AWG)<br>Grounding via terminal or DIN rail connection |                                |                                  |                                  |                                     |                                  |
| Mounting                                    | 35 mm top hat DIN rail  |                                |                                  |                                  |                                     |                                  |
| Temperature                                 | -20°C to 65°C (-4°F to 149°F)   |                                |                                  |                                  |                                     |                                  |
| Approvals                                   | CE, UL 497B   |                                |                                  |                                  |                                     |                                  |
| Surge Rated to Meet                         | ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C                                       |                                |                                  |                                  |                                     |                                  |
| Replacement Module                          | UTB5DPM   | UTB15DPM                       | UTB30DPM                         | UTB60DPM                         | UTB110DPM                           | UTB30DPSM                        |
| Replacement Module (Europe)                 | (702893)  | (702894)                       | (702896)                         | (702897)                         | (702898)                            | (702899)                         |

(1) UTB30DPS has one data/signal pair circuit equal in electrical specification rating to one pair of the UTB30DP product. The electrical specifications shown for the UTB30DPS is specific to the power supply (PS) circuit of the product.



## Features

- General purpose barrier – protection of low-voltage circuits and transducers
- Separate plug and base design – hot swappable feature allows ease of module replacement
- Multi stage protection – fine over-voltage protection, helps ensure lowest residual surge voltages reach sensitive equipment
- Common-mode and differential-mode protection – protects against both possible surge conditions
- Ease of grounding – through DIN mounting rail or via terminal
- Surge rating to 20 kA 8/20  $\mu$ s – ideal for exposed wiring
- EX series for use in intrinsically safe areas

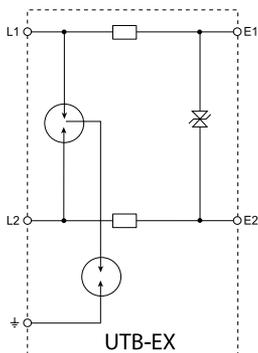
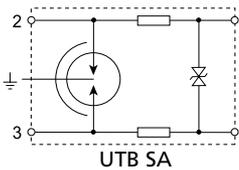
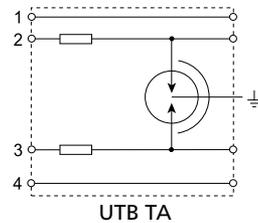


The UTB-TA and UTB-SA are specifically designed to protect telephone / modem circuits.

The UTB15EX and UTB30EX are BASEEFA approved versions for hazardous area applications (ATEX Category II 1G EEx ia IIC T4). They can be inserted without recertification into any IS loop where input <1.3W.

## Telecommunications Line Protection

| Model                                   | UTBSA  | UTBTA             |
|---|--|-------------------|
| Item Number for Europe                  | 702860   | 702850            |
| Frequency                               | 15 MHz   |                   |
| Max Discharge Current $I_{max}$         | 20 kA 8/20   | 500 A 8/20        |
| Max Line Current, $I_L$                 | 160 mA   |                   |
| Technology                              | GDT, PTC   |                   |
| Voltage Protection Level (8/20 $\mu$ s) | L-L: 340 V @ 3 kA  | L-L: 480 V @ 3 kA |
| Loop Resistance                         | 1.0 $\Omega$   |                   |
| Weight: kg (lbs)                        | 0.1 (0.22)   |                   |
| Enclosure                               | DIN 43 880, UL <sup>®</sup> 94V-0 thermoplastic, IP 20 (NEMA <sup>®</sup> -1)                              |                   |
| Connection                              | 1 mm <sup>2</sup> to 6 mm <sup>2</sup> (#18AWG to #10AWG)<br>Grounding via terminal or DIN rail connection |                   |
| Mounting                                | 35 mm top hat DIN rail   |                   |
| Temperature                             | -25°C to 65°C (-13°F to 149°F)   |                   |
| Approvals                               | CE   | CE, UL 497        |
| Surge Rated to Meet                     | ANSI/IEEE <sup>®</sup> C62.41.2-2002 Cat A, Cat B, Cat C   |                   |



## Data and Signal Line Protection

| Model                                   | UTB15EX  | UTB30EX                        |
|---|--|--------------------------------|
| Item Number for Europe                  | 702811   | 702821                         |
| Nominal Voltage                         | 3 V to 10 VAC, 5 V to 15 VDC   | 10 V to 21 VAC, 15 V to 30 VDC |
| Max Cont. Operating Voltage, $U_c$      | 12 VAC, 17VDC  | 23 VAC, 33 VDC                 |
| Frequency                               | 1 MHz  | 2 MHz                          |
| Max Discharge Current $I_{max}$         | 20 kA 8/20   |                                |
| Max Line Current, $I_L$                 | 400 mA   | 80 mA                          |
| Technology                              | GDT, Silicon   |                                |
| Voltage Protection Level (8/20 $\mu$ s) | L-L: 25 V @ 3 kA   | L-L: 44 V @ 3 kA               |
| Loop Resistance                         | 1.0 $\Omega$   |                                |
| Weight: kg (lbs)                        | 0.1 (0.22)   |                                |
| Enclosure                               | DIN 43 880, UL 94V-0 thermoplastic, IP 20 (NEMA <sup>®</sup> -1)   |                                |
| Connection                              | 1 mm <sup>2</sup> to 6 mm <sup>2</sup> (#18AWG to #10AWG)<br>Grounding via terminal or DIN rail connection |                                |
| Mounting                                | 35 mm top hat DIN rail   |                                |
| Temperature                             | -30°C to 65°C (-22°F to 149°F)   |                                |
| Approvals                               | CE, UL 497B, UL 913  |                                |
| Surge Rated to Meet                     | ANSI/IEEE <sup>®</sup> C62.41.2-2002 Cat A, Cat B, Cat C   |                                |



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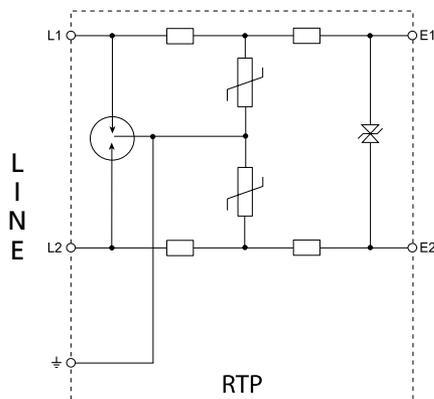
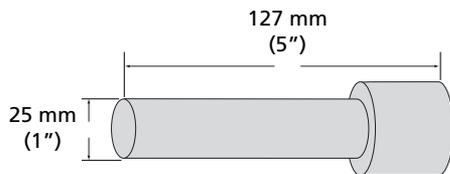
## Remote Transmitter Protector



### Features

- 3 stage protection – fine over-voltage protection helps ensure lowest residual surge voltage reaches sensitive equipment
- Flexible installation – enclosure can be installed “dead ended”, “T” configured or in-line
- Optimized for protection of 2-wire industrial 4-20mA loops – suitable for exposed locations
- Supports line currents up to 145mA – protect 24VDC powered equipment

The RTP is designed for the protection of industrial 4-20 mA loop connected transducers. The stainless steel enclosure can be installed in-line with the field conduit, or fitted to the spare transducer connection port. Installation is simplified as the protection circuit can be removed from the enclosure to connect field wiring to the screw terminals. The RTP employs a hybrid three stage clamping circuit to help ensure the best possible protection to sensitive field equipment.



EQUIPMENT

|   |   |
|---|---|
| <b>Model</b>  | RTP3034                                       |
| <b>Item Number for Europe</b>                           | 700865  |
| <b>Nominal System Voltage, <math>U_n</math></b>         | 30 VDC & 21 VAC                               |
| <b>Max Cont. Operating Voltage, <math>U_c</math></b>    | 33 VDC & 23 VAC                               |
| <b>Max Line Current, <math>I_L</math></b>               | 145 mA  |
| <b>Frequency</b>  | 3 dB @ 2 MHz (120 $\Omega$ )                  |
| <b>Max Discharge Current, <math>I_{max}</math></b>      | 20 kA 8/20 $\mu$ s (L+L)-PE                   |
| <b>Protection Modes</b>                                 | Differential & Common Mode                    |
| <b>Technology</b>                                       | GDT<br>MOV<br>Silicon                         |
| <b>Voltage Protection Level (8/20<math>\mu</math>s)</b> | L-L<br>44 V @ 3 kA                            |
| <b>Loop Resistance</b>                                  | 14.0 $\Omega$                                 |
| <b>Dimensions Dia. x L: mm (in)</b>                     | 25 x 127 (1 x 5)                              |
| <b>Weight: kg (lbs)</b>                                 | 0.34 (0.75)                                   |
| <b>Enclosure</b>  | 304 Stainless Steel                           |
| <b>Connection</b>                                       | $\leq$ 2.5 mm <sup>2</sup> (#14AWG)           |
| <b>Mounting</b>   | 3/4" NPT thread (14 threads per inch)         |
| <b>Temperature</b>                                      | -40°C to 65°C (-40°F to 149°F)                |
| <b>Humidity</b>   | 0% to 90%                                     |
| <b>Approvals</b>  | CE  |
| <b>Surge Rated to Meet</b>                              | ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C |

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Loadcell Protector

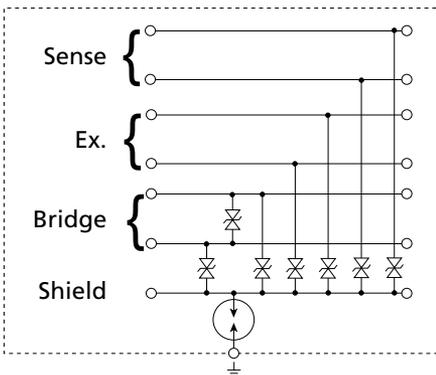


Features

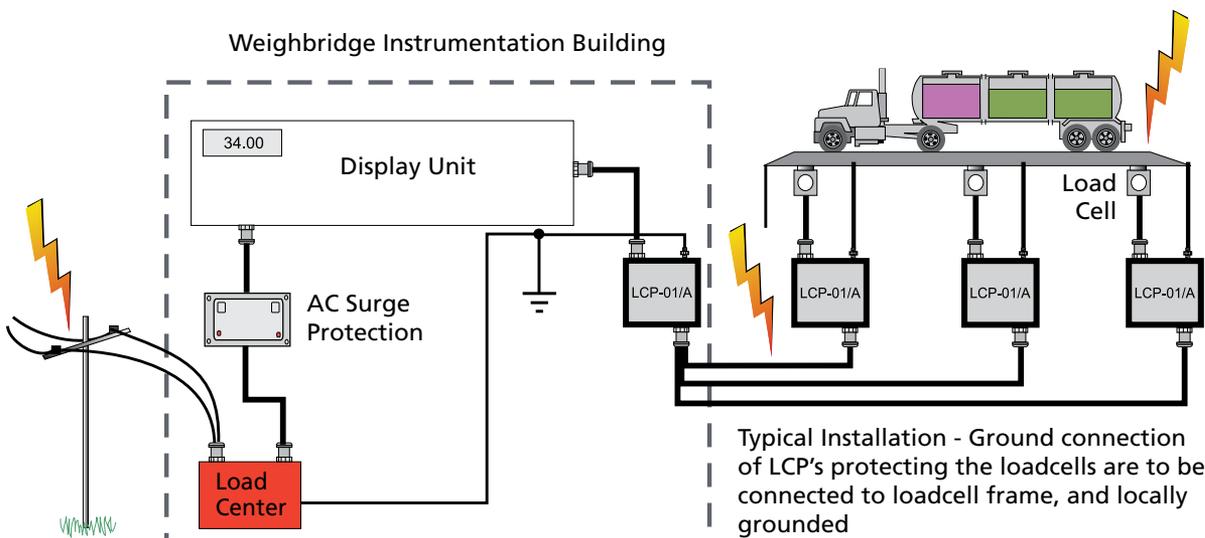
- 6 wires and shield protection – works with 4 or 6 wire systems
- Suitable for compression or tension cells
- Low series impedance – loadcells do not need recalibration
- NEMA®-12 (IP-55) rated – suitable for outdoor use
- Helps protect against excitation over-voltage – helps prevent loadcell damage

The Load Cell Protector (LCP) series is designed to provide protection to load cells from lightning induced transients. Experience has shown that the strain gauge bridge is easily damaged by surge and transients. Industrial cranes are also prime targets for lightning strikes. The LCP is well suited to such

applications to help provide protection for plate cells, tension cells and load pin cells installed on cranes. The LCP is designed for 4 or 6 wire systems. Protection of the bridge, as well as the excitation voltage source is provided, using low capacitance clamping devices in order to avoid ground loop problems.

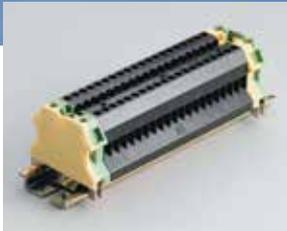


|                                  |  |
|----------------------------------|--|
| Model                            | LCP01A   |
| Item Number for Europe           | 701610   |
| Technology                       | Silicon Avalanche Diode  |
| Max Discharge Current, $I_{max}$ | 300 A 8/20 $\mu$ s (signal to shield)<br>10 kA 8/20 $\mu$ s (shield to ground)             |
| Dimensions H x D x W: mm (in)    | 75 x 56 x 110 (2.95 x 2.20 x 4.33)   |
| Weight: kg (lbs)                 | 0.25 (0.55)  |
| Enclosure                        | ABS, IP55 (NEMA®-12)   |
| Connection                       | Screw terminals for 4 or 6 wire loadcells  |
| Voltage Protection Level, $U_p$  | 30 V (signal to shield)<br>15 V 8/20 $\mu$ s (signal to signal)<br>90 V (shield to ground) |
| Temperature                      | -40°C to 80°C (-40°F to 176°F)   |
| Loop Resistance                  | 0.3 $\Omega$   |



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## Subscriber Line / High Speed Data Line Protection



DLT (#702721) available where screw terminal connections are required (2.5 mm<sup>2</sup>)

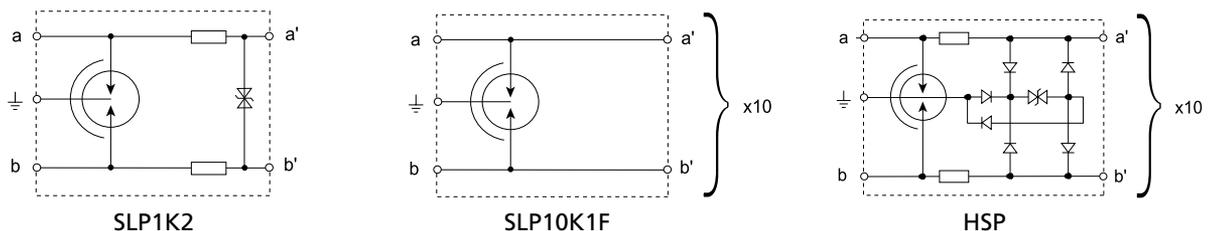
### Features

- Single and multi stage protection – primary or combination primary/secondary protectors
- Single pair and 10 pair protectors
- Simple installation into Krone-LSA® disconnect block
- L-L & L-G protection – for comprehensive protection
- HSP High Speed Protectors support 8Mbit/s digital and 12MHz analog networks

The Subscriber Line Protector (SLP) and High Speed Protector (HSP) are designed for the protection of telecommunication and data circuits that terminate on 10 pair Krone-LSA plus disconnect blocks. The DIN rail mount Data Line Termination (DLT) screw terminal block allows these protectors to be used in applications where disconnect blocks are not fitted.

The SLP1 K2 is a single pair protector, suited to protection of traditional voice circuits. The SLP10K1F is a 10 pair protector for voice and high speed data circuits.

The HSP series feature multiple protection stages providing enhanced protection. The K12, 36 and 72 are low voltage units suited to industrial/ signalling applications. The K230 is suited to protection of sensitive voice and high speed data circuits.



| Model                                       | HSP10K12                           | HSP10K36 | HSP10K72 | HSP10K230                 | SLP10K1F     | SLP1K2*                           |
|---|------------------------------------|----------|----------|---------------------------|--------------|-----------------------------------|
| Item Number for Europe                      | 700815                             | 700805   | 700850   | 700860                    | 701540       |                                   |
| Max Cont. Operating Voltage, U <sub>c</sub> | 13 VDC                             | 40 VDC   | 65 VDC   | 190 VDC                   |              |                                   |
| Max Discharge Current, I <sub>max</sub>     | 20 kA 8/20 μs (L+L)-E              |          |          |                           |              |                                   |
| Technology                                  | Multi stage                        |          |          |                           | Single stage | Multi stage                       |
| Connection                                  | Krone LSA Plus termination system  |          |          |                           |              |                                   |
| Frequency                                   | 12 MHz; 8 Mbits                    |          |          |                           |              | 3 MHz; 2 Mbits                    |
| Dimensions H x D x W: mm (in)               | 35 x 21 x 125 (1.36 x 0.83 x 4.92) |          |          |                           |              | 35 x 21 x 10 (1.38 x 0.83 x 0.37) |
| Weight: kg (lbs)                            | .02 (.05)                          |          |          |                           |              | .01 (.005)                        |
| Max Line Current, I <sub>L</sub>            | 150 mA                             |          |          |                           | 1,000 mA     | 120 mA                            |
| Temperature                                 | -20°C to 60°C (-4°F to 140°F)      |          |          |                           |              |                                   |
| Impedance Balance                           | <55 dB                             |          |          |                           | <48 dB       |                                   |
| Insertion Loss                              | <0.40 dB                           |          |          |                           | <0.75 dB     |                                   |
| Return Loss                                 | <20 dB                             |          |          |                           | <22 dB       |                                   |
| Loop Resistance                             | 16.4 Ω                             |          | 6.6 Ω    |                           | 0.2 Ω        | 20.0 Ω                            |
| Approvals                                   | C-Tick, CE                         |          |          | A-Tick, C-Tick, CE, UL497 |              | A-Tick, C-Tick, CE                |

\*Ground bar accessory, (P/N SLP-EB), required per 10 pair Krone-LSA block when using SLP1K2 protector.

## RJ11 Telephone Line Protection

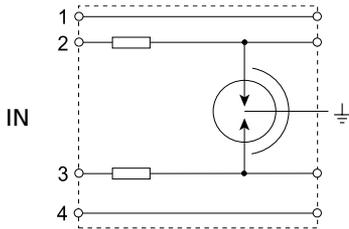


### Features

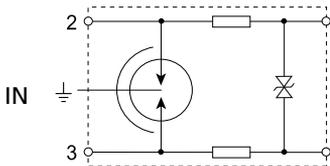
- RJ11 sockets – simple plug-in connection for 4 or 6 position RJ plugs
- 6.5" patch cord included – no additional cables required
- SLP RJ11 is UL 497A Listed
- L-L & L-G protection – for comprehensive protection
- Automatic over-current protection

The SLP1 RJ11 series of surge suppressors are designed to provide protection to telecommunication equipment connecting via RJ11 plugs. Designed for traditional (2 wire) telephone circuits, the product is also compatible with modems and ADSL circuits.

The SLP1 RJ11 is a UL Listed secondary protector intended for use in facilities where primary protective devices have been installed at the service entrance. The SLP1 RJ11A is a high-energy multi-stage primary protector intended for non-UL applications where higher surge ratings are required.



SLP1RJ11



SLP1RJ11A

| Model                              | SLP1RJ11  | SLP1RJ11A          |
|------------------------------------|---|--------------------|
| Max Cont. Operating Voltage, $U_c$ | <280 V  |                    |
| Max Discharge Current, $I_{max}$   | 500 A 8/20 $\mu$ s  | 20 kA 8/20 $\mu$ s |
| Dimensions H x D x W: mm (in)      | 38 x 28 x 76 (1.50 x 1.10 x 2.99)   |                    |
| Weight: g (lbs)                    | 50 (0.11)   |                    |
| Connection                         | 150 mm (6") 0.8 mm <sup>2</sup> (#18AWG) with earth 4 mm ring lug<br>165 mm (6.5") patch cord included<br>6 position RJ, 2 pins protected |                    |
| Mounting                           | Adhesive backing  |                    |
| Approvals                          | UL  | A-Tick             |
| Voltage Protection Level, $U_p$    | 110 V T-R<br>500 V @ 125 A (T+R)-G  |                    |
| Max Line Current, $I_L$            | 160 mA  | 120 mA             |
| Temperature                        | -40°C to 65°C (-40°F to 149°F)  |                    |

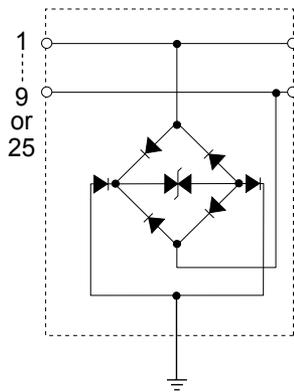


Data Equipment Protection



**Features**

- Premium 1500 Watt (>100 Amps 8/20µs) capability – robust protection
- Models to cover RS-232, RS-423, RS-422 and RS-485 protocols
- Designed to provide both line to signal-ground and signal-ground to protective-earth protection
- DEP RS232/25/25 protects all wires – circuit wiring/pin configuration does not need to be known
- Plug-in protection – simple to install



The entire line of Data Equipment Protectors has been designed to protect serial I/O interface equipment from the damaging effects of induced surges and transients. The DEP protectors are packaged in male-to-female DB9 and DB25 cases for simple installation at the serial ports of terminal equipment. For RS232/423 circuits, DEP models will allow peak working voltage of up to 15 volts, with 9 or 25 pin protection. For RS422/ 485 circuits, the DEP RS422/9/9 allows up to 9 volts working, and is packaged in a DB9 case. A flying earth lead is provided for connection to protective earth.

|   |                    |                 |             |
|---|--------------------|-----------------|-------------|
| <b>Model</b>                                      | DEPRS2322525D      | DEPRS23299D     | DEPRS42299D |
| <b>Max Cont. Operating Voltage, U<sub>c</sub></b> | 15 VDC             | 15 VDC          | 9 VDC       |
| <b>Nominal Discharge Current, I<sub>n</sub></b>   | 100 A 8/20 µs      |                 |             |
| <b>Protection Modes</b>                           | All pins to ground |                 |             |
| <b>Connection</b>                                 | DB25 Male/Female   | DB9 Male/Female |             |

Local Area Network Protection



**Features**

- A range of RJ45 based surge protection products
- Compact, in-line installation
- High speed, high energy handling capability
- Low shunt capacitance to reduce signal loss.
- Adaptability to most industry applications



The Local Area Network Protector RJ45 series suits a range of applications from 10BaseT, 100BaseT, 1000BaseT to Power over Ethernet networks. The LANRJ45C6 is designed for up to 1000BaseT Category 6 Ethernet application for the protection of single circuits. It can be used individually, DIN Rail mounted

or used with the LANRJ45RAK frame for 19" rack mount applications of up to 16 units per frame. The LANRJ45POE is designed for up to Category 6 Ethernet application for the protection of single circuits in addition to the application of Power over Ethernet making this product extremely versatile.

| Model                                     | LANRJ45POE                                 | LANRJ45C6 | LANRJ45RAK     |
|---|--|-----------|----------------|
| Item Number for Europe                    | 700529                                     | 700528    | 700531         |
| Clamping Voltage                          | 60 VDC                                     | 7.5 VDC   |                |
| Frequency                                 | 100 Mbits                                  | Cat 6     |                |
| Nominal Discharge Current, I <sub>n</sub> | 500 A 8/20 μs                              |           |                |
| Connection                                | RJ45                                       |           |                |
| Mounting                                  | Din Rail                                   |           | 19" rack mount |
| Approvals                                 | CE   |           |                |
| Surge Rated to Meet                       | ANSI®/IEEE® C62.41.2 Cat A<br>IEC 61643-21 |           |                |



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## Community Antenna and Closed Circuit Television Protection



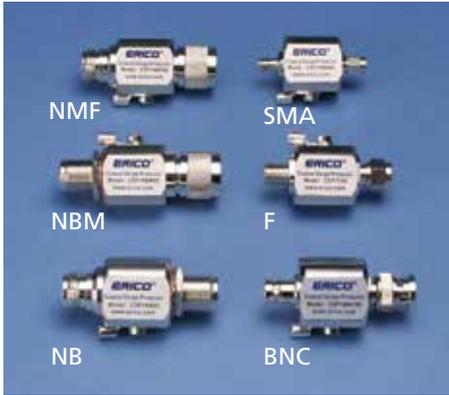
### Features

- Robust high energy protection
- Compact package for limited space requirements
- Isolated ground – does not introduce unwanted noise
- The CATVHF is designed for high frequency applications in addition to indoor or outdoor installation - suitable for digital cable.

The Closed Circuit and Community Antenna Television range of surge protectors offers a variety of protection solutions for such applications. The CATV/CCTV surge protection range is designed to protect sensitive electronic equipment from damage due to voltage transients from either the direct or indirect effects of lightning or ground potential rise.

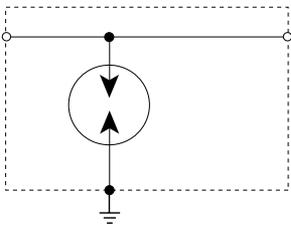
| Model                                       | CATVMF  | CATVF  | CCTV12                               | CATVHF                               |
|---|---|--|--------------------------------------|--------------------------------------|
| Item Number for Europe                      | 702525  | 702535                                       | 703000                               | 700746                               |
| Max. Operating Voltage/Spark Over           | 48 VDC/60 VDC                                     | 48 VDC/60 VDC                                | +/- 14 VDC/30-36 V                   | 180 V @ 10k V/μs                     |
| Nominal Discharge Current, I <sub>max</sub> | 5 kA 8/20 μs                                      |  | 10 kA 8/20 μs                        | 5 kA 8/20 μs                         |
| Frequency                                   | 1 GHz   |  | 100 MHz/16 Mbits                     | 2 GHz                                |
| Attenuation                                 | <0.5dB<br>47MHz - 860MHz                          |  | 100 MHz                              | -1dB @ 1GHz<br>-2dB @ 1GHz           |
| Impedance                                   | 50 - 75 Ω   |  |                                      |                                      |
| Voltage Protection Level (8/20μs)           | 600 V @ 5 kA                                      |  | 60 V @ 500 A                         | 90 V @ 500 A                         |
| Dimensions H x D x W: mm (in)               | 70 x 17 x 17<br>(2.76 x 0.67 x 0.67)              | 78 x 17 x 17<br>(3.07 x 0.67 x 0.67)         | 90 x 28 x 22<br>(3.54 x 1.10 x 0.87) | 96 x 31 x 63<br>(3.78 x 1.22 x 2.48) |
| Weight: g (oz)                              | 26 (0.92)   | 30 (1.06)                                    | 60 (2.12)                            | 115 (4.06)                           |
| Enclosure                                   | Indoor  |  |                                      | Outdoor                              |
| Connection                                  | RF 9.5 mm Coax (M/F)<br>120 mm (4.5") ground lead | F-Type, Female,<br>120 mm (4.5") ground lead | BNC, Female                          | F-Type, Female                       |
| Mounting                                    | In-line insertion                                 |  |                                      | Screw mount                          |
| Temperature                                 | -25°C to 70°C (-13°F to 158°F)                    |  |                                      |                                      |
| Approvals                                   | CE  |  |                                      | -                                    |

# Coaxial Surge Protection



## Features

- Simple plug-in installation
- Supplied with adjustable right angled grounded mounting block or flying lead ground
- Low Insertion and Return Loss
- Wide Operating Frequency Spectrum
- Field serviceable, with replaceable gas arrestor



The Coaxial Surge Protector (CSP) family of surge diverters is designed to provide robust and reliable protection from transients on coaxial antenna RF feeder cables. They are comprised of a leadless gas arrestor housed in a chrome plated brass block. Careful design and precision machining has allowed the match between the characteristic impedance of the unit and the cable to be optimized. This attention to detail has resulted in a unit capable of operating at typical power and frequency levels of 900W and 3GHz respectively, while minimizing the insertion and return losses.

|   |   |            |                       |            |                         |            |
|---|---|------------|-----------------------|------------|-------------------------|------------|
| <b>Model</b>                                    | CSP1BNC90   | CSP1BNC600 | CSP1NMF90             | CSP1NMF600 | CSP1NB90                | CSP1NB600  |
| <b>Connection</b>                               | BNC, Male / Female  |            | N-Type, Male / Female |            | N-Type, Female / Female |            |
| <b>Spark Over Voltage @100V/μs</b>              | 450V  | 1,100V     | 450V                  | 1,100V     | 450V                    | 1,100V     |
| <b>Spark-Over Voltage @100V/s</b>               | 72V-108V  | 480V-720V  | 72V-108V              | 480V-720V  | 72V-108V                | 480V-720V  |
| <b>Model</b>                                    | CSP1NBM90   | CSP1NBM600 | CSP1F90               | CSP1F600   | CSP1SMA90               | CSP1SMA600 |
| <b>Connection</b>                               | N-bulkhead, Male / Female                                     |            | F-Type, Male / Female |            | SMA, Male / Female      |            |
| <b>Spark Over Voltage @100V/μs</b>              | 450V  | 1,100V     | 450V                  | 1,100V     | 450V                    | 1,100V     |
| <b>Spark-Over Voltage @100V/s</b>               | 72V-108V  | 480V-720V  | 72V-108V              | 480V-720V  | 72V-108V                | 480V-720V  |
| <b>Frequency</b>                                | DC to 3 GHz   |            |                       |            |                         |            |
| <b>Nominal Discharge Current, I<sub>n</sub></b> | 20kA 8/20 μs  |            |                       |            |                         |            |
| <b>Dimensions H x D x W: mm (in)</b>            | 25 x 57 x 25<br>(1 x 2.24 x 1)                                |            |                       |            |                         |            |
| <b>Weight: kg (lbs)</b>                         | 0.2 (0.44)  |            |                       |            |                         |            |
| <b>Enclosure</b>                                | IP20 (NEMA®-1)  |            |                       |            |                         |            |
| <b>Mounting</b>                                 | Separate mounting bracket and ground lead connection provided |            |                       |            |                         |            |
| <b>Approvals</b>                                | CE, UL® 497E  |            |                       |            |                         |            |
| <b>Impulse Life</b>                             | 400 impulses @ 500A 10/1000μs                                 |            |                       |            |                         |            |
| <b>Insulation Resistance</b>                    | 10 GΩ   |            |                       |            |                         |            |
| <b>Temperature</b>                              | -40°C to 90°C (-40°F to 194°F)                                |            |                       |            |                         |            |
| <b>Capacitance</b>                              | 1.5 pF  |            |                       |            |                         |            |

**Note:** To select the appropriate protection voltage, use the following procedure:

1. Determine the transmitter power in Watts (P).
2. Determine the VSWR. If unsure, use 1.5.
3.  $V_{peak} = VSWR \times 1.4 \times \sqrt{(50P)}$ .
4. If  $V_{peak} < 72V$ , use CSP XXX 90.  
If  $V_{peak} > 72V$  and  $< 480V$ , use CSP XXX 600.
5. Taking this value of VSWR and allowing a little margin, this means that typically the 90V protector is used for Receivers and Transmitters up to 20W, while the 600W protector can be used for transmitters up to 900W.



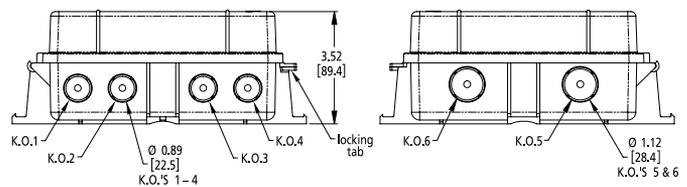
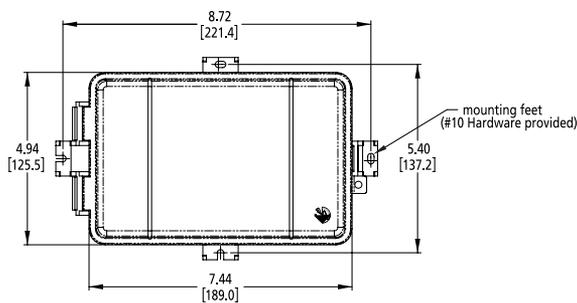
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## Outdoor Weatherproof Enclosure



### Features

- Polymeric base and housing is impact resistant, UV-stabilized, 94V-0 Flame Class Rating
- Integral mounting base for easy installation
- Quick-release latch with provisions for a lock
- Slots for straps (Part number CABTIESS) allowing mounting on both vertical and horizontal poles
- Grounding lug mounting option
- Two liquid-tight strain reliefs included
- 106 mm long DIN rail included
- Stainless steel mounting hardware for long life and corrosion resistance
- Enclosure meets UL® 497B rain test requirements



The outdoor weatherproof enclosure, part of the ERICO line of facility electrical protection products, features a polymeric base and housing that is impact resistant and UV stabilized for superior durability and weatherability.

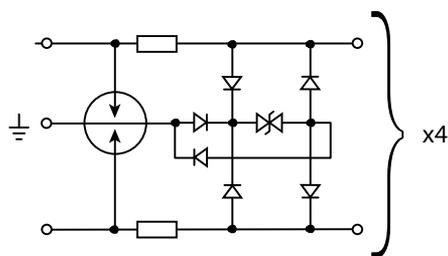
Straps can be slipped through convenient slots on the housing to allow mounting on both vertical and horizontal poles. The outdoor weatherproof enclosure

also features an integral mounting base and a quick-release latch for easy installation and operation.

For added convenience, the enclosure contains stainless steel mounting hardware, two liquid tight strain reliefs, and a 106 mm long DIN rail. A ground lug provided on the outside of the enclosure allows an attachment point to earth ground.

|  |   |
|--|---|
| <b>Model</b>                           | MWE   |
| <b>Weight: kg (lbs)</b>                | 0.54 (1.20)   |
| <b>Enclosure</b>                       | UL® 94V-0 thermoplastic   |
| <b>Connection</b>                      | Gray strain relief accepts cable diameter 4.6 mm (0.18") thru 11.2 mm (0.44") |
| <b>Mounting</b>                        | Pole mount (use CABTIESS sold separately); Wall mount (#10 hardware included) |
| <b>Useable Interior Space: mm (in)</b> | 172.7 x 109.2 x 78.7 (6.8 x 4.3 x 3.1)  |
| <b>Internal Standoffs</b>              | Qty 5, 6-32 Tapping, 41 mm (1.61") spacing, 8 mm (0.32") height               |
| <b>Knockout Locations</b>              | Qty 4 on side, 2 on opposite side   |
| <b>Knockouts (Qty. 6)</b>              | Qty 4, 22.5 mm (0.885") Diameter hole; Qty 2, 28.5 mm (1.12") Diameter hole   |

## Broadband Wireless Power Over Ethernet Surge Protection



### Features

- Ideal for 10/100 Base-T Cat5e protection
- All four twisted pairs protected
- Primary and secondary protection
- Weatherproof enclosure
- High-energy and high-speed capability
- Designed to minimize insertion loss and cross-talk
- Up to 25 kA 8/20  $\mu$ s protection
- Two strain reliefs, grounding lug, and #10 mounting hardware included
- Enclosure meets UL<sup>®</sup> 497B rain test requirements

The MWECSPOE offers economical and reliable protection of Power over Ethernet (PoE)-powered equipment from lightning surges and other transients. The MWECSPOE, part of the ERICO line of facility electrical protection products, is enclosed in a weatherproof enclosure for protection in harsh environments. It can be easily mounted on a flat surface or pole. It is ideal for 10/100 Base-T Cat5e protection and connects to the service in a pass-through configuration.

|  |   |
|--|---|
| <b>Model</b>   | MWECSPOE  |
| <b>Nominal System Voltage</b>                            | IEEE <sup>®</sup> 802.3 10/100 Base T PoE   |
| <b>Max Continuous Operating Voltage <math>U_c</math></b> | 60 VDC  |
| <b>Frequency</b>   | 10/100 Base T   |
| <b>Max Line Current, <math>I_L</math></b>                | 1 A   |
| <b>Max Discharge Current <math>I_{max}</math></b>        | 25 kA 8/20 $\mu$ s  |
| <b>Nominal Discharge Current</b>                         | 20 kA 8/20 $\mu$ s  |
| <b>Protection Modes</b>                                  | Differential & Common Mode  |
| <b>Technology</b>  | Multi stage   |
| <b>Voltage Protection Level (8/20 <math>\mu</math>s)</b> | <50V L-L @ 3kA  |
| <b>Weight: kg (lbs)</b>                                  | 0.60 (1.32)   |
| <b>Enclosure</b>   | UL 94V-0 thermoplastic  |
| <b>Connection</b>  | Screw terminals (28 AWG to 14 AWG)<br>Gray strain relief accepts cable diameter 4.6 mm (0.18") thru 11.2 mm (0.44") |
| <b>Mounting</b>  | Pole mount (use CABTIESS sold separately);<br>Wall mount (#10 hardware included)                                    |
| <b>Temperature</b>                                       | -40°C to 80°C (-40°F to 176°F)  |
| <b>Approvals</b>   | UL 497B   |
| <b>Surge Rated to Meet</b>                               | ANSI <sup>®</sup> /IEEE <sup>®</sup> C62.41.2 Cat A, Cat B, Cat C   |
| <b>Breakdown Voltage (L-L)</b>                           | 60-90V  |



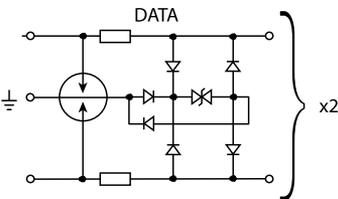
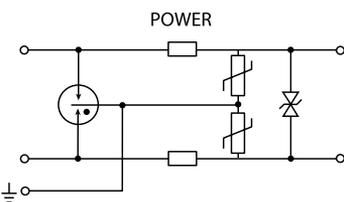
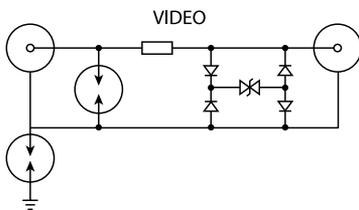
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# Outdoor Surveillance System Surge Protector



## Features

- Surge protection for coaxial-fed video surveillance cameras with PTZ capability
- Weatherproof enclosure
- Designed to protect power, video and data lines
- Up to 25 kA 8/20  $\mu$ s protection
- Low clamping voltage
- Four strain reliefs, grounding lug, and #10 mounting hardware included
- Enclosure meets UL<sup>®</sup> 497B rain test requirements



The MWESS is designed to provide economical and reliable surge protection from lightning and other transients for coax-fed video surveillance cameras with PTZ capability. The MWESS, part of the ERICO line of facility electrical protection products, is enclosed in a weatherproof enclosure for protection in harsh environments. It can be easily mounted on a flat surface or pole.

The MWESS connects to the service in a pass-through configuration. The MWESS includes four strain reliefs, a grounding lug, and #10 mounting hardware.

|  |   |
|--|---|
| <b>Model</b>   | MWESS   |
| <b>Nominal System Voltage</b>                            | 24VAC/12VDC (Power), <5VDC (Data), <5Vpp (video)  |
| <b>Frequency</b>   | 100 MHz/16 Mbits  |
| <b>Max Line Current, I<sub>L</sub></b>                   | 3 A   |
| <b>Max Discharge Current I<sub>max</sub></b>             | 25 kA 8/20 $\mu$ s (DATA/POWER)   |
| <b>Nominal Discharge Current</b>                         | 20 kA 8/20 $\mu$ s  |
| <b>Protection Modes</b>                                  | Differential & Common Mode  |
| <b>Technology</b>  | Multi stage   |
| <b>Voltage Protection Level (8/20 <math>\mu</math>s)</b> | Power/Data : <50V L-L @ 3kA; Video: 60 V @ 500 A  |
| <b>Weight: kg (lbs)</b>                                  | 0.60 (1.32)   |
| <b>Enclosure</b>   | UL 94V-0 thermoplastic  |
| <b>Connection</b>  | BNC, Female, Screw terminals (28 AWG to 14 AWG); Gray strain relief accepts cable diameter 4.6 mm (0.18") thru 11.2 mm (0.44"); Black strain relief accepts cable diameter 5.8 mm (0.26") thru 13.9 mm (0.546") |
| <b>Mounting</b>  | Pole mount (use CABTIESS sold separately); Wall mount (#10 hardware included)   |
| <b>Temperature</b>                                       | -40°C to 80°C (-40°F to 176°F)  |
| <b>Approvals</b>   | UL 497B   |
| <b>Surge Rated to Meet</b>                               | ANSI <sup>®</sup> /IEEE <sup>®</sup> C62.41.2-2002 Cat A, Cat B, Cat C  |
| <b>Max Continuous Operating Voltage U<sub>c</sub></b>    | 28 VAC / 40 VDC (Power) 9 VDC (Data), 33 VDC (Video)  |
| <b>Breakdown Voltage (L-L)</b>                           |   |
| <b>Video 100V/s</b>                                      | 25 - 50 V   |
| <b>Data 100V/s</b>                                       | 5 - 10 V  |
| <b>Power 100V/s</b>                                      | 30 - 50 V   |
| <b>Breakdown Voltage (L-G)</b>                           | 95 - 110 V  |

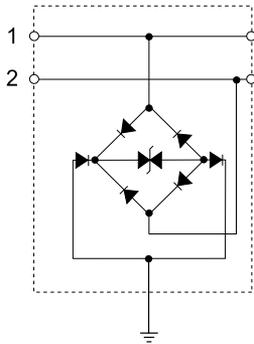
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## Outdoor Local Area Network Protector



### Features

- Designed for the protection of up to two PoE-powered devices, such as surveillance cameras, subscriber units, traffic lights, etc.
- Weatherproof enclosure
- Compact, in-line installation
- High-speed capability
- Low-shunt capacitance to reduce signal loss
- Adaptability to most industry applications
- Enclosure meets UL® 497B rain test requirements



The MWERJ451 and MWERJ452 series of broadband wireless surge protection products are designed to provide economical and reliable protection from lightning and other transients. Part of the ERICO line of facility electrical protection products, the MWERJ451 and MWERJ452 are enclosed in a weatherproof enclosure for protection in harsh environments. They can be easily mounted on a flat surface or pole. The products connect to the service in a pass-through configuration.

| Model   | MWERJ451   | MWERJ452    |
|---|--|-------------|
| Nominal System Voltage                          | IEEE® 802.3 10/100 Base T PoE  |             |
| Max Continuous Operating Voltage U <sub>c</sub> | 66 VDC   |             |
| Frequency                                       | 10/100 Base T  |             |
| Nominal Discharge Current                       | 500 A 8/20 μs  |             |
| Protection Modes                                | All 8 pins   |             |
| Weight: lbs (kg)                                | 1.43 (0.65)  | 1.54 (0.70) |
| Enclosure                                       | UL® 94V-0 thermoplastic  |             |
| Connection                                      | RJ45   |             |
| Mounting  | Pole mount (use CABTIESS sold separately);<br>Wall mount (#10 hardware included) |             |
| Temperature                                     | -40°C to 80°C (-40°F to 176°F)   |             |
| Surge Rated to Meet                             | ANSI®/IEEE® C62.41.2 Cat A<br>IEC® 61643-21                                      |             |
| Protectors                                      | 1  | 2           |



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## Potential Equalization Clamp

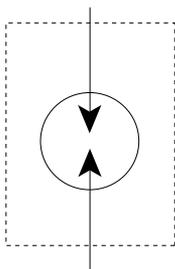


### Features

- High peak current capability – long service life
- Weatherproof enclosure – suitable for direct burial
- The PEC100 is ATEX approved – suitable for use in potentially explosive atmospheres
- The PEC150 offers a higher surge rating of 50kA 10/350µs specially designed for Class N (Normal Duty) to EN50164-3.

The PEC is an equipotential bonding device that is designed to minimize damage in applications where separated ground systems are required. The PEC100 model is ATEX approved making the device suitable for use in explosion hazard areas

such as the protection of pipeline insulated joints. The PEC150 model is a higher surge rated product for more exposed locations subject to partial direct lightning strike.



| Model                                    | PEC100  | PEC150                             |
|--|---|------------------------------------|
| Item Number for Europe                   | 702900  | 702901                             |
| Spark-Over Voltage @100V/s               | 350 V*  | 800 V*                             |
| Max Discharge Current, I <sub>max</sub>  | 100 kA 8/20 µs  | 150 kA 8/20 µs                     |
| Technology                               | Gas Discharge Tube (Auto reset)                       |                                    |
| Insulation Resistance                    | >1 GΩ   |                                    |
| Capacitance                              | <15.0 pF  |                                    |
| Voltage Protection Level, U <sub>p</sub> | 800 V @ 1 kV/µs                                       | 1.5 kV @ 1 kV/µs                   |
| Impulse Current, I <sub>imp</sub>        | 25 kA 10/350 µs                                       | 50 kA 10/350 µs                    |
| Dimensions L x Ø: mm (in)                | 138 x 25 (5.43 x 0.98)                                | 105 x 42 (4.13 x 1.65)             |
| Weight: kg (lbs)                         | 0.5 (1.10)  | 0.7 (1.54)                         |
| Enclosure                                | Suitable for outdoor or direct burial                 |                                    |
| Connection                               | 450 mm of 16 mm <sup>2</sup> (17" of #5AWG) conductor |                                    |
| Temperature                              | -30°C to 70°C (-22°F to 158°F)                        |                                    |
| Approvals                                | CE, ATEX, BASEEFA Approved, IEC® 60079-0-15           | CE, EN50164-3:2004 N (normal duty) |

\*Spark-over voltage has a tolerance of +/- 20%

## DINLINE Decoupling Inductor/ DINLINE Alarm Relay & Surge Counter



### Features

- 35 mm<sup>2</sup> tunnel terminals – accepts large cable size
- 63A model features top and bottom terminals – flexible installation
- The DINLINE Alarm Relay (DAR) is used with TDF products where alarm contacts are required for remote signaling
- The TDS-SC Surge Counter provides a non-resettable record of the number of surges diverted
- Use for decoupling of spark gaps and MOVs – allows correct coordination of different SPD technologies

Decoupling inductors are installed between spark gap and MOV protection devices to help ensure correct coordination. As the decoupling inductors are installed in series with the load, two units are available, a compact unit for circuits up to 35A and a larger unit for 63A circuits.

The DAR (DINLINE Alarm Relay) can be connected to TDF units to provide potential free change-over alarm

contacts. The TDS SC (Surge Counter) unit is designed to provide visual indication of the number of surges registered. It uses a current transformer through which the ground conductor connecting to one, or all, of the surge protection modules is fed. Current diverted by the operation of the surge module, which exceeds a 300A trip threshold, will be registered on the counter.

|                                      |  |
|--------------------------------------|--|
| <b>Model</b>                         | TDSSC  |
| <b>Status</b>                        | Maximum count 9999 Non-resettable                                |
| <b>Dimensions H x D x W: mm (in)</b> | 90 x 68 x 36 (3.54 x 2.68 x 1.42)                                |
| <b>Module Width</b>                  | 2 M  |
| <b>Weight: kg (lbs)</b>              | 0.4 (0.88)   |
| <b>Enclosure</b>                     | DIN 43 880, UL 94V-0 thermoplastic, IP 20 (NEMA <sup>®</sup> -1) |
| <b>Connection</b>                    | 1 mm <sup>2</sup> to 6 mm <sup>2</sup> (#18 AWG to #10)          |
| <b>Mounting</b>                      | 35 mm top hat DIN rail   |
| <b>Temperature</b>                   | -35°C to 55°C (-31°F to 131°F)                                   |
| <b>Approvals</b>                     | AS3260, C-Tick, CE, CSA 22.2                                     |





## Features

- 1mA nominal (0.8 - 1.2mA) test current
- 1kV/s nominal (0.8-1.2kV/s) test voltage slwe rate
- 3 digit LCD display
- Test leads supplied with probes and removable crocodile clips

The MGA-TESTER is designed for rapid testing of the integrity of both metal oxide varistors (MOVs) and gas arresters (gas discharge tubes). This portable microprocessor unit is designed to test surge components with ratings up to 900V.

Because standard MOVs and gas arresters do not provide the user with a visual indication of the integrity of the protection capacity an external means of testing is required. It is impossible to predict when these failures will occur without some form of testing.

As MOVs approach the end of their life cycle they exhibit a change in tolerance levels. The MOV & Gas Arrester Test Unit is specifically designed to identify this situation and allows the operator to effect remedial replacement to the devices which are nearing the end of their life cycle. The MOV and Gas Arrester Test Unit will also indicate if a MOV is non functional.

|                                      |                                    |
|--------------------------------------|------------------------------------|
| <b>Model</b>                         | MGATESTER                          |
| <b>Dimensions H x D x W: mm (in)</b> | 195 x 43 x 99 (7.67 x 1.70 x 3.90) |
| <b>Weight: kg (lbs)</b>              | 0.68 (1.50)                        |

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[www.erico.com](http://www.erico.com)



**AUSTRALIA**  
Phone 1-800-263-508  
Fax 1-800-423-091



**CHINA**  
Phone +86-21-3430-4878  
Fax +86-21-5831-8177



**HUNGARY**  
Phone 06-800-16538  
Fax +39-0244-386-107



**NORWAY**  
Phone 800-100-73  
Fax 800-100-66



**SWITZERLAND**  
Phone 0800-55-86-97  
Fax 0800-55-96-15



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Phone 0800-757-48  
Fax 0800-757-60



**DENMARK**  
Phone 808-89-372  
Fax 808-89-373



**INDONESIA**  
Phone +62-21-575-0941  
Fax +62-21-575-0942



**POLAND**  
Phone +48-71-349-04-60  
Fax +48-71-349-04-61



**THAILAND**  
Phone +66-2-267-5776  
Fax +66-2-636-6988



**BRAZIL**  
Phone +55-11-3623-4333  
Fax +55-11-3621-4066



**FRANCE**  
Phone 0-800-901-793  
Fax 0-800-902-024



**ITALY**  
Phone 800-870-938  
Fax 800-873-935



**SINGAPORE**  
Phone +65-6-268-3433  
Fax +65-6-268-1389



**UNITED ARAB EMIRATES**  
Phone +971-4-881-7250  
Fax +971-4-881-7270



**CANADA**  
Phone +1-800-677-9089  
Fax +1-800-677-8131



**GERMANY**  
Phone 0-800-189-0272  
Fax 0-800-189-0274



**MEXICO**  
Phone +52-55-5260-5991  
Fax +52-55-5260-3310



**SPAIN**  
Phone 900-993-154  
Fax 900-807-333



**UNITED KINGDOM**  
Phone 0808-2344-670  
Fax 0808-2344-676



**CHILE**  
Phone +56-2-370-2908  
Fax +56-2-369-5657



**HONG KONG**  
Phone +852-2764-8808  
Fax +852-2764-4486



**NETHERLANDS**  
Phone 0800-0200-135  
Fax 0800-0200-136



**SWEDEN**  
Phone 020-790-908  
Fax 020-798-964



**UNITED STATES**  
Phone 1-800-753-9221  
Fax +1-440-248-0723

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