CONNECT AND PROTECT

nVent ERICO Critec SRF N-Series

Surge Reduction Filters

nVent

ERICO

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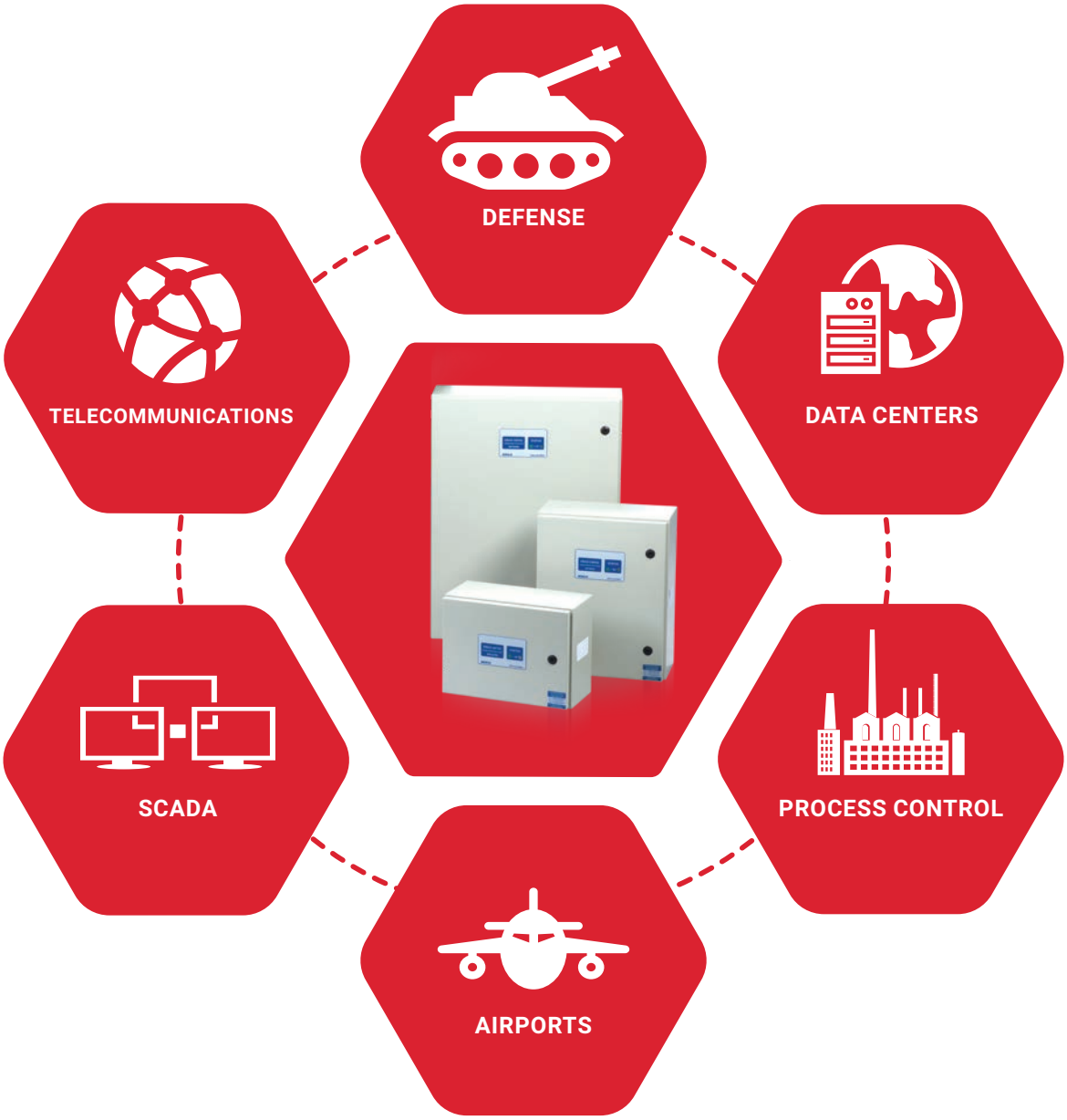
Proven for Critical Applications

nVent ERICO pioneered the development of the Surge Reduction Filter commencing in the 1980's, and since then tens of thousands have been installed in some of the highest lightning areas of the world. A policy of continuous product improvement has seen updated performance levels, culminating in the SRF N-Series.

They are renowned for their application in critical sites, with common application to telecommunications sites, data centers, process control plants, defense installations, and airports.



SRF N-Series Combined Technology Protection

Critec SRF N-Series combines rugged Spark Gap technology with effective true L-C filtering and Transient Discriminating (TD) Technology to help create the ultimate in effective and reliable AC surge protection.

PRIMARY SURGE DIVERSION

- Spark Gap Technology for high surge handling capability

FILTER CIRCUIT

- High efficiency iron – powder cored inductors
- Robust capacitors – safety agency approved

SECONDARY SURGE DIVERSION

- TD Technology for high over-voltage withstand

HIGH RELIABILITY

- Direct connection from Input to Output

FILTER PERFORMANCE

- Filter circuit reduces rate-of-voltage rise (dv/dt) and let-through voltage, providing improved protection for electronic equipment

STATUS INDICATION

- Comprehensive front panel status and internal diagnostic LEDs

ENCLOSURE

- Up to IP 65 rated
- Internal parts touch finger safe

IEC STANDARDS COMPLIANT

- Increased safety and performance

Spark Gap Technology

The SRF N-Series has as its primary surge diversion stage a high-energy Spark Gap from each phase to neutral and from neutral to ground. These devices offer remarkable surge diversion capability (rated at 130 kA 8/20 µs, 50 kA 10/350 µs), that allows them to handle partial direct strike lightning currents. The range has been tested to the IEC standard Class I tests to ensure that the filter can be installed in a high lightning area and withstand those surge currents that can occur from a direct strike to the facility.

The design of the Spark Gaps used is such that they have fast operating characteristics while extinguishing after the surge has passed, drawing low levels of follow current even on high prospective short circuit current services.

Filtering Technology

Surge protection devices may include 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 may serve to reduce any fast ringing voltages and will also help absorb the energy in a small transient thereby providing a limited level of attenuation.

A far more effective approach is the series LC filter. This type of filter is connected between the surge limiting components and is in series with the supply powering the equipment. It consists of series inductors 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.

The SRF N-Series use true series connected LC filtering. Since the load current feeding the equipment to be protected has to go through the SRF, the inductors have to be rated to carry this load current. As a consequence, the range consists of a number of models to suit increasing load currents, with the larger current models being physically larger. In addition to the heavy duty inductors, the capacitors used in this filter stage are of a special high reliability type, having received safety approvals from a number of ratings agencies.

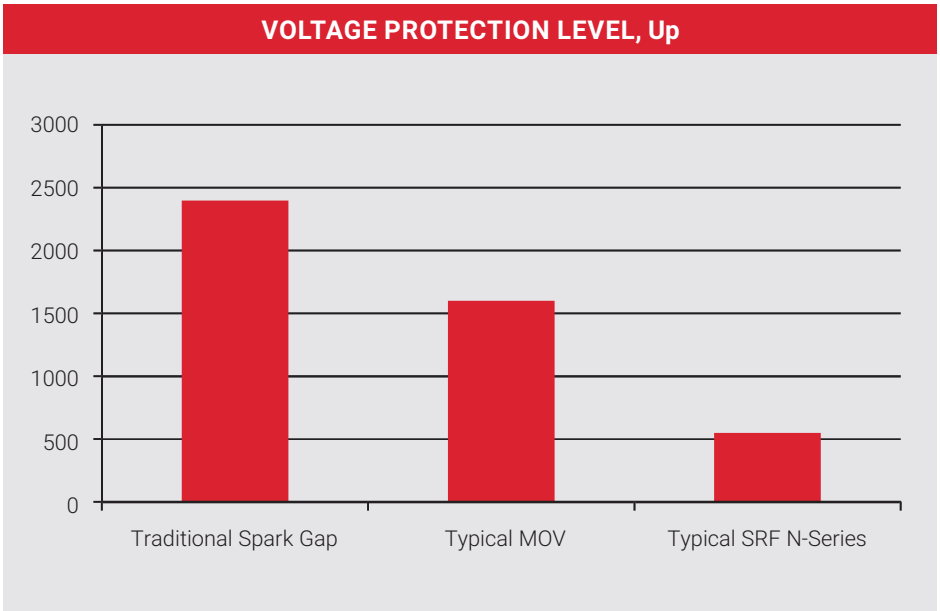
Finally, the type of filter needed for a Surge Reduction Filter is very different to that used for higher frequency RFI/EMI (Radio Frequency Interference/Electro-magnetic Interference) filters. These simple filters use small components that are effective for higher frequencies but are ineffective against lightning surge frequencies.

The IEC standard for testing and assessing the performance of Surge Protective Devices (IEC 61643-11) defines the let-through voltage of the SPD as the Voltage Protection Level, Up. Under standardized test conditions, this is determined for each SPD tested. Traditional Spark Gap technologies, while being rugged, have a relatively high Up, usually in the range of 2 kV to 3 kV. Metal Oxide Varistors (MOVs) perform better at clamping the voltage, having typical Up values in the range of 1500 V to 1800 V. When subjected to the same tests, the SRF N-Series have dramatically lower Up values in the range of 450 V to 650 V. Of course, the lower the value of Up, the better the SPD prevents damage to the equipment being protected.

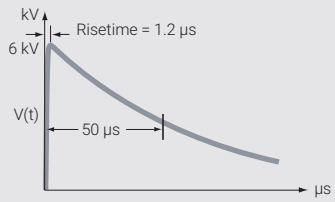
SPDS WITH FILTERS OFFER TWO PRIMARY BENEFITS:

(1) They reduce the transient voltage reaching the equipment.

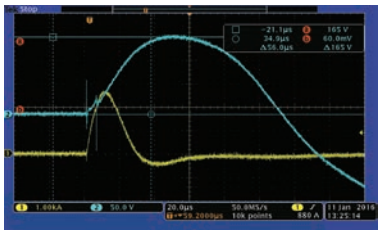
(2) They reduce the rate-of-rise of the leading edge of the impulse. The residual leading edge spike after a standard SPD, although it may only be 500 V to 900 V in amplitude, can cripple electronics due to its extremely high rate-of-voltage rise of 3,000-12,000 V/µs. Effective filtering reduces this rate-of-rise to less than 20 V/µs. 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.



ARRIVAL OF SURGE



Input surge typically up to 6 kV and 500 µs duration.



dv/dt - 5000 V/µs → dv/dt - 5V/µs

THE CONSTRUCTION OF THE SRF N-SERIES TRUE INDUCTOR-CAPACITOR (LC FILTER)

In order to provide the excellent filtering performance, the filters are constructed with separate inductor and capacitor elements.

The inductors are constructed from high quality iron powder cores, ensuring high efficiency and quiet operation.

The capacitors employed are high reliability types, having received safety approvals from ratings agencies.

Transient Discriminating Technology

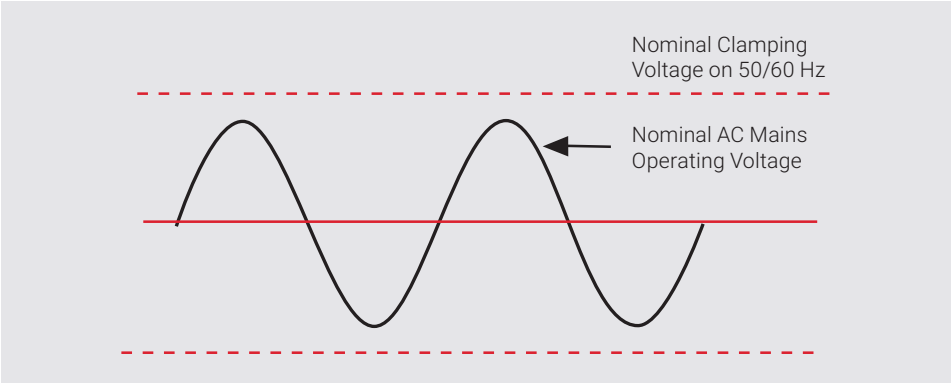
To meet the fundamental requirements of performance, longer service life and greater safety under real world conditions, nVent ERICO has developed Transient Discriminating (TD) Technology.

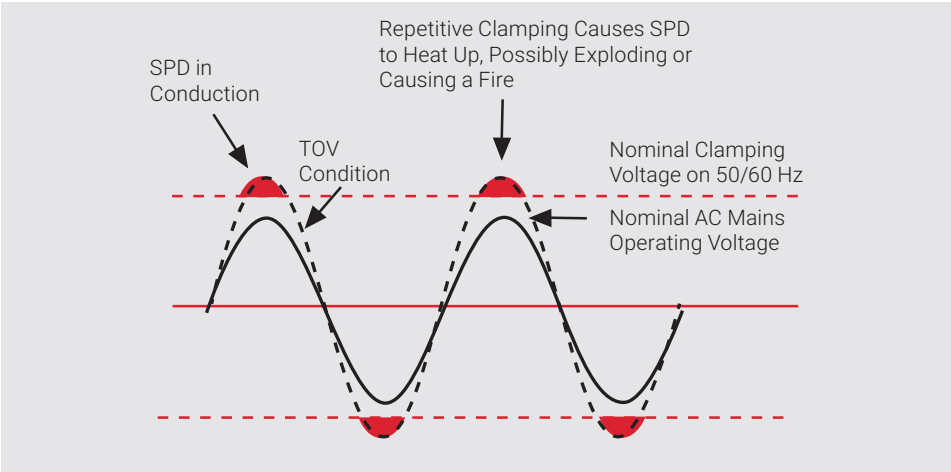
This quantum leap in technology adds a level of "intelligence" to the Surge Protection Device enabling it to discriminate between sustained abnormal overvoltage conditions (Temporary Over Voltages – TOVs) and true transient or surge events. Not only does this help ensure safe operation under practical application, but it also prolongs the life of the protector since permanent disconnects are not required as a means of achieving internal over-voltage protection.

TRADITIONAL TECHNOLOGIES

Conventional SPD technologies utilizing metal oxide varistors and/or silicon avalanche diodes to clamp or limit transient events are susceptible to sustained 50/60 Hz mains over-voltage conditions (TOVs) 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 overvoltage. This condition can cause the device to rapidly accumulate heat and in turn fail with the possibility of inducing a fire hazard.

The diagram shows how a traditional SPD is chosen to have a nominal clamping voltage that is above the peak of the nominal AC mains voltage. However, in the lower diagram, it can be seen that when the AC mains experiences a Temporary Over-Voltage (TOV), the SPD attempts to clamp the over-voltage, and rapidly heats up, resulting in failure, potentially accompanied by fire or explosion.





THE CORE OF TD TECHNOLOGY

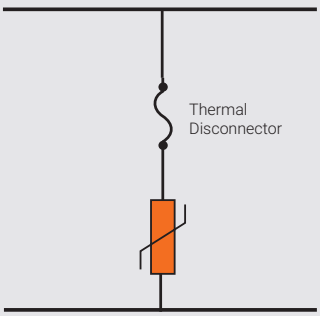
The secret to nVent ERICO Transient Discriminating Technology is its active frequency discrimination circuit. This patented device can discriminate between a temporary over-voltage (TOV) condition and a very fast transient, which is associated with lightning or switching-induced surges. When the transient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

Effectively, TD Technology allows the SPD to have two clamping levels – one well above the peak of a TOV (up to twice its nominal AC voltage!), and the other much lower, to effectively and swiftly clamp lightning transients.

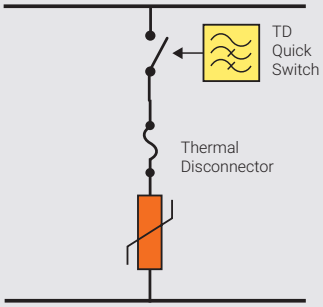
As the explanatory illustration shows, this allows the TD circuit to still remain operational after TOV events, thus continuing to clamp transients and providing a much longer operational life. For example, the IEC 61643-11 standard applies a test of 442 Vac from Line to Neutral for filters with an operating voltage of 230 Vac. While the filter may fail safely during this test, the N-Series SRFs are unaffected by this stringent test, and remain completely operational.

The SRF N-Series (incorporating 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.

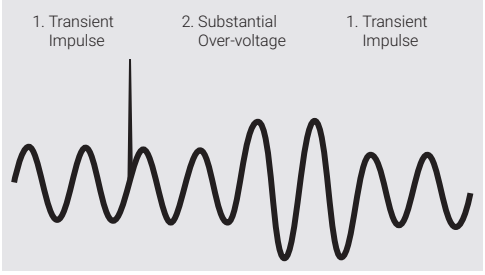
TRADITIONAL TECHNOLOGY



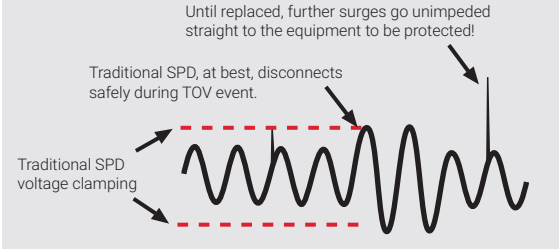
ACTIVE TD TECHNOLOGY



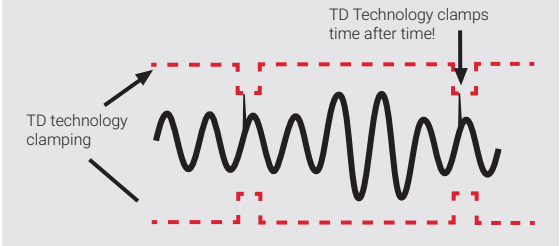
TYPICAL SUPPLY PROBLEMS



TRADITIONAL TECHNOLOGY RESPONSE



TD TECHNOLOGY SOLUTION



Combining Technologies Into The Ultimate AC Surge Protector

DEVELOPMENT OF SURGE REDUCTION FILTERS

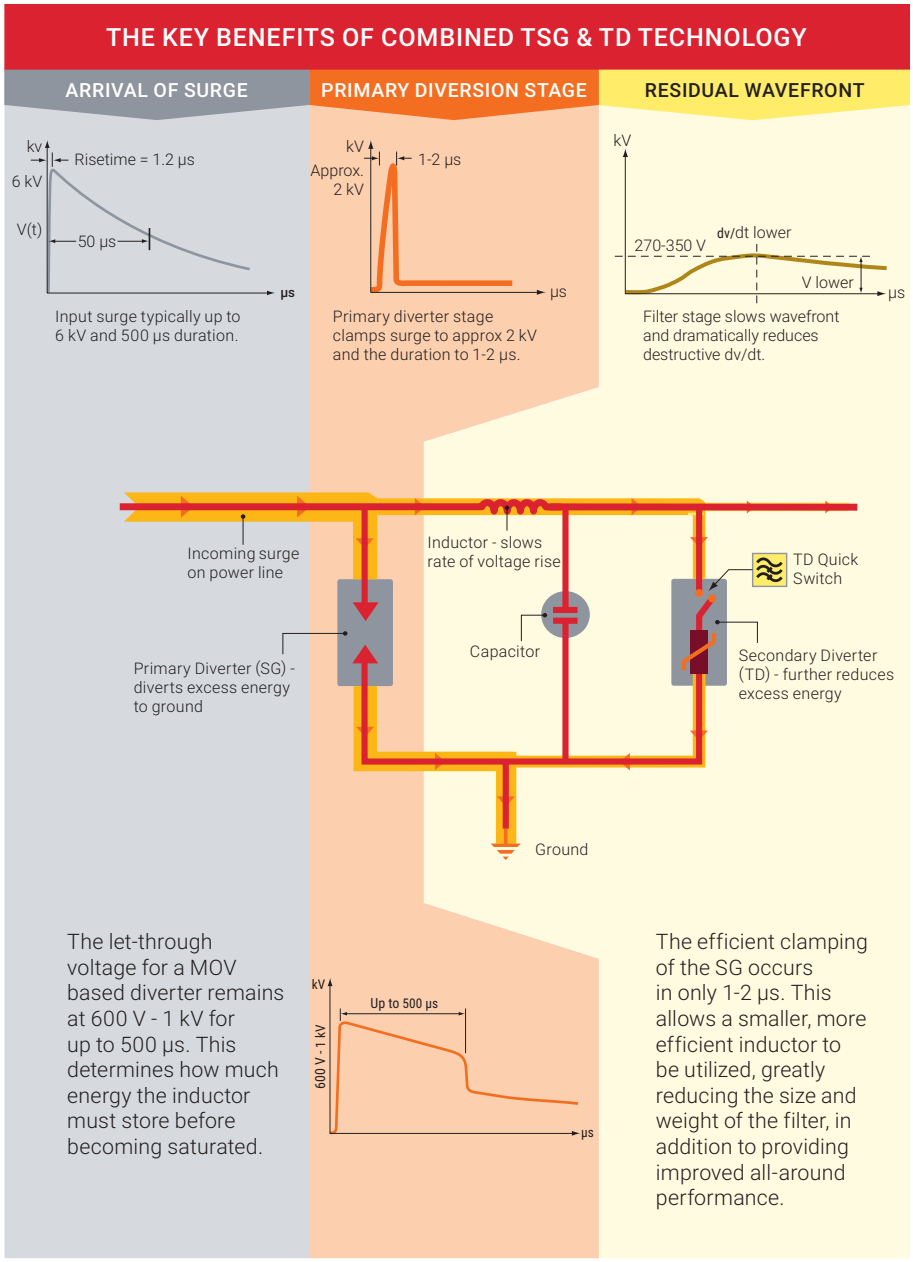
nVent ERICO strives to employ the most suitable technology for each application across its range of SPDs, including high performance Surge Reduction Filters (SRFs). The N-Series Surge Reduction Filters are the most recent development of a proud pioneering history of surge reduction filters design, and now feature IEC Standards compliance.

FUNDAMENTAL BREAKTHROUGH IN FILTER DESIGN

Incorporating Spark Gap Technology into a surge reduction filter has allowed a fundamental breakthrough in the overall design of the filter. Iron powder 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 brand of SRF.

The use of iron cored inductors is possible because the let-through voltage from a Spark Gap remains high for only a few microseconds. In comparison, the let-through voltage from a MOV based device remains between 600 V and 1000 V for the duration of the surge. This time can range up to 500 microseconds for long tail pulses and determines how much energy the inductor will have to store before reaching saturation and becoming ineffective.

The secondary TD Technology diverter adds additional protection, and is particularly useful for clamping transients generated within the facility.



WHAT BENEFITS FLOW FROM THIS TECHNOLOGY?

The combination of Spark Gaps 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.

In keeping with the role of the SRF N-Series to protect highly critical facilities, the design of these filters has been simplified to feature direct connection from input to output. Avoiding unnecessary series overcurrent protection improves the overall reliability of the system.

Overall operational status can be determined from the front door indication LED. Further LEDs within the unit identity the correct functioning of the individual surge protection elements. Remote indication of the status is easily accomplished by connection to the remote status relay contacts within the unit.

THE IEC 61643-11 SURGE PROTECTIVE DEVICES STANDARD

This standard (previously IEC61643-1) is the international standard for testing of surge protection devices (SPDs). It has evolved over the years to become the benchmark for ensuring performance and safety of SPDs. The SRF N-Series is in complete compliance with the latest version of this standard, and a Declaration of Conformity is available. The standard mandates severe tests for safety and performance, testing such aspects of the SPD's ability to withstand multiple standardized surge impulses, measurement of the voltage clamping level of the SPD to those surges, safe behavior during various failure mode simulations, and sustained TOV situations. In addition, series connected devices, such as the SRF N-Series, are put through load current tests at the rated load current, and also at severe overload currents to ensure safety and correct functioning.

Finally, the filters are tested on AC supplies able to deliver the full rated prospective short circuit current for safe behavior during various internal short circuits and even short circuits across the output terminals. Some manufacturers resist testing to this standard because it is difficult to pass. Our product compliance is your assurance for safe and reliable site protection.

nVent

EU Declaration of Conformity

Issued by
ERICO International Corporation,
declare at our sole responsibility, that these devices are designed and constructed according to the Essential Health & Safety requirements of the relevant European directives.

Equipment Description:	Surge Reduction Filters
Product Name:	SRF N-Series, models SRF163N, SRF1125N, SRF363N, SRF3125N, SRF3250N, SRF3500N, and SRF3800N, with or without suffix "BP"
Business Trade Mark/Brand Name:	ERICO CRITEC
Applicable Directives:	2014/35/EU Low Voltage Directive Laws for electrical equipment within certain voltage limits
Applicable Standards:	EN 61643-11:2012 Low-voltage Surge Protective Devices - Part 11: Surge Protective Devices Connected to Low-voltage Power Systems - Requirements and Test Methods (IEC 61643-11:2011, Modified) IEC 61643-11:2011 Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods
Test Reports:	As listed on subsequent sheet of this Declaration

Authorized by:

Ward Judson
Engineering Manager, Product Certifications

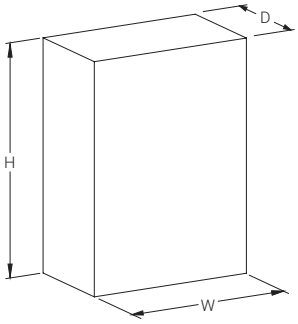
Date
11/29/16

Page 1 of 2 Subject to Change Without Notice DOC: CE_ERT_SRF_A

Surge Reduction Filter N-Series, Single Phase

FEATURES

- High-performance protection incorporating Spark Gap and Transient Discriminating (TD) technologies
- High surge rating ideal for exposed critical service entrance applications
- Reduces let-through voltages and rate-of-voltage rise (dv/dt) and helps provide optimum protection for electronic equipment
- Extreme reliability and simplified design with direct connection from input to output
- Comprehensive front panel status and internal diagnostic LEDs



SPECIFICATION

Part Number	SRF163N	SRF1125N
Nominal System Voltage (Un)	220 - 240 VAC	
Distribution System	1Ph 2W+G	
System Compatibility	TN-C TN-C-S TN-S TT	
Rated Load Current (IL)	63 A	125 A
Frequency	50 – 60 Hz	
Short Circuit Current Rating (SCCR)	43 kA	
Heat Dissipation	25 W	
Rate of Voltage Rise (dV/dt)	3 V/µs Max	8 V/µs Max
Filtering	-40 dB @ 100 kHz	
Input Connection	10 - 35 mm²	25 - 120 mm²
Output Connection	25 - 120 mm²	
Protection Modes	All modes protected	
Technology	Spark Gap In-line series low pass sine wave filter TD technology with thermal disconnect	
Enclosure Material	Metal	
Enclosure Rating	IP 65	
Mounting	Wall mount	

Part Number	SRF163N	SRF1125N
Status Indication	Front panel LED Internal diagnostic primary and secondary protection LEDs Change-over contact (Form C dry), 250 VAC/30 VDC/5 A, 4 kV isolation	
Depth (D)	200 mm	
Height (H)	300 mm	
Width (W)	400 mm	
Unit Weight	10.3 kg	12.3 kg
Complies With	IEC® 61643-11 Class I, Class II ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C ANSI®/IEEE® C62.41.2-2002 Scenario II, Exposure 3, 100 kA 8/20 µs, S10 kA 10/350 µs	

AS1768 Ratings		
Part Number	**SRF163N**	**SRF1125N**
Max Continuous Operating Voltage	310 VAC	
Maximum Surge Current, L-N	130 kA 8/20 µS 50 kA 10/350 µs	
Maximum Surge Current, N-PE	130 kA 8/20 µS 50 kA 10/350 µs	
Voltage Protection Level, L-N	150 V @ 3 kA 8/20 µs 200 V @ 20 kA 8/20 µs	250 V @ 3 kA 8/20 µs 350 V @ 20 kA 8/20 µs

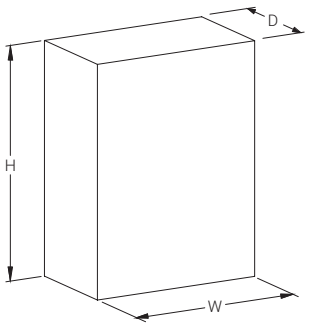
IEC 61643-11 Ratings		
Part Number	**SRF163N**	**SRF1125N**
Max Continuous Operating Voltage (Uc)	255 VAC	
Temporary Overvoltage, L-N	442 VAC 2 hours	
Temporary Overvoltage, N-PE	1200 VAC 200 ms	
Impulse Current (Iimp)	10kA 10/350 µs	
Voltage Protection level (Up), L-N @ Iimp	450 V	
Nominal Discharge Current (In)	20kA 8/20 µs	
Voltage Protection level (Up), L-N @ In	450 V	500 V
Voltage Drop	0.1 % Max	

IEC 61643-11 Annex A specifies Max Continuous Operating Voltage (Uc) as 255 VAC.
IEC 61643-11 test procedure limits maximum Impulse Current (Iimp) to 10kA due to internal product safety fusing.
IEC 61643-11 recommends a maximum preferred value for Nominal Discharge Current (In) of 20 kA.
IEC 61643-11 Temporary Overvoltage tests are passed in withstand mode.
Upstream overcurrent protection not exceeding Rated Load Current (IL) shown above must be installed ahead of the surge reduction filter.

Surge Reduction Filter N-Series, Three Phase

FEATURES

- High-performance protection incorporating Spark Gap and Transient Discriminating (TD) technologies
- High surge rating ideal for exposed critical service entrance applications
- Reduces let-through voltages and rate-of-voltage rise (dv/dt) and helps provide optimum protection for electronic equipment
- Extreme reliability and simplified design with direct connection from input to output
- Comprehensive front panel status and internal diagnostic LEDs



SPECIFICATION

Part Number	SRF363N	SRF3125N	SRF3250N	SRF3500N	SRF3800N
Nominal System Voltage (Un)	220/380 - 240/415 VAC				
Distribution System	3Ph Y 4W+G				
System Compatibility	TN-C TN-C-S TN-S TT				
Rated Load Current (IL)	63 A	125 A	250 A	500 A	800 A
Frequency	50 – 60 Hz				
Short Circuit Current Rating (SCCR)	43 kA				
Heat Dissipation	34 W	56 W	98 W	215 W	260 W
Rate of Voltage Rise (dV/dt)	5 V/µs Max	10 V/µs Max	11 V/µs Max	10 V/µs Max	
Filtering	-40 dB @ 100 kHz				
Input Connection	10 - 35 mm²	25 - 120 mm²		10 mm Stud	(2) 10 mm studs
Output Connection	10 - 35 mm²	25 - 120 mm²		10 mm Stud	(2) 10 mm studs
Protection Modes	All modes protected				
Technology	Spark Gap In-line series low pass sine wave filter TD technology with thermal disconnect				
Enclosure Material	Metal				

Part Number	SRF363N	SRF3125N	SRF3250N	SRF3500N	SRF3800N
Enclosure Rating	IP 65		IP 32		
Mounting	Wall mount				
Status Indication	Front panel LED Internal diagnostic primary and secondary protection LEDs Change-over contact (Form C dry), 250 VAC/30 VDC/5 A, 4 kV isolation				
Depth (D)	200 mm			300 mm	
Height (H)	500 mm		800 mm	1,000 mm	1,200 mm
Width (W)	400 mm		600 mm	800 mm	
Unit Weight	17.7 kg	21.6 kg	41.7 kg	76.6 kg	97.2 kg
Complies With	IEC® 61643-11 Class I, Class II ANSI®/IEEE® C62.41.2-2002 Cat A, Cat B, Cat C ANSI®/IEEE® C62.41.2-2002 Scenario II, Exposure 3, 100 kA 8/20 µs, 10 kA 10/350 µs				

AS1768 Ratings					
Part Number	**SRF363N**	**SRF3125N**	**SRF3250N**	**SRF3500N**	**SRF3800N**
Max Continuous Operating Voltage	310 VAC				
Maximum Surge Current, L-N	130 kA 8/20 µs 50 kA 10/350 µs				
Maximum Surge Current, N-PE	130 kA 8/20 µs 50 kA 10/350 µs				
Voltage Protection Level (L-N)	200 V @ 3 kA 8/20 µs 250 V @ 20 kA 8/20 µs	300 V @ 3 kA 8/20 µs 380 V @ 20 kA 8/20 µs	300 V @ 3 kA 8/20 µs 500 V @ 20 kA 8/20 µs	320 V @ 3 kA 8/20 µs 550 V @ 20 kA 8/20 µs	320 V @ 3 kA 8/20 µs 550 V @ 20 kA 8/20 µs

IEC 61643-11 Ratings					
Part Number	**SRF363N**	**SRF3125N**	**SRF3250N**	**SRF3500N**	**SRF3800N**
Max Continuous Operating Voltage (Uc)	255 VAC				
Temporary Overvoltage, L-N	442 VAC 2 hours				
Temporary Overvoltage, N-PE	1200 VAC 200 ms				
Impulse Current (Iimp)	10kA 10/350 µs				
Voltage Protection level (Up), L-N @ Iimp	450 V		500 V	550 V	
Nominal Discharge Current (In)	20kA 8/20 µs				
Voltage Protection level (Up), L-N @ In	450 V	500 V		650 V	
Voltage Drop	0.1 % Max				

IEC 61643-11 Annex A specifies Max Continuous Operating Voltage (Uc) as 255 VAC.
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Upstream overcurrent protection not exceeding Rated Load Current (IL) shown above must be installed ahead of the surge reduction filter.

Our powerful portfolio of brands:

CADDY ERICO HOFFMAN RAYCHEM SCHROFF TRACER

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