

A photograph of an industrial machine, likely a screen printing or coating machine. A cardboard box is positioned on a green surface, and a mechanical arm with blue cables is positioned above it. A red, yellow, and green light tower is visible in the background.

**Eliminate power interruptions,
transients and noise that stop
production and corrupt data.**

SolaHD™ Surge Protective Devices (SPD) and Filtering — Product Guide

Delivering required voltages safely and efficiently, to applications across manufacturing facilities.



How do you protect your power?



Employing an entire facility protection strategy will safeguard the electrical system against most transients. Multi-stage protection involves clamping the initial high-energy surge, filtering any remaining noise or transients to the protected sensitive equipment and finally, protecting the data/signal lines entering or leaving the control panel or the factory floor. This coordination of devices provides the lowest possible let through voltage to the equipment.

Emerson understands that your operations depend on clean, continuous power. That is why, since 1915, our SolaHD brand of power quality products has focused exclusively on providing the best solutions to eliminate power interruptions, transients and noise that can stop production and corrupt data. Our full breadth of products convert, clean and maintain electric current from the factory entrance to equipment throughout your facility. Combined with service and support, our total power quality offering can save you time, money and space to ensure optimal production efficiencies.



Surge Protection, the first line of defense in protecting your production line and facility.

Product Overview

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Surge Protective Device/Filter - Application Selection Table

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UL 1449 and IEEE

UL 1449 and IEEE- ► [p 9](#)

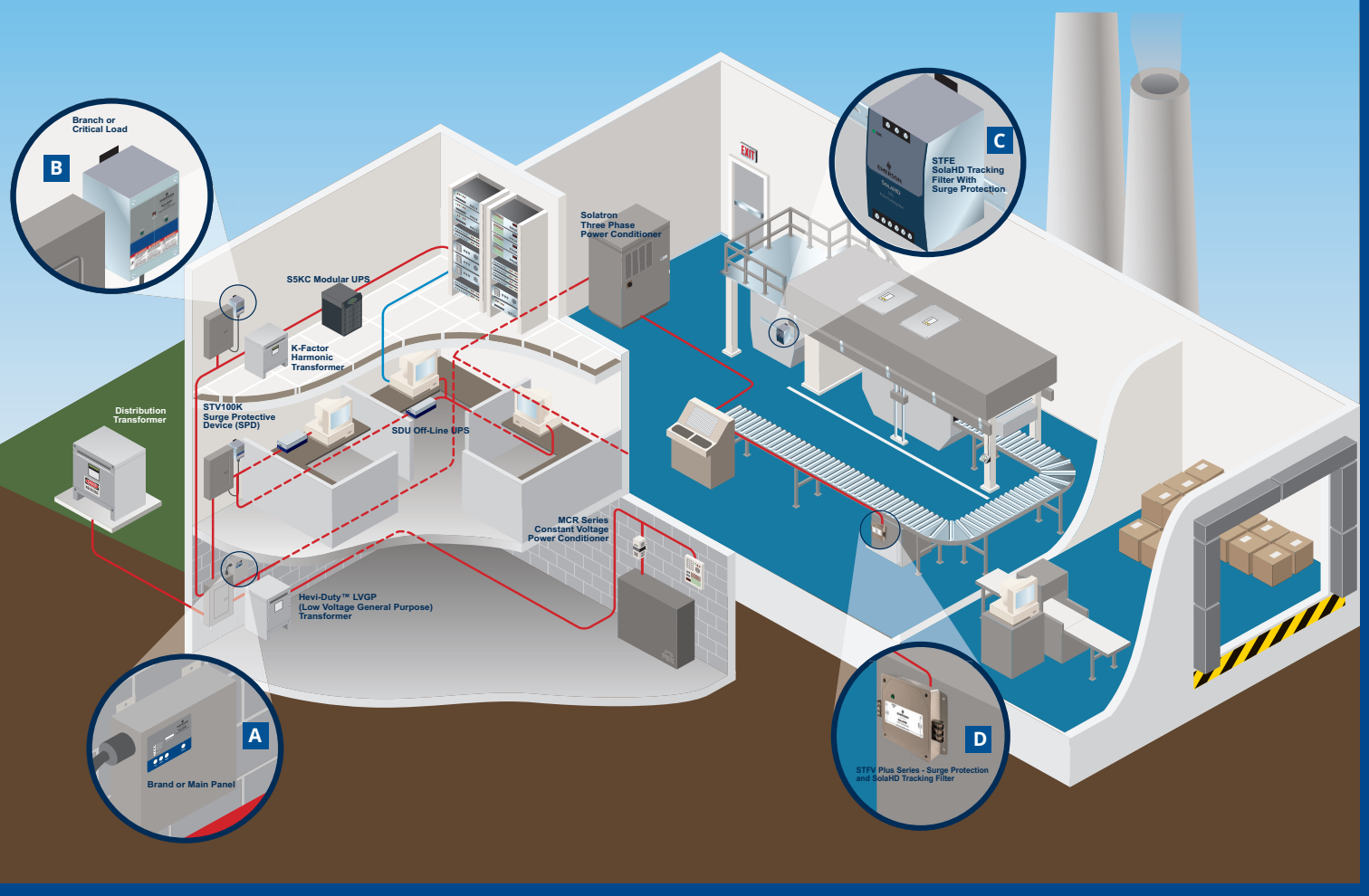
Surge Protection

STV25K DIN Rail Mount Series ► [p 10](#)

SolaHD Tracking Filtering with Surge Protection

STFV Plus Series SolaHD Tracking Filters with Surge Protection (Chassis Mount) ► [p 12](#)

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A BRANCH OR MAIN PANEL

A surge protective devices designed for severe exposure locations. They are capable of handling the high-impulse, potentially damaging transients commonly found at the service entrance or distribution panels.

B BRANCH OR CRITICAL LOAD

A surge protective devices designed for medium exposure locations. They are capable of protecting sensitive equipment and microprocessor-based systems from transients on distribution and sub-distribution panels.

C STFE OR STV25K - CONTROL PANEL LOAD

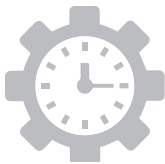
DIN Rail mounted device that either combines sine-wave tracking technology with surge protection to attenuate or reduce the amplitude of normal mode noise to a minimum or surge protection only. Filter versions designed to continuously track AC power input and respond to high-voltage transients and high-frequency noise.

D STFV - SURFACE OR PANEL MOUNT

Panel or surface mounted device that combines sine-wave tracking technology with surge protection to protect against the full spectrum of voltage transients and surges. Designed to continuously track AC power input and respond to high-voltage transients and high-frequency noise.

Longer lifespans, low maintenance and ratings that exceed industry standards.

In the automotive, material handling, packaging, and oil and gas industries, clean, reliable power is essential to keeping facilities and plants running smoothly. Anywhere there is an on/off switch, you can have a transient. In today's modern facilities, more and more sensitive equipment can be found on the floor – from production, computing, networking and telecommunications – and they all need to stay up and running. By protecting electronic equipment from surges and noise, the life expectancy can be greatly increased.



Improve Machine Availability

Surge protective devices focus on limiting high-voltage spikes, to a level that is acceptable to most electronic equipment. This is a first line of defense, using components that are placed in parallel with the line and serve as a clamping mechanism for high-energy impulses. SolaHD Surge Protective Devices by Emerson are typically installed at service entrances and on larger distribution panels, but can be installed on critical panels.

"The effects of power outages on business: 98 percent of organizations say one hour of downtime costs over \$100,000."

—Source: Foster Fuels. The Effects Of A Power Outage On A Business. February 08, 2018. <https://www.fosterfuelsmissioncritical.com/power-outage-effects-businesses/>



Increase Reliability

Changing technology and dependence on total automation processes within modern facilities has created a critical need for clean AC power at the equipment level. Low-energy transients and high-frequency noise are the primary causes for system disruption and long-term degradation of microprocessor-based equipment within facilities. SolaHD Tracking Filters by Emerson are an ideal solution for your microprocessor-based products, including industrial PLCs, OEM applications and motion control systems.

"Power surges can cause failure, permanent degradation, or temporary malfunction of electronic devices and systems. The development of an effective SPD is of paramount importance to manufacturers and users of industrial electronic equipment."

—Source: IEEE. Electrical Surge-Protection Devices for Industrial Facilities— A Tutorial Review. February 2007. https://enervisor.com/document_upload/SurgeSupressionTutorial.pdf



Added Flexibility

The need to protect all susceptible low-voltage cable routes entering a facility and at key points within the building is as critical as protecting the equipment from high-energy impulses. Your facility's reliance on sensitive instrumentation, networked automation, and uncorrupted data transmission increases. SolaHD Data/Signal Line products by Emerson utilize high-speed, high-energy components that come in a variety of unique packaging configurations to protect your point of use equipment.

"Typical applications of surge protective devices within industrial or commercial settings include HVAC systems, generators, security systems and cameras, and fire alarm signaling circuits. A recent survey found that all facilities that experienced power surges have reported downtime. The average cost of downtime due to a surge is \$130,000 per event."

—Source: ESFi. ESFi Addresses The Importance of Surge Protective Devices for Your Facility. November 30, 2020. <https://www.esfi.org/news/esfi-addresses-the-importance-of-surge-protective-devices-for-your-facility-786#sthash.A0h.dpbs>



Visit Emerson.com/solahd or contact your local SolaHD representative to learn more about our Control Power solutions.

Surge Protection: First Line of Defense in Limiting High-Impulse Transients



High-energy transients, either externally or internally generated, pose an immediate threat to the reliability and performance of your sensitive electronic equipment. Emerson recommends placing high-energy SolaHD Surge Protective Devices (SPDs) on key panels throughout your facility. Within your facility, motors, inductive loads and various equipment load switching can cause damage or costly downtime.

Our SolaHD surge protective devices focus on limiting high-voltage spikes to a level that is acceptable to most electronic equipment. Plus, they are a great first line of defense, using components that are placed in parallel with the line and serve as clamping mechanisms for high-energy impulses. Protection at this level is referred to in the industry as Sine Wave Tracking or electronic grade. Surge Protective Devices are typically installed at service entrance, distribution panels, critical branch panels and key point-of-use locations.

Point of Use Locations
STFE/STV25K/STFV
Typical applications of 100 amperes and below
Surge current capacity – defined by location.

SolaHD Tracking Filtering with Surge Protection: Provides Clean AC Power by Eliminating Low-Voltage Noise



Low-energy transients and high-frequency noise are the primary causes for system disruption and long-term degradation of microprocessor-based equipment within your facility. For more than 50 years, SolaHD Tracking Filters by Emerson have proven to be the most effective solution in critical equipment protection within harsh industrial environments. SolaHD Tracking Filters are built upon a unique multi-stage hybrid design. This design creates a foundation for a family of products that attenuate impulses that would normally go untouched by standard, parallel clamping devices.

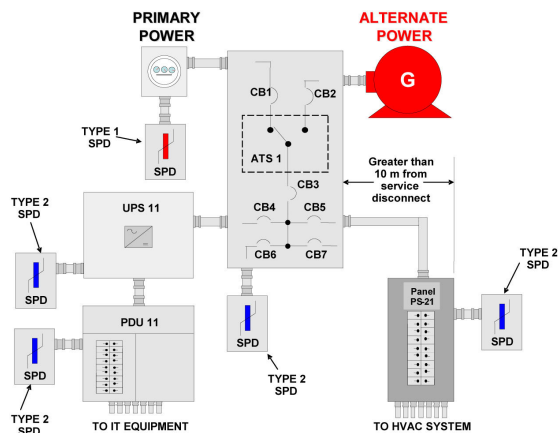
Changing technology and dependence on total automation processes within modern facilities create a critical need for clean AC power at the equipment level. Our SolaHD Tracking Filters are a perfect solution for your microprocessor-based products, including industrial PLCs, OEM applications and motion control systems.

STFE Elite Series	STFV Series
DIN Rail mount	Hard-wired connection
Critical single phase loads up to 20 amperes of continuous current	Critical single phase loads up to 30 amperes of continuous current

Surge Protective Device/Filter Application Selection Table

	Surge Protection	SolaHD Tracking Filtering With Surge Protection	
Applications	STV25K	STFE	STFV
Motor Control Centers	●		
Control Power Panels including Programmable Logic Controllers	●	●	●
Control Panels (AC Power)	●	●	●
Various OEM Equipment		●	●

UL 1449 and IEEE



SPD Locations by UL 1449 Types

Underwriters Laboratories, UL 1449, is the Safety Standard for Surge Protective Devices. It is used to evaluate these types of products.

UL categorizes surge protective devices (SPD) into categories based on their intended application.

SPD Locations by UL 1449 Types:

- TYPE 1 - Connect anywhere in the customer's facility – we strongly urge this to be specified for all critical installations.
- TYPE 2 - Connect downstream on load side of main breaker. Be aware that some competitors may have "conditions of acceptability" that can limit how the device is installed.
- TYPE 3 - Typically cord connected, plug in devices.
- TYPE 4 - Assembly tested to type 1 or type 2.
- TYPE 5 - Component level device.

Nominal Discharge Current (I Nominal Rating): This is the peak value of surge current which goes through the SPD during the test.

- TYPE 1 - UL tests to 10 kA or 20 kA. Not to be confused with maximum kA rating of the device. We recommend 20 kA I Nominal rating be specified. While this is the highest UL rating, it is a low level surge which should be required by any device in even moderate exposure installations.

- TYPE 2 - UL tests to 3 kA, 5 kA, 10 kA or 20 kA I Nominal ratings. Again, 20 kA is recommended for all specified SPD located at service entrances.

Voltage Protection Rating (VPR):

- These ratings replace the Suppressed Voltage Ratings (SVR) of the second edition standard. UL uses a surge six times the current level of the SVR testing (3,000 Amps vs. 500 Amps), so ALL measured VPR ratings are higher than the previous SVR rating.

All facilities that employ mission-critical electronic equipment should have properly sized surge protective devices (SPD) installed at the main electrical service entrance and throughout their facility at the distribution and branch levels. The surge protection connected to the incoming power line provides the first line of defense against transient surges which are typically caused by nearby utility grid switching, lightning or other power disturbances. However, disturbances can be internally generated as well as externally generated so employing SPDs at key panels throughout your facility will also provide suitable downstream protection from external surges and local protection from internal high-energy transients caused by motors, inductive loads, and various equipment load switching that can also cause damage or costly downtime.

IEEE Standard 1100-2005, The Emerald Book:

- IEEE Recommended Practice for Powering and Grounding Electronic Equipment recommends a tiered SPD protection from your Service Entrance down to branch panel level.
- 7.2.4 Surge suppressors: "...Effective surge protection for an entire building power distribution system requires the coordinated use of large-capacity current-diverting devices at the service entrance followed by lower capacity voltage-clamping devices applied strategically throughout the power system."

STV25K DIN Rail Series



The STV25K DIN Rail Series provides point-of-use protection, at the dedicated equipment level, against damaging transients. Ideal for installation in electronic control cabinets found in harsh industrial environments such as the factory floor or at remote locations. These devices provide 25,000 Amps of surge protection per phase, sine wave tracking, LED status indication and form C dry contacts. This DIN Rail series also provides protection on all electrical paths and comes with a standard ten year product warranty. The STV25K surge protective devices are UL recognized to Standard 1449.

Applications (20 Amp Max)

- Control Cabinets for Industrial Automation
- Point-of-Use Industrial/Service Equipment
- Remote Commercial or Industrial Equipment
- Instrumentation and Large Test Equipment
- Commercial and Building Automation Systems

Features

- Compact and narrow design maximizes panel space
- Low clamping levels for more effective protection
- Easy access terminal screws for quick mounting and installation
- 25,000 Amps of surge protection per phase
- Sine wave tracking and all-mode protection provide consistent and reliable protection on all electrical paths
- Thermal fusing prevents MOV overheating caused by excessive current levels
- ABS Type Approval
- Ten year limited warranty

STV25K DIN Rail Series

Selection Table

Catalog Number	Input Voltage	
STV25K10S	120 V	Single Phase (L - N)
STV25K24S	240 V	Single Phase (L1 - L2)

Specifications

Description	STV25K10S	STV25K24S
Input Voltage	120 Vac, 0-135 Vrms	240 Vac, 0-260 Vrms
Maximum Continuous Operating Voltage (MCOV)	150 Vrms	300 Vrms
Line Frequency	47-63 Hz	
Connection/Mounting Type	DIN Rail Mount with screw terminals for #12 AWG	
Input Current Rating	20 Amps	
Phase Configuration	1Ph, 2 W + G	
Short Circuit Current Rating (SCCR)	5 kA	
Weight - lbs (kg)	3.0 (1.36)	
Dimensions H x W x D - in (mm)	4.87 x 2.56 x 4.75 (123.7 x 65.0 x 120.7) Includes mounting bracket	
Modes of Protection	All Mode: L - N, L - L, L - G, N-G	
Status Indication	Green LED, Form C Contacts	
Packaging	Metal DIN Rail Mount Enclosure, IP20	
Response Time	< 0.5 nanoseconds	
Operating Temperature	-40 °C to +60 °C (-40 °F to +140 °F)	
Operating Humidity	0% to 95% Non-condensing	

STFV Plus Series



UL
E311348

Applications

- Branch and Control Panels
- Factory Automation Installations
- Point of Use Industrial Service Equipment
- Programmable Logic Controllers
- Dedicated Industrial and Machine Tools
- Telecommunications and IT Equipment

Features

- Series filter/SPD technology for total durability
- High impact plastic case, epoxy encapsulated enclosure
- Transient protection in all modes (L-N, L-G, and N-G)
- Single phase applications up to 30 Amps
- Operating temperature from -40 °C to +60 °C (-40 °F to +140 °F)
- Hardwired connection
- LED power indication
- Ten year limited warranty

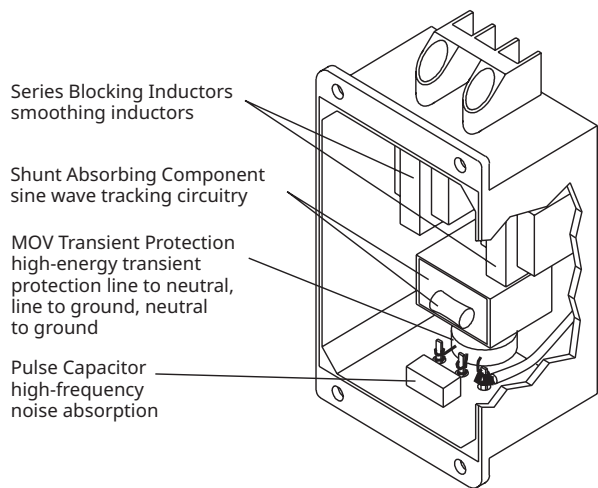
The STFV Plus Series combines SolaHD Tracking filtration for low-energy noise and surge protection for high-energy transients. It continuously tracks the input AC power line responding instantly into action upon detecting extraneous high-frequency noise and high-voltage transients caused by everyday events such as turning on machinery, motors or equipment.

These devices are designed to meet UL 1283 for Electromagnetic Interference Filters. STFV Plus attenuates or reduces the amplitude of high-frequency noise to a maximum of -90 dB that occurs in a range of 100 kHz to 50 MHz. STFV Plus provides the industry's best IEEE C62.41 Category A and B Ringwave protection.

They are designed for years of trouble free operation and require little or no operator intervention after installation.

SolaHD Tracking Filter is one part of a total power quality solution. They can be used alone or in conjunction with other SolaHD products to solve more complex power quality problems.

System Design



STFV Plus Series

Selection Table

Catalog Number	Amps	Case Dim. in (mm) - A x B x C	Mounting Flange Dim. in (mm) - D x E x F x G	Number Min. Wire Size (AWG Suggested)	Screw Size	Fuse/Circuit Breaker Ampacity		Weight lbs (kg)	ICxxx Equivalent
						Suggest	Max		
Single Phase Models (120 Vac)									
STFV05010N	5.0	4.00 x 2.88 x 1.81 (101.6 x 73.2 x 46.0)	4.38 x 2.12 x 5.31 x 0.19 (111.3 x 53.8 x 134.9 x 4.8)	22	#6	5	6.25	1.3 (.59)	IC105
STFV15010N	15.0	6.25 x 4.75 x 2.35 (158.8 x 120.7 x 59.7)	6.75 x 3.50 x 7.75 x 0.19 (171.5 x 88.9 x 196.9 x 4.8)	14	#8	15	18.75	3.5 (1.59)	IC115
STFV30010N	30.0	7.75 x 4.75 x 2.35 (196.9 x 120.7 x 59.7)	8.25 x 3.50 x 9.00 x 0.19 (209.6 x 88.9 x 228.6 x 4.8)	10	#8	30	37.5	6.0 (2.72)	IC130

STFV Plus Series

Specifications

Description	Value	
Input Voltage	0-150 Vrms	
Line Frequency	50/60 Hz	
Configuration	1 Ph (2 W + G)	
Response Time	< 5 nanoseconds	
Enclosure	High impact plastic case, 94 V-0, Vacuum impregnated magnetics, epoxy encapsulated	
Fusing	External	
Status Indication	Green LED	
Connection/Mounting Type	Series/Panel Mount	
Operating Temperature	-40 °C to +60 °C (-40 °F to +140 °F) at full load Derate Linearly to 60% at +70 °C (+158 °F)	
Operating Humidity	0% to 95% Non-condensing	
Mean Time Between Failure (MTBF)	Greater than 100,000 hours (Mil. Std. 217F)	
Packaging	High impact plastic case, vacuum impregnated magnetics, epoxy encapsulated	
Peak Surge Current Capability (8x20 µs)	Per Phase	13,000 Amps
	Line to Neutral	6,500 Amps
	Line to Ground	6,500 Amps
	Neutral to Ground	6,500 Amps
Load Surge Current Rating	10 milliseconds	5 x Nominal
	1 second	3 x Nominal
	10 seconds	2 x Nominal
Frequency Response (Forward Reverse)	100 kHz to 50 MHz	-90 dB maximum
Transient Reduction (IEEE C62.41)	Typical Category A Ringwave (6 kV, 200A, 100 kHz)	< 10 Volts peak
	Typical Category B Ringwave (6 kV, 500A, 100 kHz)	< 50 Volts peak

STFE ELITE Series



Applications

- Control Panels
- Factory Automation Installations
- Point of Use Industrial Equipment
- Programmable Logic Controllers
- Dedicated Industrial and Machine Tools Equipment

Features

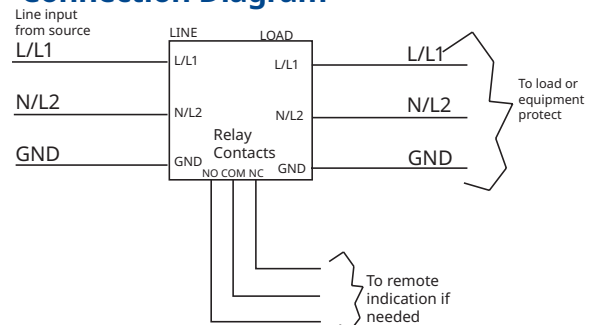
- Series connected DIN Rail mounted filter
- Durable metal mount clip
- Transient protection in all modes (L-N, L-G, and N-G)
- Single phase applications up to 20 Amps
- Operating temperature from -40 °C to +25 °C (-40 °F to +75 °F)
- Screw terminal connections
 - Reliable and convenient screw clamp connections
 - Accepts 10-16 AWG wire
 - Meets IP20 specifications for ingress protection
- LED status indication
- Form C contact for remote monitoring
- ABS Type Approval
- CE Compliance (STFE20024L only)
- Five year limited warranty

The STF Elite DIN Rail Mount Series combines SolaHD Tracking technology with UL Listed surge protection to protect against the full spectrum of voltage transients and surges. It continuously tracks the input AC power line responding instantly into action upon detecting extraneous high-frequency noise and high-voltage transients caused by everyday events such as turning on machinery, motors or equipment.

The STFE Series attenuates or reduces the amplitude of normal mode noise to a minimum of -90dB that occurs in a frequency range of 100 kHz to 50 MHz, and common mode noise to a minimum of 60 dB that occurs in a frequency range of 5 MHz to 50 MHz. STFE provides the industry's best IEEE C62.41 Category A and B Ringwave protection.

The STFE Series is built to meet your unique requirements, and are available in hardwired DIN Rail mount, single phase configuration. They are designed for years of trouble free operation and require little or no operator intervention after installation.

Connection Diagram



STFE Series

Selection Table

Catalog Number	Amps	Input Voltage	
STFE05010N	5.0	120 V	Single Phase, 2 Wire + Ground
STFE10010N	10.0	120 V	Single Phase, 2 Wire + Ground
STFE20010N	20.0	120 V	Single Phase, 2 Wire + Ground
STFE20024L	20.0	240 V	Single Phase, 2 Wire + Ground

Specifications

Description	STFEXXX10N	STFEXXX24L
Input Voltage	120 V (0-150 Vrms)	240 V (0-275 Vrms)
Line Frequency	47 - 63 Hz	
Response Time	< .5 nanoseconds normal mode, <5 nanoseconds common mode	
Enclosure	Fully Enclosed Metal Housing	
Fusing	Reference Fuse/Circuit Breaker Chart	
Status Indication	Green LED "OK"/Form C Contact/10 Amps @ 250 Vac or 5 Amps @ 100 Vdc	
Connection/Mounting Type	DIN Rail Mount	
Operating Temperature	-40 °C to +25 °C (-40 °F to +77 °F) at full load Derate Linearly to 60% at +70 °C (+158 °F)	
Weight - lbs (kg)	1.0 (0.45)	
Dimensions - in (mm) (H x W x D)	4.88 x 2.56 x 4.56 (124.0 x 65.0 x 116.0)	
Operating Humidity	0% to 95% Non-condensing	
Peak Surge Current Capability	Per Phase	30,000 Amps
	Line to Neutral	20,000 Amps
	Line to Ground	10,000 Amps
	Neutral to Ground	10,000 Amps
Load Surge Current Rating	10 milliseconds	5 x Nominal
	1 second	3 x Nominal
	10 seconds	2 x Nominal
Nominal Discharge Current Rating (I _n)	3 kA	
Short Circuit Current Rating (SCCR)	5 kA	
Normal Mode (Forward-Reverse)	100 kHz to 50 MHz	-90 dB maximum
Common Mode (Forward-Reverse)	5 MHz to 50 MHz	-60 dB maximum
Transient Reduction (IEEE C62.41)	Typical Category A Ringwave (6 kV, 200A, 100 kHz)	< 60 V Peak
	Typical Category B Ringwave (6 kV, 500A, 100 kHz)	<100 V Peak UL 1449
Warranty	5 year limited warranty	

**Your operations depend on clean,
continuous power.**



Our full breadth of products convert, clean and maintain electric current from the factory entrance to equipment throughout your facility. Combined with service and support, our total power quality offering can save you time, money and space to ensure optimal production or facility efficiencies.

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