



## Surge-Trap® Transient Voltage Surge Supressor



**Ferraz Shawmut**

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## The What, How and When of an Overvoltage



The New IEEE Standard Dictionary of Electrical and Electronics Terms defines overvoltage as, "A voltage above the normal rated voltage or the maximum operating voltage of a device or circuit." The word transient is a term used in the electrical industry to describe a sudden change of steady-state voltage, current or load. When combined, the transient overvoltage a temporary surge or voltage spike, far beyond what is intended and is usually caused by lightning or load switching. The energy capacity of transient voltage surges can be massive which can damage equipment or cause it to malfunction, hence the need of surge suppression devices.

It is a well-known fact that transients can come from lightning strikes external to the facility, what isn't well known is that most transients actually originate from other sources inside and

outside of the facility. "It is estimated that nearly 80% of today's overvoltage problems are caused by other equipment and power disturbances throughout the plant," states Kent Walker, Director of Technical Sales and Services for Ferraz Shawmut. Sources within a facility include loads that are switched, for example - motor loads that are being turned on and off. Harmonic feedback and inductive coupling from variable frequency drives and close conductor proximity are additional and less obvious sources of transients. Utility grid switching is also a potential cause of transients from outside the plant.

A Transient overvoltage is a sudden change of steady-state voltage, which can arise from any number of unpredictable incidents and can occur at any time of the day or night. It is essential that your equipment be protected against such phenomenon and Ferraz Shawmut is here to help.

ST	480	3PY	G	M
Surge-Trap	System Voltage 120 - 120V 208 - 208V 230 - 230V 240 - 240V 277 - 277V 480 - 480V 600 - 600V 690 - 690V	Voltage Configuration 1P - Single Phase SP - Split Phase 3PY - 3 Phase Wye 3PD - 3 Phase Delta	N/G Blank - Includes N/G Mode G - L-G Mode Only	Auxiliary Microswitch Blank - No Microswitch M - Microswitch Included



Ferraz Shawmut's Surge-Trap® Transient Voltage Surge Suppressor (TVSS) product line is the only TVSS product of its kind to feature a patented, thermally protected metal oxide varistor (TPMOV®) that does not require the use of additional overcurrent protection. The Surge-Trap TVSS offers IP-20 grade "finger-safe" protection and mounts easily on a 35mm DIN rail to safeguard critical electrical system components — and highly sensitive integrated electronics — from the deleterious effects of transient overvoltages.

Ferraz Shawmut has designed the Surge-Trap TVSS specifically for point-of-use overvoltage protection in industrial power applications to offer an advanced solution for plant electricians, engineers and electrical product OEMs seeking to protect vital equipment and components from the costly damage transient voltage surges can cause. Typical Surge-Trap applications include AC/DC power distribution, high-voltage power supplies, telecommunications equipment, PLC applications, electronic motor controllers and starters, medical equipment, and UPS and security systems, to name a few.

#### **UL 1449, why is it important?**

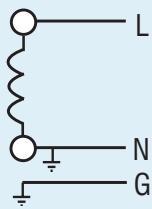
UL 1449 is the standard to which TVSS equipment is tested for the safety of the user. UL 1449 is constantly changing as the industry learns more and more about the damaging effects of transient overvoltages. In 2005 the TVSS industry along with UL agreed to add new tests to UL 1449, reproducing many common failure modes that have been witnessed in the field. By implementing these new tests UL has guaranteed safer TVSS devices. Manufacturer's were given two years to comply with the new standards and effective February 9, 2007 any TVSS device that does not comply with

the new standard will no longer bear the markings of UL. Failure to comply with the new revision will void the devices UL Recognition or Listing and possibly compromise the system where it is installed. Ferraz Shawmut not only passed the 2005 file review far in advance of it being issued but have also complied with the forthcoming UL 1449 3rd Edition - offering tomorrow's protection today and freeing users from the need to update their systems in the near future.

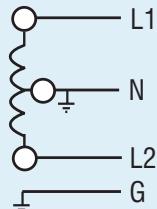
#### **Terms to Know**

- TVSS: Transient Voltage Surge Suppressor
- MOV: Metal Oxide Varistor
- MCOV: Maximum Continuous Operating Voltage
- SVR: Suppressed Voltage Rating
- Clamp Voltage: The peak MOV terminal voltage measured with an applied 8/20 $\mu$ S pulse of rated impulse current
- SCCR: Short Circuit Current Rating

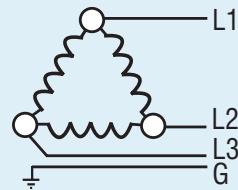
## Electrical Voltage Configurations



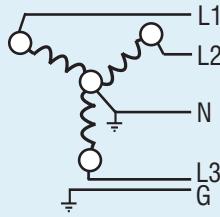
**Single Phase**  
2 Wire + Ground



**Split Phase**  
3 Wire + Ground



**3 Phase Delta**  
3 Wire + Ground



**3 Phase Wye**  
4 Wire + Ground

## Approvals/Standards

- RoHS Compliant
- UL 1449, 2nd Edition Recognized - 2005 Component File E210793
- ANSI/IEEE C62.41
- IEC 61643

## Applications

- Surge Protective Device (SPD)
- Intended for Type 2, 3 & 4 Locations
- AC/DC Distribution
- High Voltage Power Supplies
- Telecom Equipment
- Motor Controls and Starter Systems
- PLC Applications
- Power Transfer Equipment
- HVAC Controls
- AC Drives
- UPS Systems
- Security Systems
- Medical Equipment

## Ratings

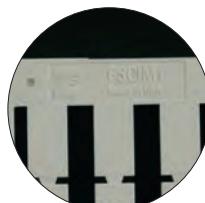
- MCOV 180 to 550
- 100kA Interrupting Rating
- 50kA 8/20µs surge capacity (per mode)
- 100kA 8/20µs surge capacity (per phase)
- Surge Life @ 3kA-8x20µs: 5000 events
- Surge Life @ 10kA-8x20µs: 1000 events
- Operating and Storage Temperature: -25°C to +60°C



**Visual Indicator**



**Optional Remote Indicator**



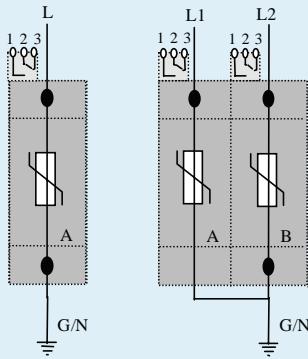
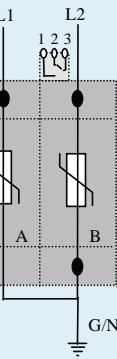
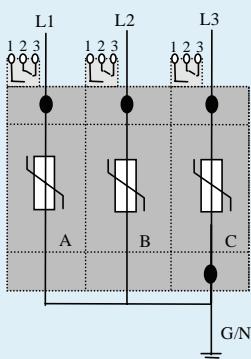
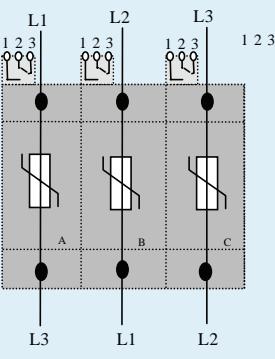
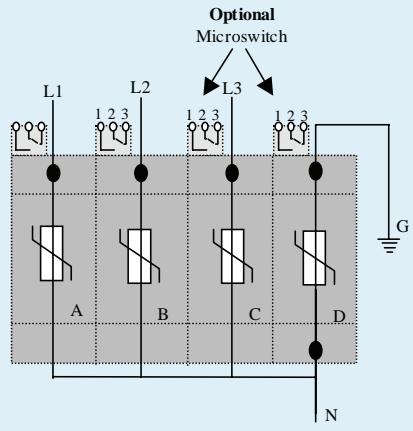
**Wire Marker  
Kit Part#  
FSCIM1**

## Surge-Trap Selection Guide

There are four easy steps to follow in order to properly select a surge-protective device (SPD):

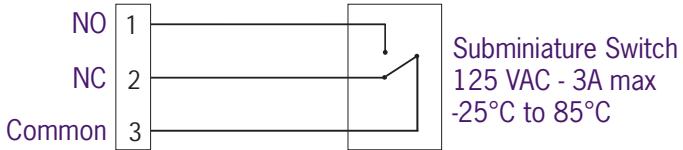
- STEP 1: Select your electrical voltage configuration (from the top of the page)
- STEP 2: Select the proper modes of protection needed (from the bottom of the page)
- STEP 3: Select the corresponding catalog number (from the middle of the page)
- STEP 4: Optional - If remote indication is needed, add the optional remote indicator part number (FSCIM1)

Voltage Configuration	Wires	Protection Modes
120V Single Phase	2 Wire + Grnd	L-N/L-G Only
230V Single Phase	2 Wire + Grnd	L-N/L-G Only
277V Single Phase	2 Wire + Grnd	L-N/L-G Only
120/208V Split Phase	3 Wire + Grnd	L-L/L-N/L-G
120/240V Split Phase	3 Wire + Grnd	L-L/L-N/L-G
240/480V Split Phase	3 Wire + Grnd	L-L/L-N/L-G
120/208V 3-ph Wye	4 Wire + Grnd	L-L/L-N/L-G/N-G
120/208V 3-ph Wye	4 Wire + Grnd	L-L/L-N/L-G
277/480V 3-ph Wye	4 Wire + Grnd	L-L/L-N/L-G/N-G
277/480V 3-ph Wye	4 Wire + Grnd	L-L/L-N/L-G
347/600V 3-ph Wye	4 Wire + Grnd	L-L/L-N/L-G/N-G
347/600V 3-ph Wye	4 Wire + Grnd	L-L/L-N/L-G
240V 3-ph Delta	3 Wire + Grnd	L-L Only
240V 3-ph Delta	3 Wire + Grnd	L-L/L-G
480V 3-ph Delta	3 Wire + Grnd	L-L Only
480V 3-ph Delta	3 Wire + Grnd	L-L/L-G

**A****B****C****D****E**

select your Surge-Trap device:  
from first column)  
for your application (from third column)  
from fourth column)  
and the letter "M" to the end of the part number

### Auxiliary Microswitch



Signal Wire Range: #16 to #30 AWG  
Terminal Torque: 1.8lb-in

Catalog Number	Figure	MCOV	Surge Capacity (80/20μs)					UL Clamping Voltage @ 3kA				UL 1449-2 SVR				
			L-G	Mode	L-G	N-G	L-L	Phase	L-N	L-G	N-G	L-L	L-N	L-G	N-G	L-L
ST1201PG (M)	A	180V	50kA	50kA	-	-	-	-	500V	500V	-	-	500V	500V	-	-
ST2301PG (M)	A	270V	50kA	50kA	-	-	-	-	800V	800V	-	-	800V	800V	-	-
ST2771PG (M)	A	320V	50kA	50kA	-	-	-	-	1000V	1000V	-	-	900V	900V	-	-
ST208SPG (M)	B	180V	50kA	50kA	-	50kA	100kA	100kA	500V	500V	-	1000V	500V	500V	-	1000V
ST240SPG (M)	B	180V	50kA	50kA	-	50kA	100kA	100kA	500V	500V	-	1000V	500V	500V	-	1000V
ST480SPG (M)	B	270V	50kA	50kA	-	50kA	100kA	100kA	800V	800V	-	1600V	800V	800V	-	1500V
ST2083PY (M)	E	360V	50kA	50kA	50kA	50kA	100kA	100kA	500V	1000V	500V	1000V	900V	500V	500V	1000V
ST2083PYG (M)	C	180V	50kA	50kA	-	50kA	100kA	500V	500V	500V	-	1000V	500V	500V	-	1000V
ST4803PY (M)	E	500V	50kA	50kA	50kA	50kA	100kA	100kA	1000V	1500V	500V	2000V	900V	1400V	500V	1800V
ST4803PYG (M)	C	320V	50kA	50kA	-	50kA	100kA	1000V	1000V	-	2000V	900V	900V	-	1800V	
ST6003PY (M)	E	690V	50kA	50kA	50kA	50kA	100kA	100kA	1500V	2300V	800V	3000V	1200V	1200V	800V	2500V
ST6003PYG (M)	C	420V	50kA	50kA	-	50kA	100kA	1500V	1500V	-	3000V	1200V	1200V	-	2500V	
ST2403PD (M)	D	N/A	50kA	-	-	50kA	-	-	-	-	-	1000V	-	-	-	800V
ST2403PDG (M)	C	270V	50kA	50kA	-	50kA	100kA	-	800V	-	1600V	-	800V	-	1500V	
ST4803PD (M)	D	N/A	50kA	-	-	50kA	-	-	-	-	-	1850V	-	-	-	1500V
ST4803PDG (M)	C	550V	50kA	50kA	-	50kA	100kA	-	1850V	-	3700V	-	1500V	-	3000V	

## A relentless pursuit of protection for electrical components, systems - and the people who use them.

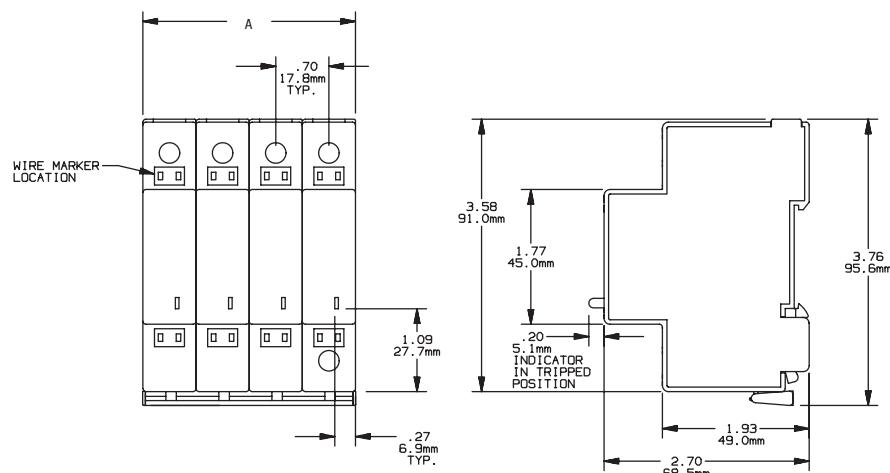
Ferraz Shawmut is an international company manufacturing the widest range of circuit protection solutions in the electrical industry. Drawing on a century of experience - and an ongoing commitment to critical research in electrical safety - we provide industrial, commercial, and OEM customers with innovative products and technical support teams to increase effectiveness, simplify applications, and enhance productivity.

### Hazard of Electric Shock, Burn or Explosion

- This equipment must be installed and serviced only by qualified electrical personnel in accordance with National and Local Electrical Codes.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.
- Do not apply petroleum-based products to non-metallic parts.

Improper installation or misapplication of these devices may result in serious injury to installer and/or damage to electrical system or related equipment. Protective eyewear and clothing should be worn whenever working around hazardous voltages.

Failure to follow these instructions could result in death or serious injury.



Poles	A
1 Pole	0.7
2 Pole	1.4
3 Pole	2.1
4 Pole	2.8

\*\* UL FILE #210793  
 \*\* WIRE SIZE: 6-14 AWG  
 \*\* TORQUE: 14.75 LBS-IN  
 \*\* USE 35mm DIN RAIL

