

CRITEC®

Surge Protection Products



ERICO®
100 YEARS YOUNG
1903 - 2003



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

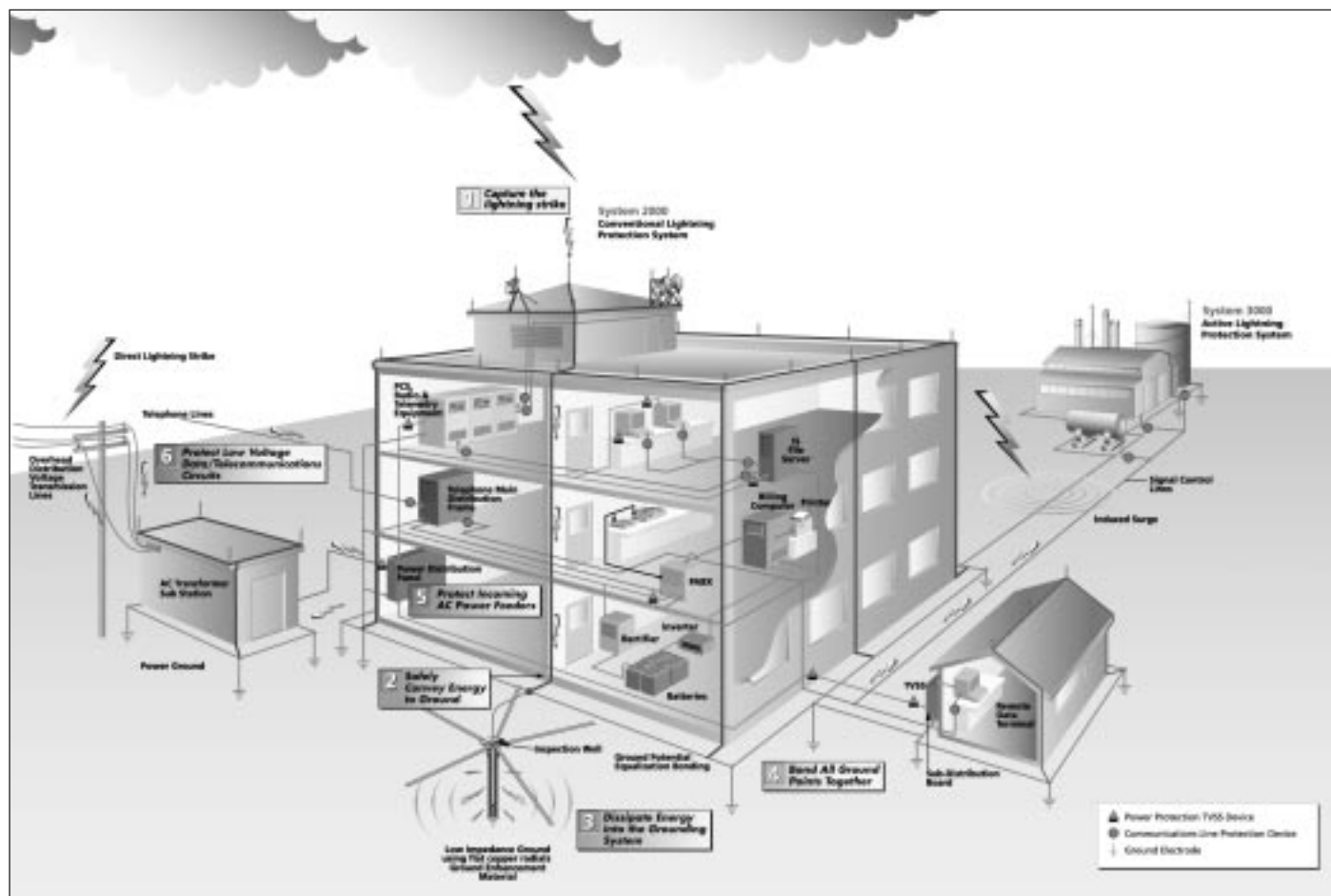
By following the Six Point Plan of Protection, ERICO customers are able to implement the most effective solutions to individual lightning, grounding and surge problems while retaining an integrated protection philosophy. The products and concepts outlined in this catalog relate to points 5 & 6 of the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

- 1** *Capture the lightning strike.*
Capture the lightning strike to a known and preferred attachment point □ using a purpose-designed air terminal system.
- 2** *Safely convey this energy to ground.*
Conduct the energy to the ground safely 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.

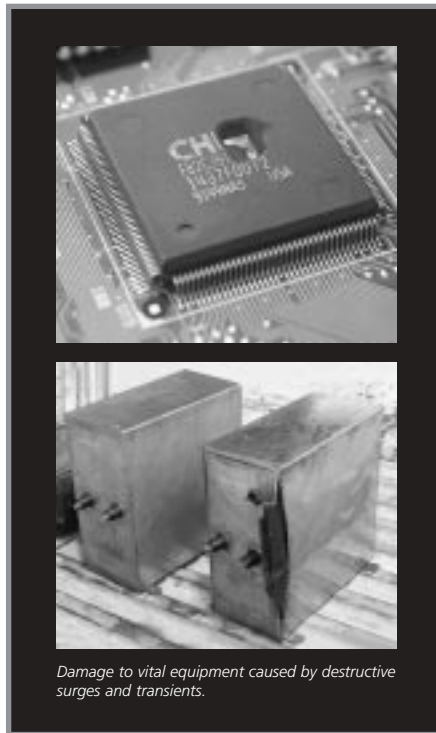
Sources of Transients and Surges

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.

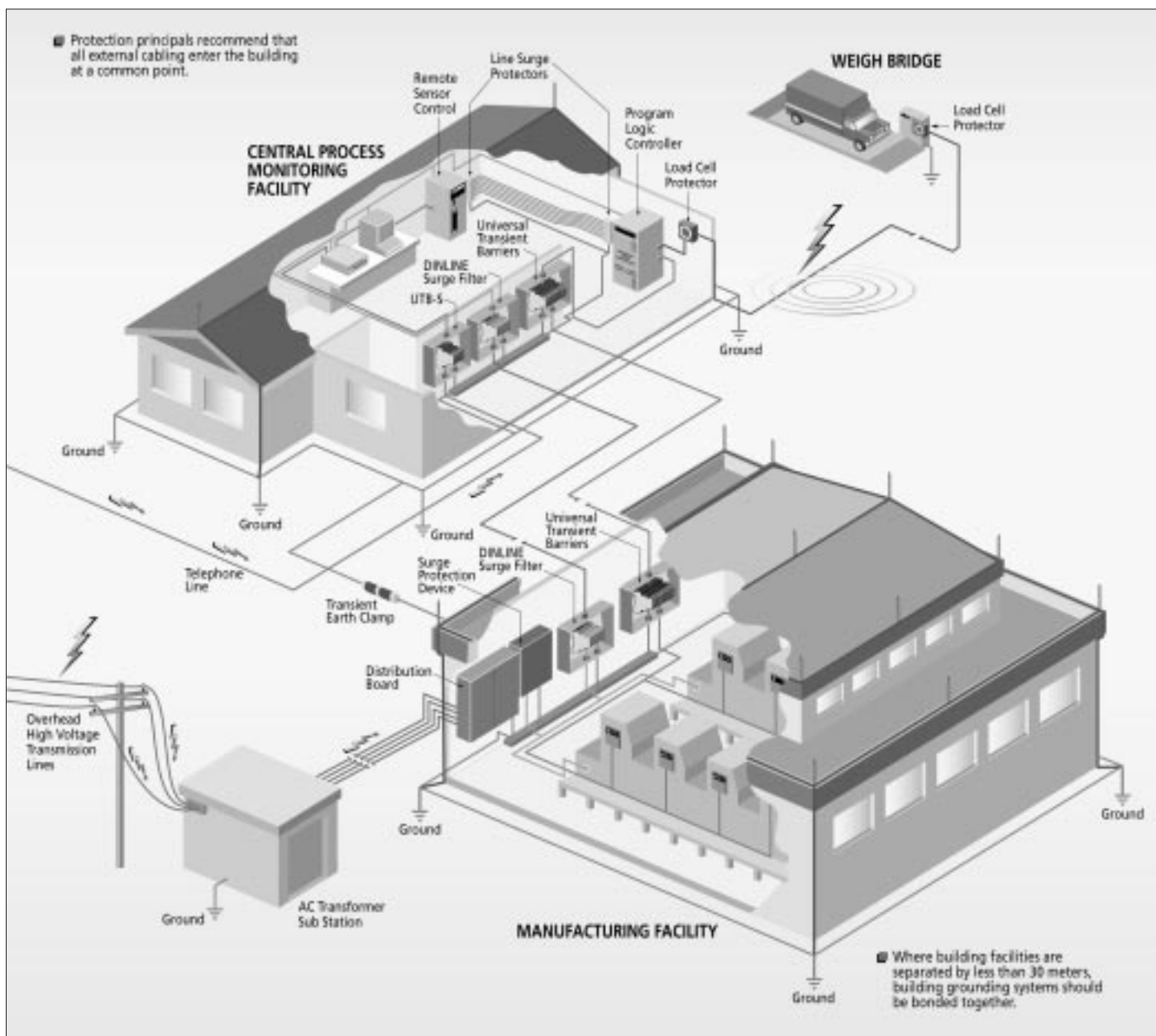


The Need for Coordinated Protection

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.

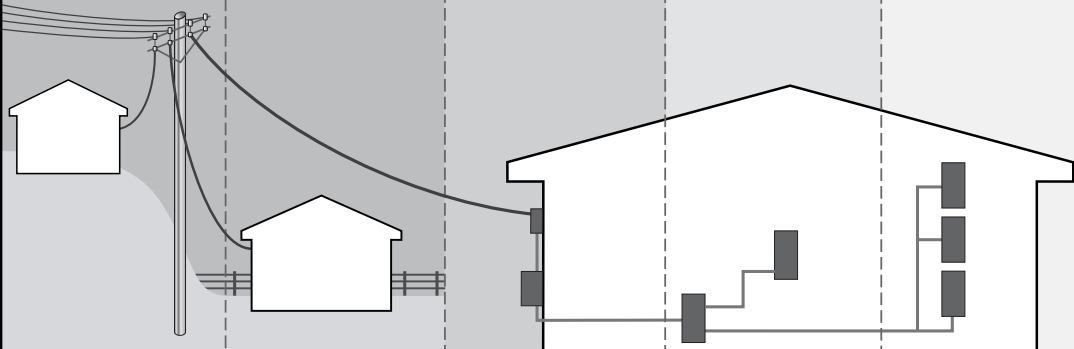
It is for these reasons that the ERICO Six Point Plan was developed. The plan prompts the consideration of a coordinated approach to lightning protection, surge and transient protection and grounding, an approach that embraces all aspects of potential damage, from the more obvious direct strike to the 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 IEC 61643 Test Class VDE Classification			CAT C	CAT B	CAT A
	I		I, II	II	III
	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
EXPOSURE					
HIGH Ng >2	100kA	70kA	40kA	20kA	10kA
MED. Ng 0.5-2	65kA	40kA	20kA	20kA	5kA
LOW Ng <0.5	65kA	40kA	15kA	5kA	3kA

Ng = strikes/km²/year.

RECOMMENDED PRODUCTS				
PRODUCT SERIES	SEP400			
	SES200			
		SES65 120/240		
	TDS Movtec & MPM			
	TDX150			
		TDX100		
			TDX50	
	TSG-SRF			
	TSG/SGD			
	DSD1150			
	DSD1100			
	DSD160 & DSD380			
		DSD140 & DSD340		
		DSD130		
			DSD110	
			TDF	
				DSF6A
	OHA130			

Selecting Surge Protection

Recommended Surge Ratings - A Comparison between IEC and IEEE Recommendations

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

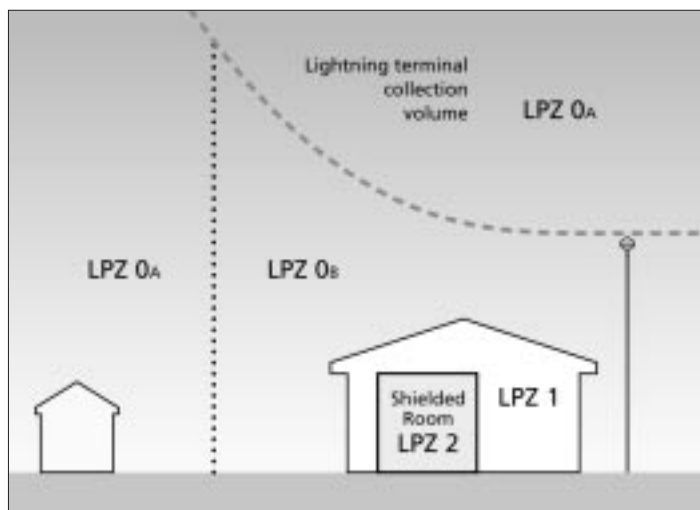
ANSI/IEEE standard C62.41 has classified the "point-of-entry" environment as CAT. B/C. Under this classification the highest expected energy level is 10kA 8/20 μ s. In contrast, the IEC61312 and DIN VDE 0675 defines some differing guidelines. IEC 61000-5-6 and IEC 61312-1 describe protection zone concepts.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

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

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

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

- Class A : **Arrester for use in low-voltage overhead lines**
- Class B : **Arrester for lightning current equipotential bonding** (must withstand 100kA 8/80 μ s or 10As charge, twice). Zones OB to 1 (Main distribution Boards, Sub-Boards)
- Class C : **Arrester for over-voltage protection** (must have a nominal surge rating of at least 5kA 8/20 μ s) Zones 1 to 2 (mainly sub-boards or low exposure main boards)
- Class D : **Arrester for portable use** on socket-outlets (must have a nominal surge rating of at least 1.5kA 8/20 μ s)



Protection zones defined by specific product application.

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

- Lightning Current Arrester
- Over-voltage Arrester

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

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

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

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

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

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

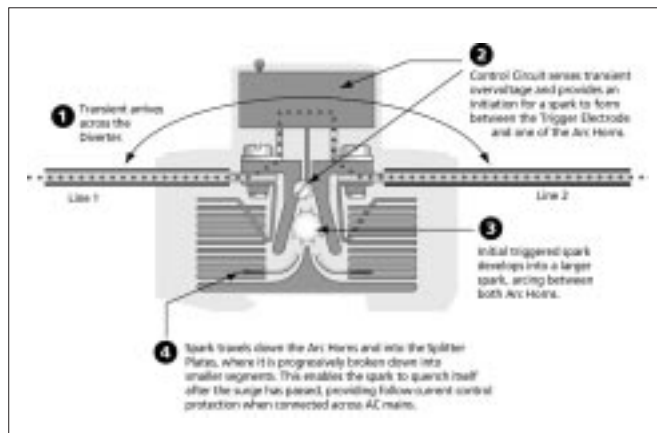
Advanced Technologies – The ERICO Advantage

Triggered Spark Gap (TSG) Technology

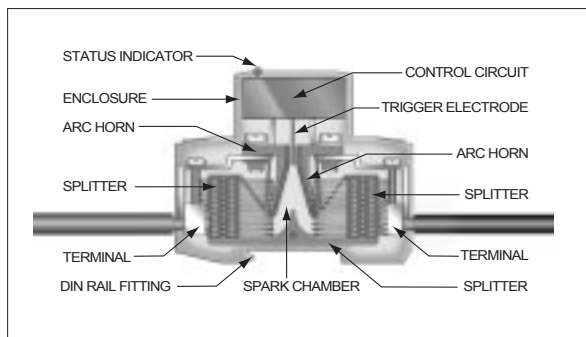
One of the criticisms of traditional spark gap technology has been the high initiating voltage required to form the arc, typically as much as three to four thousand volts. Clearly this is inappropriate for sensitive AC supply where surges of several hundred volts can be lethal to equipment. ERICO has 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.

New concepts for 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 new CRITEC SRF is the most recent development bringing together for the first time, TSG Technology with the benefits of series filtering.

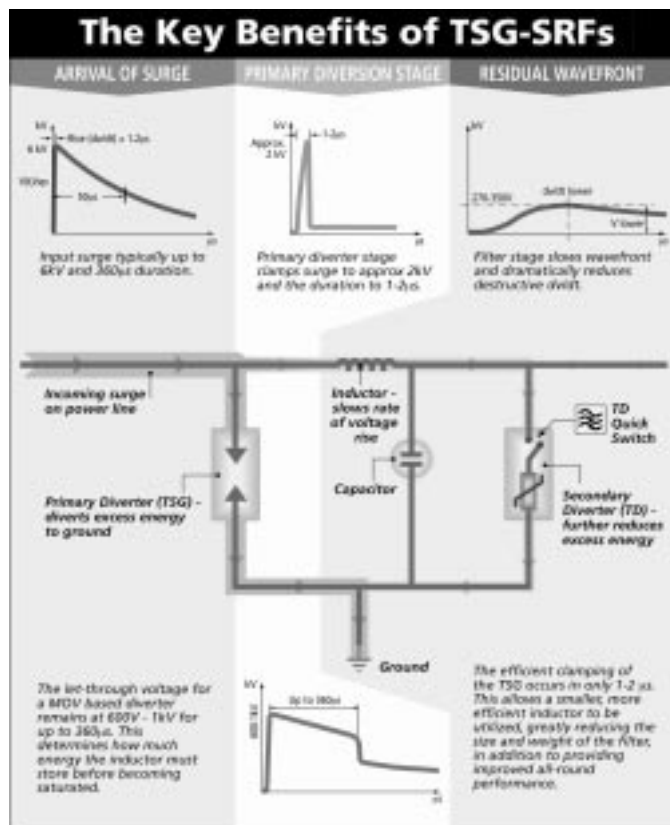
Fundamental breakthrough in filter design

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?

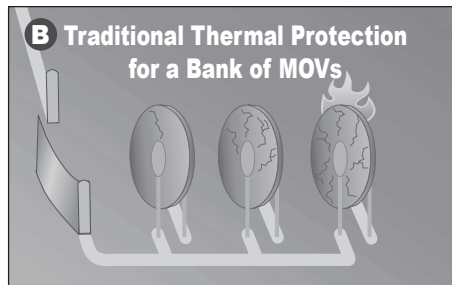
The combination of TSG and series filtering provides the benefits of high surge capability, low let-through voltage and considerably reduced rate of voltage rise (dv/dt). Additional benefits of reduced size, weight and heat dissipation also result.



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 allows the MOV to be immediately and safely disconnected, allowing neighboring MOVs to continue to provide transient protection.



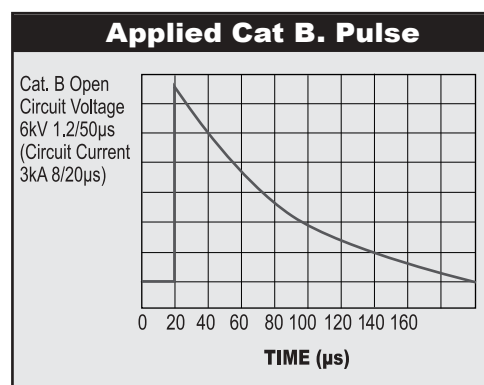
Filtering Technology

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 absorb the energy in a small transient thereby providing a level of attenuation.

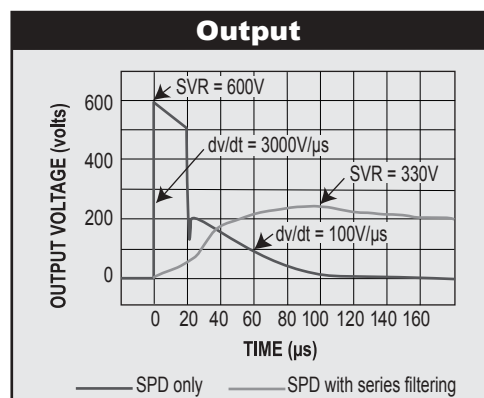
A far more effective approach is the series LC filter. This type of filter is connected after the surge limiting components and is in series with the supply powering the equipment. It consists of a series inductor and parallel capacitors. Surge protection devices of this nature are often referred to 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/ μ s. Effective filtering reduces this rate-of-rise to less than 100V/ μ 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 RFI/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 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

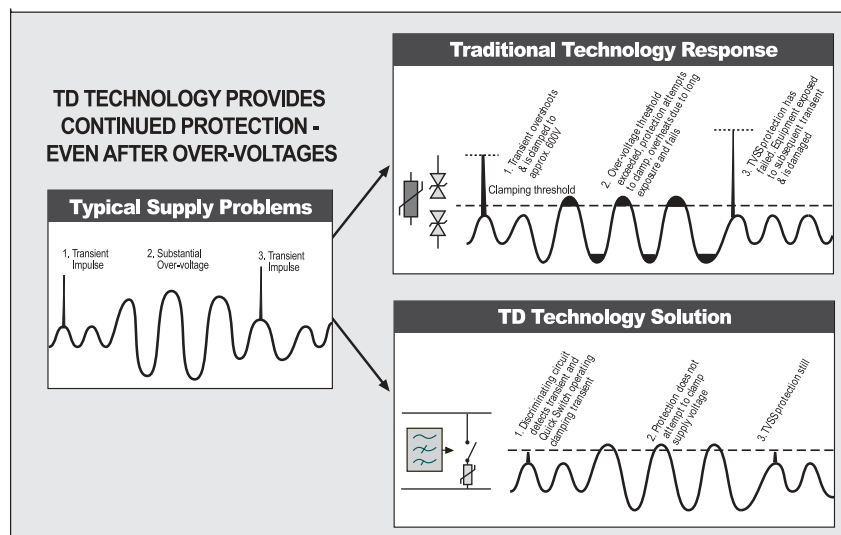
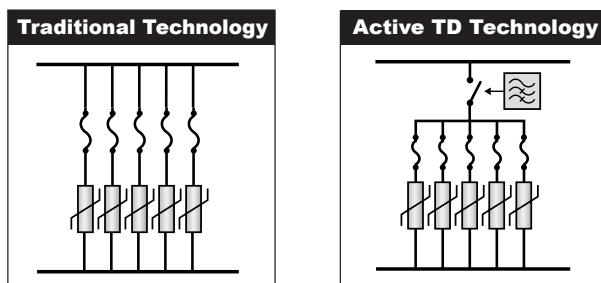
The secret to ERICO's Transient Discriminating Technology is its *active frequency discrimination* circuit. This patented device can discriminate between a temporary over-voltage (TOV) condition and a very fast transient, which is associated with lightning or switching-induced surges. When the transient 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, providing 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 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.

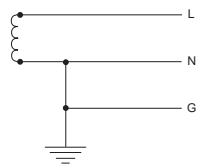
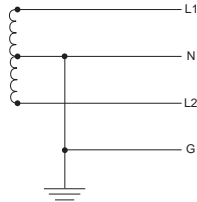
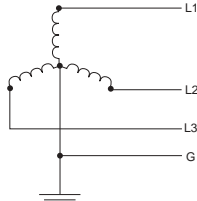
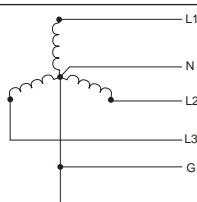
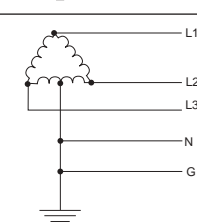
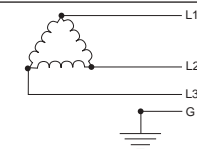
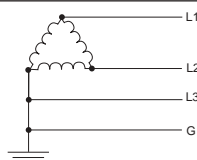
The UL 1449 testing standard addresses the safety of a TVSS device under temporary and abnormal overvoltage conditions, but does not specifically mandate a design that will give a reliable, long length of service in the real world. Specifically, UL 1449 tests that the TVSS remains operational at 10% 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% over-voltage, while ERICO's TD Technology gives even greater overhead.



A Guide to Common Power Distribution Systems

Throughout the world a number of different power distribution systems are used. This guide identifies the more common of these

systems. The individual product specification tables detail system suitability.

Description	Source Configuration	Typical Supply Voltages
Single Phase 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 , 4W+G		120/240V (L-N/L-L)
Delta Ungrounded 3Ph , 3W+G		240V 480V (L-L)
Delta Grounded corner 3Ph , 3W+G		240V 480V (L-L)

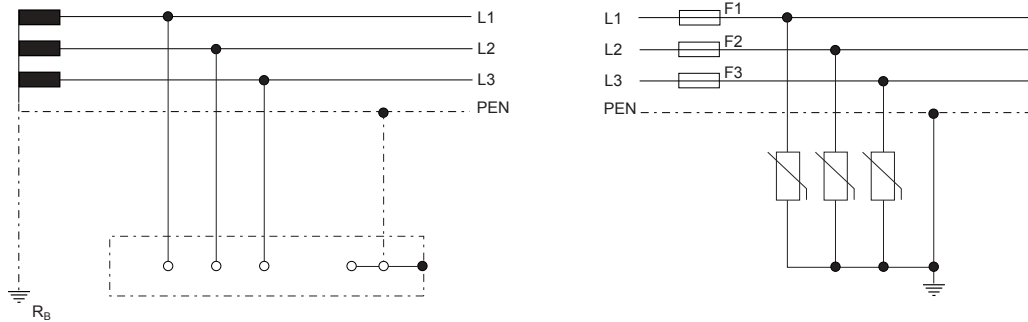
A Guide to Common Power Distribution Systems

IEC 60364 series characterizes low voltage distribution systems by grounding method and arrangement of the neutral and protective

earth conductors. The diagrams show recommended DINLINE DSD series connections for the various systems.

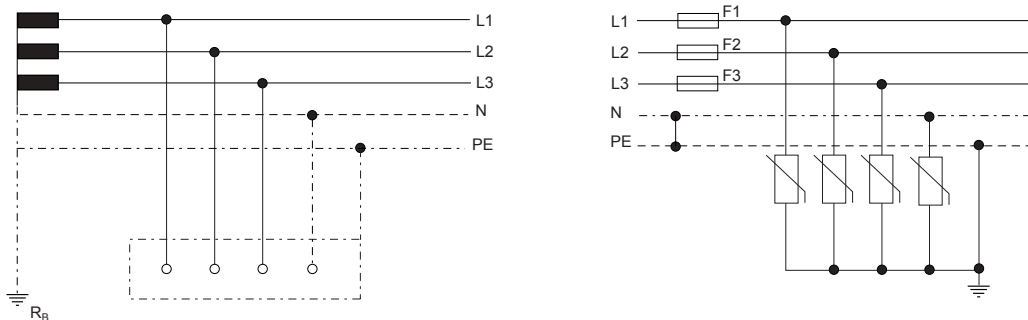
TN-C System

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.



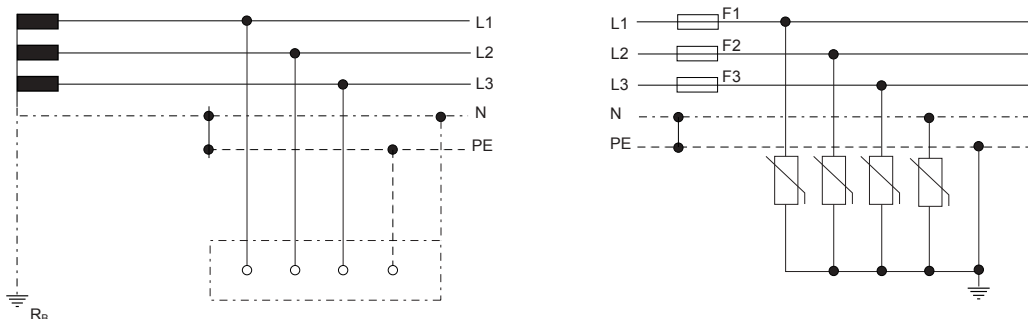
TN-S System

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.



TN-C-S System

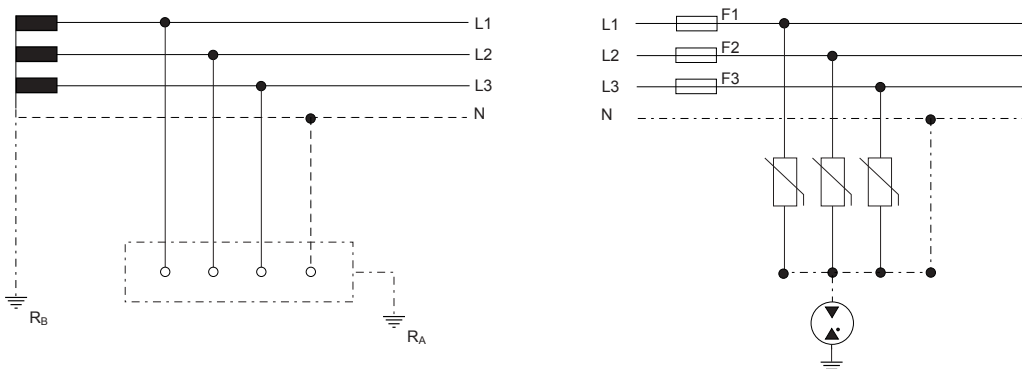
In this, a separate neutral and protective earth combine in a single PEN conductor. This system is also known as a Multiple Earthed Neutral (MEN) system and the protective conductor is referred to as the Combined Neutral Earth (CNE) conductor. The supply PEN conductor is earthed at a number of points 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.



A Guide to Common Power Distribution Systems

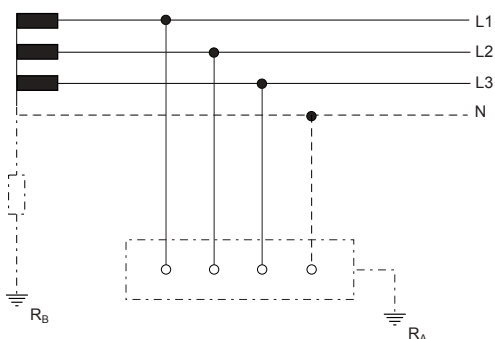
TT System

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



IT System

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



Distribution Network Configuration

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

SPD U_c Selection:

U_0 = Voltage between phase (line) and neutral conductor

X = Not applied

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

A Guide To Using This Catalog

Product Series

CRITEC® SEP400

Service Entrance Premium



- High single shot surge rating – ensures adequate rating for the electrical environment of large facility service entrances
- Transient Discriminating (TD) Technology – provides increased service life
- Safety interlocked high interrupt capacity fusing – for additional safety
- Modular design – allows easy replacement of surge modules
- Combination MOV, SAD & Filter – for enhanced protection
- Service disconnect switch – allows replacement of surge modules without interruption to facility supply

Regional Availability

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

Asia/Australia
Latin America
North America

Application Information

The SEP series of Transient Voltage Surge Suppression delivers specification grade performance and features at an affordable price. 400kA 8/20µs per line of surge material, provides long life and makes the unit ideal for the protection of service entrance panels. Internal electronics continuously monitor SPD protection, and the status of each protection mode is displayed on a 5 segment LED bar graph. Alarm contacts and a surge counter are standard features.

Behind the metal safety interlocked door replaceable modules provide protection to L-N, L-G and N-G modes. 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.

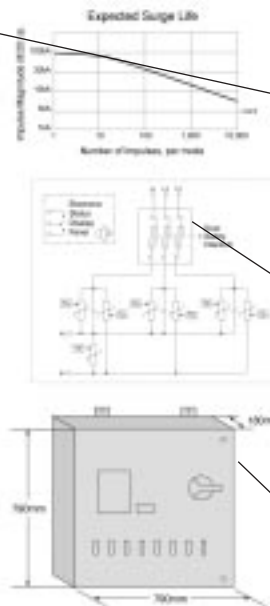
Features & Benefits

Order Codes

Line Diagram
General internal circuit arrangement. Refer to page 14 for drawing keys.

Dimensions

Model	SEP400-020008	SEP400-027480
Normal Voltage UL	150/200V	277/480V
Distribution System	3Ph Y-4W-G	3Ph Y-4W-G
Max. Cont. Operating Voltage UL	170V	430V
Stand-off Voltage	240V	480V
Frequency	50/60Hz	
Operating Current @ UL	0.5A	0.7A
Aggregate Surge Rating	400kA 8/20µs (per line)	
Max. Discharge Current I _{max}	100kA 8/20µs (NEMA LB1 per model)	
Protection Modes	All modes protected via L-N, L-G & N-G	
Technology	TD Technology MOV/Silicon with over-current fusing Sine wave filtering	
Voltage Protection Level U _p	L-N @ 500A 8/20µs (J.E. 80V)	L-N @ 500A 8/20µs (J.E. 80V)
@ Cat Ed. 3kA 8/20µs	<180V	<180V
@ 100kA 8/20µs	<130V	<130V
Filtering @100kHz	<40dB	
Status	5 segment LED bar graphs Coast status indicator per phase Change-over contact (Form C dry), 120V/5A, x 2 (seal) (#14 AWG) connecting wire Audible alarm with silence button Surge counter	
Dimensions	150mm x 750mm x 180mm (20" x 29" x 7") approx. 34kg (75lb) approx.	
Enclosure	Metal, IP20 (NEMA-12)	
Connection	Gentry to 35mm ² (100AWG) to #3AWG	
Mounting	Wall mount	
Back-up Overcurrent Protection	Fused interlock disconnect included in enclosure	
Temperature	-30°C to +60°C (14°F to 140°F)	
Humidity	0% to 90%	
Warranty	10 years free replacement	
Approvals	UL/ULC, UL 1803, NEMA	
Surge Rated to Meet	ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Surge 3, Exposure B, 100kA 8/20µs, 10kA 10/350µs	



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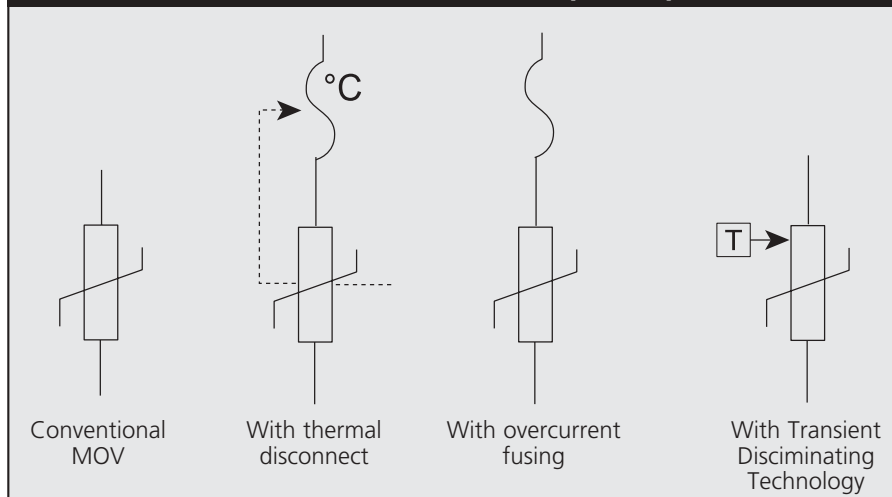
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ERICO®

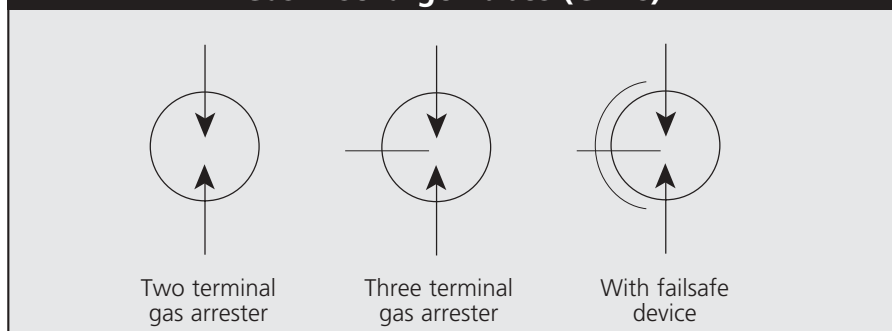
Specifications
See glossary (page 59) for explanation

Key to Symbols Used in Line Diagrams

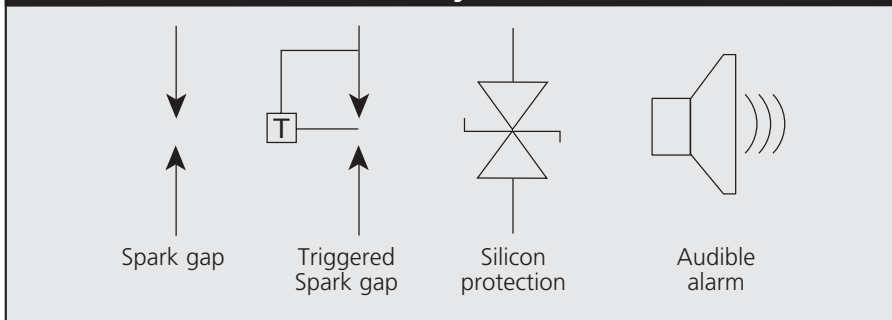
Metal Oxide Varistors (MOVs)



Gas Discharge Tubes (GDTs)



Other Symbols



Service Entrance Premium

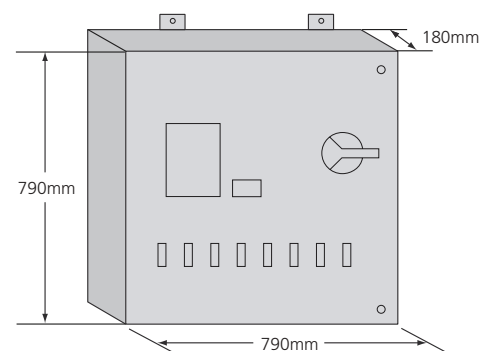
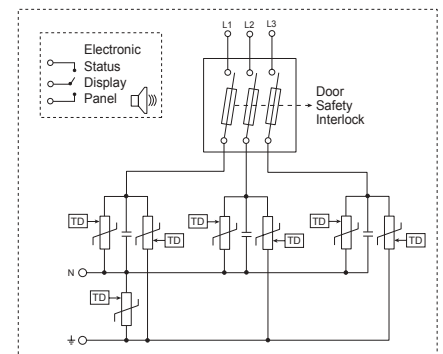
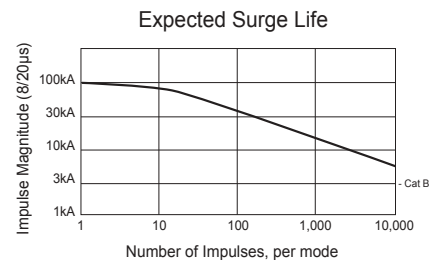


- High single shot surge rating – ensures adequate rating for the electrical environment of large facility service entrances
- Transient Discriminating (TD) Technology – provides increased service life
- Safety interlocked high interrupt capacity fusing – for additional safety
- Modular design – allows easy replacement of surge modules
- Combination MOV, SAD & Filter – for enhanced protection
- Service disconnect switch – allows replacement of surge modules without interruption to facility supply

The SEP series of Transient Voltage Surge Suppressors delivers specification grade performance and features at an affordable price. 400kA 8/20µs per line of surge material provides long life and makes the unit ideal for the protection of service entrance panels. Internal electronics continuously monitor the SPD's protection, and the status of each protection mode is displayed on a 5 segment LED bar graph. Alarm contacts and a surge counter are standard features.

Behind the metal safety interlocked door, replaceable modules provide protection to L-N, L-G and N-G modes. 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.

Model	SEP400 120/208	SEP400 277/480
Nominal Voltage U_n	120/208V	277/480V
Distribution System	3Ph Y 4W+G	3Ph Y 4W+G
Max. Cont. Operating Voltage U_c	170V	400V
Stand-off Voltage	240V	480V
Frequency	50/60Hz	
Operating Current @ U_n	0.3A	0.7A
Aggregate Surge Rating	400kA 8/20µs (per line)	
Max. Discharge Current I_{max}	100kA 8/20µs (NEMA-LS1 per mode)	
Protection Modes	All modes protected via L-N, L-G & N-G	
Technology	TD Technology MOV/Silicon with over-current fusing Sine wave filtering	
Voltage Protection Level U_p @ 500A 8/20µs (UL SVR) @ Cat B3, 3kA 8/20µs @ 10kA 8/20µs	L-N 400V <590V <1360V	L-N 700V <900V <1560V
Filtering @100kHz	-40dB	
Status	5 segment LED bar graphs Dual status indication per phase Change-over contact (Form C dry), 125V/0.3A, ≤ 2.5mm ² (#14 AWG) connecting wire Audible alarm with silence button Surge counter	
Dimensions	790mm x 790mm x 180mm (20" x 20" x 7") approx.	
Weight	34kg (75lb) approx.	
Enclosure	Metal, IP55 (NEMA-12)	
Connection	6mm ² to 35mm ² (#10AWG to #3AWG)	
Mounting	Wall mount	
Back-up Overcurrent Protection	Fused interlock disconnect included in enclosure	
Temperature	-10°C to +60°C (14°F to 140°F)	
Humidity	0% to 90%	
Warranty	10 years free replacement	
Approvals	cULus, UL 1283, NOM	
Surge Rated to Meet	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	



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 μ s per mode of surge material, making it ideal for the protection of service entrance panels and ensuring a long operational life under severe lightning conditions.

The replaceable surge modules provide protection to L-N and N-G modes, ensuring 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.

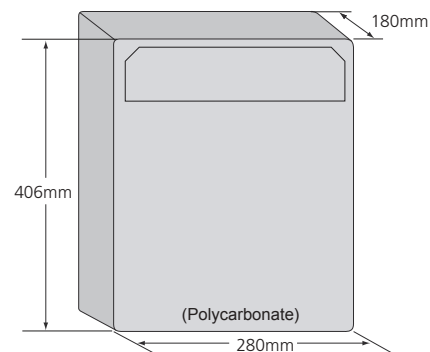
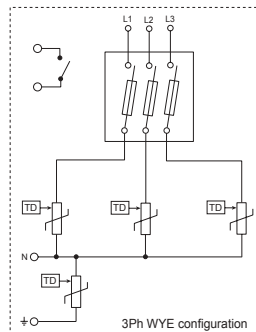
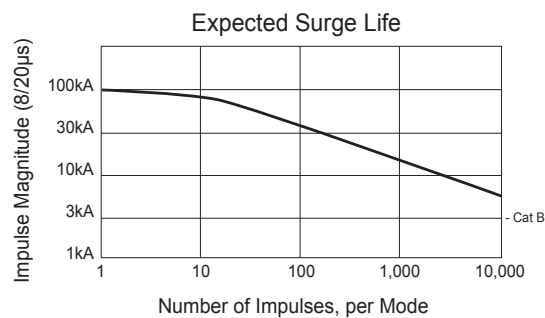
CRITEC SES200

Model	SES200 120/240	SES200 120/208	SES200 277/480	SES200 347/600	SES200 240DHG	SES200 240D	SES200 480D
Nominal Voltage U _n	120/240V	120/208V	277/480V	347/600V	120/240V	240V	480V
Distribution System ⁽¹⁾	1Ph 3W+G	3Ph Y 4W+G	3Ph Y 4W+G	3Ph Y 4W+G	3Ph Δ 4W+G	3Ph Δ 3W+G	3Ph Δ 3W+G
Max. Cont. Operating Voltage U _c	170/340V	170/295V	400/692V	480/830V	170/400V	400V	528V
Stand-off Voltage	240/480V	240/415V	480/831V	600/1040V	240/415V	275V	600V
Frequency	50/60Hz						
Operating Current @ U _n	25mA			20mA	25mA		20mA
Aggregate Surge Rating (8/20μs per line)	200kA			120kA	200kA		120kA
Max. Discharge Current I _{max} (NEMA-LS1 8/20μs per mode)	100kA			80kA	100kA		80kA
Protection Modes	All modes protected					L-L	L-L
Technology	TD Technology MOV/Silicon with over-current fusing						
Voltage Protection Level U _p @ 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 1500V <1500V <2000V	L-N 400V <620V <1400V	L-L 700V <1000V <1800V	L-L 1500V <1500V <2000V
Filtering @100kHz	40dBb (Optional)					40dB (Optional)	
Status	5 segment LED bar graphs						
Contacts	N.O ⁽²⁾			Form C ⁽³⁾	N.O		Form C
Dimensions	Polycarbonate: 280mm x 406mm x 180mm (11" x 16" x 7") approx. Optional Metal: 355mm x 406mm x 165mm (14" x 16" x 6.5") approx						
Weight	Polycarbonate: 8kg (18lbs) Optional Metal: 13kg (30lbs)						
Enclosure	Polycarbonate: IP66 (NEMA-4X) Optional Metal: IP66 (NEMA-4)						
Connection	3mm² to 35mm² (#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%						
Warranty	10 years free replacement						
Approvals	cULus, NOM				cULus		
Surge Rated to Meet	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							
Filter & Surge Counter	Yes				-	Yes	-
Metal Enclosure	Yes				Yes	Yes	Yes

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

(2) N.O = Normally open contact, 250V \approx /10A, \leq 1.5mm² (#16AWG) connecting wire

(3) Form C = Change-over contact (Form C dry contact), 400V \approx /3A, \leq 1.5mm² (#16AWG) connecting wire



Service Entrance Standard



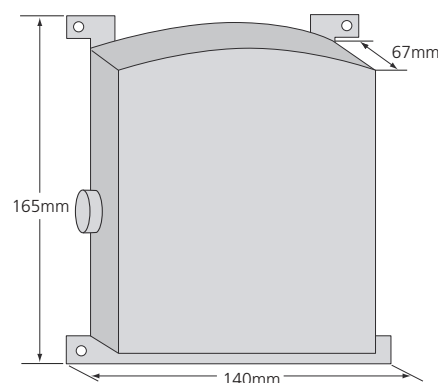
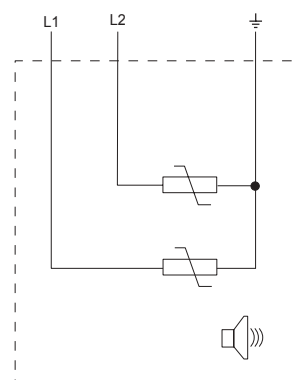
- Dual Listed TVSS / Secondary Surge Arrester – provides an arrester with TVSS safety
- Can be installed line-side or load-side of main disconnect – providing installation flexibility
- NEMA 3R enclosure – suitable for outdoor use
- LED and audible alarm status indicators

Designed to meet the needs of service entrance protection for residential or light commercial service panels.

Within the USA, the SES 120/240 offers the advantage of being listed as a Secondary Surge Arrester, which allows connection on the line side of service panels. However, the unit has also been

engineered to the higher industry safety criteria of UL 1449 Edition 2 for installation on the load side of the main over-current disconnect. The design not only ensures full compliance with UL 1449 Edition 2, but also provides continued operation after such temporary over-voltages.

Model	SES65 120/240
Nominal Voltage U_n	120/240V
Distribution System	1Ph 3W+G & 1Ph 2W+G
Max. Cont. Operating Voltage U_c	150V
Stand-off Voltage	240V
Frequency	50/60Hz
Operating Current @ U_n	12mA
Aggregate Surge Rating	65kA 8/20 μ s (per line)
Max. Discharge Current I_{max}	65kA 8/20 μ s (NEMA-LS1 per mode)
Protection Modes	All modes protected via L-G
Technology	Parallel hybrid MOV
Voltage Protection Level U_p @ 500A 8/20 μ s (UL SVR) @ Cat B3, 3kA 8/20 μ s	L-N 400V <520V
Status	LED status indication per phase Audible alarm
Dimensions	140mm x 165mm x 67mm (5.6" x 6.5" x 2.65") approx.
Weight	1.6kg (3.5lb) approx.
Enclosure	Polycarbonate, IP64 (NEMA-3R)
Connection	Line: 450mm of 3.3mm ² (18" of #12AWG) flying leads Ground: 450mm of 5.3mm ² (18" of #10AWG) flying lead
Mounting	1/2" straight nipple Optional flush mounting plate for drywall
Back-up Overcurrent Protection	30A
Temperature	-10°C to +60°C (14°F to 140°F)
Humidity	0% to 90%
Warranty	5 years
Approvals	cULus (TVSS & Secondary Surge Arrester Listings)
Surge Rated to Meet	ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 2, 50kA 8/20 μ s



Transient Discriminating MOVTEC



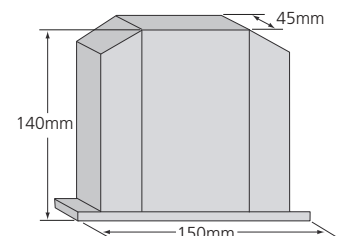
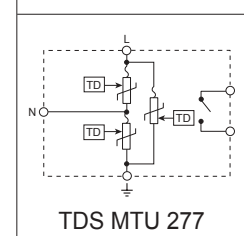
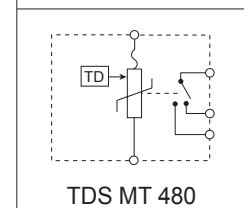
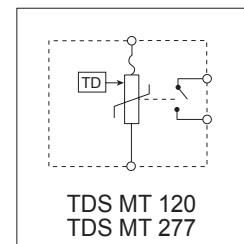
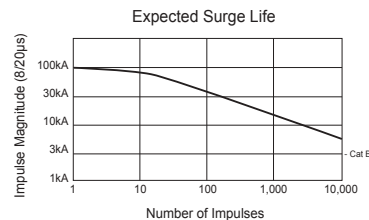
- Transient Discriminating (TD) Technology – provides increased service life
- Primary protection – suitable for high exposure sites and point-of-entry protection applications
- TDS-MT configurable to L-L, L-N, L-G or N-G protection
- TDS-MTU provides simultaneous L-N, L-G & N-G protection
- Small foot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

The TDS-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 MT 480	TDS MTU 277
Item Number for Europe		700740		
Nominal Voltage U_n	120V	230V & 277V	347V & 480V	230V & 277V
Max. Cont. Operating Voltage U_c	170V	400V	528V	400V
Stand-off Voltage	240V	480V	600V	480V
Frequency	50/60Hz			
Operating Current @ U_n	25mA		20mA	25mA
Aggregate Surge Rating	200kA 8/20µs	200kA 8/20µs	120kA 8/20µs	L-N 80kA L-G 80kA N-G 40kA 8/20µs
Max. Discharge Current I_{max}	200kA 8/20µs	200kA 8/20µs	200kA 8/20µs	L-N 40kA L-G 40kA N-G 20kA 8/20µs
Impulse Current I_{imp}	20kA 10/350µs	20kA 10/350µs	12kA 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) @ Cat B3, 3kA 8/20µs @ 20kA 8/20µs	330V <480V <760V	700V <750V <980V	1500V <1050V <1300V	L-N 700V <760V <1200V L-G 700V <870V <1290V N-G 600V <850V <1200V
Status	5 segment LED bar graphs per phase			
Contacts	N.O. ⁽¹⁾	N.O.	Form C ⁽²⁾	N.O.
Dimensions	45mm x 150mm x 140mm (1.8" x 5.9" x 5.5") approx.			
Weight	0.6kg (1.3lb) approx.			
Enclosure	UL94V-0 thermoplastic			
Connection	≤16mm ² (#6AWG) connecting to M6 bolt			
Back-up Fuse	100A			
Temperature	-35°C to +55°C (-31°F to +131°F)			
Humidity	0% to 90%			
Warranty	5 years			
Approvals	UL Recognized, AS3260, IEC950, C-Tick, NOM			
Surge Rated to Meet	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			ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C

(1) N.O. = Normally open contact, 250V~/10A, ≤1.5mm² (#16AWG) connecting wire

(2) Form C = Change-over contact (Form C dry contact), 400V~/3A, ≤1.5mm² (#16AWG) connecting wire

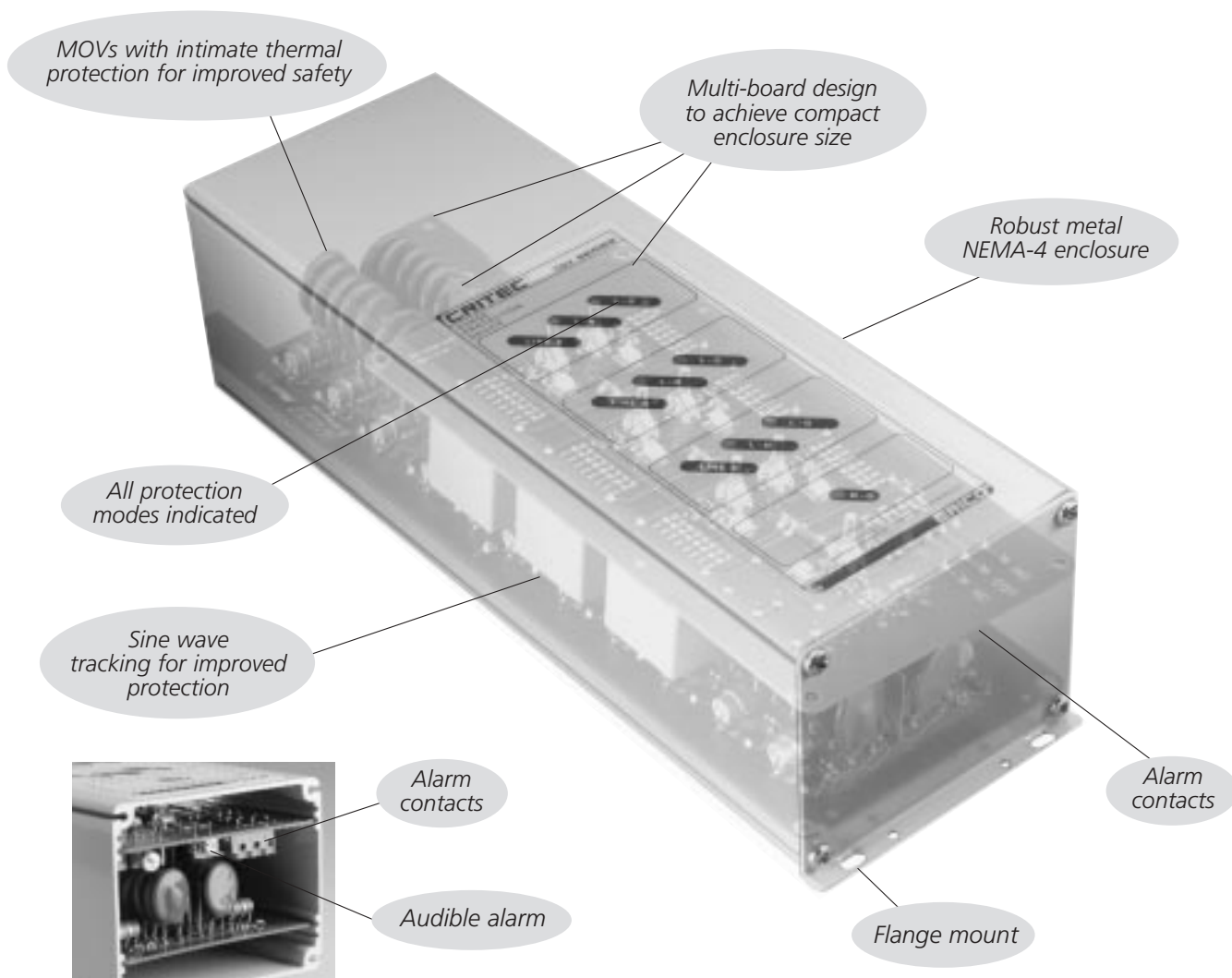
TDX150 Transient Discriminating Panel Protectors



- 150kA 8/20 protection – rated for service entrance and branch distribution panels
- Transient Discriminating (TD) Technology – provides increased service life
- Three built-in safety features include – TD Technology, thermal protection and over-current fusing
- Form-C alarm contacts and audible alarm – provide remote status monitoring
- Compact NEMA-4 metal enclosure – can be flush mounted or installed in a narrow space

The TDX150 Series of Transient Voltage Surge Suppressors are designed for critical protection applications. The 150kA 8/20 μ s of surge protection exceeds the IEEE C62.41.2 Scenario II single shot surge rating requirements for exposed service entrance locations - Exposure 3.

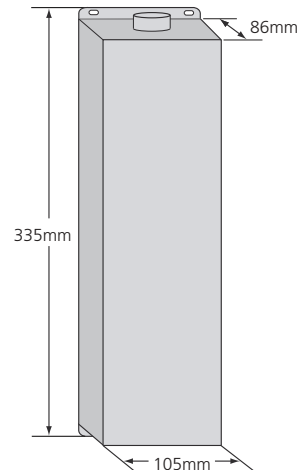
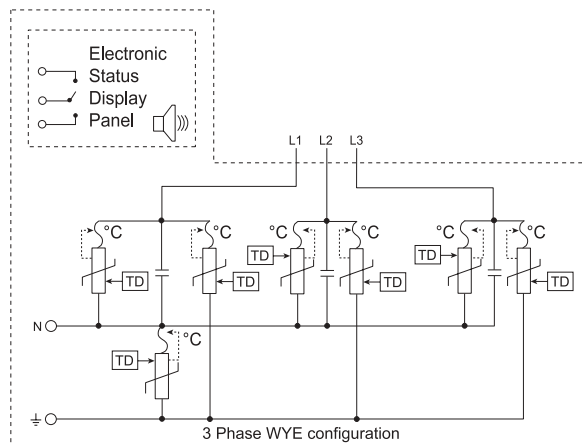
The NEMA-4 weather-tight housing allows the TDX to be installed on indoor or outdoor service panels. The preconfigured connecting leads simplify installation. The unique narrow construction allows the TVSS to fit between adjacent panel boards and connect via a 90-degree elbow. A flush mounting kit is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



CRITEC TDX150

Model	TDX150 120/240	TDX150 120/208	TDX150 277/480	TDX150 347/600	TDX150 120/240D	TDX150 240D	TDX150 480D
Nominal Voltage U_n	120/240V	120/208V	277/480V	347/600V	120/240V	240V	480V
Distribution System ⁽¹⁾	1Ph 3W+G	3Ph Y 4W+G	3Ph Y 4W+G	3Ph Y 4W+G	3Ph Δ 4W+G	3Ph Δ 3W+G	3Ph Δ 3W+G
Max. Cont. Operating Voltage U_c	170/340V	170/295V	310/536V	480/830V	170/400V	275V	528V
Stand-off Voltage	240/480V	240/415V	480/813V	600/1040V	240/415V	275V	528V
Frequency	50/60Hz						
Operating Current @ U_n	0.37A	0.37A	0.56A	0.33A	0.37/0.63A	0.73A	0.45A
Aggregate Surge Rating	180kA 8/20μs (per line)						
Max. Discharge Current I_{max}	75kA 8/20μs (NEMA-LS1 per mode)						
Protection Modes	All modes protected via L-N, L-G & N-G (L-L & L-G for 3W+G Delta units)						
Technology	TD Technology MOV with over-current & thermal fusing Sine wave filtering						
Voltage Protection Level U_p @ 500A, 8/20μs (UL SVR) @ Cat B3, 3kA 8/20μs @ 10kA 8/20μs	(L-N) 400V <510V <680V	(L-N) 400V <510V <680V	(L-N) 900V <1050V <1240V	(L-N) 1200V <1640V <1520V	(L-N) 400V <740V <920V	(L-G) 800V <710V <970V	(L-G) 1200V <1250V <1440V
Filtering @100kHz	-41dB			-34dB	-41dB	-43dB	-35dB
Status	Dual status indication per phase & N-G Change-over contact (Form C dry), 400V~/3A, ≤1.5mm ² (#16AWG) connecting wire Audible alarm						
Dimensions	105mm x 86mm x 335mm (4.1" x 3.4" x 13.2") approx.						
Weight	2.3kg (5lb) approx.						
Enclosure	Aluminum, IP65 (NEMA-4)						
Connection	Line: 600mm of 5.26mm ² (24" of #10AWG) flying leads Neutral/Ground: 900mm of 5.26mm ² (36" of #10AWG) flying leads						
Mounting	3/4" straight nipple Optional flush mounting plate for drywall						
Back-up Overcurrent Protection	30A						
Temperature	-40°C to +80°C (-40°F to +176°F)						
Humidity	0% to 90%						
Warranty	10 years free replacement						
Approvals	cULus NOM	cULus NOM	cULus C-Tick	cULus	cULus NOM	cULus	cULus
Surge Rated to Meet	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 TDX100FP) Side Mount Kit (Order TDX100SM)						

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



TDX100 Transient Discriminating Panel Protectors



- 100kA 8/20 protection – rated for service entrance and branch distribution panels
- Transient Discriminating (TD) Technology – provides increased service life
- Three built-in safety features include TD Technology, thermal protection and over-current fusing
- Form-C alarm contacts and audible alarm – provide remote status monitoring
- Compact NEMA-4 metal enclosure – can be flush mounted or installed in narrow space

The TDX100 Series of Transient Voltage Surge Suppressors are designed for critical protection applications. The 150kA 8/20 μ 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 TVSS to fit between adjacent panel boards and connect via a 90-degree elbow. A flush mounting kit is also available for installing the TVSS in drywall applications.



TDX100 240/415 T provided with screw terminal connections.



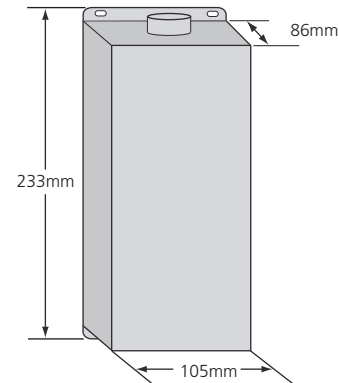
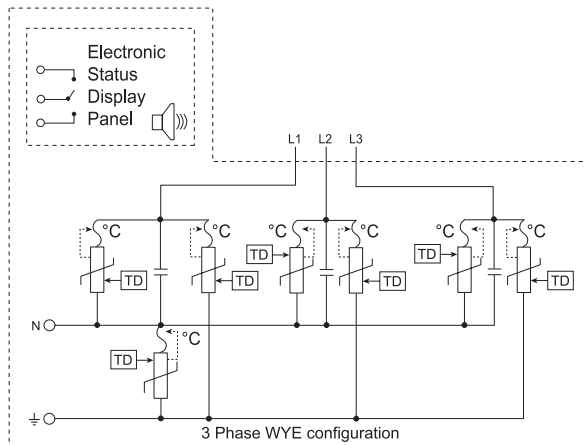
Typical installation.

CRITEC TDX100

Model	TDX100 120/240	TDX100 120/208	TDX100 240/415T	TDX100 277/480	TDX100 347/600D	TDX100 120/240D	TDX100 240D	TDX100 480D
Nominal Voltage U_n	120/240V	120/208V	240/415V	277/480V	347/600V	120/240V	240V	480V
Distribution System ⁽¹⁾	1Ph 3W+G	3Ph Y 4W+G	3Ph Y 4W+G	3Ph Y 4W+G	3Ph Δ 4W+G	3Ph Δ 4W+G	3Ph Δ 3W+G	3Ph Δ 3W+G
Max. Cont. Operating Voltage U_c	170/340V	170/295V	310/536V	310/536V	480/830V	170/400V	275V	528V
Stand-off Voltage	240/480V	240/415V	480/813V	480/813V	600/1040V	240/415V	275V	528V
Frequency	50/60Hz							
Operating Current @ U_n	0.37A	0.37A	0.56A	0.33A	0.37/0.63A	0.37/0.63A	0.73A	0.45A
Aggregate Surge Rating	120kA 8/20μs (per line)							
Max. Discharge Current I_{max}	50kA 8/20μs (NEMA-LS1 per mode)							
Protection Modes	All modes protected via L-N, L-G & N-G (L-L & L-G for 3W+G Delta units)							
Technology	TD Technology MOV with over-current & thermal fusing Sine wave filtering							
Voltage Protection Level U_p @ 500A, 8/20μs (UL SVR) @ Cat B3, 3kA 8/20μs @ 10kA 8/20μs	(L-N) 400V <480V <690V	(L-N) 400V <500V <670V	(L-N) <680V <900V	(L-N) 900V <1025V <1270V	(L-N) 1200V <1270V <1470V	(L-N) 400V <750V <895	(L-G) 800V <780V <1060V	(L-G) 1200V <1210V <1400V
Filtering @100kHz	-41dB	-41dB	-41dB	-41dB	-34dB	-41dB	-43dB	-35dB
Status	Dual status indication per phase & N-G Change-over contact (Form C dry), 400V~/3A, ≤1.5mm ² (#16AWG) connecting wire Audible alarm							
Dimensions	105mm x 86mm x 233mm (4.1" x 3.4") approx.							
Weight	1.8kg (4lb) approx.							
Enclosure	Aluminum, IP65 (NEMA-4) ⁽²⁾							
Connection	Line: 600mm of 5.26mm ² (24" of #10AWG) flying leads Neutral/Ground: 900mm of 5.26mm ² (36" of #10AWG) flying leads							
Mounting	3/4" straight nipple ⁽²⁾ Optional flush mounting plate for drywall ⁽²⁾							
Back-up Overcurrent Protection	30A							
Temperature	-40°C to +80°C (-40°F to +176°F)							
Humidity	0% to 90%							
Warranty	10 years free replacement							
Approvals	cULus NOM	cULus NOM	C-Tick	cULus C-Tick	cULus	cULus	cULus	cULus
Surge Rated to Meet	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 TDX100FP) ⁽²⁾ Side Mount Kit (Order TDX100SM) ⁽²⁾							

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

(2) Not available for TDX100 240/415T



TDX50 Transient Discriminating Panel Protectors



- 50kA 8/20 protection – ideal for branch distribution panels
- Transient Discriminating (TD) Technology – provides increased service life
- Built-in safety features – TD Technology, thermal protection and over-current fusing
- Very compact NEMA-4 metal enclosure – can be flush mounted or installed in a small space
- Status indication – provides clear visual indication of life status

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 TVSS to fit between adjacent panel boards. A flush mounting kit is also available for installing the TVSS in drywall applications.



Side mount kit.



Flush mount kits.

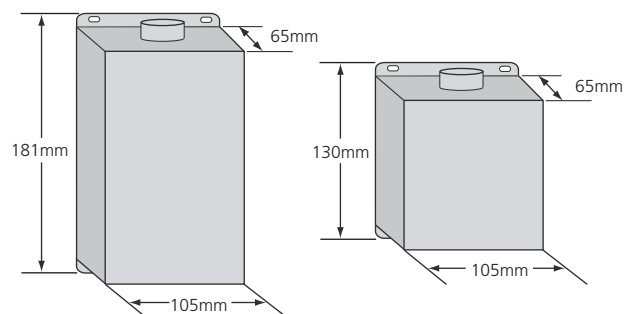
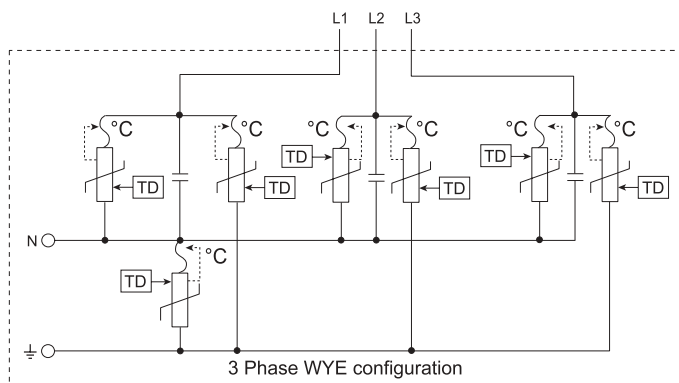


Compact size fits narrow installations.

Model	TDX50 120	TDX50 240	TDX50 120/240	TDX50 120/208	TDX50 277/480	TDX50 347/600	TDX50 120/240D
Nominal Voltage U _n	120V	240V	120/4240V	120/208V	277/480V	347/600V	120/240V
Distribution System ⁽¹⁾	1Ph 2W+G	1Ph 2W+G	1Ph 3W+G	3Ph Y 4W+G	3Ph Y 4W+G (& 3W+G ⁽²⁾)	3Ph Y 4W+G	3Ph Δ 4W+G
Max. Cont. Operating Voltage U _c	170V	275V	170/340V	170/295V	310/536V	480/830V	170/400V
Standoff Voltage	240V	415V	240/480V	240/415V	480/813V	600/1040V	240/415V
Frequency	50/60Hz						
Operating Current @ U _n	0.19A	0.37A	0.19A	0.19A	0.28A	0.17A	0.19A
Aggregate Surge Rating	60kA 8/20μs (per line)						
Max. Discharge Current I _{max}	25kA 8/20μs (NEMA-LS1 per mode)						
Protection Modes	All modes protected via L-N, L-G & N-G						
Technology	TD Technology MOV with over-current & thermal fusing Sine wave filtering						
Voltage Protection Level U _p @ 500A, 8/20μs (UL SVR) @ Cat B3, 3kA 8/20μs @ 10kA 8/20μs	(L-N) 400V <510V <740V	(L-N) 900V <920V <1031V	(L-N) 400V <540V <1240V	(L-N) 400V <540V <690V	(L-N) 400V <560V <770V	(L-N) 1200V <1420V <1660V	(L-N) 400V <560V <770V
Filtering @100kHz	-35dB	-35dB	-35dB	-35dB	-34dB	-25dB	-34dB
Status	LED status indication per phase & N-G						
Dimensions	105mm x 65mm x 130mm (4.1" x 2.57" x 5.14") approx.			105mm x 65mm x 181mm (4.1" x 2.57" x 7.15") approx.			
Weight	1kg (2.2lb) approx.			1.2kg (2.7lb) approx.			
Enclosure	Aluminum, IP65 (NEMA-4)						
Connection	Line: 600mm of 5.26mm ² (24" of #10AWG) flying leads Neutral/Ground: 900mm of 5.26mm ² (36" of #10AWG) flying leads						
Mounting	3/4" straight nipple Optional flush mounting plate for drywall						
Back-up Overcurrent Protection	30A						
Temperature	-40°C to +80°C (-40°F to +176°F)						
Humidity	0% to 90%						
Warranty	10 years free replacement						
Approvals	cULus NOM	cULus C-Tick	cULus NOM	cULus NOM	cULus C-Tick	cULus	cULus
Surge Rated to Meet	ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 2, 50kA 8/20μs						
Available Options Flush Mount Kit Side Mount Kit	TDX50FP1 TDX50SM			TDX50FP3			

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

(2) TDX50 271/480 can be used on "No Neutral" 480V Wye 3W+G systems



Transient Discriminating Protection Module

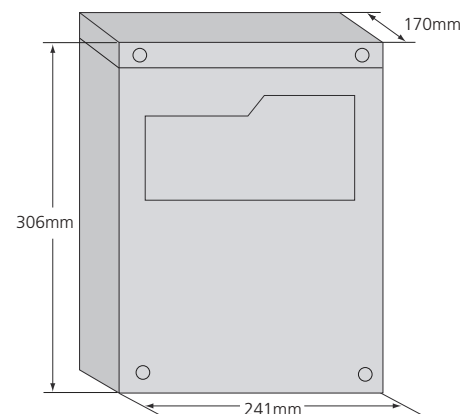
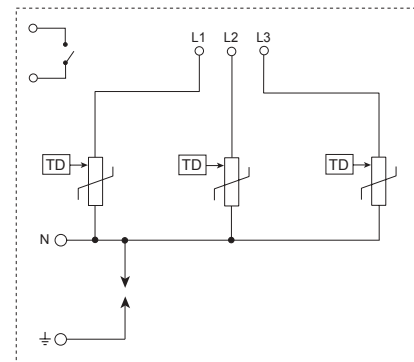
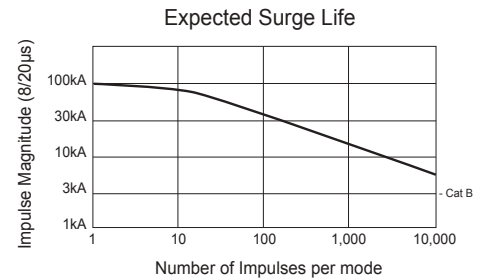


- Primary protection – suitable for high exposure sites and point-of-entry facility protection
- Modular design – allows easy replacement of surge modules
- 5 segment electronic status indication – displays percentage of capacity remaining
- Lug connection – allows Kelvin (in and out) connection of large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

The Transient Discriminating MOVTEC Protection Module (TDS-MPM) integrates three TD-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
Max. Cont. Operating Voltage U_c	400/692V
Stand-off Voltage	480/831V L-N, 440V N-G
Frequency	50/60Hz
Operating Current @ U_n	25mA
Aggregate Surge Rating	200kA 8/20 μ s (L-N)
Max. Discharge Current I_{max}	100kA 8/20 μ s L-N (NEMA-LS1) 130kA 8/20 μ s N-G (NEMA-LS1)
Impulse Current I_{imp}	20kA 10/350 μ s L-N 50kA 10/350 μ s L-G
Protection Modes	All modes protected via L-N & N-G
Technology	TD Technology and MOV/Silicon L-N Triggered Spark Gap N-G
Voltage Protection Level U_p @ Cat B3, 3kA 8/20 μ s @ 20kA 8/20 μ s	L-N N-G <750V <1.5kV <980V <2.3kV
Status	5 segment LED bar graphs per phase Normally open contact, 250V~/10A, $\leq 1.5mm^2$ (#16AWG) connecting wire
Dimensions	241mm x 306mm x 170mm (9.5" x 12" x 6.7") approx.
Weight	5kg (11lb) approx.
Enclosure	Metal, IP33 (NEMA-2)
Connection	$\leq 16mm^2$ (#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%
Warranty	5 years
Approvals	AS3260, IEC950, C-Tick
Surge Rated to Meet	ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 3, 100kA 8/20 μ s, 10kA 10/350 μ s



CRITEC TSG SRF (Single Phase)

Asia/Australia
Latin America

Triggered Spark Gap Surge Reduction Filters

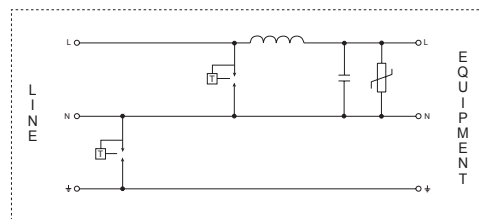


- Incorporates CRITEC TSG and TD Technologies – high performance protection
- High surge rating – ideal for exposed critical service entrance applications
- Surge Reduction Filters dramatically reduce let-through voltage – provides optimum protection
- Surge Reduction Filters reduce rate-of-voltage rise (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. TN-C, TN-S, TNC-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 μ s (NEMA-LS1 per mode)		
Impulse Current I_{imp}	50kA 10/350 μ s		
Protection Modes	All modes protected via L-N & N-G		
Technology	Triggered Spark Gap In-line series low pass sine wave tracking filter 40kA 8/20 μ s tertiary TD Technology MOV protection		
Voltage Protection Level U_p @ Cat B3, 3kA 8/20 μ s @ 20kA 8/20 μ 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	400mm x 300mm x 170mm (15.7" x 11.8" x 6.7") approx.		
Weight	11kg (24lb) approx.		13kg (28lb) approx.
Enclosure	Metal, IP55 (NEMA-12)		
Heat Dissipation @ I_L	13W	13W	19W
Connection			
Input	$\leq 50\text{mm}^2$ (1/0AWG)		8mm stud
Output	$\leq 35\text{mm}^2$ (#2AWG)		8mm stud
Mounting	Wall mount		
Back-up Overcurrent Protection	See table	See table	125A
Temperature	0°C to +40°C (-32°F to +104°F)		
Humidity	0% to 90%		
Warranty	5 years		
Approvals	AS3100, C-Tick, Certificate of Suitability		
Surge Rated to Meet	ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 3, 100kA 8/20 μ s, 10kA 10/350 μ s		



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

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 56 for schematic diagram.

Model	TSG SRF340	TSG SRF363	TSG SRF3125	TSG SRF3200	TSG SRF3400	TDG SRF3630	TSG SRF31250	TSG SRF32000
Nominal Voltage U _n	240/415V							
Distribution System	3Ph Y 4W+G. TN-C, TN-S, TNC-S & TT							
Max. Cont. Operating Voltage U _c	275/476V							
Stand-off Voltage	440V							
Frequency	50/60Hz							
Max. Line Current I _L	40A	63A	125A	200A	400A	630A	1250A	2000A
Max. Discharge Current I _{max}	130kA 8/20μs (NEMA-LS1 per mode)							
Impulse Current I _{imp}	50kA 10/350μs							
Protection Modes	All modes protected via L-N & N-G							
Technology	Triggered Spark Gap In-line series low pass sine wave tracking filter 40kA 8/20μs tertiary TD Technology MOV protection							
Voltage Protection Level U _p @ 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.)	500mm x 400mm x 170mm		650mm x 500mm x 175mm	780mm x 500mm x 215mm	1100mm x 650mm x 233mm	1150mm x 850mm x 220mm	1650mm x 1050mm x 315mm	1650mm x 1050mm x 315mm
Weight (Approx)	20kg	20kg	38kg	52kg	98kg	115kg	288kg	360kg
Enclosure	Metal, IP55 (NEMA 12)				IP32			
Heat Dissipation @ I _L	29W	36W	63W	90W	175W	225W	350W	600W
Connection	≤50mm ² (1/0AWG) ≤35mm ² (#2AWG)		Stud	Stud			Enquire	Enquire
Input			8mm	10mm				
Output			8mm	10mm				
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%							
Warranty	5 years							
Approvals	AS3100, C-Tick, Certificate of Suitability							
Surge Rated to Meet	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							

Spark Gap Diverter/Triggered Spark Gap

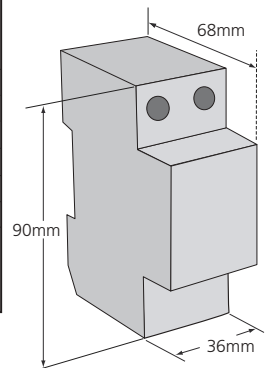
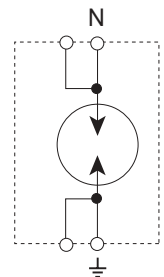
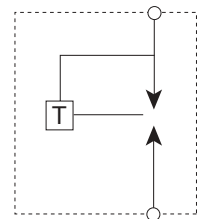


- Effective equipotential bonding – provides N-E protection bond on TT power distribution systems
- Meets IEC 61643-1 test class I, II
- SGD provides 100kA 10/350 surge rating – for the protection of zones 0A – 1
- TSG can also be used L-G or L-N due to low follow current
- Environment – IP 20, indoor use

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-6036-5-534. Its high surge rating makes it suitable to IEC zones 0A – 1 and VDE classification B locations.

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 L-L, L-N, L-G as well as N-G.

Model	SGD1100 2S NE		TSG1130 2S	TSG1130 2S 120
Item Number for Europe	702400		Not available in Europe and North America	
Nominal Voltage U_n	230V		240V	120V
Max. Cont. Operating Voltage U_c	255V		440V	150V
Frequency	50/60Hz			
Operating Current @ U_n	<0.5mA		2.2mA	2.2mA
Max. Discharge Current I_{max}	140kA 8/20 μ s		130kA 8/20 μ s	
Nom. Discharge Current I_n	80kA 10/350 μ s			
Impulse Current I_{imp}	100kA 10/350 μ s		50kA 10/350 μ s (25As)	
Protection Modes	N-G		Single mode (L-N, L-G or N-G)	
Technology	Encapsulated		Triggered Spark Gap	
Short Circuit Current Rating I_{sc}	25kA		-	
Follow Current Extinguishing Capability I_f	200A @ U_n		43kA @ U_n	
Voltage Protection Level U_p @ I_n @ I_{imp}	<1.5kV <0.6kV		3kA 8/20 μ s <1.5kV 20kA 8/20 μ s <2.3kV	
Status			LED for L-N or L-G modes	
Dimensions	2M. 90mm x 68mm x 36mm (3.5" x 2.6" x 1.4") approx.			
Weight	0.3kg (0.66lb) 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		Bi connect terminal 2.5mm ² to 50mm ² (#14AWG to 1/0) or 12mm x 2.5mm busbar	
Mounting	35mm top hat DIN rail			
Back-up Overcurrent Protection	100 A		See table	
Temperature	-40°C to +80°C (-40°F to +176°F)			
Humidity	0% to 90%			
Warranty	5 years			
Approvals	IEC 61643-1, CE		C-Tick	
Surge Rated to Meet	IEC 61643-1 Class I, Class II ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 3, 100kA 8/20 μ s, 10kA 10/350 μ s			



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

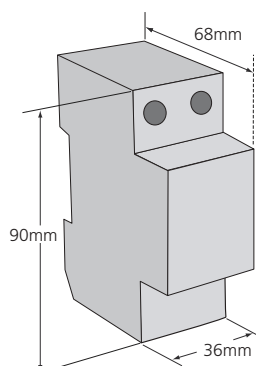
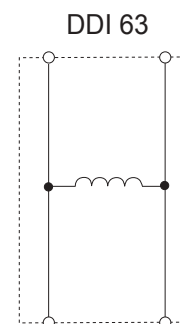
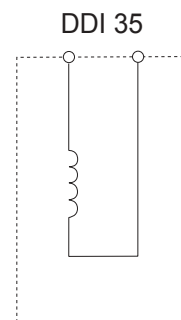
DIN Decoupling Inductor



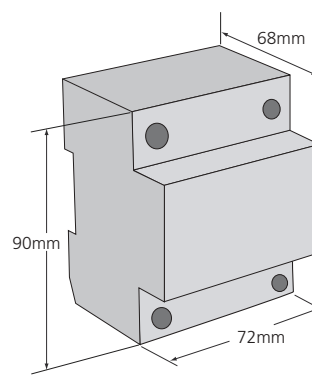
- Use for decoupling of spark gaps and MOVs – allows correct coordination of different SPD technologies
- 35mm² tunnel terminals – accepts large cable size
- 63A features top and bottom terminals – flexible installation
- 35mm DIN 43880 profile – matches triggered spark gap and DSD range

Decoupling inductors are installed between spark gap and MOV protection devices to ensure correct coordination. If less than 10 meters of wiring exists between a spark gap and downstream MOV device, then decoupling inductors should be installed. 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.

Model	DDI 35	DDI 63
Item Number for Europe	700465	700475
Max. Cont. Operating Voltage U_c	500V~ 200V=	
Frequency	0 to 60Hz	
Max. Line Current I_L	35A @ 40°C	63A @ 40°C
Inductance	7.5μH	15μH
Resistance	4.5mΩ	1.7mΩ
Dimensions	2M. 90mm x 68mm x 36mm (3.5" x 2.6" x 1.4") approx.	4M. 90mm x 68mm x 72mm (3.5" x 2.6" x 2.8") approx.
Weight	0.45kg (1lb) approx.	1kg (2.2lb) approx.
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)	
Connection	≤35mm ² (#2AWG) solid ≤25mm ² (#4AWG) stranded	
Mounting	35mm top hat DIN rail	
Back-up Overcurrent Protection	35A	63A
Temperature	-40°C to +115°C (-40°F to +239°F)	
Humidity	0% to 90%	
Warranty	5 years	
Approvals	CE	



DDI 35



DDI 63

CRITEC DSD1150 (150kA)

Asia/Australia
Europe
Latin America

DIN Surge Diverter

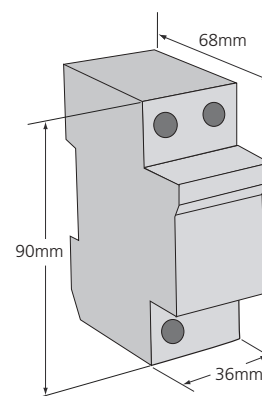
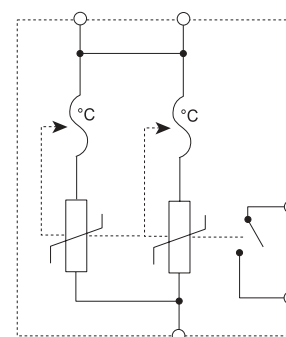


- 35mm DIN 43 880 profile – matches common circuit breakers
- Indication flag – provide clear visual indication of life status
- 150kA 8/20 surge rating provides protection – suitable for main distribution panels and provides a long operational life
- Various operating voltages – to suit most common 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 150	DSD1150 2SR 275
Item Number for Europe	702410	702420
Max. Cont. Operating Voltage U_c	150V~ 200V===	275V~ 350V===
Frequency	0 to 60Hz	
Operating Current @ U_n	<1mA	
Nom. Discharge Current I_n	70kA 8/20 μ s	
Max. Discharge Current I_{max}	150kA 8/20 μ s	
Impulse Current I_{imp}	25kA 10/350 μ 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 μ s @ I_n	<480V <1.2kV	<850V <1.6kV
Status	Mechanical flag Contact 250V~/0.5A, max 1.5mm ² (#14AWG) connecting wire	
Dimensions	2M. 90mm x 68mm x 36mm (3.5" x 2.6" x 1.4") approx.	
Weight	0.15kg (0.33lb) 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	35mm top hat DIN rail	
Back-up Overcurrent Protection	250A if supply >250A	
Temperature	-40°C to +80°C (-40°F to +176°F)	
Humidity	0% to 90%	
Warranty	5 years	
Approvals	IEC 61643-1, CE	
Surge Rated to Meet	IEC 61643-1 Class I, Class II ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 3, 100kA 8/20 μ s, 10kA 10/350 μ s	



CRITEC DSD1100 (100kA)

Asia/Australia
Europe
Latin America

DIN Surge Diverter

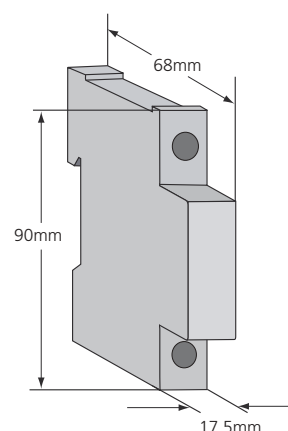
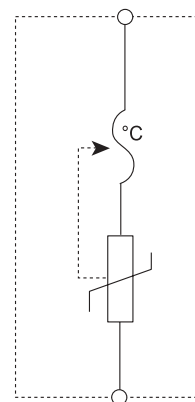


- 35mm DIN 43 880 profile – matches common circuit breakers
- Indication flag – provides clear visual indication of life status
- 100kA 8/20 surge rating – provides protection suitable for main/sub-distribution panels and a long operational life
- Various operating voltages – to suit most common power distribution systems

The DSD1100 series of surge suppressors provide economical 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 II.

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.

Model	DSD1100 1S 150	DSD1100 1S 275
Item Number for Europe	702430	702440
Max. Cont. Operating Voltage U_c	150V~ 200V~	275V~ 350V~
Frequency	0 to 60Hz	
Operating Current @ U_n	<1mA	
Max. Discharge Current I_{max}	100kA 8/20 μ s	
Nom. Discharge Current I_n	50kA 8/20 μ s	
Impulse Current I_{imp}	10kA 10/350 μ 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 μ s @ I_n	<480V <1.5kV	<850V <1.7kV
Status	Mechanical flag	
Dimensions	1M. 90mm x 68mm x 17.5mm (3.5" x 2.6" x 0.68") approx.	
Weight	0.15kg (0.33lb) approx.	
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)	
Connection	$\leq 35mm^2$ (#2AWG) solid $\leq 25mm^2$ (#4AWG) stranded	
Mounting	35mm top hat DIN rail	
Back-up Fuse	250A if supply >125A	
Temperature	-40°C to +80°C (-40°F to +176°F)	
Humidity	0% to 90%	
Warranty	5 years	
Approvals	IEC 61643-1, CE	
Surge Rated to Meet	IEC 61643-1 Class I, Class II ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 3, 100kA 8/20 μ s, 10kA 10/350 μ s	



CRITEC DSD160 (60kA)

Asia/Australia
Europe
Latin America

DIN Surge Diverter

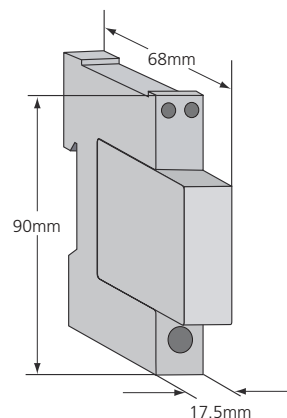
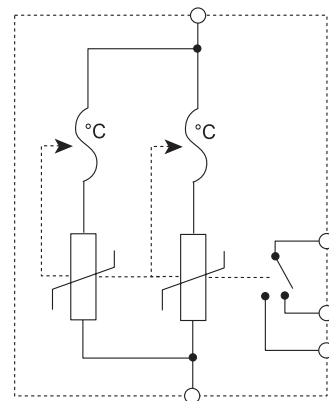


- 35mm DIN 43 880 profile – matches common circuit breakers
- Indication flags – provide progressive visual indication of life status
- Remote contacts (R models) – provide remote status monitoring
- 60kA 8/20 maximum surge rating provides protection suitable for sub-distribution panels and a long operational 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 and voltage-free contacts provide user-feedback in the event of such operation.

Model	DSD160 1SR 150	DSD160 1SR 275	DSD160 1SR 440
Item Number for Europe	702450	702460	702470
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}	60kA 8/20 μ s		
Nom. Discharge Current I_n	30kA 8/20 μ s		
Impulse Current I_{imp}	5kA 10/350 μ s		
Protection Modes	Single mode (L-G or N-G)		
Technology	MOV with thermal disconnect		
Short Circuit Current Rating I_{sc}	25kA		
Voltage Protection Level U_p @ Cat B3, 3kA 8/20 μ s @ I_n	<480V <1.2kV	<850V <1.5kV	<1.4kV <2.0kV
Status	Mechanical flag with progressive induction Change-over contact (Form C dry) 250V~/0.5A, max 1.5mm ² (#14AWG) connecting wire		
Dimensions	1M, 90mm x 68mm x 17.5mm (3.5" x 2.6" x 0.68") approx.		
Weight	0.12kg (0.26lb) 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	35mm top hat DIN rail		
Back-up Overcurrent Protection	160A if supply >160A		
Temperature	-40°C to +80°C (-40°F to +176°F)		
Humidity	0% to 90%		
Warranty	5 years		
Approvals	IEC 61643-1, CE		
Surge Rated to Meet	IEC 61643-1 Class I, Class II ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure 2, 50kA 8/20 μ s		



CRITEC DSD140 (40kA)

Asia/Australia
Europe
Latin America

DIN Surge Diverter

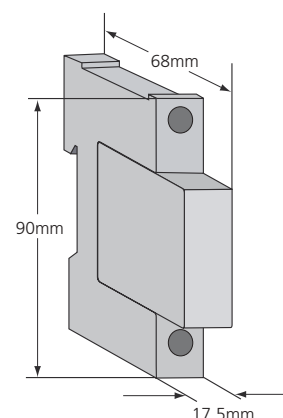
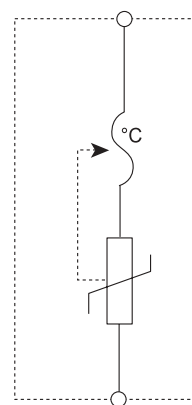


- 35mm DIN 43 880 profile – matches common circuit breakers
- Indication flag – provide clear visual indication of life status
- Remote contacts (R models) – provide remote status monitoring
- 40kA 8/20 maximum surge rating provides protection suitable for sub-distribution panels and a long operational 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 1S 440 DSD140 1SR 440*
Item Number for Europe	702480 702510	702490 702520	702500 702530
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 μ s		30kA 8/20 μ s
Nom. Discharge Current I_n	15kA 8/20 μ 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 μ s @ 5kA 8/20 μ s @ I_n	<480V <550V <1.2kV	<850V <1kV <1.4kV	<1.4kV <1.75kV <1.8kV
Status	Mechanical flag * "R" units only: Change-over contact (Form C dry) 250V~/0.5A, max 1.5mm ² (#14AWG) connecting wire		
Dimensions	1M, 90 x 68 x 17.5mm (3.5 x 2.6 x 0.68") approx.		
Weight	0.12kg (0.26lb) 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	35mm top hat DIN rail		
Back-up Overcurrent Protection	125A if supply >125A		
Temperature	-40°C to +80°C (-40°F to +176°F)		
Humidity	0% to 90%		
Warranty	5 years		
Approvals	IEC 61643-1, CE		
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 1, 20kA 8/20 μ s		



CRITEC DSD130 (30kA)

Asia/Australia
Europe
Latin America

DIN Surge Diverter

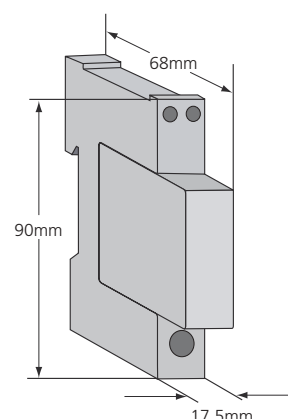
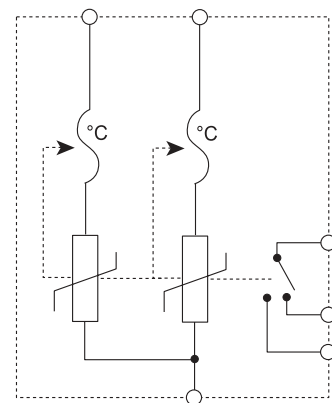


- 35mm DIN 43 880 profile – matches common circuit breakers
- Indication flag and remote status monitoring contacts – provide clear visual indication of life status
- 30kA 8/20 per pole maximum surge rating – provides protection suitable for small sub-distribution panels and a long operational life
- Two modes of protection – L-G and N-G
- Various operating voltages – to suit most common power distribution systems

The DSD130 series of surge suppressors provide economical and reliable protection from voltage transients on power distribution systems. Each module provides two modes of protection, L-G and N-G, in a convenient 35mm DIN package suitable for sub-distribution panel boards.

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 and voltage-free contacts provide user-feedback in the event of such operation.

Model	DSD130 1BR 150	DSD130 1BR 275
Item Number for Europe	702710	702720
Max. Cont. Operating Voltage U_c	150V~ 200V---	275V~ 350V---
Frequency	0 to 60Hz	
Operating Current @ U_n	<1mA	
Max. Discharge Current I_{max}	30kA 8/20 μ s	
Nom. Discharge Current I_n	15kA 8/20 μ s	
Protection Modes	Bipolar (L-G and N-G)	
Technology	MOV with thermal disconnect	
Short Circuit Current Rating I_{sc}	25kA	
Voltage Protection Level U_p @ Cat B3, 3kA 8/20 μ s @ I_n	<480V <1.5kV	<850V <1.7kV
Status	Mechanical flag Change-over contact (Form C dry) 250V~/0.5A, max 1.5mm ² (#14AWG) connecting wire	
Dimensions	1M, 90mm x 68mm x 17.5mm (3.5" x 2.6" x 6.8") approx.	
Weight	0.15kg (0.33lb) approx.	
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)	
Connection		
L & N	$\leq 6\text{mm}^2$ (#10AWG) solid, $\leq 4\text{mm}^2$ (#12AWG) stranded	
G	$\leq 25\text{mm}^2$ (#4AWG) solid, $\leq 16\text{mm}^2$ (#6AWG) stranded	
Mounting	35mm top hat DIN rail	
Back-up Overcurrent Protection	100A if supply >100A	
Temperature	-40°C to +80°C (-40°F to +176°F)	
Humidity	0% to 90%	
Warranty	5 years	
Approvals	IEC 61643-1, CE	
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 1, 20kA 8/20 μ s	



CRITEC DSD110 (10kA)

Asia/Australia
Europe
Latin America

DIN Surge Diverter

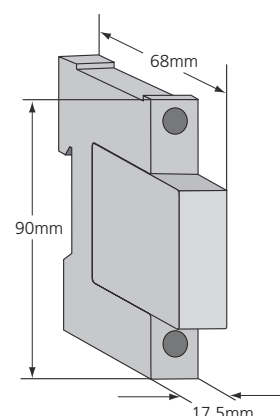
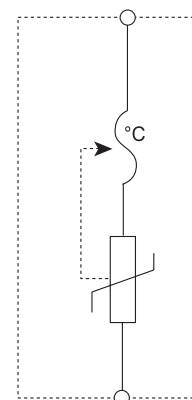


- 35mm DIN 43 880 profile – matches common circuit breakers
- Indication flag – provide clear visual indication of life status
- 10kA 8/20 maximum surge rating – provides protection suitable for small sub-distribution panels or point-of-use applications
- Various operating voltages – to suit most common 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 150	DSD110 1S 275	DSD110 1S 440
Item Number for Europe	702550	702560	702570
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}	10kA 8/20µs		
Nom. Discharge Current I_n	5kA 8/20µs		
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	<550V <900V	<930V <1.1kV	<1.3kV <1.4kV
Status	Mechanical flag		
Dimensions	1M, 90mm x 68mm x 17.5mm (3.5 x 2.6 x 0.68") approx.		
Weight	0.12kg (0.26lb) approx.		
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)		
Connection	≤35mm ² (#2AWG) solid ≤25mm ² (#4AWG) stranded		
Mounting	35mm top hat DIN rail		
Back-up Overcurrent Protection	100A if supply >100A		
Temperature	-40°C to +80°C (-40°F to +176°F)		
Humidity	0% to 90%		
Warranty	5 years		
Approvals	IEC 61643-1, CE		
Surge Rated to Meet	IEC 61643-1 Class II, Class III ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C		



DIN Three Phase Surge Diverter



- 35mm DIN 43 880 profile – matches common circuit breakers
- Indication flags – provide clear visual indication of life status
- Remote contacts – provide remote status monitoring
- 40kA & 80kA 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 & 380 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. Low Leakage units are available for use with ELCBs.

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.

See page 56 for schematic diagrams.

Model	DSD340 TNC275	DSD340 TNS275	DSD340 TT275	DSD380 TNC275	DSD380 TNS275	DSD380 TT275	DSD380 TNC L275	DSD380 TNS L275	DSD380 TT L275
Item Number for Europe	702580	702590	702600	702610	702620	702630	702640	702650	702660
Nominal Voltage U _n	230V								
Distribution System	TNC	TNS	TT	TNC	TNS	TT	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 8/20μs (per mode)			80kA 8/20μs (per mode)					
Nom. Discharge Current I _n	20kA 8/20μs (per mode)			40kA 8/20μs (per mode)					
Impulse Current I _{imp}	5kA 10/350μs (per mode)			25kA 10/350μs (per mode)					
Protection Modes	L-G	L-G & N-G	L-G & N-G	L-G	L-G & N-G	L-G & N-G	L-G	L-G & N-G	L-G & N-G
Technology	MOV	MOV	MOV. GDT N-G	MOV	MOV	MOV. GDT N-G	MOV+ GDT	MOV+ GDT	MOV+GDT GDT N-G
Short Circuit Rating I _{sc}	25kA								
Voltage Protection Level U _p @ Cat B3, 3kA 8/20μs @ I _n	<850V <1.5kV	<850V <1.5kV	L-G <850V <1.5kV	<850V <1.7kV	<850V <1.7kV	L-G <850V <1.7kV			
Status	Mechanical flag Change-over contact (Form C dry), 250V~/0.5A, max 1.5 ² (#14AWG) connecting wire								
Dimensions (Approx.)	4M. 90mm x 68mm x 72mm (3.5" x 2.6" x 6.8") approx.								
Weight (Approx)	0.3 kg (0.66lb)			0.4 kg (0.88lb)					
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)								
Connection	≤35mm ² (#2AWG) ≤25mm ² (#4AWG)								
Mounting	35mm top hat DIN rail								
Back-up Overcurrent Protection	160A if supply >160A								
Temperature	-40°C to +80°C (-40°F to +176°F)								
Humidity	0% to 90%								
Warranty	5 years								
Approvals	IEC 61643-1, CE								
Surge Rated to Meet	IEC 61643-1 Class I, Class II ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II								

Transient Discriminating Suppressor and DINLINE Alarm Relay & Surge Counter



- TDS/TDS50 series offers compact TVSS with TD Technology in DIN enclosures
- The DINLINE Alarm Relay (DAR) is used with the above where alarm contacts are required for remote signaling
- The TDS-SC Surge Counter provides a non-resettable record of the number of surges diverted

The TDS units are compact 35mm DIN mounting TVSS devices, ideal for installation into electrical panels or equipment. The TDS unit protects a single mode while the TDS50 protects L-N, L-G and N-G simultaneously.

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

See page 56 for schematic diagrams.

Model	TDS140 2S 277	TDS180 4S 277	TDS50 240	DAR275V	TDC SC
Item Number for Europe	700300	700710	700305	700900	702150
Nominal Voltage U _n	240V	240V	240V (1Ph 2W+G)	110V and 240V	–
Max. Cont. Operating Voltage U _c	340V	340V	340V	275V	–
Stand-off Voltage	480V	480V	480V	275V	–
Frequency	50/60Hz	50/60Hz	50/60Hz	50/60Hz	–
Operating Current @ U _n	2mA	4mA	2mA	20mA	–
Max. Discharge Current I _{max}	40kA 8/20µs	80kA 8/20µs	20kA 8/20µs L-G 20kA 8/20µs L-N 10kA 8/20µs N-G	–	–
Impulse Current I _{imp}	8kA 10/350µs	16kA 10/350µs		–	–
Aggregate Surge Rating	80kA 8/20µs	160kA 8/20µs		–	–
Protection Modes	Single	Single	L-N, L-G & N-G	–	–
Technology	TD Technology			–	–
Voltage Protection Level U _p @ 500A 8/20µs (UL SVR) @ Cat B3, 3kA 8/20µs @ 20kA 8/20µs	800V <750V <960V	800V <720V <910V	L-N 600V <700V	–	–
Status	Green LED. On=OK. Isolated opto-coupler output ⁽¹⁾			Red/Green LEDs. Change-over contact ⁽²⁾	Maximum count 9999 Non-resettable
Dimensions	2M. 90mm x 68mm x 36mm (3.5" x 2.6" x 1.4")	4M. 90mm x 68mm x 72mm (3.5" x 2.6" x 2.8")	2M. 90mm x 68mm x 36mm (3.5" x 2.6" x 1.4") (excluding CT)		
Weight	0.2kg (0.44lb)	0.35kg (0.77lb)	0.2kg (0.44lb)		
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)				
Connection	1mm ² to 6mm ² (#18AWG to #10)				
Mounting	35mm top hat DIN rail				
Back-up Overcurrent Protection	16-32A. Refer to installation instructions				–
Temperature	-35°C to +55°C (-31°F to +131°F)				
Humidity	0% to 90%				
Warranty	5 years				
Approvals	UL 1449, C-Tick AS 3260, IEC 950		UL 1449, CSA22.2 CE, C-Tick, NOM	CSA22.2 C-Tick, AS 3260, CE	
Surge Rated to Meet	ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C		ANSI/IEEE C62.41-1991		

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

(2) Form C = Change-over contact (Form C dry contact), 400V~/3A 1mm² to 6mm² (#18AWG to #10AWG) connecting wire

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-G & N-G
- 35mm 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 (8/20 μ s) across L-N, L-G, and N-G. 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.

See page 56 for schematic diagrams.

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 _n	120V	240V	120V	240V	120V	240V
Distribution System	1Ph 2W+G					
Max. Cont. Operating Voltage U _c	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 _L	3A		10A		20A	
Operating Current @ U _n	135mA	250mA	240mA	480mA	240mA	480mA
Max. Discharge Current I _{max}	20kA 8/20 μs L-N 20kA 8/20 μs L-G 10kA 8/20 μs N-G					
Protection Modes	All modes protected via L-N, L-G & N-G					
Technology	TD Technology In-line series low pass sine wave filter					
Voltage Protection Level U _p @ 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 ⁽¹⁾					
Dimensions	4M. 90mm x 68mm x 72mm (3.5" x 2.6" x 2.8")		8M. 90mm x 68mm x 144mm (3.5" x 2.6" x 5.6")			
Weight	0.35kg (0.77lb)		0.75kg (0.77lb)		0.8kg (1.7lb)	
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)					
Connection	1mm ² to 6mm ² (#18AWG to #10)					
Mounting	35mm 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%					
Warranty	5 years					
Approvals	UL 1449, UL 1283, CSA 22.2, C-Tick, CE (NOM 3A, 120V)					
Surge Rated to Meet	ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C					

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

DINLINE Surge Filter

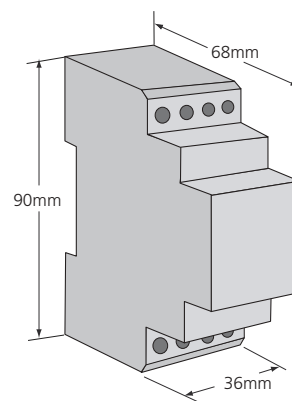
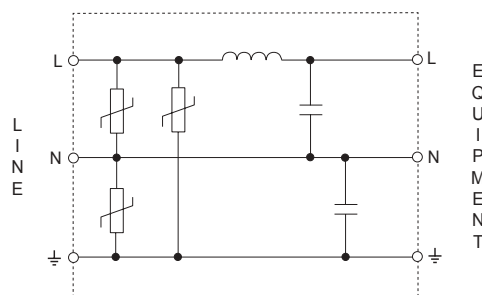


- In-line series protection
- EMI/RFI noise filtering – protects against industrial electrical noise
- Compact design – fits into motor control and equipment panels
- Three modes of protection: L-N, L-G & N-G
- 35mm DIN rail mount – simple installation
- LED power indicator

The 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 DSF is a series connected single phase surge filter providing an aggregate surge capacity of 16kA (8/20 μ s) across L-N, L-G, and N-G. A space-efficient filter provides attenuation to high frequency interference.

Model	DSF6A 30V	DSF6A 150V	DSF6A 275V
Item Number for Europe	702090	701000	701030
Nominal Voltage U _n	24V	120V	240V
Distribution System	1Ph 2W+G		
Max. Cont. Operating Voltage U _c	30V~ 38V~	150V~	275V~
Frequency	0 to 60Hz	50/60Hz	
Operating Current @ U _n	7mA~		
Max. Discharge Current I _{max}	4kA 8/20μs per mode	16kA 8/20μs per mode	
Protection Modes	All modes protected		
Technology	MOV In-line series filter		
Voltage Protection Level U _p @ Cat B3, 3kA 8/20μs	<110V	<400V	<750V
Filtering @300kHz	3dB		
Status	Red LED power indicator		
Dimensions	2M. 90mm x 68mm x 36mm (3.5" x 2.6" x 1.4")		
Weight	0.2kg (0.44lb)		
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)		
Connection	1mm ² to 6mm ² (#18AWG to #10)		
Mounting	35mm top hat DIN rail		
Back-up Overcurrent Protection	6A		
Temperature	-35°C to +55°C (-31°F to +131°F)		
Humidity	0% to 90%		
Warranty	5 years		
Approvals	cURus, NOM		
Surge Rated to Meet	ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C		



Overhead Arresters



- Hermetically sealed enclosure – suitable for outdoor use
- 30 kA surge rating – suitable for the protection of transformers and low voltage distribution lines
- Meets IEC 61643-1 test class II

The Overhead Arresters series provides primary protection to outdoor overhead supply lines feeding a facility. Other applications include the protection of transformer bushings and large industrial motors such as those found in the mining industry.

The unit incorporates an internal disconnect to ensure a safe failure mode under conditions which exceed stated ratings so as to avoid a short circuit condition on the supply. A red pop-out indicator shows the disconnection of a failed arrester providing ready visible detection from the ground below.

Model	OHA130 150	OHA130 275	OHA130 440
Item Number for Europe	702300	702310	702320
Max. Cont. Operating Voltage U_c	150V	275V	440V
Frequency	50/60Hz		
Max. Discharge Current I_{max}	30kA 8/20 μ s		
Nom. Discharge Current I_n	15kA 8/20 μ s		
Protection Modes	Single mode (L-G or N-G)		
Technology	MOV with thermal		
Voltage Protection Level U_p @ I_n	<1.2kV	<1.5kV	<2.0kV
Status	Mechanical Indicator		
Dimensions	94mm x 46mm (3.7" x 1.8") approx.		
Weight	0.13kg (0.3 lb)		
Enclosure	UL94V-0 thermoplastic		
Connection	M8 threaded stud		
Mounting	Outdoor		
Temperature	-40°C to +80°C (-40°F to +176°F)		
Humidity	0% to 90%		
Warranty	5 years		
Approvals	IEC 61643-1		
Surge Rated to Meet	IEC 61643-1 Class I, Class II ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure I, 20kA 8/20 μ s		

Light Pole Protector

North America



- 40kA 8/20 protection – suitable for exposed locations
- Weatherproof enclosure – can be installed in the base of the light pole
- Solid state design – for reliable operation
- In-line installation – simple to install

The LPP series of surge arresters provide economical protection for highway, parking and other outdoor lighting systems. The weatherproof enclosure is designed for installation in the light-base chamber. For optimum protection, the LPP unit

should be installed in the base of each light pole, while the CRITEC TDX unit should be used to protect the primary electrical panel feeding the lighting distribution system.

Model	LPP40 277	LPP40 480
Nominal System Voltage U_n	240V and 277V	480V
Distribution System	1Ph 2W+G	
Max. Cont. Operating Voltage U_c	320V	550V
Frequency	50/60Hz	
Max. Line Current I_L	30A	
Max. Discharge Current I_{max}	40kA 8/20 μ s (per mode)	
Protection Modes	All modes protected	
Technology	MOV	
Voltage Protection Level U_p @ Cat B3, 3kA 8/20 μ s	<1.2kV	<1.8kV
Dimensions	140mm x 63mm x 43mm (5.5" x 2.5" x 1.7") approx.	
Weight	0.5kg (1.2lb)	
Enclosure	Thermoplastic	
Connection	Ground: 550mm of 13mm ² (22" of #6AWG) Line/Neutral: 300mm of 5mm ² (12" of #10AWG)	
Mounting	Weatherproof	
Temperature	-40°C to +80°C (-40°F to +176°F)	
Humidity	0% to 90%	
Warranty	5 years	
Surge Rated to Meet	ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C ANSI/IEEE C62.41.2 Scenario II, Exposure I, 20kA 8/20 μ s	

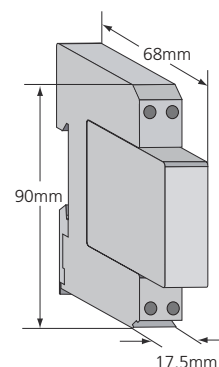
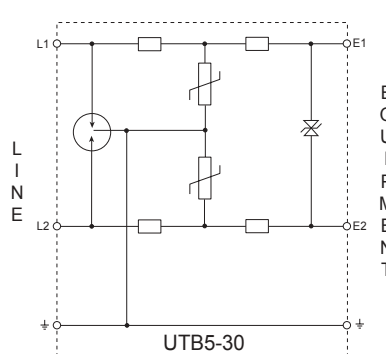
Universal Transient Barrier



- 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, ensures lowest residual surge voltages reach sensitive equipment
- Common-mode and differential-mode protection – protects against both possible surge conditions
- Internal over-current trip – protects unit itself and wiring during an inadvertent short circuit of the output
- Ease of grounding – through DIN mounting rail or via terminal
- Surge rating to 20kA 8/20 – ideal for exposed wiring

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 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.



Model	UTB5	UTB15	UTB30	UTB60	UTB110	UTBSA	UTBTA
Item Number for Europe	702800	702810	702820	702830	702840	702860	702850
Nominal Voltage U _n	0 to 5V=== 0 to 3V~	5 to 15V=== 3 to 10V~	15 to 30V=== 10 to 21V~	30 to 60V=== 21 to 42V~	42 to 154V=== 100 to 120V~	Analog telephone circuits	
Max. Cont. Operating Voltage U _c	7V=== 5V~	18V=== 12V~	33V=== 23V~	64V=== 45V~	200V=== 150V~	–	
Max. Line Current I _L	1.5A					160mA	
Frequency (120Ω term.)	0.5MHz	1MHz	2MHz	3MHz	0 to 60Hz	15MHz	
Max. Discharge Current I _{max}	20kA (8/20μs)						
Protection Modes	Differential and Common Mode						
Technology	GDT, MOV, Silicon with series PTC			GDT, MOV, Silicon		GDT, Silicon, PTC	GDT, PTC
Voltage Protection Level U _p @ 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	1M. 90mm x 68mm x 17.5mm (3.5" x 2.6" x 0.7") approx.						
Weight	0.1kg (0.24lb) approx.						
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)						
Connection	1mm ² to 6mm ² (#18AWG to #10AWG) Grounding via terminal or DIN rail connection						
Mounting	35mm top hat DIN rail						
Temperature	-25°C to +65°C (-13°F to 149°F)						
Humidity	0% to 90%						
Warranty	5 years						
Approvals	CE						
Surge Rated to Meet	ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C						

DIN Surge Diverter



- General purpose barrier – protection of 12 / 24V DC systems and equipment
- Ease of grounding – through DIN mounting rail or via terminal

DSD12/24

- Narrow 6 mm profile – allows dense packing on DIN rail
- Surge rating to 500A 8/20 – suitable for internal wiring

DSD120

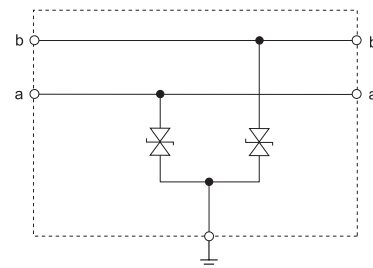
- Separate plug and base design – facilitates ease of module replacement
- Two stage protection – suitable for the protection of power supply feeds
- Large surge rating to 20kA 8/20 – suitable for exposed DC wiring

The DSD12/24 has been designed as a general-purpose transient barrier for the protection of low voltage circuits such as those used in fire and security systems. The narrow profile is ideal for applications where extensive wiring from remote sensors to a central console is employed and limited space may be available.

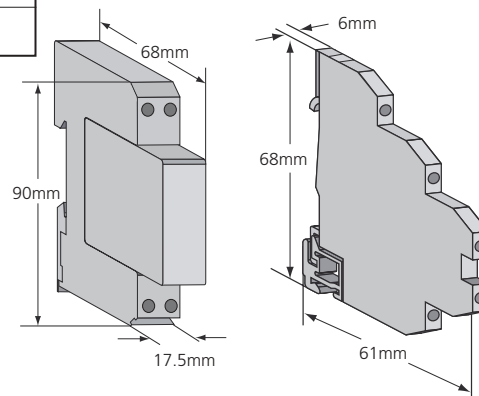
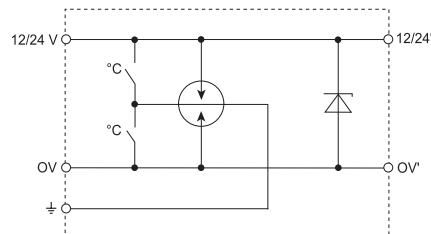
The DSD120 series provides higher surge rating for circuits that are exposed to higher transient levels, such as those which exit the facility building.

Model	DSD120 1S 12		DSD120 1S 24	DSD12	DSD24
Item Number for Europe	702670		702680	702690	702700
Nominal System Voltage U _n	12V ⁼⁼⁼		24V ⁼⁼⁼	12V ⁼⁼⁼	24V ⁼⁼⁼
Max. Cont. Operating Voltage U _c	15V ⁼⁼⁼		28V ⁼⁼⁼	15V ⁼⁼⁼	28V ⁼⁼⁼
Max. Line Current I _L	10A				
Max. Discharge Current I _{max}	20kA 8/20μs			500A 8/20μs	
Protection Modes	Differential and Common Mode				
Technology	GDT & Silicon			Silicon	
Voltage Protection Level U _p @ Cat B3, 3kA 8/20μs	L-L <30V	L-L <40V	L-L <19V	L-L <36V	
Loop Resistance	<0.5Ω				
Dimensions	1M. 90mm x 68mm x 17.5mm (3.5" x 2.6" x 0.7") approx.			90mm x 68mm x 6mm (3.5" x 2.6" x 0.24") approx.	
Weight	0.1kg (0.24lb)			0.05kg (0.12lb)	
Enclosure	DIN 43 880, UL94V-0 thermoplastic, IP 20 (NEMA-1)				
Connection	1mm ² to 6mm ² (#18AWG to #10AWG)			1mm ² to 2.5mm ² (#18AWG to #13AWG)	
Mounting	35mm top hat DIN rail				
Temperature	-25°C to +70°C (-13°F to +158°F)				
Humidity	0% to 90%				
Warranty	5 years				
Approvals	CE				
Surge Rated to Meet	ANSI/IEEE C62.41-1991 Cat A, Cat B, Cat C			ANSI/IEEE C62.41-1991 Cat A	

DSD 12/24



DSD 120



Subscriber/High Speed Line Protection/Termination

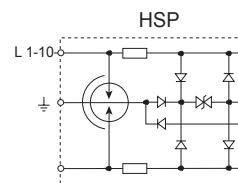
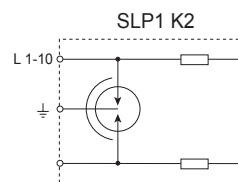
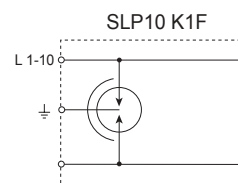


DLT available where screw terminal connections are required.

- 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

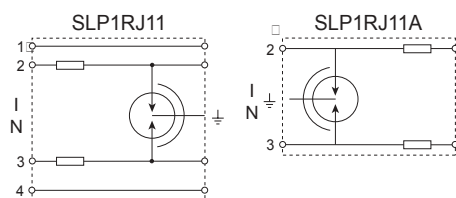
Model	SLP1 K2	SLP10 K1F	HSP10 K12	HSP10 K36	HSP10 K72	HSP10 K230
Item Number for Europe		701540			700850	700860
Max. Cont. Operating Voltage U_c	190V	190V	13V	40V	65V	190V
Max. Line Current I_L	120mA	1000mA	150mA			
Max. Discharge Current I_{max}	20kA 8/20 μ s (L+L)-E					
Technology	Multi stage	Single 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 Ω	0.2 Ω	9 Ω			
Dimensions	125mm x 34.5mm x 21mm					
Connection	Krone LSA Plus termination system					
Temperature	-20°C to +60°C (-4°F to 140°F)					
Humidity	0% to 90%					
Warranty	5 years					
Approvals	CE, C-Tick, A-Tick		CE, C-Tick			CE, C-Tick, A-Tick



RJ11 Telephone Line Protection



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



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 8/20 μ s	20kA 8/20 μ s
Voltage Protection Level U_p @ 5kV/125A 10/700 μ s	110V T-R 500V (T+R)-G	
Dimensions	76mm x 38mm x 28mm (3.0" x 1.5" x 1.1") approx.	
Weight	50g (1.8oz) approx.	
Connection	6 position RJ, 2 pins protected 150mm (6") 0.8mm ² (#18AWG) with earth 4mm ring lug 165mm (6.5") patch cord included	
Mounting	Adhesive backing	
Temperature	-40°C to +65°C (-40°F to +150°F)	
Warranty	5 years	
Approvals	UL	A-Tick

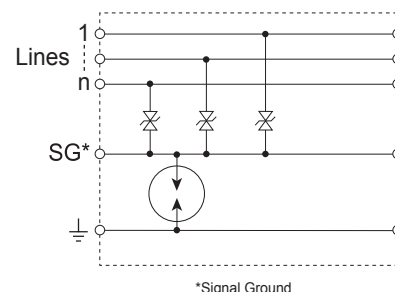
Data Equipment Protector



- 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 \equiv	15V \equiv	9V \equiv
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	
Warranty	5 years		

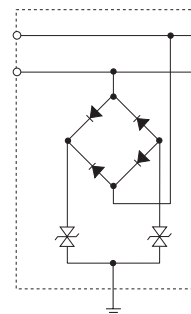
Local Area Network Protector



- Plug-in protection – simple to install
- 100BaseT (Cat 5) – works with high speed networks
- Earth potential equalization
- Patch cord included – no additional cables required

The LAN-RJ45 module suits both 10BaseT and 100BaseT Unshielded Twisted Pair (UTP) Ethernet networks. The unit features simple plug-in operation and provides Earth Potential Equalization (EPE) via the flying lead that is connected to the equipment

ground/chassis. State-of-the-art protection technology ensures that high speed LAN data (Cat 5) is allowed to pass unhindered while transient over-voltages are attenuated to safe levels.



Model	LAN RJ45
Item Number for Europe	700525
Max. Cont. Operating Voltage U_c	$\leq 65V\equiv$
Max. Discharge Current I_{max}	500A 8/20 μs
Frequency	100Mbits (100BaseT & 10BaseT)
Voltage Protection Level U_p @ 5kV/500A 8/20 μs	23V L-L 140V L-G
Connection	RJ45
Warranty	5 years

Community Antenna Television Protector and Closed Circuit Television Protector



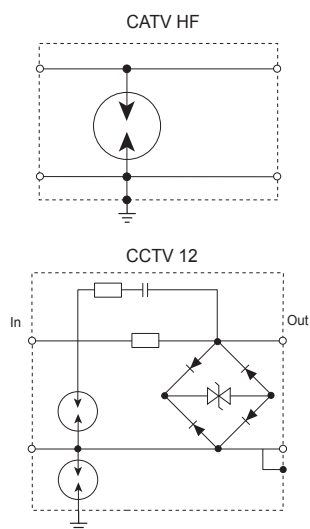
- Plug-in protection – simple to install
- Required component for IEEE Std 1100 single point grounding system

CATV-HF Protector

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

CCTV Protector

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

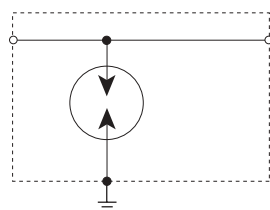


Model	CATV HF	CCTV 12
Item Number for Europe		703000
Spark Over Voltage	180V @10kV/μs	30-36V (Uc = 12V)
Max. Discharge Current I _{max}	5kA 8/20μs	20kA 8/20μs
Frequency	2GHz	100MHz/16Mbits
Attenuation	-1dB @ 1GHz -2dB @ 1GHz	
Impedance	50-75Ω	
Voltage Protection Level U _p @ 5kV/500A 8/20μs	<90V	<60V
Dimensions	96mm x 63mm x 31mm (3.8" x 2.5" x 1.25") approx.	90mm x 22mm x 28mm (3.5" x 0.86" x 1.1") approx.
Weight	115g (4oz) approx	60g (2oz)
Enclosure	Outdoor	Indoor
Connection	F-Type, Female	BNC, Female ⁽¹⁾
Mounting	Screw mount	In-line
Temperature	-25°C to +70°C (-13°F to +158°F)	
Warranty	5 years	
Approvals		CE

⁽¹⁾ Adapter supplied for female/male connection.

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Coaxial Surge Protector



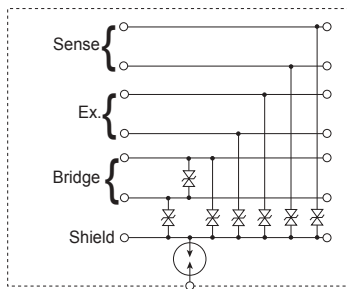
Model	CSP BNC 90	CSP BNC 600	CSP NMF 90	CSP NMF 600	CSP NB 90	CSP NB 600
Item Number for Europe	700360	700405	700310	700355	700410	700455
Spark Over Voltage @100V/s @100V/us	72-108V 450V	480-720V 1100V	72-108V 450V	480-720V 1100V	72-108V 450V	480-720V 1100V
Max. Discharge Current I _{max}	20kA 8/20μs					
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	29mm x 29mm x 57mm (1.14" x 1.14" x 2.44") approx.				29mm x 29mm x 67mm (1.14" x 1.14" x 2.64")	
Weight	30g (1oz) approx.					
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 4mm holes, 10mm center					
Temperature	0°C to +65°C (32°F to 150°F)					
Warranty	5 years					
Approvals	CE					



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

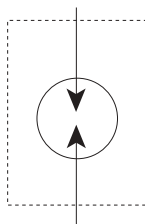


Model	LCP 01A
Item Number for Europe	701610
Max. Discharge Current I_{max}	300A 8/20 μ s (signal to shield) 10kA 8/20 μ s (shield to ground)
Technology	Silicon Avalanche Diode
Voltage Protection Level U_p	30V (signal to shield) 15V 8/20 μ s (signal to signal) 90V (shield to ground)
Loop Resistance	<0.25 Ω
Dimensions	110mm x 75mm x 56mm (4.3" x 2.9" x 2.2") approx.
Weight	0.25kg (0.55lb)
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)
Warranty	5 years

Transient Earth Clamp and Insulated Joint Protector



- High peak current capability – long service life
- Weatherproof enclosure – suitable for direct burial
- Explosion proof – suitable for use on gas pipelines (IJP)



Model	TEC100	IJP230
Item Number for Europe	701040	701060
Spark Over Voltage	350V +/- 15% @100V/ μ s	230V +/- 15% @100V/ μ s
Max. Discharge Current I_{max}	100kA 8/20 μ s	
Technology	Gas Discharge Tube (Auto reset)	
Insulation Resistance	>10G Ω	
Capacitance	<10pF	
Voltage Protection Level U_p	1000V @ 1kV/ μ s	
Dimensions	138mm x 25mm (5.4" x 1") approx.	
Weight	0.5kg (1.1lb) approx.	
Enclosure	Outdoor, direct burial	Outdoor, insulated sheath
Connection	450mm of 16mm ² (17" of #5AWG) conductor	
Temperature	-10°C to +60°C (-14°F to +140°F)	
Warranty	5 years	

Power Line Filter

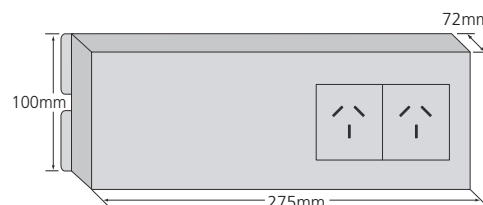
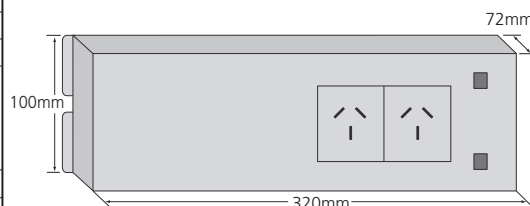
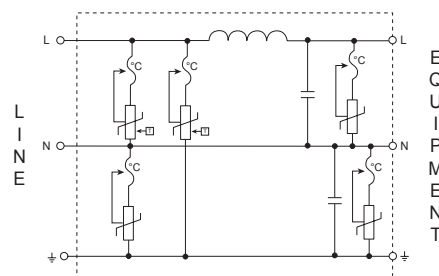


- In-line series protection
- 20kA 8/20 surge rating – robust surge protection rating
- Three modes of protection – L-N, L-G & N-G
- Transient Discriminating (TD) Technology – provides increased service life
- LED life status indication
- Mounting flange – can be wall mounted
- Telephone protection and 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
	PLF G 2	2 x German 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 8/20 μ s	
Max. Discharge Current I_{max}	20kA 8/20 μ s L-N 20kA 8/20 μ s L-G 20kA 8/20 μ s N-G PLF A 2 RJ Phone protection 20kA 8/20 μ s (L+L)-G	
Protection Modes	All modes protected	
Technology	TD Technology	
Voltage Protection Level U_p @ 500A 100kHz	50V	
@ Cat B3, 3kA 8/20 μ s	<600V	
Filtering @ 100kHz	-3dB	
Status	LED indicator	
Dimensions	275mm x 100mm x 72mm (10" x 3.9" x 2.8") approx. 320mm x 100mm x 72mm (12.5" x 3.9" x 2.8") with phone protection	
Weight	1.5kg (3.3lb) approx.	
Enclosure	Aluminum	
Connection	Power Cord, 2m (6')	
Mounting	Portable or wall mount	
Temperature	-25°C to +70°C (13°F to 158°F)	
Humidity	0% to 90%	
Warranty	5 years	
Approvals	Australian Power Authority approved	
Surge Rated to Meet	ANSI/IEEE C62.41-1991 Cat A, B, C	



Multi-Socket Surge Protection Device

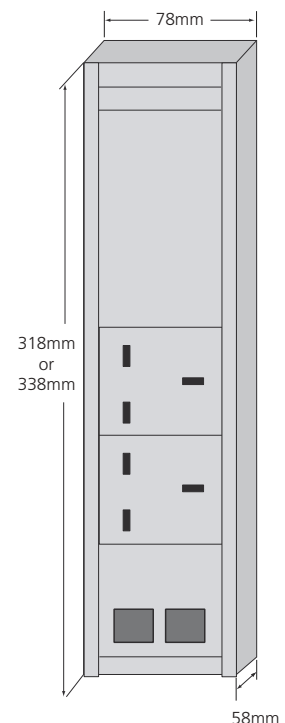


- In-line series protection
- Three modes of protection – L-N, L-G & N-G
- LED status indication
- In-built overload protection
- Telephone protection and international receptacle options available

The Multi-Socket Surge Protection Device is used for the protection of sensitive equipment that plugs into AC wall sockets. The data protection module provides protection to the telephone

data circuit for computers, fax machines and other electronic business equipment.

Model	Model	Description	Item Number
	MSPDA4F	4 x French outlets	701780
	MSPDA4G	4 x French outlets	701790
	MSPDA4U	4 x UK outlets	701300
	MSPDA2FD	2 x French outlets, 1 RJ11 phone	701810
	MSPDA2GD	2 x German outlets, 1 RJ11 phone	701820
	MSPDA2UD	2 x UK outlets, 1 RJ11 phone	701830
Nominal Voltage U_n	230V		
Distribution System	1Ph 2W+G		
Max. Cont. Operating Voltage U_c	275V (350V for versions with French receptacles)		
Frequency	50/60Hz		
Max. Line Current I_L	13A		
Leakage Current @ U_n	<0.2mA		
Max. Discharge Current I_{max}	5kA 8/20 μ s L-N, L-G & N-G Phone protection 5kA 8/20 μ s (L+L)-G		
Protection Modes	All modes protected		
Technology	TD Technology		
Voltage Protection Level U_p	<900V (1200V for versions with French receptacles) <600V for phone protection circuit		
Status	LED indicator		
Dimensions	Power only: 318mm x 78mm x 58mm (12.5" x 3" x 2.2") approx Power/Data: 338mm x 78mm x 58mm (13" x 3" x 2.2") approx		
Weight	1.4kg (3.3lb)		
Enclosure	Aluminum		
Warranty	5 years		
Approvals	CE		
Surge Rated to Meet	ANSI/IEEE C62.41-1991 Cat A, B IEC zone II, III, VDE Classification D		



Plug-In Protector



- High performance surge protection – effective protection for sensitive electronic equipment
- Under and over-voltage protection – comprehensive protection
- Versions offer telephone and coaxial protection – protect equipment connected to multiple services
- Outlets spaced for power supply transformers – allows utilization of all outlets
- Surge and wiring status indication – warning of an incorrect ground connection
- Disconnects power if the surge protection is compromised – safeguards equipment

In addition to protecting against lightning and other electrical transients, the MAX®8 series provides over and under-voltage protection. Under-voltages (brownouts) are a common cause of electric motor failure. In the case of under or over-voltages the

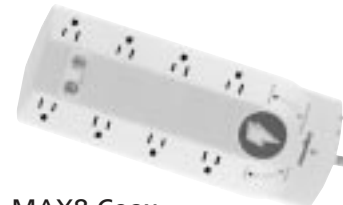
MAX8 series temporarily disconnects power to the connected AC equipment until the voltage returns to a safe level. Should a transient beyond the protector's rating damage the surge protector, power to the equipment is disconnected to avoid damage.

Model	MAX®8 Tel	MAX®8 Coax	MAX8 DBS+5
Order Code	M8T	M8C	M8DBS5
Nominal Voltage U_n	120V		
Distribution System	1 Ph 2W+G		
Frequency	50/60Hz		
Max. Line Current I_L	15A		
Aggregate Surge Rating	52kA 8/20 μ s		
Protection Modes	All modes protected		
Technology	Automatic under & over-voltage disconnect (84V \pm 6V to 147V \pm 8V) Internal disconnect for end-of-life MOV and filtering		
Voltage Protection Level U_p @ 500A 8/20 μ s (UL SVR)	330V		
Filtering	-50dB (100kHz to 1MHz)		
Status	Line fault, ground OK, unsafe voltage & protection OK indicators		
Connection	8' Power cord 4 always-on receptacles, 4 switched		
Warranty	Lifetime. \$5,000,000 Connected Equipment Warranty		
Approvals	UL		
Telephone Protection:	1 circuit		1 circuit
Auto-Reset	Yes		Yes
Protection Modes	Common & differential		Common & differential
Voltage Protection Level U_p	260V		260V
Connectors	RJ-11. Pins 3 & 4 protected		RJ-11. Pins 3 & 4 protected
CATV Protection:		1 circuit	2 circuits
Frequency		50MHz to 1 GHz. <1dB insertion loss	
Voltage Protection Level U_p		0.7V	
Connectors		Female "F"	
Satellite Protection:			2 circuits
Frequency			950MHz to 2GHz. <1dB insertion loss
Voltage Protection Level U_p			27V
Connectors			Female "F"



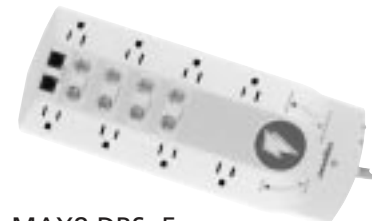
MAX8 Tel

- Power and telephone protection
- Standard CO telephone protection
- DSL, ADSL, UADSL and G.Lite compatible



MAX8 Coax

- Power and coax protection for television/video recorders
- Standard digital cable protection



MAX8 DBS+5

- Direct broadcast TV protection
- 2x cable TV and 2x Satellite protection circuits
- Telephone protection circuit for pay TV systems

Plug-In Protector



- High performance surge protection – effective protection for sensitive electronic equipment
- Direct plug-in – saves space
- Surge and wiring status indication – warning of an incorrect ground connection
- Disconnects power if the surge protection is compromised – safeguards equipment

The MAX[®]2 series provides a range of compact, direct plug-in, TVSS units for residential applications. The MAX2 Tel is designed for computers with dial-up modems. The MAX2 Coax is for protection of small television/home entertainment centers connected

to Cable TV, or for computers connected to cable modems. The MAX2-20A provides AC-only protection with NEMA 20R plug and socket. The MAX2 Dog Fence protects electronic pet containment systems by protecting both the AC power and loop circuits.

Model	MAX [®] 2 Tel	MAX [®] 2 Coax	MAX2-20A	MAX2 Dog Fence
Order Code	M2T	M2C	M2A20	M2DF
Nominal Voltage U _n	120V			
Distribution System	1 Ph 2W+G			
Frequency	50/60Hz			
Max. Line Current I _L	15A		20A	15A
Aggregate Surge Rating	52kA 8/20μs			
Protection Modes	All modes protected			
Technology	Internal disconnect for end-of-life MOV and filtering			
Voltage Protection Level U _p @ 500A 8/20μs (UL SVR)	330V			700V
Filtering	-50dB (100kHz to 1MHz)			
Status	Protection OK indicators			
Connection	2 outlets (NEMA 5R)		2 outlets (NEMA 20R)	2 outlets (NEMA 5R)
Warranty	Lifetime. \$5,000,000 Connected Equipment Warranty			Lifetime
Approvals	UL			
Telephone Protection:	1 circuit			
Auto-Reset	Yes			
Protection Modes	Common & differential			
Voltage Protection Level U _p	260V			
Connectors	RJ-11/45 Pins 4 & 5 protected			
CATV Protection:		1 circuit		
Frequency		50MHz to 1 GHz. <1dB insertion loss		
Voltage Protection Level U _p		0.7V		
Connectors		Female "F"		
Pet Containment Loop Protection:				1 circuit
Surge Rating I _{max}				18kA 8/20μs
Voltage Protection Level U _p				70V



MAX2 Tel

- Power and telephone protection
- Standard CO telephone protection
- DSL, ADSL, UADSL and G.Lite compatible



MAX2 Coax

- Power and coax protection for televisions/video recorders
- Standard and digital cable protection



MAX2-20A

- Protection for high current circuits



MAX2 Dog Fence

- Protection for pet containment systems

Digital Equipment Noise Filter



- High performance surge protection – effective protection for sensitive electronic equipment
- Enhanced EMI/RFI noise filtering – ideal protection for digital copy equipment
- Under and over-voltage protection – comprehensive protection
- Provides protection to computer networks and dial-up telephone connections
- Outlets spaced for power supply transformers – allows utilization of all outlets
- Surge and wiring status indication – warning of an incorrect ground connection
- 20A plug, 5-ALT-20R receptacles (15/20A) – high current capability
- Disconnects power if the surge protection is compromised – safeguards equipment

The MAX® ImagePro™ 20 offers enhanced EMI/RFI noise filtering for the protection of sensitive printing and digital copy equipment. It features 20A capability for larger high speed copiers and protection for connected computer network and dial-up connections. In addition to protecting against lightning and other electrical transients, the MAX ImagePro 20 provides under and over-voltage

protection. Under-voltages (brownouts) are a common cause of electric motor failure. In the case of under or over-voltages, the MAX ImagePro 20 temporarily disconnects power to the connected AC equipment until the voltage returns to a safe level. Should a transient beyond the protector's rating damage the surge protector, power to the equipment is disconnected to avoid damage.

Model	MAX Image Pro 20
Order Code	MIP20
Nominal Voltage U_n	120V
Distribution System	1 Ph 2W+G
Frequency	50/60Hz
Max. Line Current I_L	20A
Aggregate Surge Rating	52kA 8/20 μ s
Protection Modes	All modes protected
Technology	Over-voltage disconnect (146V \pm 8V) Internal disconnect for end-of-life MOV and filtering
Voltage Protection Level U_p @ 500A 8/20 μ s (UL SVR)	330V
Filtering	-65dB (100kHz to 1MHz)
Status	4 status indicators
Connection	8' Power cord, 4 receptacles
Warranty	Lifetime. \$5,000,000 Connected Equipment Warranty
Approvals	UL
Telephone Protection	
Auto-Reset	Yes
Protection Modes	Common & differential
Voltage Protection Level U_p	260V
Connectors	RJ-45. Pins 4 & 5 protected
LAN Protection	
Auto-Reset	Yes
Voltage Protection Level U_p	7V
Connectors	RJ-45. Pins 1, 2, 3 & 6 protected

Modular Plug-In Protector

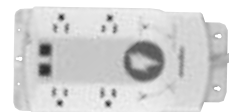


- High performance surge protection – effective protection for sensitive electronic equipment
- Under and over-voltage protection – comprehensive protection
- Allows towerMAX data modules to be added – allows protection of many circuits
- Outlets spaced for transformers – allows utilization of all outlets
- Surge and wiring status indication – warning of an incorrect ground connection
- Disconnects power if the surge protection is compromised – safeguards equipment

In addition to protecting against lightning and other electrical transients, the towerMAX® series provides over and under-voltage protection. Under-voltages (brownouts) are a common cause of electric motor failure. In the case of under or over-voltages the towerMAX series temporarily disconnects power to the connected AC equipment until the voltage returns to a safe level. Should a

transient beyond the protector's rating damage the surge protector, power to the equipment is disconnected to avoid damage. The towerMAX unit facilitates matching towerMAX data protection modules that can be added to protect a variety of different signal types and quantities.

Model	towerMAX®4 Tel	towerMAX®4 LAN	towerMAX®4 KSU towerMAX®8 KSU	MAX8 COM/DATA
Order Code	M4T	M4L	M4KSU M8KSU60	M8COM60
Nominal Voltage U_n	120V			
Distribution System	1 Ph 2W+G			
Frequency	50/60Hz			
Max. Line Current I_L	15A			
Aggregate Surge Rating	52kA 8/20 μ s			
Protection Modes	All modes protected			
Technology	Under and over voltage disconnect (84V \pm 6V to 147V \pm 8V) Internal disconnect for end-of-life MOV and filtering			
Voltage Protection Level U_p @ 500A 8/20 μ s (UL SVR)	330V			
Filtering	-50dB (100kHz to 1MHz)			
Status	Line fault, ground OK, unsafe voltage & protection OK indicators			
Connection	8' Power cord			
Warranty	Lifetime. \$5,000,000 Connected Equipment Warranty			
Approvals	UL			
Telephone Protection	1 circuit			4 circuits
Auto-Reset	Yes			Yes
Protection Modes	Common & differential			Common & differential
Voltage Protection Level U_p	260V			260V
Connectors	RJ-45. Pins 3 & 4 protected			RJ-11. Pins 3 & 4 protected
LAN Protection		1 circuit		1 circuit
Auto-Reset		Yes		Yes
Voltage Protection Level U_p		7V		7V
Connectors		RJ-45. Pins 1 to 8 protected		RJ-45. Pins 1 to 8 protected
T1 Protection				1 circuit
Auto-Reset				Yes
Protection Modes				Common & differential
Voltage Protection Level U_p				70V
Connectors				RJ-45. Pins 1, 2, 4, 5, 7 & 8 protected



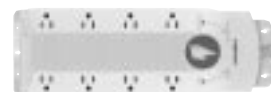
towerMAX4 Tel

- Power and telephone protection
- Standard CO telephone protection
- DSL, ADSL, UADSL and G.Lite compatible
- Allows towerMAX data modules to be added



towerMAX4 LAN

- Power and LAN protection
- Cat 5 (10BaseT & 100BaseT) Ethernet protection
- Allows towerMAX data modules to be added



towerMAX8 KSU

- Allows towerMAX data modules to be added



MAX8 COM/DATA

- Power, telephone, T1 & LAN protection
- Allows towerMAX data modules to be added

towerMAX® and MAX® AllPath® Modules



Protection for Analog Telephone Lines

towerMAX CO/4

Order Code: MCO4

Protects up to four lines using RJ-14 connectors (2 in, 2 out)
Pins 3 & 6 and 4 & 5 protected



towerMAX CO/4X4

Order Code: MCO4X460

Protects up to four lines using RJ-11/45 connectors
1 CO pair protected per jack. Pins 4 & 5 protected



towerMAX CO/16

Order Code: MCO16

Protects up to sixteen CO lines using 50 pin, RJ-21X (Amphenol) connectors



towerMAX CO/25

Order Code: MCO2560

Protects up to twenty-five CO lines using 50 pin, RJ-21X (Amphenol) connectors



MAX Tel 1

Order Code: GTM1010

One line protected using RJ-11/45 connectors
Pins 4 & 5 protected



MAX Tel 2

Order Code: GTM1020

Two lines protected using RJ-11/45 connectors (1 in, 1 out)
Pins 3, 4, 5 & 6 protected



Protection for Analog Telephone Lines connecting via 110 Punch-down

towerMAX CO/4-110

Order Code: MCO4110

Protects up to four lines using one 110 punch-down block on input.
Output either 110 block or four RJ-11 or two RJ-14 connectors



towerMAX CO/8-110

Order Code: MCO8110

Protects up to eight lines using punch-down blocks input and output



Protection for Digital Station Lines

towerMAX DS/25

Order Code: MDS25

Protects up to twenty-five 2-wire or twelve 4-wire digital station lines
using 50 pin, RJ-21X (Amphenol) connectors



towerMAX DS/2

Order Code: MDS260

Protects one 8-wire line using RJ-45 connectors or two 4-wire lines using
RJ-11/45 connectors



towerMAX DS/CO

Order Code: MDSCO60

Protects two 4-wire digital/analog lines or two 2-wire tip/ring analog lines
using RJ-11/45 connectors

towerMAX and MAX AllPath Modules



Protection for T1/ISDN Lines, Paging Lines & RS232

towerMAX LL(T-1)

Order Code: *MLLT1*

Protects 2 (T1 or ISDN) lines, each using RJ-45 connectors
Pins 1 & 2 and 4 & 5 protected



MAX ISDN/LL

Order Code: *GTM2000*

Protects 1 (T1 or ISDN) line using RJ-45 connectors
Pins 1, 2, 4, 5, 7 & 8 protected



towerMAX SCL/8

Order Code: *MSCL860*

Protects eight wires for paging horn and speaker protection
Protection voltage 47V



towerMAX RS/DB

Order Code: *MRSDb*

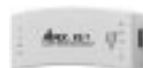
Protects one 25-wire RS-232 line using DB25 connectors
All pins protected
Protection voltage 30V



towerMAX RS/2

Order Code: *MRS2*

Protects two 8-wire RS-232 lines using RJ-45 connectors
Pins 1 to 8 protected
Protection voltage 30V



MAX RS/1

Order Code: *GTM6050*

Protects one RS-232 line using UTP & RJ-45 connectors
Pins 1 to 8 protected
Protection voltage 30V



Protection for LAN & CATV

MAX LAN Gigabit

Order Code: *GTM1500*

Protects one Cat 5, fast Ethernet or ATM circuit using RJ-45 connectors
Pins 1 to 8 protected



MAX LAN UTP

Order Code: *GTM6010*

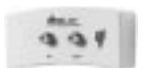
Protects one Cat 5, Ethernet, ArcNET or Token Ring circuit using RJ-45 connectors
Pins 1 to 6 protected



MAX ANT/CATV

Order Code: *GTM2010*

Protects one coax line for cable TV or rooftop antenna using "F" connectors
Protection voltage 0.7V



MAX SSP

Order Code: *GTM3010*

Protects one satellite coax line using "F" connectors
Protection voltage 27V

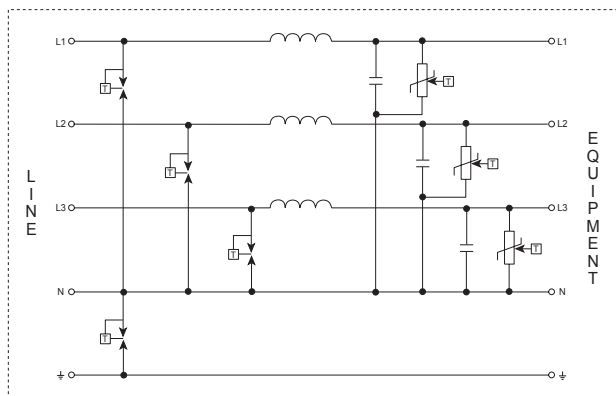
MAX AllPath Ground/Mount Kit

Order Code: *GMTGND*

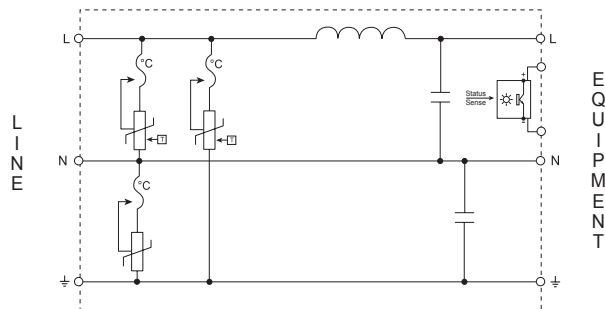
Ground kit for MAX AllPath GTM series

Schematic Diagrams

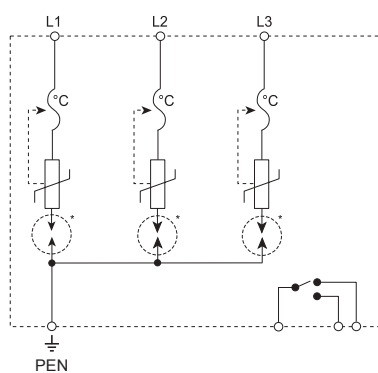
TSG-SRF



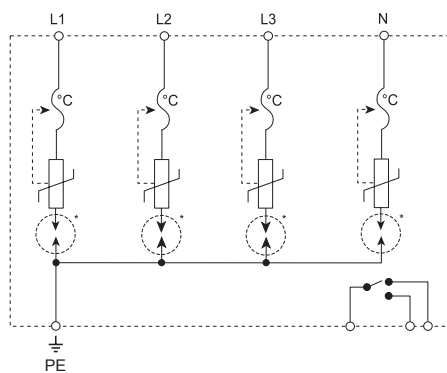
TDF



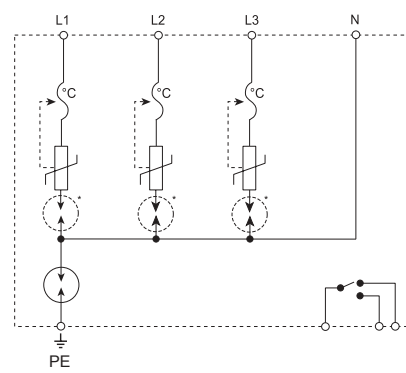
DSD340/380 *L



TNC Configuration
*Only present in "L" low leakage models

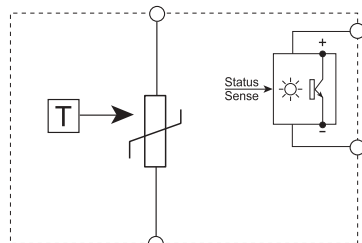


TNS Configuration
*Only present in "L" low leakage models

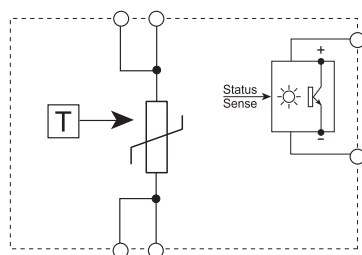


TT Configuration
*Only present in "L" low leakage models

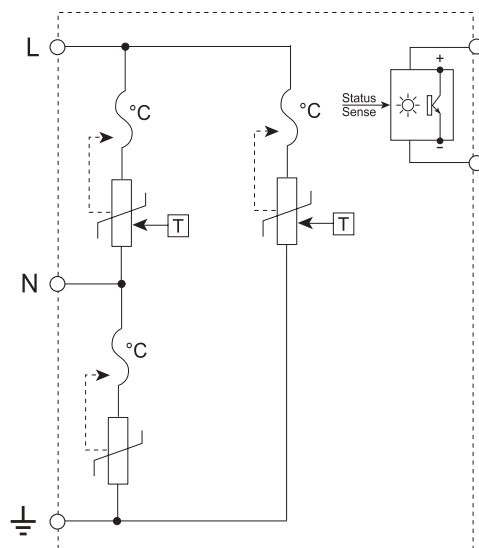
TDS 140



TDS 180



TDS 50



Glossary of Terminology

8/20 μ s Current Waveshape

A current impulse with a virtual front time of 8 μ s and a time to half-value of 20 μ 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 Over-current Protection

An external over-current protective device installed prior to the SPD. Such a device may be required if the over-current 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 μ 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 μ 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 μ 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.

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 disconnect function, for example an over-current protection function and a thermal protection function. These functions may be integrated into one unit or performed in separate units.

Spark-over Voltage

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



Glossary of Terminology

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 μ 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 μ s I_{max} .

Six Point Plan CD-ROM and ERICO Website



Six Point Plan CD-ROM

The Six Point Plan CD-ROM is an interactive and educational tool that introduces ERICO's Six Point Plan of Protection - a coordinated approach to lightning protection, surge protection and grounding.

The CD-ROM details the range of products available and provides useful information and tools. These include, a comprehensive technical library of relevant publications, graphics of typical installations and sales support information.

A number of our software design tools are included such as the GEM Grounding Calculator, Benji ProCalc Lightning Layout Design Calculator, CRITEC Surge Selection Calculator and CADWELD Selection Calculator. The extensive CAD-Club compilation of grounding and bonding application drawings along with their source AutoCAD files, are included.

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, by ERICO division, 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:

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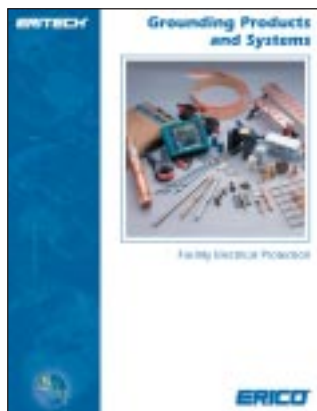
ERICO® Facility Electrical Protection Literature



ERITECH® Lightning Protection Catalogs

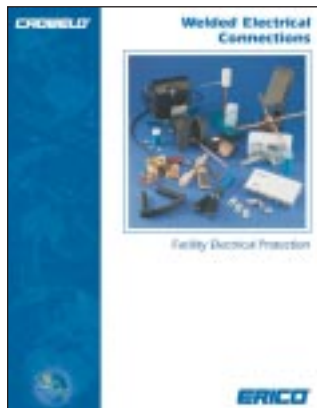
ERICO System 2000 Lightning Protection Products catalog highlights products used in conventional lightning protection. Products detailed include conductors, ground rods and plates, clamps, splices, points and accessories.

ERICO 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 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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