

**ERITECH®**

# CRITEC® Surge Protection Products



**ERICO®**



*Lightning strikes and the dangerous surges and transients induced by lightning, as well as surges caused by motor switching and power supply regulation problems, represent a direct threat to people, building facilities, electrical and electronic equipment.*

*ERICO® recognizes that no single technology can protect a facility from the damaging effects of lightning and induced transients, which can severely damage or destroy electronic systems. An integrated approach is required to provide effective direct strike protection and grounding, in combination with effective surge protection, so that valuable assets, data and personnel remain secure and safe.*

*In order to provide the optimum level of protection, ERICO has developed a Six Point Plan of Protection, incorporating direct strike protection and grounding and surge protection for power and data lines. This protection plan, combined with engineering and manufacturing excellence established over the last century, has helped position ERICO as a global supplier of premium performance protection products.*



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# Introduction

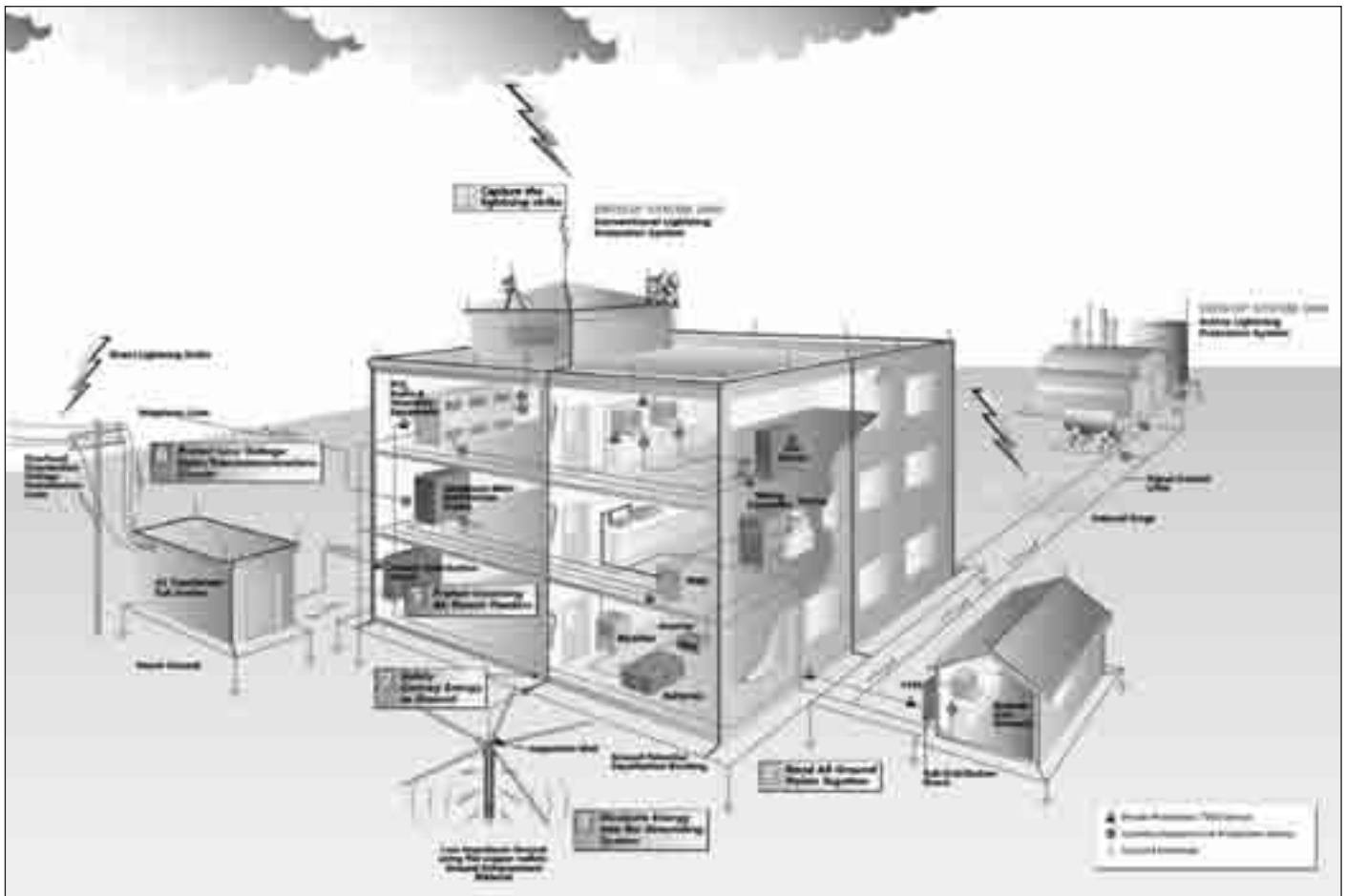
By following the Six Point Plan of Protection, ERICO® customers are able to implement effective solutions to individual lightning, grounding and surge problems while retaining an integrated protection philosophy. The products and concepts outlined in this catalog relate to points 5 & 6 of the ERICO Six Point Plan.

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 ERICO® Six Point Plan of Protection

- 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 energy into the grounding system.**  
Dissipate 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.

According to the Insurance Information Institute, NY, (NY Press Release 11 August 1989): Lightning and over-voltage transients cause damage to property, electrical, electronic and communications equipment estimated to be more than US\$1.2 billion dollars per year in the US alone. This represents approximately 5% of all insurance claims in the US. Costs in more lightning prone regions of the world are even greater.

According to Holle, et al., Journal of Applied Met, Vol 35, No.8, August 1996: Insurance claims to lightning and over-voltage damage amount to US\$332 million annually in the US. On average this represents one claim for every 57 lightning strikes in the US.

## 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.

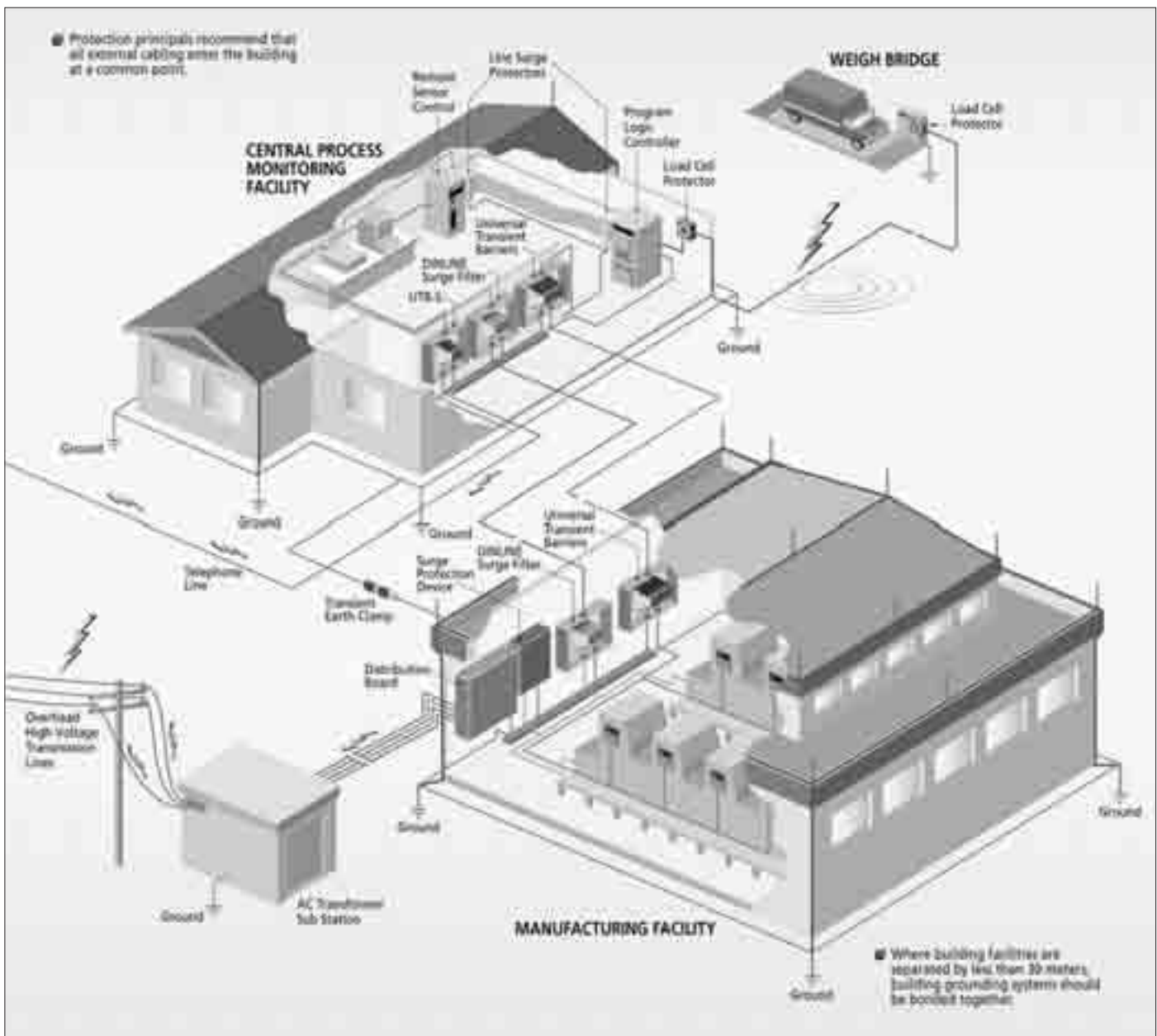


# The Need for Coordinated Protection

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 the ERICO® Six Point Plan of Protection was developed. 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 (8/20μs)					
ANSI/IEEE® C62.41			CAT C	CAT B	CAT A
IEC® 61643-1 Test Class	I		I, II	II	III
VDE Classification	A		B	C	D
	POINT-OF-ENTRY HIGHLY EXPOSED OR CRITICALLY IMPORTANT SITES	POINT-OF-ENTRY EXPOSED OR RURAL SITES	POINT-OF-ENTRY INNER CITY SITES	SUB CIRCUITS OR NEAR TO POINT-OF-ENTRY	DISTRIBUTED CIRCUITS, POWER OUTLETS, CIRCUITS REMOTE 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		
		TDS CRITEC® MOVTEC & MPM		
		TDX200		
			TDX100	
				TDX50
		TSG-SRF		
		TSG/SGD		
		DSD1150		
		TDS1100		
		DSD160		
			TDS150 & TDS350	
			DSD140 & DSD340	
				DSD110
				TDF
				DSF

# 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 structures 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 new IEC<sup>SM</sup> 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

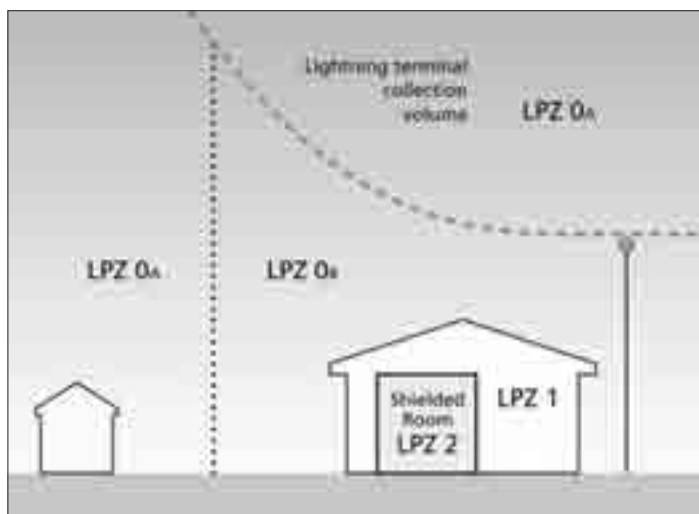
standard postulates that under a LPL I the magnitude of a direct strike to the structure's LPS may be as high as 200kA 10/350. While this level is possible, its statistical probability of occurrence is approximately 1%. In other words, 99% of discharges will be less than this postulated 200 kA peak current 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 200kA has been considered. It follows that the threat level to the equipotential bonding SPDs will be less than 25kA 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 10kA 8/20, while under Scenario II it is considered to be 10kA 10/350 (exposure Level 3).



Protection zones defined by specific product application.

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.



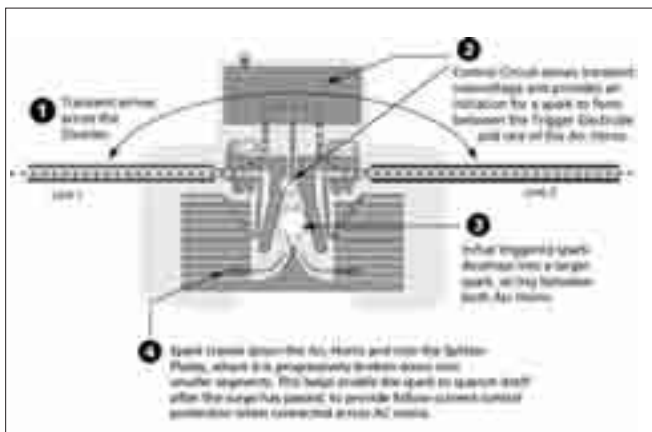
# Advanced Technologies – The ERICO® Advantage

## Triggered Spark Gap (TSG) Technology

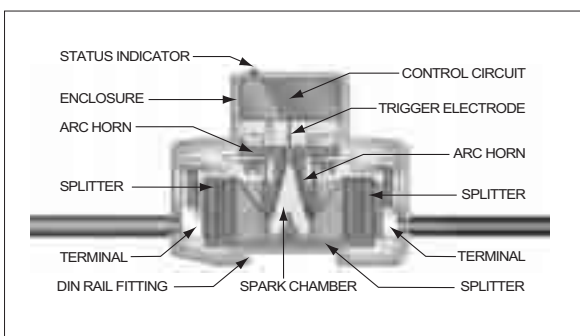
One of the criticisms of traditional spark gap technology has been the high initiating voltage required to form the arc, typically as much as three to four thousand volts. Clearly this is inappropriate for sensitive AC supply where surges of several hundred volts can be lethal to equipment. ERICO® has addressed this problem by incorporating a triggering device, which senses the arrival of a transient and initiates a spark to ionize the region surrounding the spark gap electrodes. This enables the spark gap to operate on significantly lower transient voltages.

A second major criticism of traditional spark gaps has been their follow-current performance. Spark gaps have a low clamping voltage and can clamp a surge below the peak of the AC mains voltage, thereby causing significant follow-current to flow until the next zero crossing point is reached, and the arc is extinguished.

ERICO has incorporated a method of increasing the arc voltage thereby extinguishing it earlier and significantly reducing the follow-current. This feature is effective even on AC supplies with higher prospective fault current capacities and has the added benefit of preventing upstream fuses or circuit breakers from activating.



Activation of the Triggered Spark Gap.



Internal components of Triggered Spark Gap.

## Development of surge reduction filters

ERICO strives to employ the most suitable technology for each application across its range of SPDs, including high performance Surge Reduction Filters (SRFs). The CRITEC® SRF is the most recent development bringing together for the first time, TSG Technology with the benefits of series filtering.

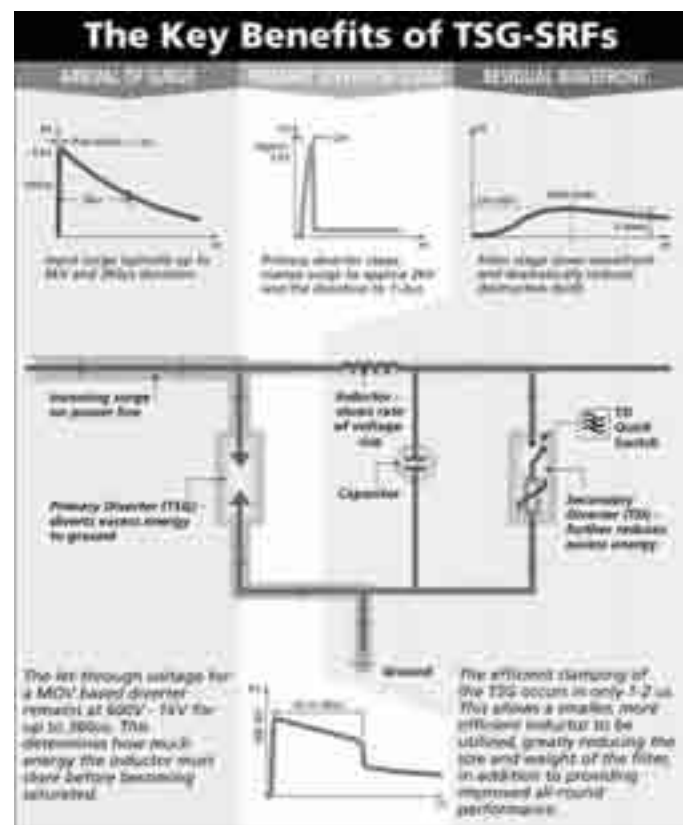
## Fundamental breakthrough in filter design

Incorporating TSG Technology into a surge reduction filter has allowed a fundamental breakthrough in the overall design of the filter. Ferrous-cored inductors, which are much smaller than non-saturating air-cored inductors required in MOV based surge reduction filters, have been used in the CRITEC TSG-SRF.

The use of ferrous-cored inductors is possible because the let-through voltage from a TSG remains high for only a few microseconds. In comparison, the let-through voltage from a MOV based device remains between 600V and 1000V for the duration of the surge. This time can range up to 400 milliseconds for long tail pulses and determines how much energy the inductor will have to store before reaching saturation and becoming ineffective.

## What benefits flow from this technology?

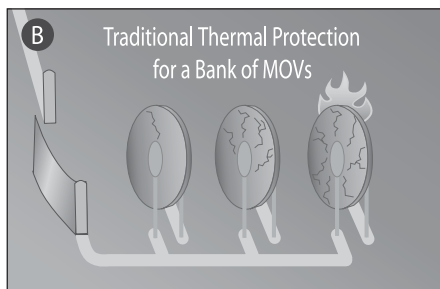
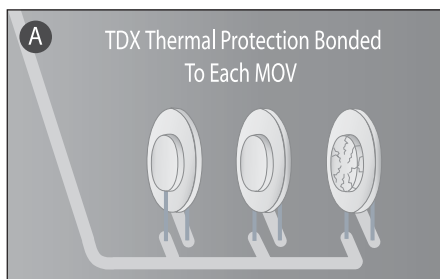
The combination of TSG and series filtering provides the benefits of high surge capability, low let-through voltage and considerably reduced rate of voltage rise (dv/dt). Additional benefits of reduced size, weight and heat dissipation also result.



# Advanced Technologies – The ERICO® Advantage

## Thermal MOV Technology

MOV components have for many years been used in surge protection devices due to their excellent non-linear clamping characteristics and large energy handling capability. Unfortunately, MOVs can become a hazard should they overheat due to excess stress or aging lowering the clamping voltage. For this reason it is important to have a means of disconnection which safely isolates the MOV during abnormal conditions. In the past this has been achieved by the use of separate thermal disconnects that, due to the distance from the MOV, require significant MOV heat to cause their operation. In low cost designs, several MOVs may share a common thermal device, resulting in more than just the failed MOV from being disconnected. The new thermal protection utilized by ERICO®, bonds the thermal disconnect directly to the substrate of each MOV beneath the epoxy coating. This more intimate thermal contact helps allow the MOV to be immediately and safely disconnected, allowing neighboring MOVs to continue to provide transient protection.



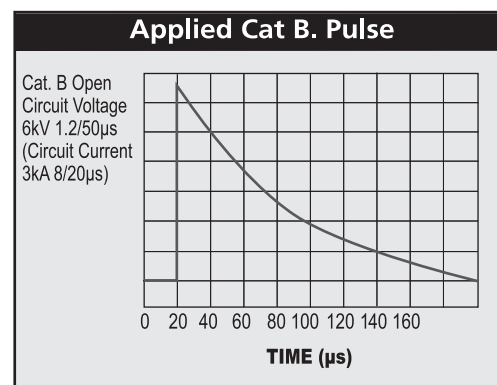
## Filtering Technology

Surge protection devices may include such a filtering stage to help condition the waveshape, thereby providing superior protection for sensitive electronics. This said, it is important to realize that a number of different topologies of filter circuit exist, each providing significantly different performance. At its simplest, a manufacturer may include a capacitor in parallel with the output. This will serve to reduce any fast ringing voltages and will also help absorb the energy in a small transient thereby providing a level of attenuation.

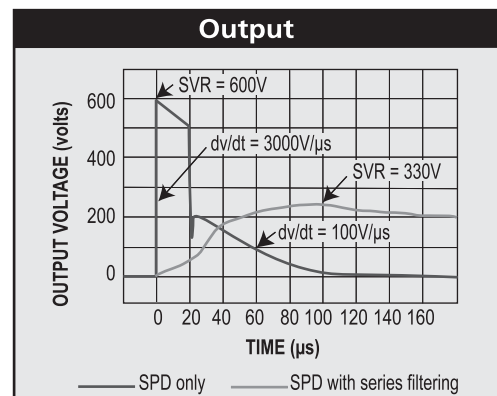
A far more effective approach is the series LC filter. This type of filter is connected after the surge limiting components and is in series with the supply powering the equipment. It consists of a series inductor and parallel capacitors. Surge protection devices of this nature are often referred to as “two port” devices since they have a distinct input and output side.

SPDs with filters offer two primary benefits:

- 1) They reduce the transient voltage reaching the equipment.
- 2) They reduce the rate-of-rise of the leading edge of the impulse. The residual leading edge spike after a standard SPD, although it may only be 500V in amplitude, can cripple electronics due to its extremely high rate-of-voltage rise of 3,000-12,000V/ $\mu$ s. Effective filtering reduces this rate-of-rise to less than 100V/ $\mu$ s. This slower change in voltage is better withstood by electronic equipment using switched mode power supplies. The filter also helps to attenuate small signal RF/EMI noise problems.



Applied voltage pulse.



Improved reduction in  $dv/dt$  with filtering incorporated.



# 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 ensure safe 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 ERICO's Transient Discriminating Technology is its *active frequency discrimination* circuit. This patented device can discriminate between a temporary over-voltage (TOV) condition

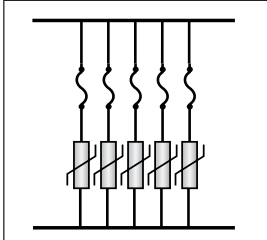
and a very fast transient, which is associated with lightning or switching-induced surges. When the transient frequencies are detected, the patented Quick-Switch within TD activates to allow the robust protection to limit the incoming transient. The frequency discriminating circuit that controls the Quick-Switch ensures 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

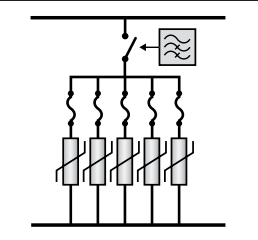
The CRITEC® range of surge protection devices from ERICO® employing TD Technology has been specifically designed to meet and exceed the new safety requirements of UL 1449 Edition 2. To meet the abnormal over-voltage testing of UL 1449 Edition 2, many manufacturers of SPD devices have incorporated fuse 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 safe, 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 a TVSS 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 TVSS 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 ERICO's TD Technology gives even greater overhead.

Traditional Technology

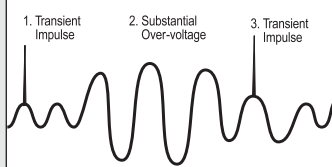


Active TD Technology

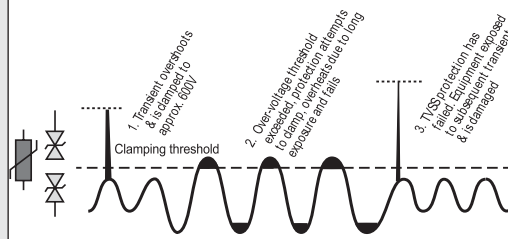


### TD TECHNOLOGY PROVIDES CONTINUED PROTECTION - EVEN AFTER OVER-VOLTAGES

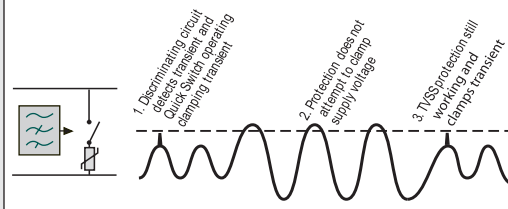
#### Typical Supply Problems



#### Traditional Technology Response



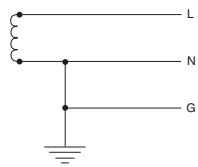
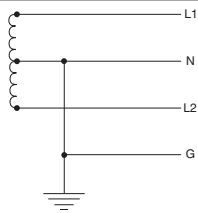
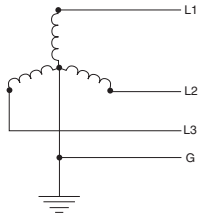
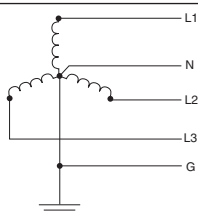
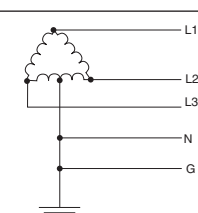
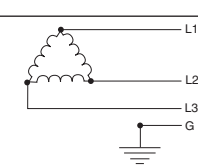
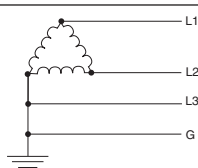
#### TD Technology Solution



# A Guide to Common Power Distribution Systems

Throughout the world a number of different power distribution systems are used that employ different grounding practices and methods of distributing the Neutral and Protective Earth conductors. The following pages are based on IEC<sup>SM</sup> 60364 and detail a number of the more common systems and ERICO's recommendation for the

selection and installation of SPDs on each of these. The individual product specification tables detail system suitability. It is recommended that users consult IEC61643-12 "Surge protective devices connected to low-voltage power distribution systems - Selection and application principles," for additional information.

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



# Power Distribution Systems and SPD Installation

The IEC<sup>SM</sup> 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

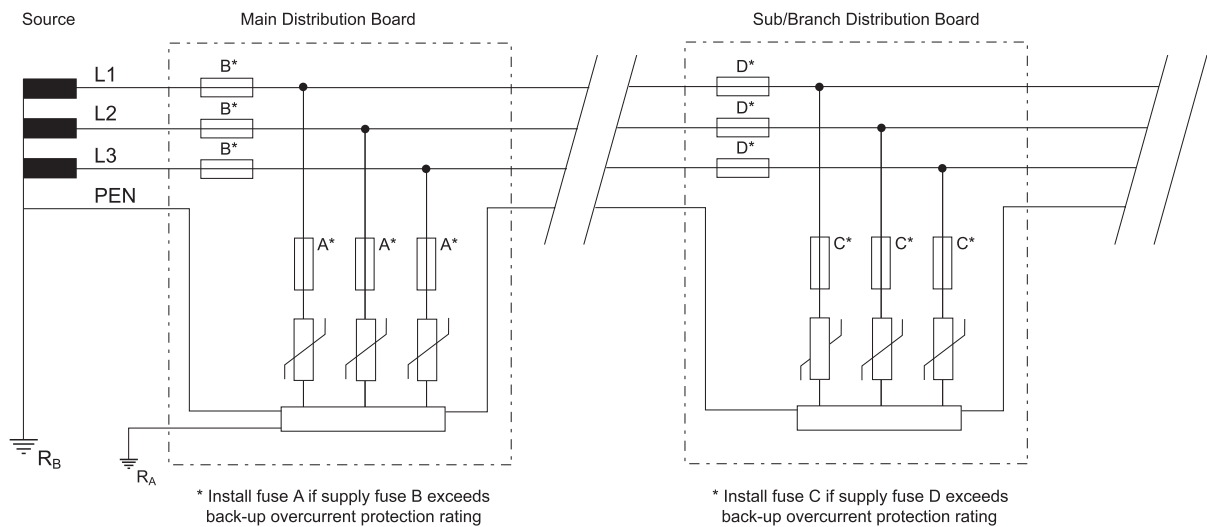
value should be selected. Effective protection does not require SPD's to be installed in all the modes detailed. The following diagrams provide guidance on the selection and installation of SPDs on the more common distribution systems. While three phase WYE systems are shown, similar logic can be applied 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  $U_o \times 1.10$ )

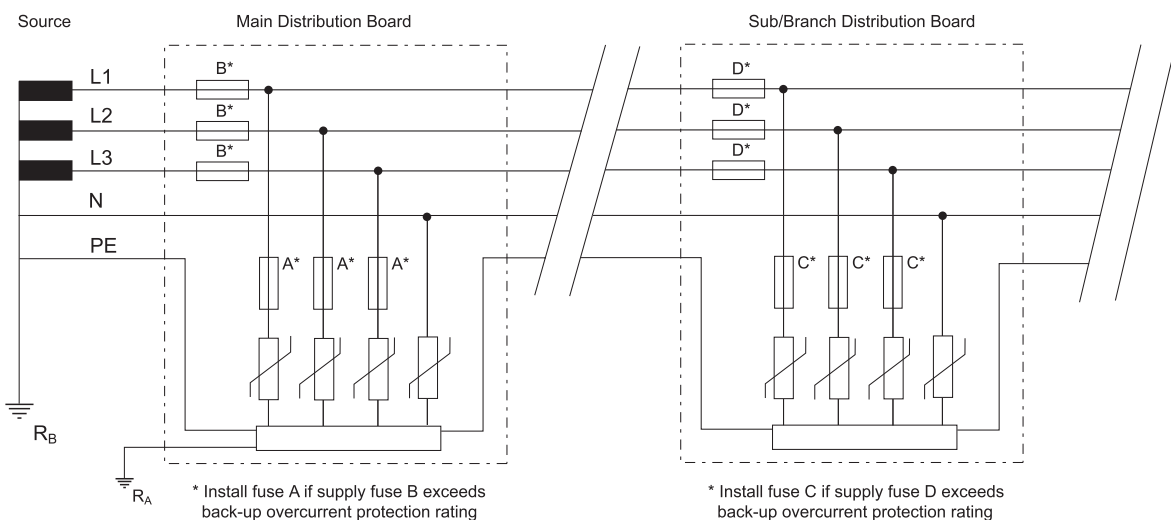
## TN-C System

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.

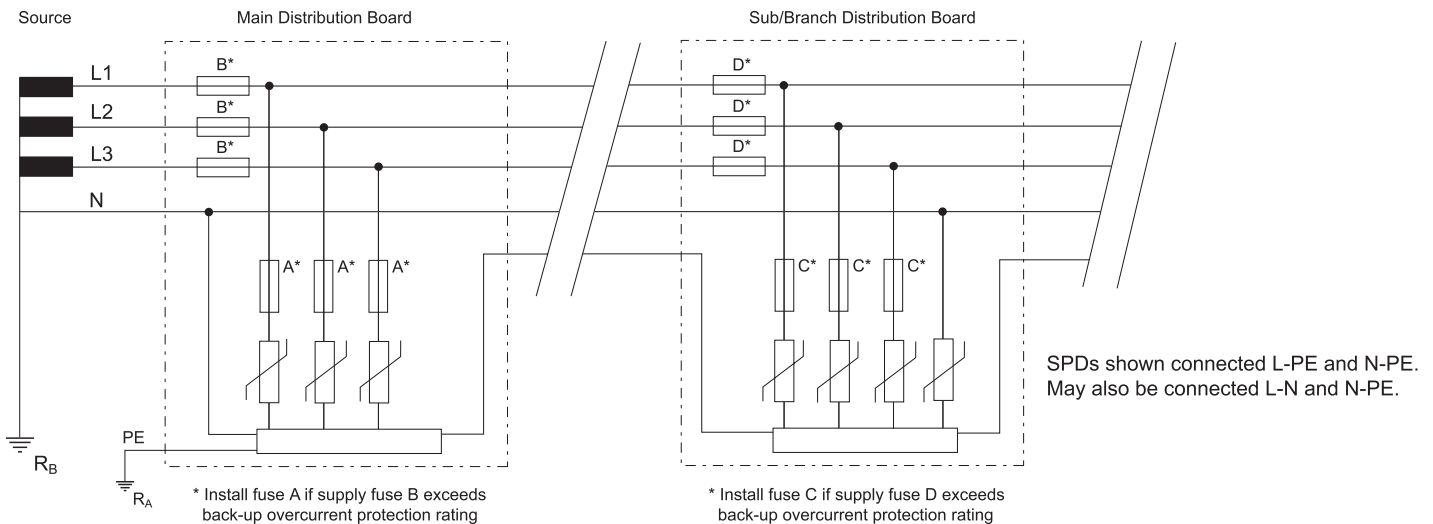


SPDs shown connected L-PE and N-PE.  
May also be connected L-N and N-PE.

# Power Distribution Systems and SPD Installation

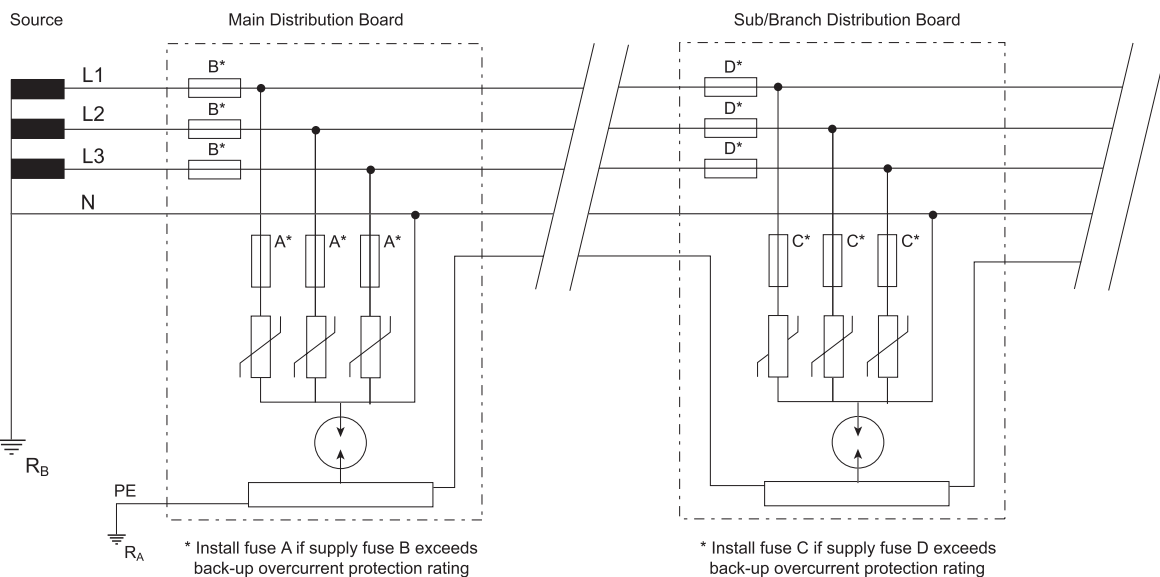
## TN-C-S System

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.



## 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.



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

# A Guide to Using This Catalog

**Product Series**

**Application Information**

**Specifications**  
See glossary (page 53) for explanation

**Regional Availability**  
Products are typically available and supported in the regions specified. Refer to specifications table for specific product approvals.

**Features & Benefits**

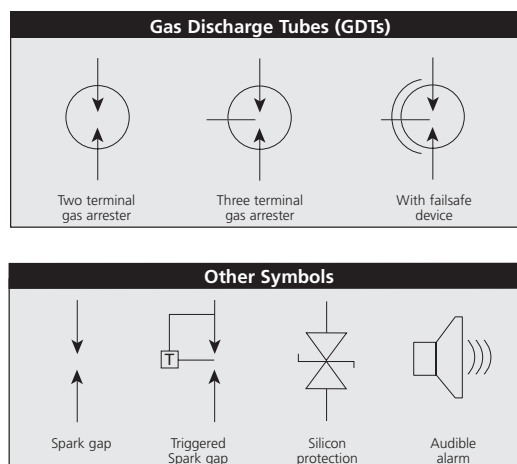
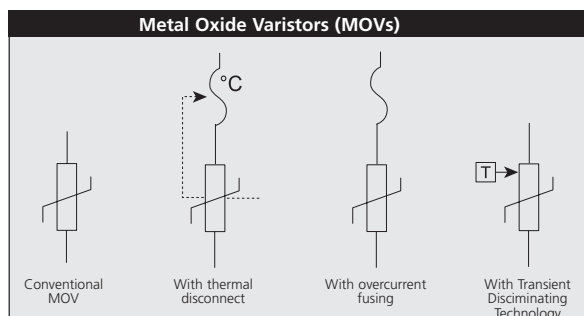
**Order Codes**

**Line Diagram**  
General internal circuit arrangement. See below for Drawing keys.

**Dimensions**

Where appropriate, the IEC term Protective Earth (PE) is used in place of regional terms Ground (G) or Earth (E).

## Key to Symbols Used in Line Diagrams



## Service Entrance Standard



- 200kA 8/20 primary protection – rated for service entrance applications
- NEMA-4X enclosure – for harsh environments
- Internal high interrupt capacity fusing – for added safety
- Modular design – allows easy replacement of surge modules
- Transient Discriminating (TD) Technology – provides increased service life
- Optional Filter and Surge Counter – for enhanced protection

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 2, 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.



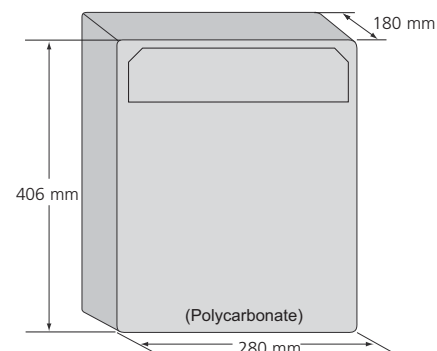
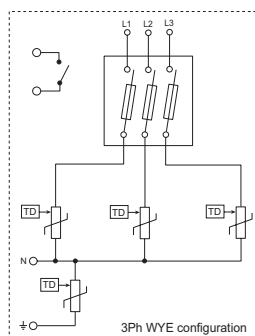
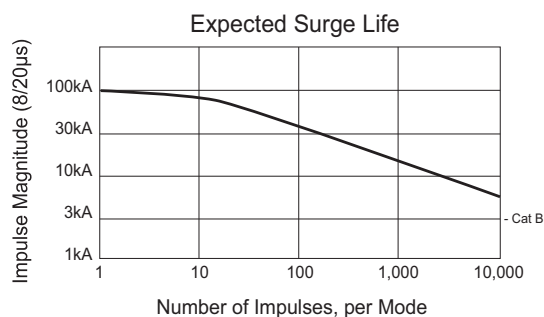
# CRITEC® SES200

Model	SES200 120/240	SES200 120/208	SES200 277/480	SES200 240DHG	SES200 240D
Nominal Voltage U <sub>n</sub>	120/240V	120/208V	277/480V	120/240V	240V
Distribution System	1Ph 3W+G	3Ph Y 4W+G	3Ph Y 4W+G	3Ph Δ 4W+G	3Ph Δ 3W+G
System Compatibility <sup>(1)</sup>	TN-C, TN-S, TN-C-S				
Max. Cont. Operating Voltage U <sub>c</sub>	170/340V	170/295V	400/692V	170/400V	400V
Stand-off Voltage	240/480V	240/415V	480/831V	240/415V	275V
Frequency	50/60Hz				
Operating Current @ U <sub>n</sub>	25mA				
Aggregate Surge Rating (8/20μs per line)	200kA				
Max. Discharge Current I <sub>max</sub> (NEMA-LS1 8/20μs per mode)	100kA				
Protection Modes	All modes protected				L-L
Technology	TD Technology MOV/Silicon with over-current fusing				
Voltage Protection Level U <sub>p</sub> @ 500A 8/20μs (UL SVR) @ Cat B3, 3kA 8/20μs @ 10kA 8/20μs	L-N 400V <620V <1400V	L-N 400V <620V <1400V	L-N 700V <1000V <1800V	L-N 400V <620V <1400V	L-L 700V <1000V <1800V
Filtering @100kHz	-40dBb (Optional)				-40dB (Optional)
Status	5 segment LED bar graphs				
Contacts	Normally open <sup>(2)</sup>				
Dimensions	Polycarbonate: 280 mm x 406 mm x 180 mm (11" x 16" x 7") approx. Metal option <sup>(3)</sup> : 355 mm x 406 mm x 165 mm (14" x 16" x 6.5") approx				
Weight	Polycarbonate: 8 kg (18 lbs) Metal option: 13 kg (30 lbs)				
Enclosure	Polycarbonate: IP66 (NEMA-4X) Metal option: IP66 (NEMA-4)				
Connection	3mm <sup>2</sup> to 35mm <sup>2</sup> (#12AWG to #2AWG)				
Mounting	Wall mount				
Back-up Overcurrent Protection	Fused disconnect included in enclosure				
Temperature	-10°C to +60°C (14°F to 140°F)				
Humidity	0% to 90%				
Approvals	cULus, NOM				cULus
Surge Rated to Meet	ANSI/IEEE C62.41.2 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 3, 100kA 8/20μs, 10kA 10/350μs				
Available Options <sup>(3)</sup> Filter & Surge Counter Metal Enclosure	Yes Yes			- Yes	

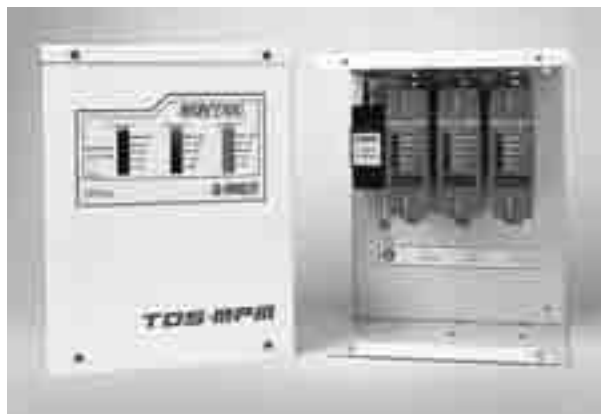
(1) Grounded systems only. SES200 240D should not be used on high leg or ungrounded systems

(2) Normally open contact, 250V~10A,  $\leq 1.5\text{mm}^2$  (#16AWG) connecting wire

(3) Inquire for availability



## Transient Discriminating Protection Module

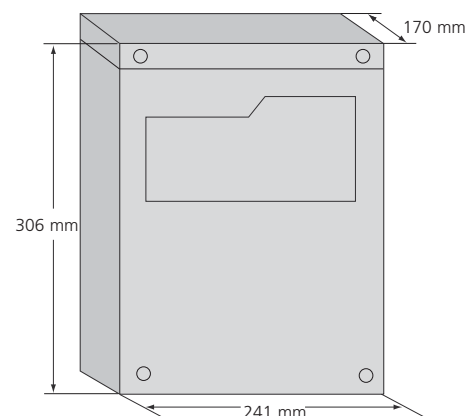
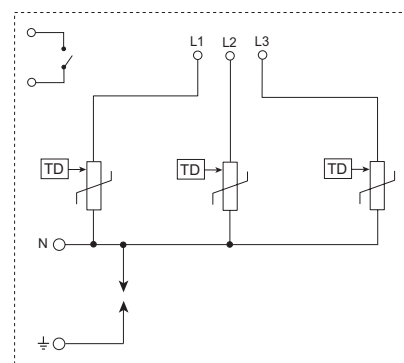
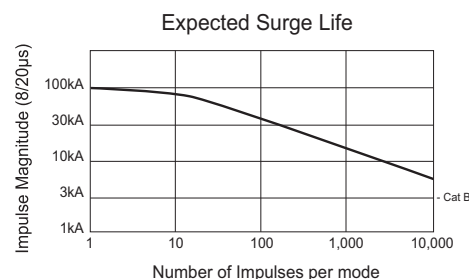


- Primary protection – suitable for high exposure sites and point-of-entry facility protection
- Modular design – allows easy replacement of surge modules
- 5 segment electronic status indication – displays percentage of capacity remaining
- Lug connection – allows Kelvin (in and out) connection of large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

The Transient Discriminating CRITEC® MOVTEC Protection Module (TDS-MPM) integrates three TD-CRITEC 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.

Model	TDS MPM 277
Nominal Voltage $U_n$	240/415V & 277/480V
Distribution System	3Ph Y 4W+G
System Compatibility	TN-C, TN-S, TN-C-S & TT
Max. Cont. Operating Voltage $U_c$	400/692V
Stand-off Voltage	480/831V L-N, 440V N-PE
Frequency	50/60Hz
Operating Current @ $U_n$	25mA
Aggregate Surge Rating	200kA 8/20 $\mu$ s (L-N)
Max. Discharge Current $I_{max}$	100kA 8/20 $\mu$ s L-N (NEMA-LS1) 130kA 8/20 $\mu$ s N-PE (NEMA-LS1)
Impulse Current $I_{imp}$	20kA 10/350 $\mu$ s L-N 50kA 10/350 $\mu$ s L-PE
Protection Modes	All modes protected
Technology	TD Technology and MOV/Silicon L-N Triggered Spark Gap N-PE
Voltage Protection Level $U_p$ @ Cat B3, 3kA 8/20 $\mu$ s @ 20kA 8/20 $\mu$ s	L-N      N-PE <750V   <1.5kV <980V   <2.3kV
Status	5 segment LED bar graph per phase Normally open contact, 250V~/10A, $\leq 1.5\text{mm}^2$ (#16AWG) connecting wire
Dimensions	241 mm x 306 mm x 170 mm (9.5" x 12" x 6.7") approx.
Weight	5 kg (11 lb) approx.
Enclosure	Metal, IP33 (NEMA-2)
Connection	$\leq 16 \text{ mm}^2$ (#6AWG) connecting to M6 bolt
Mounting	Wall mount
Back-up Overcurrent Protection	100A
Temperature	-35°C to +55°C (-31°F to +131°F)
Humidity	0% to 90%
Approvals	AS3260, IEC950, C-Tick
Surge Rated to Meet	ANSI/IEEE C62.41.2 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 3, 100kA 8/20 $\mu$ s, 10kA 10/350 $\mu$ s



## Transient Discriminating CRITEC® MOVTEC



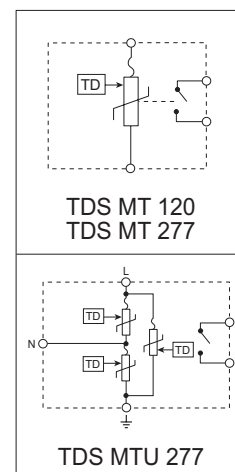
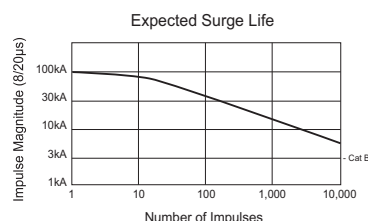
- Transient Discriminating (TD) Technology – provides increased service life
- Primary protection – suitable for high exposure sites and point-of-entry protection applications
- TDS-MT configurable to L-L, L-N, L-G or N-G protection
- TDS-MTU provides simultaneous L-N, L-G & N-G protection
- Small foot print – effective use of real estate
- 5 segment electronic status indication – displays percentage of capacity remaining

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

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

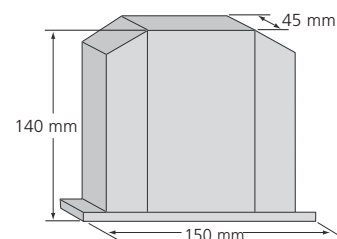
Transient Discriminating (TD) Technology, which meets the safety standards of UL® 1449 Edition 2, provides a superior life by eliminating the common temporary over-voltage failure mode of most SPDs. TD Technology is essential for any site where abnormal over-voltages can occur or where the possible catastrophic 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.



Model	TDS MT 120	TDS MT 277	TDS MTU 277
Nominal Voltage $U_n$	120V	230V & 277V	230V & 277V
System Compatibility <sup>(1)</sup>	TN-C, TN-C-S, TN-S, TT & IT		
Max. Cont. Operating Voltage $U_c$	170V	400V	400V
Stand-off Voltage	240V	480V	480V
Frequency	50/60Hz		
Operating Current @ $U_n$	25mA		
Aggregate Surge Rating	200kA 8/20µs	200kA 8/20µs	L-N 80kA L-G 80kA N-G 40kA 8/20µs
Max. Discharge Current $I_{max}$	100kA 8/20µs	100kA 8/20µs	L-N 40kA L-G 40kA N-G 20kA 8/20µs
Impulse Current $I_{imp}$	20kA 10/350µs	20kA 10/350µs	
Protection Modes	Single mode (L-L, L-N, L-G or N-G)		L-N, L-G & N-G
Technology	TD Technology MOV/Silicon		
Voltage Protection Level $U_p$ @ 500A 8/20µs (UL SVR)	330V	700V	L-N 700V L-G 700V N-G 600V
@ Cat B3, 3kA 8/20µs	<480V	<750V	<760V <870V <850V
@ 20kA 8/20µs	<760V	<980V	<1200V <1290V <1200V
Status	5 segment LED bar graph per phase		
Contacts	Normally open <sup>(2)</sup>		
Dimensions	45 mm x 150 mm x 140 mm (1.8" x 5.9" x 5.5") approx.		
Weight	0.6 kg (1.3 lb) approx.		
Enclosure	UL94V-0 thermoplastic		
Connection	≤16 mm <sup>2</sup> (#6AWG) connecting to M6 bolt		
Back-up Overcurrent Protection	100A		
Temperature	-35°C to +55°C (-31°F to +131°F)		
Humidity	0% to 90%		
Approvals	UL Recognized, AS3260, IEC950, C-Tick		
Surge Rated to Meet	ANSI/IEEE C62.41.2 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 3, 100kA 8/20µs, 10kA 10/350µs		

(1) Should not be connected in all modes of these systems. Refer to Power Distribution Systems and SPD Installation, Pages 11-12  
(2) Normally open contacts, 250V~/10A, ≤1.5mm<sup>2</sup> (#16AWG) connecting wire



# CRITEC® TDXM Modular Series

Asia/Australia  
Latin America  
North America

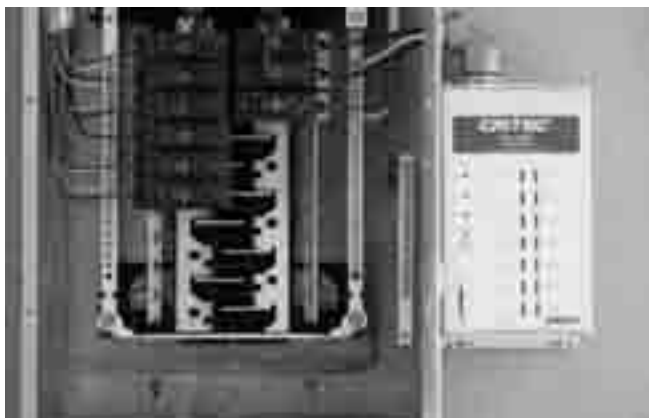
## TDX200 Transient Discriminating Panel Protectors



- CRITEC® 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 safety 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 8/20 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® pending

The TDX200 Series of Transient Voltage Surge Suppressors are designed for critical protection applications. The 200kA 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-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.



*Typical installation.*



*TDX200M Enclosure.*



*TDX Replaceable Modules.*



*TDX Replaceable Module backplane fully removed.*





# CRITEC® TDXM Modular Series

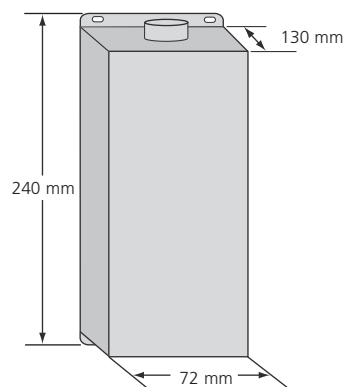
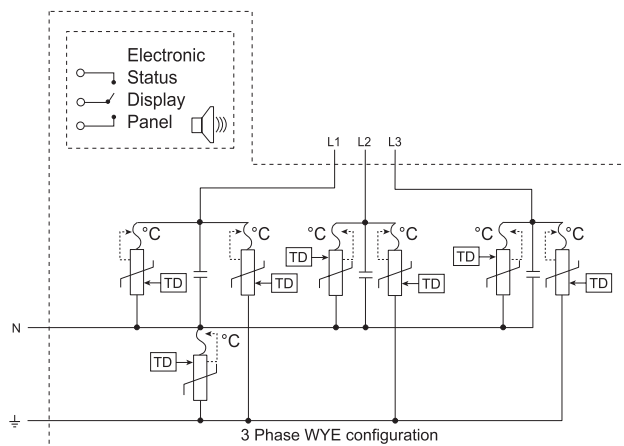
## TDX200 Transient Discriminating Panel Protectors

Model	TDX200M 120/240	TDX200M 120/208	TDX200M 120/240D	TDX200M 277/480	TDXM200M 277/480TT	TDX200M 347/600	TDX200M 240D	TDX200M 480D
Nominal Voltage U <sub>n</sub> (pole)	120/240V~	120/240V~	120/240V~	277/480V~	277/480V~	347/600V~	240V~	480V~
Distribution System <sup>(1)</sup>	1Ph 3W+G	3Ph 4W+G	3Ph Δ 4W+G	3Ph 4W+G (8.3W+G <sup>(2)</sup> )	3Ph 4W+G	3Ph 4W+G	3Ph Δ 3W+G	3Ph Δ 3W+G
MCOV Uc	170/340V~	170/295V~	170/340V~	310/536V~	310/536V~	560/970V ~	275V ~	560V ~
Stand off Voltage	240/480V~	240/415V~	240/415V~	480/813V~	480/813V~	790/1370V ~	415V ~	790V ~
Frequency	50 / 60Hz							
Short Circuit Current Rating	200kAIC (Isc)							
Technology Used	TD Technology with thermal disconnect Over-current Replaceable Cartridge Fusing							
Protection								
Maximum Discharge Current (Imax/per line)	200kA 8/20μs							
Nominal Discharge Current (In/per line)	80kA 8/20μs				80kA 8/20μs			
Protection Modes	L-N, L-G & N-G				L-N, N-G	L-N, L-G & N-G		L-L, L-G
Protection Level (L-N) Up @ 3kA	< 450V				< 800V			
Protection Level (L-N) Up @ In	< 1.1kV				< 1.2kV			
Alarms and Indicators								
Status Indication	LED status indication per phase, mechanical flag per mode, all modes monitored Remote contacts, change-over, 400V~ / 3A, max 1.5 mm² (#14AWG) terminals Audible Alarm Optional Surge Counter (insert “S” in order code as follows, example TDX200S277/480)							
Physical Data								
Dimensions	240 mm x 130 mm x 72 mm    9.5” x 5.125” x 2.875”							
Weight	2 kg (4.4 lbs) approx.							
Enclosure	Aluminum, IP 65 (NEMA-4)							
Connection	Line: 600 mm of 5.26 mm² (24” of # 10 AWG) flying leads Neutral/ Ground: 900 mm of 5.26 mm² (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)							
Humidity	0 to 90%							
Test Standards								
Approvals	CE, IEC™ 61643-1, UL® 1449 Pending, C-Tick							
Surge Rated to Meet	IEC 61643-1 Class II, ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 3, 100kA 8/20μs, 10kA 10/350μs							
Available Options	Flush Mount Kit (Order TDXM200FP) Side Mount Kit (Order TDXM200SM) Replacement Surge Module (Order TDS150150M or TDS150240M or TDS150277M or TDS150560M) (please refer to installation instructions for the correct replacement surge module order code) Replacement Fuse Cartridge (Order TDXFUSE)							

(1) Grounded systems only. 240D and 480D should not be used on high-leg or ungrounded systems.

(2) TDX200M277/480 can be used on "No Neutral" 480V Wye 3W+G systems.

Due to a policy of continual product development, specifications are subject to change without notice.



# CRITEC® TDXM Modular Series

Asia/Australia  
Latin America  
North America

## TDX100 Transient Discriminating Panel Protectors



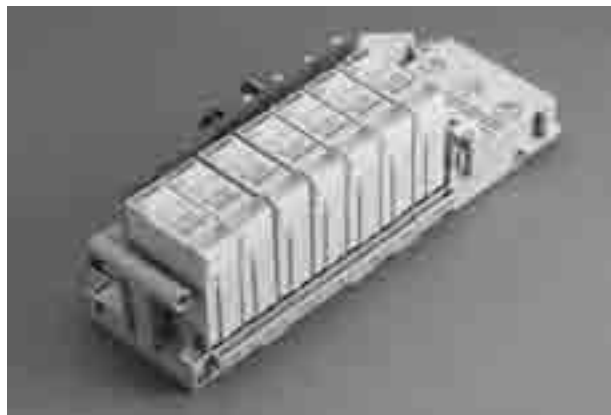
- CRITEC® Transient Discriminating (TD) Technology provides increased service life
- Modular design allows individual modes to be field replaceable, built-in disconnect and fusing eliminates need for external fusing
- Built-in safety features include TD Technology, thermal protection and short circuit 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 8/20 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® pending

The TDX100 Series of Transient Voltage Surge Suppressors are designed for critical protection applications. The 100kA 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.

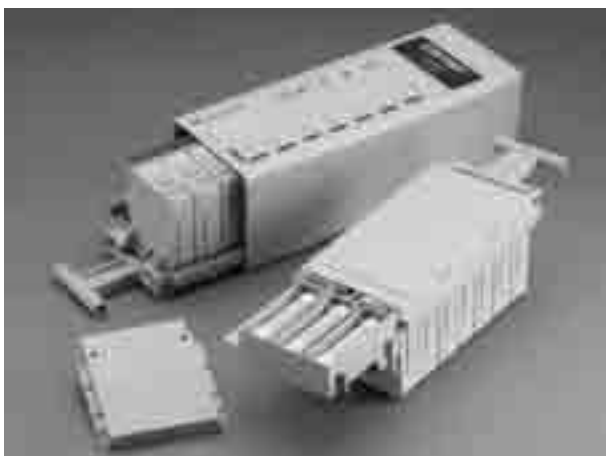
The NEMA-4 weather tight housing allows the TDX to be installed on indoor or outdoor service panels. The preconfigured connecting leads simplify installation. The unique narrow construction allows the SPD to fit between adjacent panel boards and connect via a 90-degree elbow. A flush mounting kit is also available for installing the SPD in drywall applications.



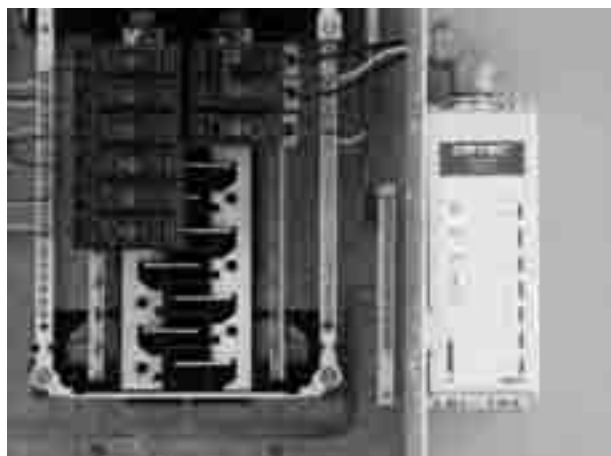
*Output contacts.*



*TDX Replaceable Modules.*



*TDX Replaceable Cartridge overcurrent fuse protection.*



*Typical installation.*



# CRITEC® TDXM Modular Series

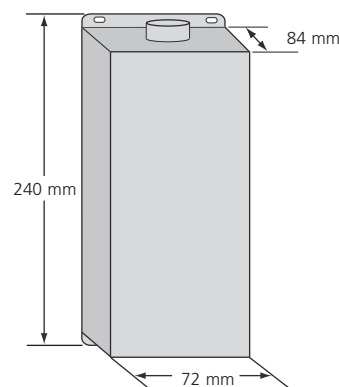
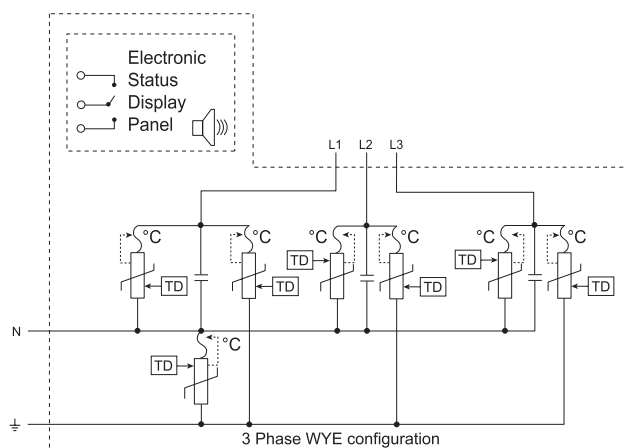
## TDX100 Transient Discriminating Panel Protectors

Model	TDX100M 120/240	TDX100M 120/208	TDX100M 120/240D	TDX100M 277/480	TDX100M 277/480TT	TDX100M 347/600	TDX100M 240D	TDX100M 480D
Nominal Voltage U <sub>n</sub> (pole)	120/240V~	120/240V~	120/240V~	277/480V~	277/480V~	347/600V~	240V~	480V~
Distribution System <sup>(1)</sup>	1Ph 3W+G	3Ph 4W+G	3Ph Δ 4W+G	3Ph 4W+G (83W+G <sup>(2)</sup> )	3Ph 4W+G	3Ph 4W+G	3Ph Δ 3W+G	3Ph Δ 3W+G
MCOV U <sub>c</sub>	170/340V~	170/295V~	170/340V~	310/536V~	310/536V~	560/970V ~	275V ~	560V ~
Stand off Voltage	240/480V~	240/415V~	240/415V~	480/813V~	480/813V~	790/1370V ~	415V ~	790V ~
Frequency	50 / 60Hz							
Short Circuit Current Rating	200kAIC (Isc)							
Technology Used	TD Technology with thermal disconnect Over-current Replaceable Cartridge Fusing							
<b>Protection</b>								
Maximum Discharge Current (I <sub>max</sub> /per line)	100kA 8/20μs							
Nominal Discharge Current (I <sub>n</sub> /per line)	40kA 8/20μs				40kA 8/20μs			
Protection Modes	L-N, L-G & N-G				L-N, N-G	L-N, L-G & N-G	L-L, L-G	
Protection Level (L-N) Up @ 3kA	< 450V				< 800V			
Protection Level (L-N) Up @ I <sub>n</sub>	< 1.1kV				< 1.2kV			
<b>Alarms and Indicators</b>								
Status Indication	LED status indication per phase, mechanical flag per mode, all modes monitored Remote contacts, change-over, 400V~ / 3A, max 1.5 mm <sup>2</sup> (#14AWG) terminals Audible Alarm Optional Surge Counter (insert "S" in order code as follows, example TDX100S277/480)							
<b>Physical Data</b>								
Dimensions	240 mm x 84 mm x 72 mm    9.5" x 3.25" x 2.875"							
Weight	1.4 kg (3.1 lbs) approx.							
Enclosure	Aluminum, IP 65 (NEMA-4)							
Connection	Line: 600 mm of 5.26 mm <sup>2</sup> (24" of # 10 AWG) flying leads 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)							
Humidity	0 to 90%							
<b>Test Standards</b>								
Approvals	CE, IEC™ 61643-1, UL® 1449 Pending, C-Tick							
Surge Rated to Meet	IEC 61643-1 Class II, ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 3, 100kA 8/20μs, 10kA 10/350μs							
Available Options	Flush Mount Kit (Order TDXM100FP) Side Mount Kit (Order TDXM100SM) Replacement Surge Module (Order TDS150150M or TDS150240M or TDS150277M or TDS150560M) (please refer to installation instructions for the correct replacement surge module order code) Replacement Fuse Cartridge (Order TDXFUSE)							

(1) Grounded systems only. 240D and 480D should not be used on high-leg or ungrounded systems.

(2) TDX100M277/480 can be used on "No Neutral" 480V Wye 3W+G systems.

Due to a policy of continual product development, specifications are subject to change without notice.



# CRITEC® TDXC Compact Series

Asia/Australia  
Latin America  
North America

## TDX100C Transient Discriminating Panel Protectors



- CRITEC® Transient Discriminating (TD) Technology provides increased service life
- Built-in safety 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
- LED status indication flag and voltage-free contacts provide remote status monitoring
- 100kA 8/20 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® pending

The TDX100 Series of Transient Voltage Surge Suppressors are designed for critical protection applications. The 100kA 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-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.



*Typical installation.*





# CRITEC® TDXC Compact Series

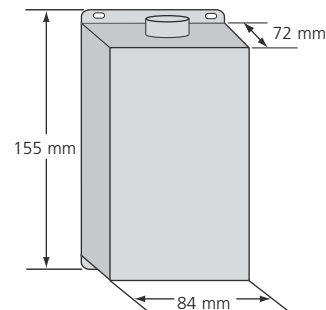
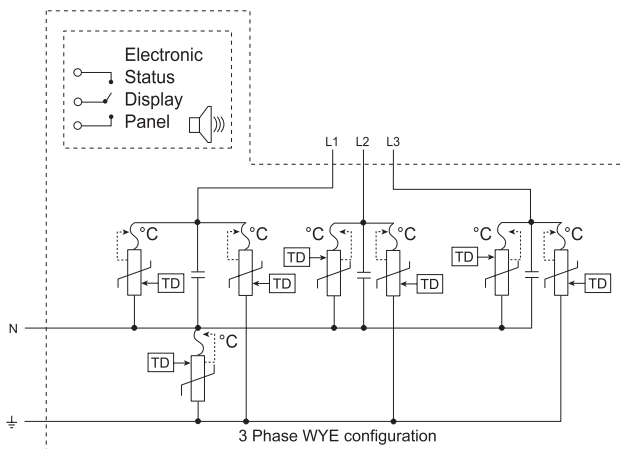
## TDX100C Transient Discriminating Panel Protectors

Model	TDX100C 120	TDX100C 120/240	TDX100C 120/208	TDX100C 120/240D	TDX100C 240	TDX100C 277/480	TDX100C 347/600
Nominal Voltage U <sub>n</sub> (pole)	120V~	120/240V~	120/240V~	120/240V~	240V~	277/480V~	347/600V~
Distribution System <sup>(1)</sup>	1Ph 2W+G	1Ph 3W+G	3Ph 4W+G	3Ph Δ 4W+G	1Ph 2W+G	3Ph 4W+G ( & 3W+G <sup>(2)</sup> )	3Ph 4W+G
MCOV U <sub>c</sub>	170V~	170/340V~	170/295V~	170/340V~	275V~	310/536V~	480V/830V ~
Stand off Voltage	240V~	240/480V~	240/415V~	240/415V~	415V~	480/813V~	600V/1040V ~
Frequency	50 / 60Hz						
Short Circuit Current Rating	200kAIC (Isc)						
Technology Used	TD Technology with thermal disconnect Over-current Replaceable Cartridge Fusing						
Protection							
Maximum Discharge Current (Imax/per line)	100kA 8/20μs						
Nominal Discharge Current (In/per line)	40kA 8/20μs				40kA 8/20μs		
Protection Modes	All modes protected via L-N, L-G & N-G						
Protection Level (L-N) Up @ 3kA	< 450V				< 800V		< 450V
Protection Level (L-N) Up @ In	< 1.1kV				< 1.2kV		< 900V
Alarms and Indicators							
Status Indication	LED status indication per phase, all modes monitored Remote contacts, change-over, 125V~ / 3A, max 1.5 mm² (#14AWG) terminals						
Physical Data							
Dimensions	155 mm x 84 mm x 72 mm (6" x 3.25" x 2.875")						
Weight	0.8 kg (1.75 lbs) approx.						
Enclosure	Aluminum, IP 65 (NEMA-4)						
Connection	Line: 600 mm of 5.26 mm² (24" of # 10 AWG) flying leads Neutral/ Ground: 900 mm of 5.26 mm² (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)						
Humidity	0 to 90%						
Test Standards							
Approvals	CE, IEC™ 61643-1, UL® 1449 Pending, C-Tick						
Surge Rated to Meet	IEC 61643-1 Class II, ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 2, 50kA 8/20μs						

(1) Grounded systems only. 240D and 480D should not be used on high-leg or ungrounded systems.

(2) TDX50C277/480 can be used on "No Neutral" 480V Wye 3W+G systems.

Due to a policy of continual product development, specifications are subject to change without notice.



# CRITEC® TDXC Compact Series

Asia/Australia  
Latin America  
North America

## TDX50 Transient Discriminating Panel Protectors



- CRITEC® Transient Discriminating (TD) Technology provides increased service life
- Built-in safety 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
- LED status indication flag and voltage-free contacts provide remote status monitoring
- 50kA 8/20 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® pending

The TDX50 Series of Transient Voltage Surge Suppressors for equipment, panel and motor protection applications are 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.



*Typical installation.*



# CRITEC® TDXC Compact Series

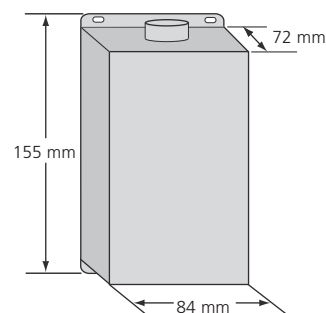
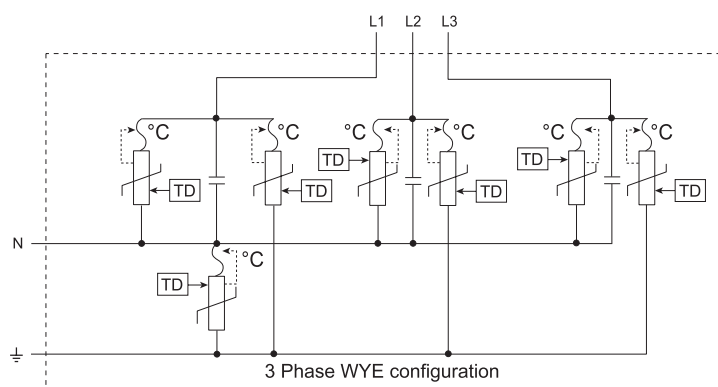
## TDX50 Transient Discriminating Panel Protectors

Model	TDX50C 120	TDX50C 120/240	TDX50C 120/208	TDX50C 120/240D	TDX50C 240	TDX50C 277/480	TDX50C 347/600
Nominal Voltage U <sub>n</sub> (pole)	120V~	120/240V~	120/240V~	120/240V~	240V~	277/480V~	347/600V~
Distribution System <sup>(1)</sup>	1Ph 2W+G	1Ph 3W+G	3Ph 4W+G	3Ph Δ 4W+G	1Ph 2W+G	3Ph 4W+G (& 3W+G <sup>(2)</sup> )	3Ph 4W+G
MCOV U <sub>c</sub>	170V~	170/340V~	170/295V~	170/340V~	275V~	310/536V~	480V/830V ~
Stand off Voltage	240V~	240/480V~	240/415V~	240/415V~	415V~	480/813V~	600V/1040V ~
Frequency	50 / 60Hz						
Short Circuit Current Rating	200kAIC (Isc)						
Technology Used	TD Technology with thermal disconnect Over-current Replaceable Cartridge Fusing						
<b>Protection</b>							
Maximum Discharge Current (Imax/per line)	50kA 8/20μs						
Nominal Discharge Current (In/per line)	20kA 8/20μs				20kA 8/20μs		
Protection Modes	All modes protected via L-N, L-G & N-G						
Protection Level (L-N) Up @ 3kA	< 450V				< 800V		< 450V
Protection Level (L-N) Up @ In	< 1.1kV				< 1.2kV		< 900V
<b>Alarms and Indicators</b>							
Status Indication	LED status indication per phase, all modes monitored Remote contacts, change-over, 125V~ / 3A, max 1.5 mm <sup>2</sup> (#14AWG) terminals						
<b>Physical Data</b>							
Dimensions	155 mm x 84 mm x 72 mm (6" x 3.25" x 2.875")						
Weight	0.7 kg (1.5 lbs) approx.						
Enclosure	Aluminum, IP 65 (NEMA-4)						
Connection	Line: 600 mm of 5.26 mm <sup>2</sup> (24" of # 10 AWG) flying leads 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)						
Humidity	0 to 90%						
<b>Test Standards</b>							
Approvals	CE, IEC™ 61643-1, UL® 1449 Pending, C-Tick						
Surge Rated to Meet	IEC 61643-1 Class II, ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 2, 50kA 8/20μs						

(1) Grounded systems only. 240D and 480D should not be used on high-leg or ungrounded systems.

(2) TDX50277/480 can be used on "No Neutral" 480V Wye 3W+G systems.

Due to a policy of continual product development, specifications are subject to change without notice.



# CRITEC® TSG SRF (Single Phase)

Asia/Australia  
Latin America

## Triggered Spark Gap Surge Reduction Filters

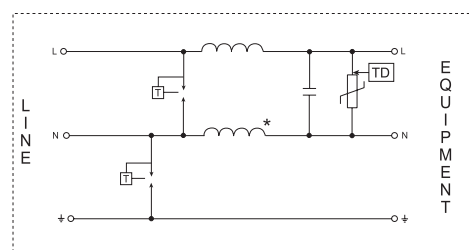


- Incorporates CRITEC TSG and TD Technologies – high performance protection
- High surge rating – ideal for exposed critical service entrance applications
- Surge Reduction Filters dramatically reduce let-through voltage – provides optimum protection
- Surge Reduction Filters reduce rate-of-voltage rise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

Triggered Spark Gap Surge Reduction Filters 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.

Model	TSG SRF140	TSG SRF163	TSG SRF1125
Nominal Voltage $U_n$	240V		
Distribution System	1Ph 2W+G		
System Compatibility	TN-C, TN-S, TN-C-S & TT		
Max. Cont. Operating Voltage $U_c$	275V		
Stand-off Voltage	440V		
Frequency	50/60Hz		
Max. Line Current $I_L$	40A	63A	125A
Max. Discharge Current $I_{max}$	130kA 8/20 $\mu$ s (NEMA-LS1 per mode)		
Impulse Current $I_{imp}$	50kA 10/350 $\mu$ s		
Protection Modes	All modes protected		
Technology	Triggered Spark Gap In-line series low pass sine wave tracking filter 40kA 8/20 $\mu$ s tertiary TD Technology MOV protection		
Voltage Protection Level $U_p$ @ Cat B3, 3kA 8/20 $\mu$ s @ 20kA 8/20 $\mu$ s	L-N <262V <247V	L-N <262V <247V	L-N <413V <392V
Filtering @100kHz	-40dB		
Status	Primary Protection LED Tertiary Protection LED Change-over contact (Form C dry), 125V/~600mA. 4kV isolation		
Dimensions (hwxwd)	400 mm x 300 mm x 170 mm (15.7" x 11.8" x 6.7") approx.		
Weight	11 kg (24 lb) approx.		13 kg (28lb) approx.
Enclosure	Metal, IP55 (NEMA-12)		
Heat Dissipation @ $I_L$	13W	13W	19W
Connection			
Input	$\leq 50 \text{ mm}^2$ (1/0AWG)		8 mm stud
Output	$\leq 35 \text{ mm}^2$ (#2AWG)		8 mm stud
Mounting	Wall mount		
Back-up Overcurrent Protection	See table		125A
Temperature	0°C to +40°C (-32°F to +104°F)		
Humidity	0% to 90%		
Approvals	AS3100, C-Tick, Certificate of Suitability		
Surge Rated to Meet	ANSI/IEEE C62.41.2 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 3, 100kA 8/20 $\mu$ s, 10kA 10/350 $\mu$ s		



\* Not present in 40A and 63A models

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

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



# CRITEC® TSG SRF (Three Phase)

Asia/Australia  
Latin America

## Triggered Spark Gap Surge Reduction Filters



- Incorporates CRITEC TSG and TD Technologies – high performance protection
- High surge rating – ideal for exposed critical service entrance applications
- Surge Reduction Filters dramatically reduce let-through voltages – 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 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.

See page 26 for schematic diagram.

Model	TSG SRF340	TSG SRF363	TSG SRF3125	TSG SRF3200	TSG SRF3400	TSG SRF3630	TSG SRF31250	TSG SRF32000
Nominal Voltage U <sub>n</sub>	240/415V							
Distribution System	3Ph Y 4W+G							
System Compatibility	TN-C, TN-S, TN-C-S & TT							
Max. Cont. Operating Voltage U <sub>c</sub>	275/476V							
Stand-off Voltage	440/762V							
Frequency	50/60Hz							
Max. Line Current I <sub>L</sub>	40A	63A	125A	200A	400A	630A	1250A	2000A
Max. Discharge Current I <sub>max</sub>	130kA 8/20μs (NEMA-LS1 per mode)							
Impulse Current I <sub>imp</sub>	50kA 10/350μs							
Protection Modes	All modes protected							
Technology	Triggered Spark Gap In-line series low pass sine wave tracking filter 40kA 8/20μs tertiary TD Technology							
Voltage Protection Level U <sub>p</sub> @ Cat B3, 3kA 8/20μs @ 20kA 8/20μs	L-N <210V <180V	L-N <352V <282V	L-N <325V <404V	L-N <347V <447V	L-N <500V <500V	L-N <500V <500V	L-N <500V <500V	L-N <500V <500V
Filtering @100kHz	-40dB							
Status	Primary Protection LED Tertiary Protection LED Change-over contact (Form C dry), 125V/600mA. 4kV isolation							
Dimensions (Approx.) (hxxwxd)	500 mm x 400 mm x 170 mm		650 mm x 500 mm x 175 mm	780 mm x 500 mm x 215 mm	1100 mm x 650 mm x 233 mm	1150 mm x 850 mm x 220 mm	1650 mm x 1200 mm x 315 mm	1650 mm x 1200 mm x 315 mm
Weight (Approx)	20 kg	20 kg	38 kg	52 kg	98 kg	115 kg	288 kg	360 kg
Enclosure	Metal, IP55 (NEMA 12)				IP32			
Heat Dissipation @ I <sub>L</sub>	29W	36W	63W	90W	175W	225W	350W	600W
Connection			Stud	Stud				Inquire
Input	≤50 mm <sup>2</sup> (1/0AWG)		8 mm	10 mm				Inquire
Output	≤35 mm <sup>2</sup> (#2AWG)		8 mm	10 mm				
Mounting	Wall mount							
Back-up Overcurrent Protection	See table page 27		125A	200A	400A	630A	1250A	2000A
Temperature	0°C to +40°C (-32°F to +104°F)							
Humidity	0% to 90%							
Approvals	AS3100, C-Tick, Certificate of Suitability							
Surge Rated to Meet	ANSI/IEEE C62.41.2 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 3, 100kA 8/20μs, 10kA 10/350μs							



## Triggered Spark Gap

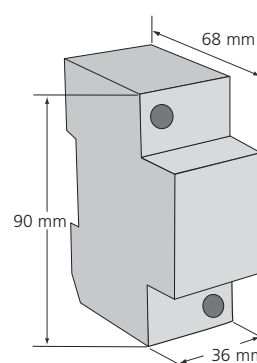
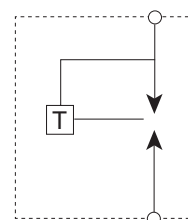


- Triggering air gap technology provides low let-through voltage – offers superior protection compared to traditional spark gaps
- Effective equipotential bonding – provides N-PE equilization protection bond on TT power distribution systems
- Meets IEC<sup>SM</sup> 61643-1 test class I, II
- Can be used 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.

Model	TSG1130 2S	TSG1130 2S 120
Nominal Voltage $U_n$	240V	120V
System Compatibility <sup>(1)</sup>	TN-C, TN-S, TN-C-S, TT	
Max. Cont. Operating Voltage $U_c$	440V	150V
Frequency	50/60Hz	
Operating Current @ $U_n$	2.2mA	
Max. Discharge Current $I_{max}$	130kA 8/20 $\mu$ s	
Impulse Current $I_{imp}$	50kA 10/350 $\mu$ s	
Protection Modes	Single mode (L-L, L-N, L-PE or N-PE)	
Technology	Triggered Spark Gap	
Short Circuit Current Rating $I_{sc}$	25kA	
Follow Current Extinguishing Capability $I_f$	43kA @ $U_n$	
Voltage Protection Level $U_p$ @ Cat B, 3kA 8/20 $\mu$ s @ 20kA 8/20 $\mu$ s	<1.5kV <2.3kV	
Status	LED for Line connected modes	
Dimensions	2 M. 90 mm x 68 mm x 36 mm (3.5" x 2.6" x 1.4") approx.	
Weight	0.3 kg (0.66 lb) approx.	
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)	
Connection	Bi connect terminal 2.5 mm <sup>2</sup> to 50 mm <sup>2</sup> (#14AWG to 1/0) or 12 mm x 2.5 mm busbar	
Mounting	35 mm top hat DIN rail	
Back-up Overcurrent Protection	See table	
Temperature	-40°C to +80°C (-40°F to +176°F)	
Humidity	0% to 90%	
Approvals	C-Tick	
Surge Rated to Meet	IEC 61643-1 Class I, Class II	
	ANSI/IEEE C62.41.2 Cat A, Cat B, Cat C	
	ANSI/IEEE C62.41.2 Scenario II, Exposure 3, 100kA 8/20 $\mu$ s, 10kA 10/350 $\mu$ s	



(1) Should not be connected in all modes of these systems. Refer to Power Distribution Systems and SPD Installation, Pages 11-12

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

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

## Spark Gap Diverter



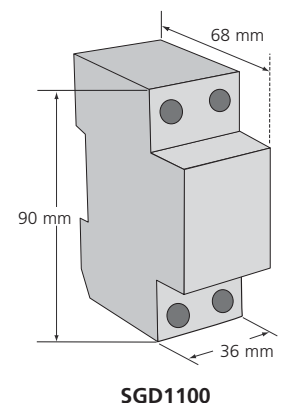
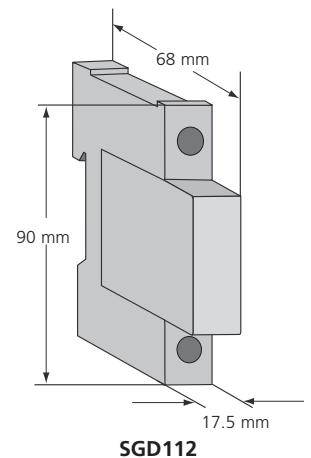
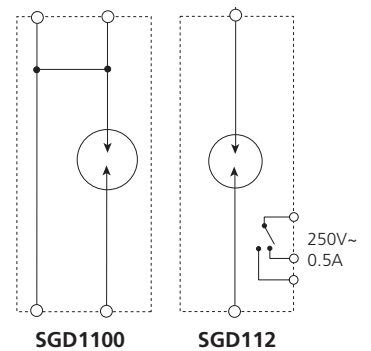
- Effective equipotential bonding – provides N-E protection bond on TT power distribution systems
- SGD1100 meets IEC<sup>SM</sup> 61643-1 test class I, II
- SGD112 provides compact modular unit with remote contacts

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 OA-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.

Model	SGD1100 2S NE	SGD112 1S NE
Item Number for Europe	702400	702402
System Compatibility	TN-S, TN-C-S & TT for N-PE applications	
Max. Cont. Operating Voltage $U_c$	255V	
Frequency	50/60Hz	
Operating Current @ $U_n$	<0.5mA	
Max. Discharge Current $I_{max}$	140kA 8/20 $\mu$ s	40kA 8/20 $\mu$ s
Impulse Current $I_{imp}$	100kA 10/350 $\mu$ s	12kA 10/350 $\mu$ s
Protection Modes	N-PE	
Technology	Encapsulated Spark Gap	
Short Circuit Current Rating $I_{sc}$	25kA	
Follow Current Extinguishing Capability $I_f$	200A @ $U_n$	100A @ $U_n$
Voltage Protection Level $U_p$ @ $I_n$ @ $I_{imp}$	<1.2kV <0.6kV	<1.6kV
Dimensions	2 M. 90 mm x 68 mm x 36 mm (3.5" x 2.6" x 1.4") approx.	1 M. 90 mm x 68 mm x 17.5 mm (3.5" x 2.6" x 0.68") approx.
Weight	0.3 kg (0.66 lb) approx.	0.12 kg (0.26 lb) approx.
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)	
Connection	$\leq 35 \text{ mm}^2$ (#2AWG) solid $\leq 25 \text{ mm}^2$ (#3AWG) stranded	
Mounting	35 mm top hat DIN rail	
Temperature	-40°C to +80°C (-40°F to +176°F)	
Humidity	0% to 90%	
Approvals	IEC 61643-1, CE	
Surge Rated to Meet	IEC 61643-1 Class I, Class II ANSI/IEEE C62.41.2 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 3, 100kA 8/20 $\mu$ s, 10kA 10/350 $\mu$ s	IEC 61643-1 Class II ANSI/IEEE C62.41.2 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 1, 20kA 8/20 $\mu$ s
Replacement Module Module Item Number (Europe)		SGD112 M 702403

(1) Should not be connected in all modes of these systems. Refer to Power Distribution Systems and SPD Installation, Pages 11-12



## TDS Surge Diverter - TDS1100 Series



- CRITEC® 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 flag and voltage-free contacts provide remote status monitoring
- Separate plug and base design facilitates replacement of a failed surge module
- 100kA 8/20 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

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 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.

CRITEC® TD technology helps ensure reliable and continued operation during sustained and abnormal over-voltage events. Internal thermal disconnect devices help ensure safe or 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
Nominal Voltage U <sub>n</sub>	120-150V~	220-240V~	240-277V~	480-560V~
Max. Cont. Operating Voltage U <sub>c</sub>	170V~	275V~	320V~	610V~
Stand off Voltage	240V~	440V~	480V~	700V~
Frequency	0 - 100Hz			
Short Circuit Current Rating I <sub>sc</sub>	25kAIC			
Required Back-up Fuse	125AgL, if supply > 100A			
Technology Used	TD with thermal disconnect			
Protection				
Maximum Discharge Current I <sub>max</sub>	100kA 8/20μs			
Nominal Discharge Current I <sub>n</sub>	50kA 8/20μs	40kA 8/20μs	40kA 8/20μs	40kA 8/20μs
Protection Modes	Single mode (L-G, L-N or N-G)			
Voltage Protection Level Up @ 3kA	< 400V	< 700V	< 800V	< 1.6kV
Voltage Protection Level Up @ 20kA	< 650	< 1000	< 1.1kV	< 2kV
Alarms and Indicators				
Status Indication	Mechanical flag / remote contacts (R model only) Change-over, 250V~ / 0.5A, max 1.5 mm <sup>2</sup> (#14AWG) terminals			
Physical Data				
Dimensions	2 modules wide, 90 mm x 68 mm x 35 mm			
Weight	0.24 kg approx.			
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)			
Connection	≤35 mm <sup>2</sup> (#2AWG) solid ≤25 mm <sup>2</sup> (#4AWG) stranded			
Mounting	35 mm top hat DIN rail			
Temperature	-40°C to +80°C (-40°F to +176°F)			
Humidity	0 to 90%			
Test Standards				
Approvals	CE, IEC™ 61643-1, UL® 1449 Pending			
Surge Rated to Meet	IEC 61643-1 Class I and II ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C			

Due to a policy of continual product development, specifications are subject to change without notice.

## TDS Surge Diverter - TDS150 Series



- CRITEC® TD Technology with thermal disconnect protection
- Compact design fits into DIN distribution panelboards and motor control centers
- 35 mm DIN rail mount – DIN 43 880 profile matches common circuit breakers
- Indication flag and voltage-free contacts provide remote status monitoring
- Separate plug and base design facilitates replacement of a failed surge module
- 50kA 8/20 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

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 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.

CRITEC® TD technology helps ensure reliable and continued operation during sustained and abnormal over-voltage events. Internal thermal disconnect devices help ensure safe or 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 due.

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
Nominal Voltage $U_n$	120-150V~	220-240V~	240-277V~	480-560V~
Max. Cont. Operating Voltage $U_c$	170V~	275V~	320V~	610V~
Stand off Voltage	240V~	440V~	480V~	700V~
Frequency	0 - 100Hz			
Short Circuit Current Rating $I_{sc}$	25kAIC			
Required Back-up Fuse	125AgL, if supply > 100A			
Technology Used	TD with thermal disconnect			
Protection				
Maximum Discharge Current $I_{max}$	50kA 8/20 $\mu$ s			
Nominal Discharge Current $I_n$	25kA 8/20 $\mu$ s	20kA 8/20 $\mu$ s	20kA 8/20 $\mu$ s	20kA 8/20 $\mu$ s
Protection Modes	Single mode (L-G, L-N or N-G)			
Voltage Protection Level Up @ 3kA	< 400V	< 700V	< 850V	< 1.7kV
Voltage Protection Level Up @ $I_n$	< 800V	< 1.1kV	< 1.2kV	< 2.2kV
Alarms and Indicators				
Status Indication	Mechanical flag / remote contacts Change-over, 250V~ / 0.5A, max 1.5 mm <sup>2</sup> (#14AWG) terminals			
Physical Data				
Dimensions	1 module wide, 90 mm x 68 mm x 17.5 mm			
Weight	0.12 kg approx.			
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)			
Connection	$\leq$ 35 mm <sup>2</sup> (#2AWG) solid $\leq$ 25 mm <sup>2</sup> (#4AWG) stranded			
Mounting	35 mm top hat DIN rail			
Temperature	-40°C to +80°C (-40°F to +176°F)			
Humidity	0 to 90%			
Test Standards				
Approvals	CE, IEC™ 61643-1, UL® 1449 Pending			
Surge Rated to Meet	IEC 61643-1 Class II ANSI/IEEE C62.41-1991 Cat A. Cat B. Cat C			

Due to a policy of continual product development, specifications are subject to change without notice.

## TDS Multi Phase Surge Diverter Series



- CRITEC® TD Technology with thermal disconnect protection
- Compact design fits into DIN distribution panelboards and motor control centers
- 35 mm DIN rail mount – DIN 43 880 profile matches common circuit breakers
- Indication flag and voltage-free contacts provide remote status monitoring
- Separate plug and base design facilitates replacement of a failed surge module
- 50kA 8/20 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

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 TDS series of surge suppressors 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.

CRITEC® TD technology helps ensure reliable and continued operation during sustained and abnormal over-voltage events. Internal thermal disconnect devices help ensure safe or 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.

Model	TDS350TNC150	TDS350TT150	TDS350TNC277	TDS350TT277	TDS50120/240
Nominal Voltage U <sub>n</sub> (pole)	120-150V~		240-277V~		120-150V~
MCOV U <sub>c</sub>	170V/295V ~		320V/536V~		170V/340V ~
Stand off Voltage	240V/415V ~		480V/813V~		240V/480V ~
Frequency	0 to 100Hz				
Short Circuit Current Rating	25kAIC (Isc)				
Required Back-up Fuse	125AgL, if supply > 100A				
Technology Used	TD with thermal disconnect				
Protection					
Maximum Discharge Current (I <sub>max</sub> /per pole)	50kA 8/20μs (TT models 12.5kA 10/350μs N-PE)				
Nominal Discharge Current (I <sub>n</sub> /per pole)	25kA 8/20μs		20kA 8/20μs		25kA 8/20μs
Protection Modes	L-N	L-N, N-PE	L-N	L-N, N-PE	L-N, N-PE
Protection Level Up @ 3kA	< 400V		< 850V		< 400V
Protection Level Up @ I <sub>n</sub>	< 800V		< 1.2kV		< 800V
Alarms and Indicators					
Status Indication	Mechanical flag / remote contacts, change-over, 250V~ / 0.5A, max 1.5 mm <sup>2</sup> (#14AWG) terminals				
Physical Data					
Dimensions	3 module wide	4 module wide	3 module wide	4 module wide	3 module wide
Weight	0.36 kg approx.	0.5 kg approx.	0.36 kg approx.	0.5 kg approx.	0.36 kg approx.
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)				
Connection	≤35 mm <sup>2</sup> (#2AWG) solid ≤25 mm <sup>2</sup> (#4AWG) stranded				
Mounting	35 mm top hat DIN rail				
Temperature	-40°C to +80°C (-40°F to +176°F)				
Humidity	0 to 90%				
Test Standards					
Approvals	CE, IEC™ 61643-1, UL® 1449 Pending				
Surge Rated to Meet	IEC 61643-1 Class II, ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C				

Due to a policy of continual product development, specifications are subject to change without notice.



# CRITEC® DSD1150 (150kA)

Asia/Australia  
Europe  
Latin America

## DIN Surge Diverter

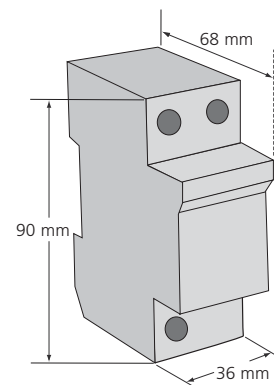
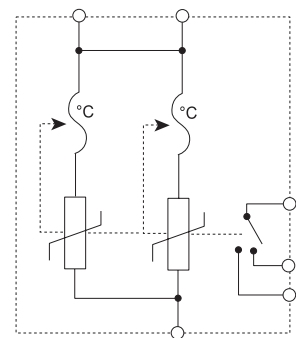


- 35 mm DIN 43 880 profile – matches common circuit breakers
- Indication flag – provide clear visual indication of life status
- 150kA 8/20 surge rating provides protection – suitable for main distribution panels and provides a long operational life
- Various operating voltages – to suit most common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

The DSD1150 series of surge suppressors provide economical and reliable protection to primary distribution panel boards and power distribution systems. They are intended for locations classified for devices tested to IEC61643-1 test class I (or VDE classification B). Internal thermal disconnect devices 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 due.

Model	DSD1150 2SR 275
Item Number for Europe	702420
Nominal Voltage $U_n$	220-240V
System Compatibility <sup>(1)</sup>	TN-C, TN-S, TN-C-S & TT
Max. Cont. Operating Voltage $U_c$	275V~ 350V <sub>---</sub>
Frequency	0 to 60Hz
Operating Current @ $U_n$	<1mA
Nom. Discharge Current $I_n$	70kA 8/20 $\mu$ s
Max. Discharge Current $I_{max}$	150kA 8/20 $\mu$ s
Impulse Current $I_{imp}$	25kA 10/350 $\mu$ s
Protection Modes	Single mode
Technology	MOV with thermal disconnect
Short Circuit Current Rating $I_{sc}$	25kA
Voltage Protection Level $U_p$ @ Cat B3, 3kA 8/20 $\mu$ s @ $I_n$	<850V <1.6kV
Status	Mechanical flag Change-over contact (Form C Dry) 250V~/0.5A, max 1.5 mm <sup>2</sup> (#14 AWG) connecting wire
Dimensions	2 M. 90 mm x 68 mm x 36 mm (3.5" x 2.6" x 1.4") approx.
Weight	0.33 kg (0.76 lb) approx.
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)
Connection	$\leq 35 \text{ mm}^2$ (#2AWG) solid $\leq 25 \text{ mm}^2$ (#4AWG) stranded
Mounting	35 mm top hat DIN rail
Back-up Overcurrent Protection	250Agl if supply >250A
Temperature	-40°C to +80°C (-40°F to +176°F)
Humidity	0% to 90%
Approvals	IEC 61643-1, CE
Surge Rated to Meet	IEC 61643-1 Class I, Class II ANSI/IEEE C62.41.2 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 3, 100kA 8/20 $\mu$ s, 10kA 10/350 $\mu$ s



(1) Should not be connected in all modes of these systems. Refer to Power Distribution Systems and SPD Installation, Pages 11-12

# CRITEC® DSD160 (60kA)

Asia/Australia  
Europe  
Latin America

## DIN Surge Diverter



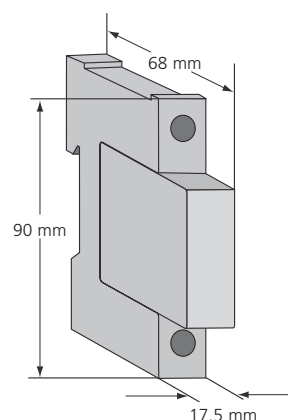
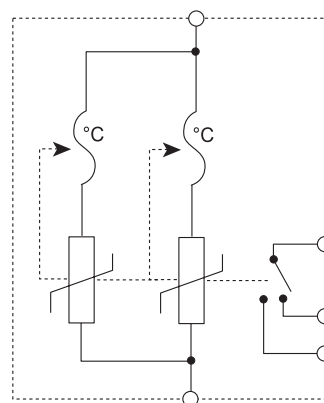
- 35 mm DIN 43 880 profile – matches common circuit breakers
- Indication flags – provide progressive visual indication of life status
- Remote contacts – provide remote status monitoring
- 60kA 8/20 maximum surge rating provides protection suitable for sub-distribution panels and a long operational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

The DSD160 series of surge suppressors 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 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 provide user-feedback in the event of reduction of capacity.

Model	DSD160 1SR 275
Item Number for Europe	702460
Nominal Voltage $U_n$	220-240V
System Compatibility <sup>(1)</sup>	TN-C, TN-S, TN-C-S & TT
Max. Cont. Operating Voltage $U_c$	275V~ 350V==
Frequency	0 to 60Hz
Operating Current @ $U_n$	<1mA
Max. Discharge Current $I_{max}$	60kA 8/20μs
Nom. Discharge Current $I_n$	30kA 8/20μs
Impulse Current $I_{imp}$	5kA 10/350μs
Protection Modes	Single mode
Technology	MOV with thermal disconnect
Short Circuit Current Rating $I_{sc}$	25kA
Voltage Protection Level $U_p$ @ Cat B3, 3kA 8/20μs @ $I_n$	<850V <1.5kV
Status	Mechanical flag with progressive indication Change-over contact (Form C dry) 250V~/0.5A, max 1.5 mm <sup>2</sup> (#14AWG) connecting wire
Dimensions	1 M, 90 mm x 68 mm x 17.5 mm (3.5" x 2.6" x 0.68") approx.
Weight	0.12 kg (0.26 lb) approx.
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)
Connection	≤35 mm <sup>2</sup> (#2AWG) solid ≤25 mm <sup>2</sup> (#4AWG) stranded
Mounting	35 mm top hat DIN rail
Back-up Overcurrent Protection	160Agl if supply >160A
Temperature	-40°C to +80°C (-40°F to +176°F)
Humidity	0% to 90%
Approvals	IEC 61643-1, CE
Surge Rated to Meet	IEC 61643-1 Class I, Class II ANSI/IEEE C62.41.2 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 2, 50kA 8/20μs
Replacement Module Module Item Number for Europe	DSD160 1SR 275M 702465

(1) Should not be connected in all modes of these systems. Refer Power to Distribution Systems and SPD Installation, Pages 11-12



# CRITEC® DSD140 (40kA)

Asia/Australia  
Europe  
Latin America

## DIN Surge Diverter

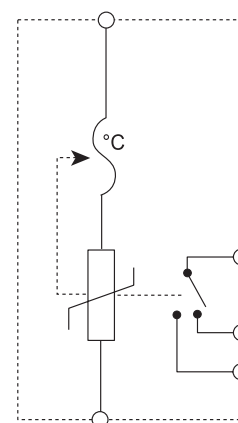


- 35 mm DIN 43 880 profile – matches common circuit breakers
- Indication flag – provide clear visual indication of life status
- Remote contacts (R models) – provide remote status monitoring
- 40kA 8/20 maximum surge rating provides protection suitable for sub-distribution panels and a long operational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

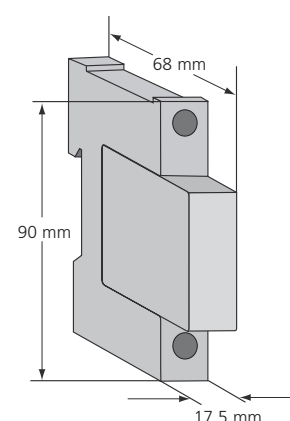
The DSD140 series of surge suppressors provide economical protection to sub-distribution panel boards in locations classified for devices tested to IEC61643-1 test Class II (or VDE classification C). The convenient plug-in module and separate base design facilitates replacement of a failed surge module 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 due.

Model	DSD140 1S 150 DSD140 1SR 150*	DSD140 1S 275 DSD140 1SR 275*	DSD140 1SR 440*
Item Number for Europe	702480 702510	702491 702521	702530
Nominal Voltage $U_n$	120V	220-240V	
System Compatibility <sup>(1)</sup>	TN-C, TN-S, TN-C-S & TT		
Max. Cont. Operating Voltage $U_c$	150V~ 200V---	275V~ 350V---	440V~ 580V---
Frequency	0 to 60Hz		
Operating Current @ $U_n$	<1mA		
Max. Discharge Current $I_{max}$	40kA 8/20 $\mu$ s		
Nom. Discharge Current $I_n$	20kA 8/20 $\mu$ s		
Protection Modes	Single mode		
Technology	MOV with thermal disconnect		
Short Circuit Current Rating $I_{sc}$	25kA		
Voltage Protection Level $U_p$			
@ Cat B3, 3kA 8/20 $\mu$ s	<480V	<850V	<1.4kV
@ 5kA 8/20 $\mu$ s	<550V	<1kV	<1.75kV
@ $I_n$	<0.7kV	<1.4kV	<2.2kV
Status	Mechanical flag * "R" units only: Change-over contact (Form C dry) 250V~/0.5A, max 1.5 mm <sup>2</sup> (#14AWG) connecting wire		
Dimensions	1 M, 90 x 68 x 17.5 mm (3.5 x 2.6 x 0.68") approx.		
Weight	0.12 kg (0.26 lb) approx.		
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)		
Connection	$\leq 35 \text{ mm}^2$ (#2AWG) solid $\leq 25 \text{ mm}^2$ (#4AWG) stranded		
Mounting	35 mm top hat DIN rail		
Back-up Overcurrent Protection	125Agl if supply >125A		
Temperature	-40°C to +80°C (-40°F to +176°F)		
Humidity	0% to 90%		
Approvals	IEC 61643-1, CE		
Surge Rated to Meet	IEC 61643-1 Class II ANSI/IEEE C62.41.2 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 1, 20kA 8/20 $\mu$ s		
Replacement Module	DSD140M150	DSD140M275	DSD140M440
Module Item Number for Europe	702436	702496	702506



Contacts provided on "R" models



(1) Should not be connected in all modes of these systems. Refer to Power Distribution Systems and SPD Installation, Pages 11-12



# CRITEC® DSD340 (40kA)

Asia/Australia  
Europe  
Latin America

## DIN Three Phase Surge Diverter

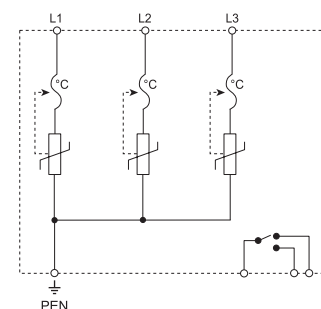


- 35 mm DIN 43 880 profile – matches common circuit breakers
- Indication flags – provide clear visual indication of life status
- Remote contacts – provide remote status monitoring
- 40kA 8/20 maximum surge ratings provide protection suitable for sub-distribution panels and a long operational life
-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

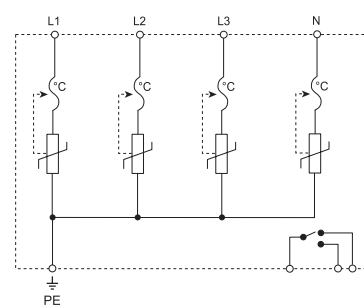
The DSD340 series of surge suppressors provide economical protection to sub-distribution panel boards in locations classified for devices tested to IEC61643-1 test Class II (or VDE Classification C). The single module units conveniently protect three phase systems with TNC, TNS and TT options.

A visual indicator flag provides user-feedback if the internal thermal disconnecter operates and a set of voltage-free contacts for remote signaling indicates that maintenance is due.

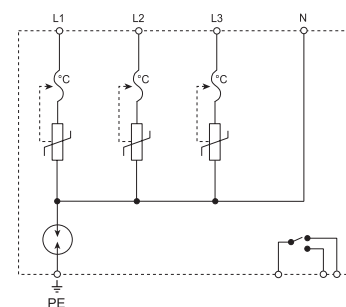
Model	DSD340 TNC275A	DSD340 TNS275A	DSD340 TT275A
Item Number	702581	702591	702601
Nominal Voltage $U_n$	220/380V-240/415V		
System Compatibility	TNC	TNS	TT
Max. Cont. Operating Voltage $U_c$	275V~ 350V~		
Frequency	0 to 60Hz		
Operating Current @ $U_n$	<1mA		
Max. Discharge Current $I_{max}$	40kA 8/20 $\mu$ s (per mode)		
Nom. Discharge Current $I_n$	20kA 8/20 $\mu$ s (per mode)		
Impulse Current $I_{imp}$	5kA 10/350 $\mu$ s (per mode)		
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 Rating $I_{sc}$	25kA		
Voltage Protection Level $U_p$ @ Cat B3, 3kA 8/20 $\mu$ s @ $I_n$	<850V <1.4kV	<850V <1.4kV	<850V <1.4kV
Status	Mechanical flag Change-over contact (Form C dry), 250V~/0.5A, max 1.5 <sup>2</sup> (#14AWG) connecting wire		
Dimensions (Approx.)	3 M. 90 mm x 68 mm x 54 mm (3.5" x 2.6" x 2.1") approx. 4 M. 90 mm x 68 mm x 72 mm (3.5" x 2.6" x 2.8") approx.		
Weight (Approx.)	0.4 kg (0.88 lb)		
Enclosure Connection	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1) $\leq 35$ mm <sup>2</sup> (#2AWG) solid $\leq 25$ mm <sup>2</sup> (#4AWG) stranded		
Mounting	35 mm top hat DIN rail		
Back-up Overcurrent Protection	125Agl if supply >125A		
Temperature	-40°C to +80°C (-40°F to +176°F)		
Humidity	0% to 90%		
Approvals	IEC 61643-1, CE		
Surge Rated to Meet	IEC 61643-1 Class II ANSI/IEEE C62.41.2 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 2, 50kA 8/20 $\mu$ s, 5kA 10/350 $\mu$ s		
Replacement MOV Module	DSD140M275 702496		
Replacement GDT Module	SGD112M 702403		



TNC Configuration



TNS Configuration



TT Configuration



# CRITEC® DSD110 (10kA)

Asia/Australia  
Europe  
Latin America

## DIN Surge Diverter



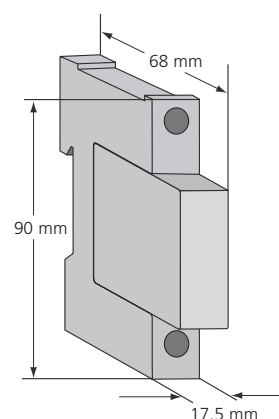
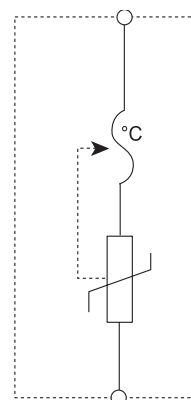
- 35 mm DIN 43 880 profile – matches common circuit breakers
- Indication flag – provide clear visual indication of life status
- 10kA 8/20 maximum surge rating – provides protection suitable for small sub-distribution panels or point-of-use applications
- Various operating voltages – to suit most common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

The DSD110 series of surge suppressors provide economical protection to small sub-distribution panel boards or locations classified for devices tested to IEC61643-1 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.

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

Model	DSD110 1S 275
Item Number for Europe	702560
Nominal Voltage $U_n$	220-240V
System Compatibility <sup>(1)</sup>	TN-S, TN-C, TN-S-C & TT
Max. Cont. Operating Voltage $U_c$	275V~ 350V===
Frequency	0 to 60Hz
Operating Current @ $U_n$	<1mA
Max. Discharge Current $I_{max}$	10kA 8/20 $\mu$ s
Nom. Discharge Current $I_n$	5kA 8/20 $\mu$ s
Protection Modes	Single mode
Technology	MOV with thermal
Short Circuit Current Rating $I_{sc}$	25kA
Voltage Protection Level $U_p$ @ Cat B3, 3kA 8/20 $\mu$ s @ $I_n$	<930V <1.0kV
Status	Mechanical flag
Dimensions	1 M, 90 mm x 68 mm x 17.5 mm (3.5 x 2.6 x 0.68") approx.
Weight	0.12 kg (0.26 lb) approx.
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)
Connection	$\leq 35 \text{ mm}^2$ (#2AWG) solid $\leq 25 \text{ mm}^2$ (#4AWG) stranded
Mounting	35 mm top hat DIN rail
Back-up Overcurrent Protection	100Agl if supply >100A
Temperature	-40°C to +80°C (-40°F to +176°F)
Humidity	0% to 90%
Approvals	IEC 61643-1, CE
Surge Rated to Meet	IEC 61643-1 Class III ANSI/IEEE C62.41.2 Cat A, Cat B
Replacement Module	DSD110M275
Module Item Number for Europe	702566

(1) Should not be connected in all modes of these systems. Refer to Power Distribution Systems and SPD Installation, Pages 11-12





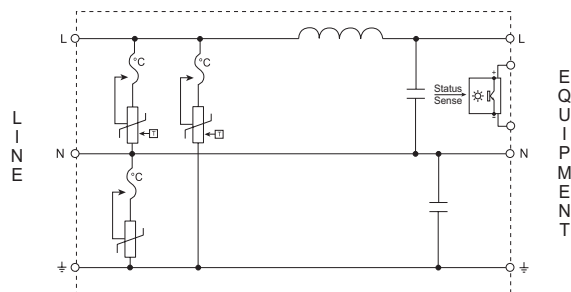
## Transient Discriminating Filter



- 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
- Transient Discriminating (TD) Technology – provides increased service life
- LED status indication and opto-isolated output – for remote status monitoring

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 110-120V ac/dc and 220-240Vac circuits.

The TDF is a series connected, single phase surge filter providing an aggregate surge capacity of 50kA (8/20µs) 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	TDF3A 120V	TDF3A 240V	TDF10A 120V	TDF10A 240V	TDF20A 120V	TDF20A 240V
Item Number for Europe	700001	700002	700003	700004	700005	700006
Nominal Voltage U <sub>n</sub>	120V	240V	120V	240V	120V	240V
Distribution System	1Ph 2W+G, TN-S & TN-C-S					
Max. Cont. Operating Voltage U <sub>c</sub>	170V	340V	170V	340V	170V	340V
Stand-off Voltage	240V	400V	240V	400V	240V	400V
Frequency	0 to 60Hz	50/60Hz	0 to 60Hz	0 to 60Hz	0 to 60Hz	50/60Hz
Max. Line Current I <sub>L</sub>	3A		10A		20A	
Operating Current @ U <sub>n</sub>	135mA	250mA	240mA	480mA	240mA	480mA
Max. Discharge Current I <sub>max</sub>	20kA 8/20 μs L-N 20kA 8/20 μs L-PE 10kA 8/20 μs N-PE					
Protection Modes	All modes protected					
Technology	TD Technology In-line series low pass sine wave filter					
Voltage Protection Level U <sub>p</sub> @ 500A, 8/20μs (UL SVR) @ Cat B3, 3kA 8/20μs	500V <250V	700V <600V	500V <250V	700V <600V	500V <250V	700V <600V
Filtering @100kHz	-62dB		-65dB		-53dB	
Status	Green LED. On=Ok. Isolated opto-coupler output <sup>(1)</sup>					
Dimensions	4 M. 90 mm x 68 mm x 72 mm (3.5" x 2.6" x 2.8")		8 M. 90 mm x 68 mm x 144 mm (3.5" x 2.6" x 5.6")			
Weight	0.35 kg (0.77 lb)		0.75 kg (0.77 lb)		0.8 kg (1.7 lb)	
Enclosure	DIN 43 880, UL94V-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	3A		10A		20A	
Temperature	-35°C to +55°C (-31°F to +131°F)					
Humidity	0% to 90%					
Approvals	UL 1449, UL 1283, CSA 22.2, C-Tick, CE (NOM 3A, 120V)					
Surge Rated to Meet	ANSI/IEEE C62.41.2 Cat A. Cat B. Cat C					

(1) Opto-coupler output can be connected to DAR275V to provide Form C dry contacts, Page 39

## DINLINE Surge Filter

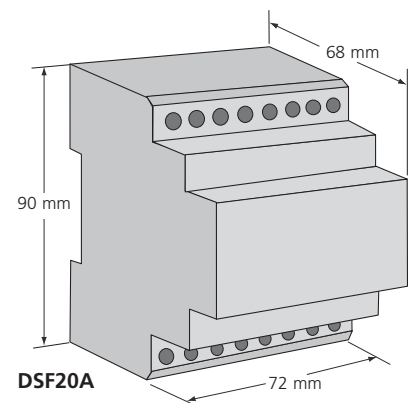
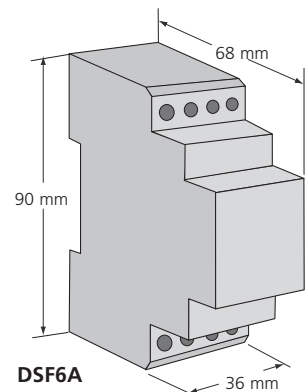
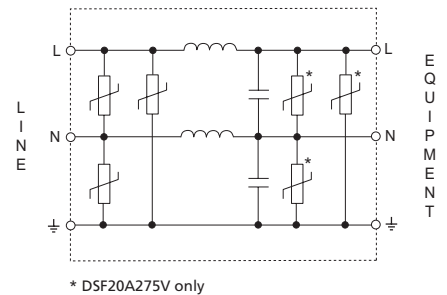


- In-line series protection
- EMI/RFI noise filtering – protects against industrial electrical noise
- Compact design – fits into motor control and equipment panels
- Three modes of protection: L-N, L-PE & N-PE
- 35 mm DIN rail mount – simple installation
- LED power indicator

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	DSF6A 30V		DSF6A 150V	DSF6A 275V	DSF20A 275V
Item Number for Europe	702090		701000	701030	
Nominal Voltage $U_n$	24V		120V	240V	
Distribution System	1Ph 2W+G				
System Compatibility	TN-S & TN-C-S				
Max. Cont. Operating Voltage $U_c$	30V~ 38V		150V~	275V~	
Frequency	0 to 60Hz 50/60Hz				
Max. Line Current $I_L$	6A				20A
Operating Current @ $U_n$	7mA				
Max. Discharge Current $I_{max}$	4kA 8/20μs per mode	16kA 8/20μs per mode			15kA 8/20μs L-PE 15kA 8/20μs L-N 25kA 8/20μs N-PE
Protection Modes	All modes protected				
Technology	MOV In-line series filter				
Voltage Protection Level $U_p$ @ Cat B3, 3kA 8/20μs	<110V	<400V	<750V	<710V	
Filtering	-3dB @ 300kHz				-3dB @ 62kHz
Status	LED power indicator				Status indicator
Dimensions	2 M. 90 mm x 68 mm x 36 mm (3.5" x 2.6" x 1.4")				4 M. 90 mm x 68 mm x 72 mm (3.5" x 2.6" x 2.8")
Weight	0.2 kg (0.44 lb)				0.7 kg (1.5 lb)
Enclosure	DIN 43 880, UL94V-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	6A				20A
Temperature	-35°C to +55°C (-31°F to +131°F)				
Humidity	0% to 90%				
Approvals	CE, C-Tick, NOM	CE, C-Tick			
Surge Rated to Meet	ANSI/IEEE C62.41.2 Cat A, Cat B				



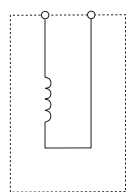
## DIN Decoupling Inductor/ DINLINE Alarm Relay & Surge Counter



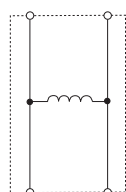
- Use for decoupling of spark gaps and MOVs – allows correct coordination of different SPD technologies
- 35 mm<sup>2</sup> tunnel terminals – accepts large cable size
- 63A model features top and bottom terminals – flexible installation
- The DINLINE Alarm Relay (DAR) is used with TDF products where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

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.

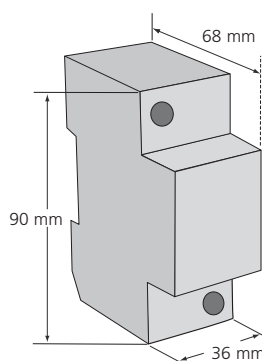
The DAR (DINLINE Alarm Relay) can be connected to TDF units to provide potential free change-over alarm contacts. The TDS SC (Surge Counter) unit is designed to provide visual indication of the number of surges registered. It uses a current transformer through which the ground conductor connecting to 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.



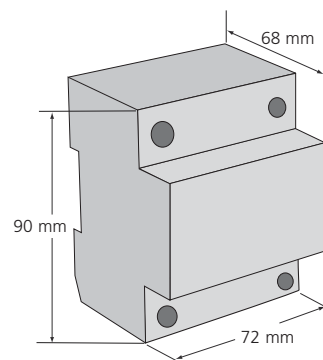
DDI 35



DDI 63



DDI 35



DDI 63

Model	DDI 35	DDI 63	DAR275V	TDS SC
Item Number for Europe	700465	700475	700900	701250
Nominal Voltage U <sub>n</sub>	-	-	20-110V---, 100-240V~	–
System Compatibility(1)	-	-	TN-C, TN-S, TN-C-S & TT	
Max. Cont. Operating Voltage U <sub>c</sub>	500V~ 200V---		275V	-
Stand-off Voltage	-	-	275V	-
Operating Current @ U <sub>n</sub>	-	-	20mA	-
Frequency	0 to 60Hz			-
Max. Line Current I <sub>L</sub>	35A @ 40°C	63A @ 40°C	-	-
Temperature Increase	45° C @ max line current (I <sub>L</sub> )		-	-
Inductance	7.5µH	15µH	-	-
Resistance	4.5mΩ	1.7mΩ	-	-
Technology	-	-	CT - trip threshold 300A 8/20µs	
Status	-	-	Red/Green LEDs Change-over contact <sup>(1)</sup>	Maximum count 9999 Non-resettable
Dimensions	2 M. 90 mm x 68 mm x 36 mm (3.5" x 2.6" x 1.4") approx.	4 M. 90 mm x 68 mm x 72 mm (3.5" x 2.6" x 2.8") approx.	2 M. 90 mm x 68 mm x 36 mm (3.5" x 2.6" x 1.4") (excluding CT)	
Weight	0.45 kg (1 lb) approx.	1 kg (2.2 lb) approx.	0.2 kg (0.44 lb)	
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)			
Connection	≤35 mm <sup>2</sup> (#2AWG) solid ≤25 mm <sup>2</sup> (#4AWG) stranded		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	35A	63A	-	-
Temperature	-40°C to +70°C (-40°F to +158°F)		-35°C to +55°C (-31°F to +131°F)	
Humidity	0% to 90%			
Approvals	CE		CSA22.2 C-Tick, AS 3260, CE	-

(1) Form C = Change-over contact (Form C dry contact), 400V~/3A 1 mm<sup>2</sup> to 6 mm<sup>2</sup> (#18AWG to #10AWG) connecting wire

## Power Line Filter

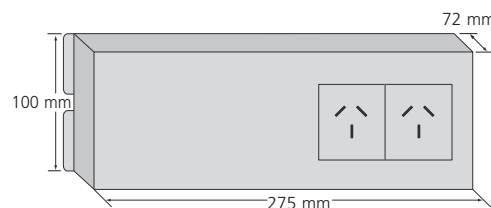
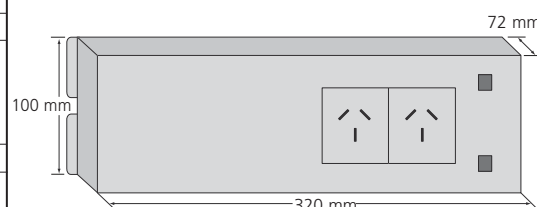
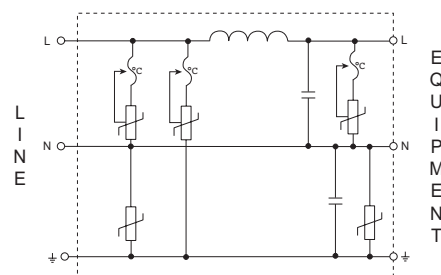


- In-line series protection
- 20kA 8/20 surge rating – robust surge protection rating
- Three modes of protection – L-N, L-PE & N-PE
- LED life status indication
- Mounting flange – can be wall mounted
- Telephone protection and international receptacle options available

PLFs are used to provide the final stage of surge protection to electrical and electronic equipment that connects via AC power plug. The effectiveness of this simple-to-install protection is assured by the virtue of being installed close to the equipment to be protected.

AC equipment which also connects to telephone circuits such as fax machines or computer modems, have special protection requirements. The PLF combination protection provides effective equipotential bonding between the power and data services, which is often not achieved when separate modules are used.

Model	Model	Description
	PLF A 2	2 x Australian outlets
	PLF A 2 RJ	2 x Australian outlets and RJ11 phone
	PLF B 2	2 x British outlets
Nominal Voltage $U_n$	230V	
Distribution System	1Ph 2W+G	
Max. Cont. Operating Voltage $U_c$	275V	
Frequency	50/60Hz	
Max. Line Current @ $U_n$	10A	
Operating Current @ $U_n$	840mA	
Leakage Current @ $U_n$	<0.2mA	
Aggregate Surge Rating	80kA 8/20µs	
Max. Discharge Current $I_{max}$	20kA 8/20µs L-N 20kA 8/20µs L-PE 20kA 8/20µs N-PE PLF A 2 RJ Phone protection 20kA 8/20µs (L+L)-PE	
Protection Modes	All modes protected	
Voltage Protection Level $U_p$ @ 500A 100kHz @ Cat B3, 3kA 8/20µs	50V <600V	
Filtering	-3dB @ 8kHz	
Status	LED indicator	
Dimensions	275 mm x 100 mm x 72 mm (10" x 3.9" x 2.8") approx. 320 mm x 100 mm x 72 mm (12.5" x 3.9" x 2.8") with phone protection	
Weight	1.5 kg (3.3 lb ) approx.	
Enclosure	Aluminum	
Connection	Power Cord, 2 m (6')	
Mounting	Portable or wall mount	
Temperature	-25°C to +70°C (13°F to 158°F)	
Humidity	0% to 90%	
Approvals	Australian Power Authority approved	
Surge Rated to Meet	ANSI/IEEE C62.41.2 Cat A, B, C	



## Universal Transient Barrier

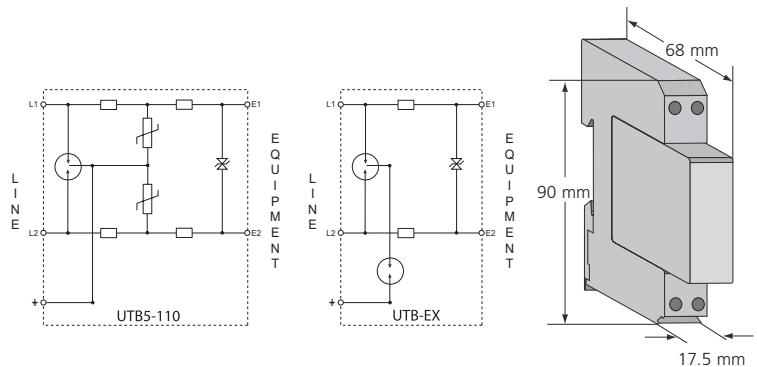


- General purpose barrier – protection of low voltage circuits and transducers
- Separate plug and base design – facilitates ease of module replacement.
- 3 stage protection – fine over-voltage protection, helps ensure lowest residual surge voltages reach sensitive equipment
- Common-mode and differential-mode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

The UTB series provides 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 and industrial monitoring and control equipment. The UTB employs a hybrid, three 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-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.



Model	UTB5	UTB15	UTB15EX	UTB30	UTB30EX	UTB60	UTB110	UTBSA	UTBTA
Item Number for Europe	702800	702810	702811	702820	702821	702830	702840	702860	702850
Nominal System Voltage U <sub>n</sub>	0 to 5V <sup>---</sup> 0 to 3V~	5 to 15V <sup>---</sup> 3 to 10V~		15 to 30V <sup>---</sup> 10 to 21V~		30 to 60V <sup>---</sup> 21 to 42V~	42 to 154V <sup>---</sup> 100 to 120V~	Analog telephone circuits	
Max. Cont. Operating Voltage U <sub>c</sub>	7V <sup>---</sup> 5V~	18V <sup>---</sup> 12V~		33V <sup>---</sup> 23V~		64V <sup>---</sup> 45V~	200V <sup>---</sup> 150V~	–	
Max. Line Current I <sub>L</sub>	1.5A		0.5A	1.5A	0.5A	1.5A		160mA	
Frequency	0.5MHz	1MHz		2MHz		3MHz	0 to 60Hz	15MHz	
Max. Discharge Current I <sub>max</sub>	20kA 8/20								500A 8/20
Protection Modes	Differential & Common Mode								
Technology	GDT, MOV, Silicon with series PTC		GDT & Silicon	GDT, MOV, Silicon w/series PTC	GDT & Silicon	GDT, Silicon & PTC		GDT, PTC	
Voltage Protection Level U <sub>p</sub> @ Cat B3, 3kA 8/20μs	L-L <10V	L-L <25V		L-L <44V		L-L <85V	L-L <220V	L-L <340V	L-L <480V
Loop Resistance	1Ω					0.6Ω		24Ω	14Ω
Dimensions	1 M. 90 mm x 68 mm x 17.5 mm (3.5" x 2.6" x 0.7") approx.								
Weight	0.1 kg (0.24 lb) approx.								
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)								
Connection	1 mm² to 6 mm² (#18AWG to #10AWG) 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)								
Humidity	0% to 90%								
Approvals	CE		CE, ATEX	CE	CE, ATEX	CE			
Surge Rated to Meet	ANSI/IEEE C62.41.2 Cat A, Cat B, Cat C								
Replacement Module Module Item Number for Europe	UTB5M 702805	UTB15M 702815		UTB30M 702805		UTB60M 702835	UTB110M 702845		



# CRITEC® UTB Compact Series

Asia/Australia  
Europe  
Latin America  
North America

## Universal Transient Barrier



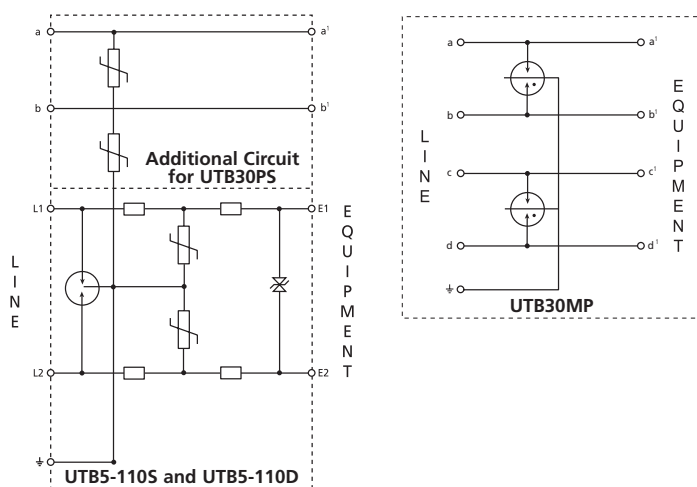
- Compact design universal transient barrier – protection of low-voltage circuits and transducers
- Compact, slimline single or two pair housing 12 mm wide
- 3 stage protection – fine over-voltage protection helps ensure lowest residual surge voltages reach sensitive equipment
- Common-mode and differential mode protection – protects against both possible surge conditions
- Ease of grounding – through DIN mounting rail or via terminal
- Surge rating to 20kA 8/20 – ideal for exposed wiring
- “PS” Power Supply design for compact protection of signal and power supply in one compact housing
- “MP” Multipurpose design suitable for course protection, signal ground to ground bonding or higher current applications

The UTB Compact series provides 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 CRITEC® UTB Modular series. They are well suited to the protection of industrial equipment such as PLCs and SCADA systems.

The UTB S (single pair) and D (two pair) employs a hybrid, three 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 PS (power supply) 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 MP (multipurpose) is generally designed for a variety of applications, including course protection, signal ground bonding or higher current applications.



Model Item Number for Europe		UTB5S	UTB15S	UTB30S	UTB60S	UTB110S	UTB5D	UTB15D	UTB30D	UTB60D	UTB110D	UTB30PS	UTBMP
Nominal System Voltage Un	DC	0 to 5V	5 to 15V	15 to 30V	30 to 60V	42 to 154V	0 to 5V	5 to 15V	15 to 30V	30 to 60V	42 to 154V		
	AC	0 to 3V	3 to 10V	10 to 21V	21 to 42V	100 to 120V	0 to 3V	3 to 10V	10 to 21V	21 to 42V	100 to 120V		
Max. Cont. Voltage Uc	DC	7V	18V	33V	64V	200V	7V	18V	33V	64V	200V		
	AC	5V	12V	23V	45V	150V	5V	12V	23V	45V	150V		
Max. Line Current IL		1.5A					800mA					2A	
Frequency		0.5MHz	1MHz	2MHz	3MHz	60Hz	0.5MHz	1MHz	2MHz	3MHz	60Hz		12MHz
Protection													
Max. Discharge Current Imax		20kA 8/20 μs											
Protection Modes		Differential & Common Mode											
Technology		GDT, MOV, Silicon with Series PTC						GDT, MOV, Silicon					GDT
Voltage Protection Level Up @ Cat B3, 3kA 8/20μs (L-L)		< 10V	< 25V	< 44V	< 85V	< 220V	< 10V	< 25V	< 44V	< 85V	< 220V		
Loop Resistance		1			0.6		1			0.6			
Physical Data													
Dimensions		90 mm x 68 mm x 12 mm (3.5" x 2.6" x 0.47") approx.											
Weight		0.05 kg (0.12 lb) approx.											
Enclosure		DIN43 880, UL®94V-0 thermoplastic, IP20 (NEMA® 1)											
Connection		1 mm² to 2.5 mm² (#18AWG to 14AWG) Grounding via terminal or DIN rail connection											
Mounting		35 mm top hat DIN rail											
Temperature		- 20°C to +65°C (-13°F to 149°F)											
Humidity		0% to 90%											
Test Standards													
Approvals		CE											
Surge Rated to Meet		ANSI®/IEEE® C62.41.2 Cat A, Cat B, Cat C											

Due to a policy of continual product development, specifications are subject to change without notice.

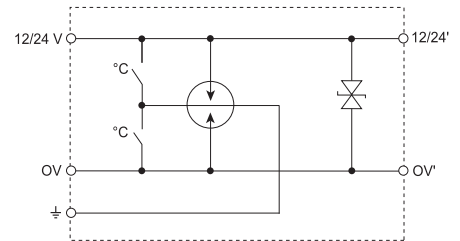
## DIN Surge Diverter



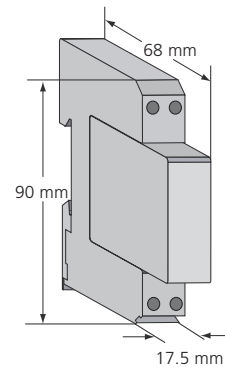
- General purpose barrier – protection of 12 / 24V DC systems and equipment
- Ease of grounding – through DIN mounting rail or via terminal
- Separate plug and base design – facilitates ease of module replacement
- Two stage protection – suitable for the protection of power supply feeds
- Large surge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

The DSD120 series provides high surge rating for circuits that are exposed to higher transient levels, such as those which exit the facility building.

Model	DSD120 1S 12	DSD120 1S 24
Item Number for Europe	702670	702680
Nominal System Voltage $U_n$	12V $\overline{=}$	24V $\overline{=}$
Max. Cont. Operating Voltage $U_c$	15V $\overline{=}$	28V $\overline{=}$
Max. Line Current $I_L$	10A	
Max. Discharge Current $I_{max}$	20kA 8/20 $\mu$ s	
Protection Modes	Differential & Common Mode	
Technology	GDT & Silicon	
Voltage Protection Level $U_p$ @ Cat B3, 3kA 8/20 $\mu$ s	(L-L) <30V	(L-L) <40V
Loop Resistance	<0.5 $\Omega$	
Dimensions	1 M. 90 mm x 68 mm x 17.5 mm (3.5" x 2.6" x 0.7") approx.	
Weight	0.1 kg (0.24 lb)	
Enclosure	DIN 43 880, UL94V-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	
Temperature	-25°C to +70°C (-13°F to +158°F)	
Humidity	0% to 90%	
Approvals	CE	
Surge Rated to Meet	ANSI/IEEE C62.41.2 Cat A, Cat B, Cat C	
Replacement Module	DSD1201S12M	DSD1201S24M
Module Item Number for Europe	702675	702685



**DSD 120**



## DIN Surge Diverter

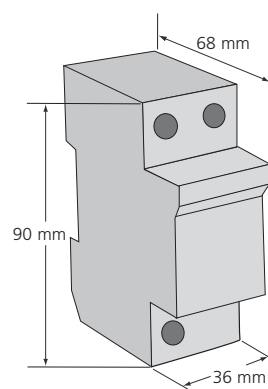
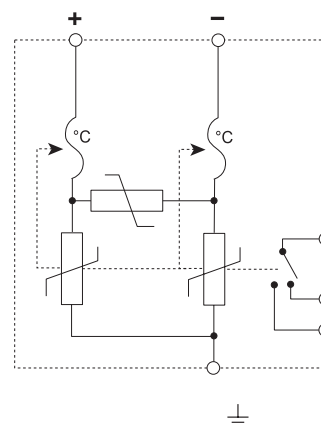


- 35 mm DIN 43 880 profile – matches common circuit breakers
- Indication flag – provides clear visual indication of life status
- 40kA 8/20 surge rating – suitable for exposed DC wiring
- Suitable for both 24VDC and 48VDC distribution systems

The DSD140 2BR 24/48 surge protection device provides 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 IEC61643-1 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 due.

Model	DSD140 2BR 24/48
Item Number for Europe	702750
Nominal System Voltage $U_n$	24V= and 48V=
Max. Cont. Operating Voltage $U_c$	48V~ and 60V=
Frequency	0 to 60Hz
Max. Discharge Current $I_{max}$	40kA (8/20 $\mu$ s)
Nom. Discharge Current $I_n$	20kA (8/20 $\mu$ s)
Protection Modes	Differential & Common Mode
Technology	MOV with thermal
Short Circuit Rating $I_{sc}$	25kA
Voltage Protection Level $U_p$ @ Cat B3, 3kA 8/20 $\mu$ s @ $I_n$	<120V <300V
Status	Mechanical flag Change-over contact (Form C Dry) 250V~/0.5A, max 1.5 mm <sup>2</sup> (#14AWG) connecting wire
Dimensions	2 M, 90 x 68 x 36 mm (3.5" x 2.6" x 1.4") approx.
Weight	0.15 kg (0.33 lb) approx.
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)
Connection	$\leq 35$ mm <sup>2</sup> (#2AWG) solid $\leq 25$ mm <sup>2</sup> (#4AWG) stranded
Mounting	35 mm top hat DIN rail
Back-up Fuse	250AgI if supply >250A
Temperature	-40°C to +80°C (-40°F to +176°F)
Humidity	0% to 90%
Approvals	IEC 61643-1, CE
Surge Rated to Meet	IEC 61643-1 Class II ANSI/IEEE C62.41.2 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 1, 20kA 8/20 $\mu$ s



## Remote Transmitter Protector

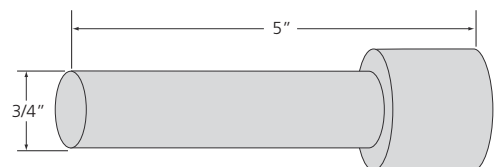
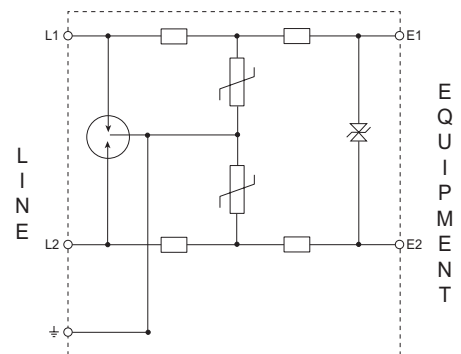


- Flexible installation – enclosure can be installed "dead ended," "T" configured or in-line
- 3 stage protection – fine over-voltage protection helps ensure lowest residual surge voltage reaches sensitive equipment
- Optimized for protection of 2-wire industrial 4-20mA loops – suitable for exposed locations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

The RTP is designed for the protection of industrial 4-20mA 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.

Model	RTP 30 34
Item Number for Europe	700865
Nominal System Voltage $U_n$	30V--- 21V~
Max. Cont. Operating Voltage $U_c$	33V--- 23V~
Max. Line Current $I_L$	145mA
Frequency	3dB @ 2MHz (120Ω)
Max. Discharge Current $I_{max}$	20kA 8/20μs
Protection Modes	Differential & Common Mode
Technology	GDT, MOV & Silicon
Voltage Protection Level $U_p$ @ Cat B3, 3kA 8/20μs	(L-L) 44V
Loop Resistance	14Ω
Dimensions	3/4" diameter x 5" length (17 mm x 127 mm) approx.
Weight	0.34 kg (0.75 lb) approx.
Enclosure	304 Stainless Steel
Connection	≤ 2.5 mm <sup>2</sup> (#14AWG)
Mounting	3/4" NPT thread (14 threads per inch)
Temperature	-40°C to +65°C (-40°F to +149°F)
Humidity	0% to 90%
Approvals	CE
Surge Rated to Meet	ANSI/IEEE C62.41.2 Cat A, Cat B, Cat C



## Subscriber/High Speed Line Protection/Termination



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

- 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

\* Krone-LSA is a registered trademark of Krone GmbH, Germany

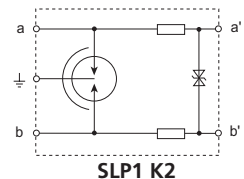
The Subscriber Line Protector (SLP) and High Speed Protector (HSP) are designed for the protection of telecommunication and data circuits that terminate on 10 par Krone-LSA plus disconnect blocks. The DIN rail mount Data Line Termination (DLT) screw terminal block allows these protectors to be used in 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.

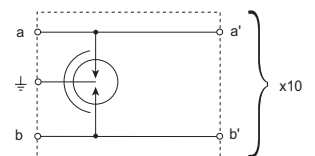
The HSP series feature multiple protection stages providing enhanced protection. The K12, 36 and 72 are low voltage units suited to industrial/signalling applications. The K230 is suited to protection of sensitive voice and high speed data circuits.

Model	SLP1 K2*	SLP10 K1F	HSP10 K12	HSP10 K36	HSP10 K72	HSP10 K230
Item Number for Europe		701540	700815	700805	700850	700860
Max. Cont. Operating Voltage $U_c$	190V---	190V---	13V---	40V---	65V---	190V---
Max. Line Current $I_L$	120mA	1000mA	150mA			
Max. Discharge Current $I_{max}$	20kA 8/20 $\mu$ s (L+L)-E					
Technology	Multi stage	Single stage	Multi stage			
Frequency	2Mbits 3MHz	8Mbits 12MHz	8Mbits 12MHz			
Insertion Loss	<0.75dB		<0.4dB			
Return Loss	<22dB		<20dB			
Impedance Balance	<48dB		<55dB			
Loop Resistance	20 $\Omega$	0.2 $\Omega$	16.4 $\Omega$		6.6 $\Omega$	
Dimensions	125 mm x 34.5 mm x 21 mm					
Connection	Krone LSA Plus termination system					
Temperature	-20°C to +60°C (-4°F to 140°F)					
Humidity	0% to 90%					
Approvals	CE, C-Tick, A-Tick		CE, C-Tick			CE, C-Tick, A-Tick

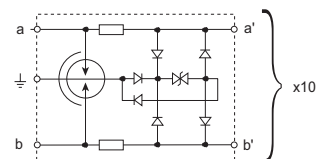
\*Ground bar accessory, (P/N SLP-EB), required per 10 pair Krone-LSA block.



SLP1 K2



SLP10 K1F



HSP

## RJ11 Telephone Line Protection

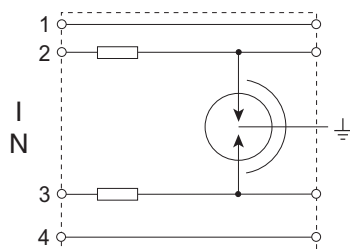
Asia/Australia  
Latin America  
North America



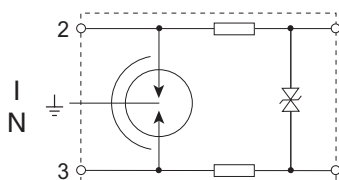
- RJ11 sockets – simple plug-in connection for 4 or 6 position RJ plugs
- 6.5" patch cord included – no additional cables required
- SLP RJ11 is UL® 497A Listed
- L-L & L-G protection – for comprehensive protection
- Automatic over-current protection

The SLP1 RJ11 series of surge suppressors 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	SLP1 RJ11	SLP1 RJ11A
Max. Cont. Operating Voltage $U_c$	<280V	
Max. Line Current $I_L$	160mA @ 25°C (77°F)	120mA
Max. Discharge Current $I_{max}$	500A 8/20μs	20kA 8/20μs
Voltage Protection Level $U_p$ @ 5kV/125A 10/700μs	110V T-R 500V (T+R)-G	
Dimensions	76 mm x 38 mm x 28 mm (3.0" x 1.5" x 1.1") approx.	
Weight	50 g (1.8 oz) approx.	
Connection	6 position RJ, 2 pins protected 150 mm (6") 0.8 mm <sup>2</sup> (#18AWG) with earth 4 mm ring lug 165 mm (6.5") patch cord included	
Mounting	Adhesive backing	
Temperature	-40°C to +65°C (-40°F to +150°F)	
Approvals	UL	A-Tick



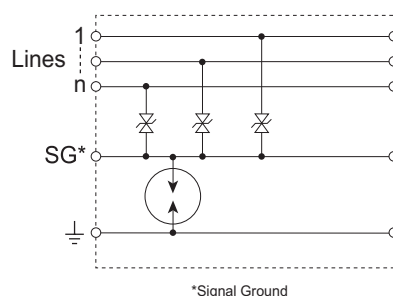
## Data Equipment Protector



- Premium 1500 Watt (>100 Amps 8/20) capability – robust protection
- Models to cover RS-232, RS-423, RS-422 and RS-485 protocols
- Provides 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 DEP series 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.



Model	DEP RS232 25 25	DEP RS232 9 9	DEP RS422 9 9
Item Number for Europe	700630	700640	700650
Max. Cont. Operating Voltage $U_c$	15V $\approx$	15V $\approx$	9V $\approx$
Protection Modes	All pins to pin 7 (SG) SG to ground	All pins to pin 5 (SG) SG to ground	All pins to pin 1 (SG) SG to ground
Connection	DB25 Male/Female	DB9 Male/Female	

## Local Area Network Protector

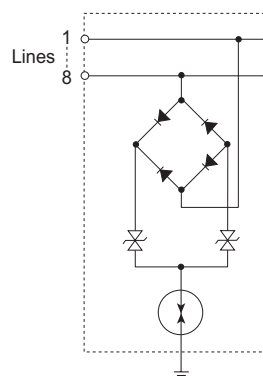


- Plug-in protection – simple to install
- 100BaseT (Cat 5) – works with high speed networks
- Earth Potential Equalization

The LAN-RJ45 series suits both 10BaseT and 100BaseT Unshielded Twisted Pair (UTP) Ethernet networks. The unit(s) features simple plug-in installation and provide Earth Potential Equalization (EPE). State-of-the-art protection technology to help ensure that high speed LAN data (Cat 5) is allowed to pass unhindered while

transient over-voltages are attenuated to safe levels. The LANRJ451 is designed for the protection of single circuits such as workstations, while the LANRJ4524 is a 19" rack mounted for the protection of 24 circuits such as routers and other network equipment.

Model	LAN RJ45 1	LAN RJ45 24
Item Number for Europe	700526	700527
Max. Cont. Operating Voltage $U_c$	66V $\approx$	
Nom. Discharge Current $I_{max}$	500A 8/20 $\mu$ s	
Frequency	100Mbps (100BaseT & 10BaseT)	
Voltage Protection Level $U_p @ I_n$	35V L-L 350V L-G	
Connection	RJ45 with 250 mm (10") patch cord	24 x RJ45 circuits
Mounting	Screw Mount	19" rack mount
Approvals	CE	
Surge Rated to Meet	IEC 61643-21 ANSI/IEEE C62.41.2 Cat A	



# Community Antenna Television Protector and Closed Circuit Television Protector



## CATV-HF Protector

- High frequency design – suitable for digital cable
- Weatherproof enclosure – install indoor or outdoor

## CATV-F and CATV-MF Protector

- Traditional TV coax protector

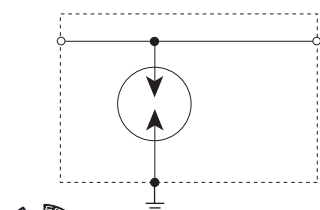
## CCTV-12 Protector

- Isolated ground – does not introduce unwanted noise
- Male-male adaptor included
- Suitable for coaxial LAN protection

Model	CATV HF	CATV F	CATV MF	CCTV 12
Item Number for Europe		702535	702525	703000
Spark Over/Max. Operating Voltage	180V @10kV/μs	Uc---60V~/85V---	Uc---48V~/60V---	30-36V (Uc--- 12V~)
Max. Discharge Current I <sub>max</sub>	5kA 8/20μs	5kA 8/20μs	5kA 8/20μs	20kA 8/20μs
Frequency	2GHz	1GHz	1GHz	100MHz/16Mbits
Attenuation	-1dB @ 1GHz -2dB @ 1GHz	<0.5dB 47MHz - 860MHz	<0.5dB 47MHz - 860MHz	
Impedance	50-75Ω			
Voltage Protection Level Up @ 5kV/500A 8/20μs	<90V	600V @ 5kA	600V @ 5kA	60V
Dimensions	96 mm x 63 mm x 31 mm (3.8" x 2.5" x 1.25") approx.	78 mm x 17 mm x 17 mm (3.1" x 0.7" x 0.7") approx.	70 mm x 17 mm x 17 mm (2.7" x 0.7" x 0.7") approx.	90 mm x 22 mm x 28 mm (3.5" x 0.86" x 1.1") approx.
Weight	115 g (4 oz) approx.	30 g (1 oz) approx.	26 g (1 oz) approx.	60 g (2 oz)
Enclosure	Outdoor	Indoor		
Connection	F-Type, Female	F-Type, Female, 4.5 ground lead	RF 9.5 mm Coax (M/F). 120 mm (4.5") ground lead	BNC, Female <sup>(1)</sup>
Mounting	Screw mount	In-line insertion		
Temperature	-25°C to +70°C (-13°F to +158°F)			
Approvals		CE		

<sup>(1)</sup> Adapter supplied for female/male connection.

# Coaxial Surge Protector



Model	CSP BNC 90	CSP BNC 600	CSP NMF 90	CSP NMF 600	CSP NB 90	CSP NB 600
Item Number for Europe	700360	700405	700310	700355	700410	700455
Spark Over Voltage @100V/s @100V/us	72-108V 450V	480-720V 1100V	72-108V 450V	480-720V 1100V	72-108V 450V	480-720V 1100V
Max. Discharge Current I <sub>max</sub>	20kA 8/20μs					
AC Discharge Current	100A 50/60Hz 9 cycles					
Impulse Life	400 impulses @ 500A 10/1000μs					
Frequency	DC to 3GHz typical					
Capacitance	<1.5pF					
Impedance	50Ω					
Insulation Resistance	>10GΩ					
Dimensions	29 mm x 29 mm x 57 mm (1.14" x 1.14" x 2.44") approx.				29 mm x 29 mm x 67 mm (1.14" x 1.14" x 2.64")	
Weight	0.2 kg (0.44 lb)					
Enclosure	IP20 (NEMA-1)					
Connection	BNC, Male/Female		N-Type, Male/Female		N-Type Female/Female	
Mounting	Removable mounting bracket and ground lead supplied 2 x 4 mm holes, 10 mm centers					
Temperature	0°C to +65°C (32°F to 150°F)					
Approvals	CE					

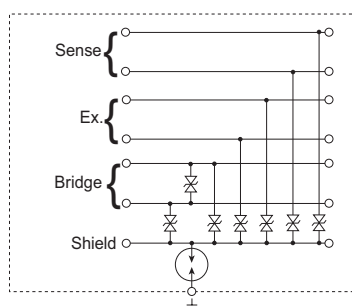
90V units suitable for transmitters up to 25W, 600V units suitable for transmitters up to 900W



## Loadcell Protector



- 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
- Protects against excitation over-voltage – prevents loadcell damage



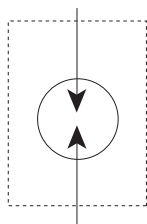
Model	LCP 01A
Item Number for Europe	701610
Max. Discharge Current $I_{max}$	300A 8/20 $\mu$ s (signal to shield) 10kA 8/20 $\mu$ s (shield to ground)
Technology	Silicon Avalanche Diode
Voltage Protection Level $U_p$	30V (signal to shield) 15V 8/20 $\mu$ s (signal to signal) 90V (shield to ground)
Loop Resistance	<0.25 $\Omega$
Dimensions	110 mm x 75 mm x 56 mm (4.3" x 2.9" x 2.2") approx.
Weight	0.25 kg (0.55 lb)
Enclosure	ABS, IP55 (NEMA-12)
Connection	Screw terminals for 4 or 6 wire loadcells
Temperature	-40°C to +80°C (-40°F to +176°F)

## Potential Equalization Clamp



- High peak current capability – long service life
- Weatherproof enclosure – suitable for direct burial
- ATEX approved – suitable for use in potentially explosive atmospheres

The PEC is an equipotential bonding device that can be used to minimize damage in applications where separated ground systems are required. The PEC is ATEX approved, making the device suitable for use in explosion hazard areas such as the protection of pipeline insulated joints.



Model	PEC100
Item Number for Europe	702900
Spark Over Voltage	350V +/- 15% @100V/s
Max. Discharge Current $I_{max}$	100kA 8/20 $\mu$ s
Technology	Gas Discharge Tube (Auto reset)
Insulation Resistance	>1G $\Omega$
Capacitance	<10pF
Voltage Protection Level $U_p$	800V @ 1kV/ $\mu$ s
Dimensions	138 mm x 25 mm (5.4" x 1") approx.
Weight	0.5 kg (1.1 lb) approx.
Enclosure	Suitable for outdoor or direct burial
Connection	450 mm of 16 mm <sup>2</sup> (17" of #5AWG) conductor
Temperature	-20°C to +60°C (-4°F to +140°F)
Approvals	CE, ATEX, BASEEFA Approved

# A Guide to Communication and Signaling Circuits

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

- 1) Maximum Continuous Operating Voltage (Uc)
- 2) Maximum line current (I<sub>L</sub>)
- 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. Although standard allows +/- 25V signaling, use of more than +/- 12V is uncommon.	DEP RS232 25 25 DEP RS232 9 9 UTB 15 <sup>(1)</sup>
RS-422 (V.11)	Industrial version of RS-232. 0-5V balanced signaling.	DEP RS422 9 9 UTB 5 <sup>(1)</sup> LAN RJ45 Series
RS-423	Similar to RS-232 but +/- 5V signaling used.	DEP RS232 25 25 DEP RS232 9 9 UTB 5 <sup>(1)</sup> LAN RJ45 Series
RS-499	Based on RS422, but defined DB-25 connector used.	DEP RS232 25 25
RS-485	Similar to RS-422 but allows multiple devices to communicate. DB-9 connector is common.	DEP RS422 9 9 UTB 5 <sup>(1)</sup>
Ethernet Cat 4 Cat 5 10BaseT 100Base T	Ethernet is the term used to describe a family of communication protocols. <ul style="list-style-type: none"> <li>10BaseT is a 10MHz system using twisted pair or coax cables</li> <li>100BaseT is a 100MHz system using twisted pair cables</li> </ul> Cat 4 is a cable specification that allows operation up to 10BaseT, while Cat 5 allows operation up to 100BaseT frequencies.	LAN RJ45 Series
Token Ring		CCTV 12
ArcNet	Registered service mark of ARCNET Architects	CCTV 12
CCTV	Closed Circuit TV Signal, i.e. video signal	CCTV 12
Cable TV	High speed analog or digital TV services	CATV HF
Antenna TV	Analog or digital TV services	CATV MF
T1 E1	T1 is a European high speed telephone service (1.5 Mbit) E1 is a 2 Mbit connection	For hardwired circuits refer to Note 2.
Telephone lines		UTB SA <sup>(3)</sup> UTB TA <sup>(3)</sup> SLP Series <sup>(3)</sup>
4-20mA current loop	Common industrial communications protocol used to interface with transducers etc	UTB 30 RTP 30 34
Strain gauge Load cells	As used in weigh bridges etc.	LCP01A

- (1) The number of UTB's required is dependent on the number of wires being used in the signaling circuit. UTBs are design for balanced circuits and each UTB will protect one pair of wires. The UTB can also be used to protect two unbalanced circuits.
- (2) "Wet" lines are sometimes found within a telecommunication carriers network. Wet lines superimpose DC power (60V, 40-160mA) to power remote repeaters. Two UTB SA units are recommended for such applications. "Dry" lines are typically found at the customer connection point where 2 x UTB 15 are recommended.
- (3) The UTB TA is rated to 500A 8/20µs and intended to meet US NEC requirements. The SLP1 RJ11 is rated to 500A 8/20µs and UL Listed. The UTB SA and SLP1RJ11A are rated to 20kA 8/20µs and specifically designed and approved for use on the Australian telecommunication network.

# 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.

# Glossary of Terminology

## 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.

## 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 ( $I_L$ )

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 over-current 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 Disconnect

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.





# Glossary of Terminology

## 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  $U_c$  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  $I_{max}$ .

# CRITEC® Surge Calculator and ERICO® Website

## ERICO Website

ERICO has updated its website to offer easier navigation – giving customers the information that they need right at their fingertips. Now search the site via ERICO's well-known brand names, alphabetical product listing, or industry. The easy-to-access Literature Library provides pertinent literature in an easy-to-download PDF format. In the News & Events section, customers can find new product updates, press releases and lists of helpful seminars and tradeshow.

Other features include:

- Faster access to product information through improved navigation
- Product specifications
- A list of upcoming events and industry trade shows
- Locations and contact information for ERICO offices around the world



## CRITEC® Surge Selection Calculator

Available as a download from the ERICO® website, the CRITEC Surge Selection Calculator is an invaluable software tool to help the user choose the correct SPD for his application. The tool also includes:

- A comprehensive technical library of publication and a frequently asked section on surge protection.
- Electronic copies of specification sheets and installation prints
- Specification guides for contractors and system specifiers
- Electronic risk assessment calculators for a number of countries



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# ERICO® Facility Electrical Protection Literature



## Facility Electrical Protection Solutions Brochure

Discusses effective facility electrical protection. The catalog details the ERICO® Six Point Plan of Protection and goes on to cover lightning protection, grounding, bonding and surge protection in depth. Products and detailed drawings are included, as are industries to which the technologies are most applicable.



## ERITECH® Lightning Protection Catalogs

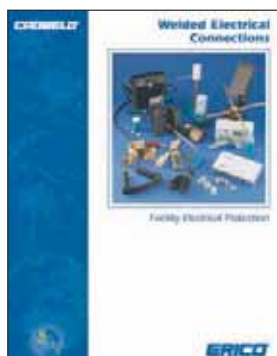
ERITECH® SYSTEM 2000 Lightning Protection Products catalog highlights products used in conventional lightning protection. Products detailed include conductors, ground rods and plates, clamps, splices, points and accessories.

ERITECH® SYSTEM 3000 Lightning Protection Products catalog details the active lightning protection process. Information on air terminals, downconductors and design software is included.



## ERITECH® Grounding Products Catalog

Details ERICO's extensive offering of ground rods and accessories, ground mesh and mats, signal reference grids, ground bars, ground receptacles, transient earth clamps, ground enhancement materials, and other grounding materials.



## CADWELD® Welded Electrical Connections Catalog

Covers the range of hardware required to make a CADWELD connection as well as detailed ordering information for molds, weld materials, fence and gate jumpers and the smokeless CADWELD® EXOLON process.



## CRITEC® Surge Protection Products Catalog

Details the extensive range of CRITEC Surge Protection Devices for industries such as commercial & industrial, process control & automation and telecommunications. It includes information on AC protection products, data control and signal protection products, as well as point-of-use protection products.



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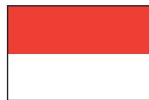
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