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MODERN EQUIPMENT,

now and in the future, require electrical systems to be free of transient surge events. Technology that is dependent on electrical utility power, while evolving with more sophistication, is also becoming more susceptible to power quality issues. **Everyday equipment** such as fax machines. printers, and elevators, are common producers of electrical transients and noise, which can be destructive, disruptive, and cause degradation to vital equipment. The threat of damage is rapidly growing and the data centric world is more susceptible to damage than ever before.

RISK

There are very few events that can match the destructive capability of transient and noise induced surges, which are responsible for 30-50% of most electrical failures.

Large surges, which can reach hundreds of thousands of volts can cause immediate and intermittent equipment failure. The most destructive transient surges are attributed to lightning and utility load switching. A commonly held belief is that lightning never strikes the same place twice. In reality, lightning strikes are not single events, but instead typically produce 4 to 6 "hits", and have even been recorded with as many as 40 hits. Therefore, facilities need protection from multiple surge events.

Lightning only accounts for 20% of transient surges, while the other 80% are produced internally in a facility. Everyday equipment such as computers and lighting are typical culprits of smaller surges. Though these surges may be smaller in size, they are higher in occurrence. Continued exposure can cause random delayed equipment failures and lock ups. Sensitive electronics are most susceptible to these types of transients and noise events. Smaller surges contribute to the degradation of equipment and can mimic communication errors, causing detrimental errors such as computer system restarts or lockups.

REASONS

In order to reduce and prevent damage caused by transient surges and noise, Surge Protective Devices (SPD), or Transient Voltage Surge Suppressors (TVSS), should be installed in all facilities to safeguard systems. An SPD's function is to eliminate damaging activity throughout all electrical distribution systems and equipment operations. With the use of an SPD, transients and noise are reduced to harmless levels, preventing disruption of important processes. Companies can spend more time on other issues while less time is spent on service calls, which can greatly impact maintenance budgets.

RESULTS

Surge Protective Devices are quality and performance based products that lead to greater reliability of facilities and improved operating productivity. They cost effectively protect electrical distribution, telecommunications, and data systems throughout your facility and prevent unnecessary downtime and repairs.

Electrical disturbances cost North American companies more than \$26 billion¹ every year, with the costs of downtime reaching as much as ten times the cost associated with electrical maintenance and repair. Installing an SPD will lower these maintenance costs 70% by extending equipment life and reducing break/fix labor.

An SPD is an extremely inexpensive form of protection with a very quick return on investment that leaves companies with significant capital to spend on other projects. Not only do SPDs produce immediate savings, they also give the peace of mind that imperative processes will be less likely to be affected by electrical disturbances.

¹ Source: Electric Light & Power, March 1993

APPLICATIONS APPLICATIONS



RENEWABLE ENERGY





AVAILABLE CONFIGURATIONS

Model Number	Voltage	Configuration
SPD-F-xxx-1P120-F	120V	Single Phase 2-wire + grd
SPD-F-xxx-1S240-F	120/240V	Split-Phase 3-wire + grd
SPD-F-xxx-3Y208-F	120/208V	Three-Phase 4-wire + grd
SPD-F-xxx-3Y480-F	277/480V	Three-Phase WYE, 4-wire + grd

xxx = 100, 160, 240, 400 kA per phase.



FEATURES AND BENEFITS

- Fail-Safe Design with individually fused MOV's that eliminate single point failure protecting against both over-current and over-voltage events.
- 200 KAIC Short Circuit Rating permits direct buss connection to most electrical services.
- Low Let Through Voltage ensured by the lowest possible impedance path to ground and equal current sharing during surge events.
- All Weather sealed, powder-coated NEMA 4/IP65 housing is designed for indoor/outdoor applications.
- 10-Year Standard Warranty.
- Listed to UL 1449 3rd Edition as a Type 1 SPD.

SPECIFICATIONS

Mechanical		
Weight	100 160 240, 400	10 lbs. (4.5 kg) 20 lbs. (9 kg) 40 lbs. (18.2 kg)
Enclosure Type		Powder coated, impact-resistance steel, weather-proof NEMA 4
Installation Location	on	Indoor or outdoor
Connection Method 100	od	Pre-wired with 36 inches of #10 AWG conductor
160, 240, 400		Hard-wired via internal lugs #10 AWG – #3 AWG (5.27mm – 26.7mm)
Mounting Method		Dual mounting flanges
Operating Environ	ment	-40° C to +70° C (-40° F to +158° F) 5% – 95% non-condensing humidity
Altitude		Up to 13,000 ft. (4000 m)

EMI/RFI FILTER ATTENUATION - MIL STANDARD 220B

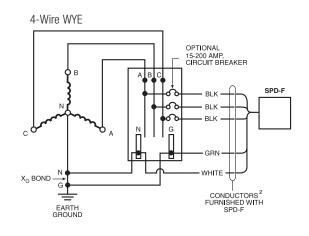
Max. Attenuation Freq. 41dB @ 106kHz

SURGE FACT

A wind turbine generator is the most exposed of all types of generators connected to electric utility systems. Wind turbines are most often erected in hostile lightning environments. Lightning damage is the single largest cause of unplanned downtime in wind turbines.

Source: "Effective Lightning Protection For Wind Turbine Generators" IEEE, March 2007

TYPICAL 3-PHASE INSTALLATION



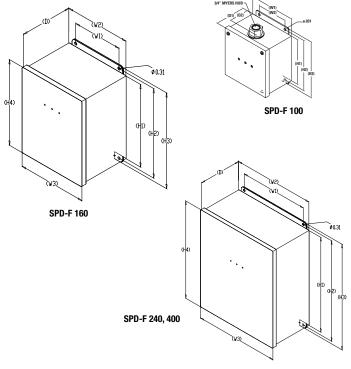


Continued

SPECIFICATIONS

Electrical	
Operating Frequency	47–63Hz
Connection Method	Parallel to electrical distribution system
Modes of Protection	L-N, L-G, L-L, N-G
Fault Rating (SCCR)	200kAIC – no upstream over-current protection device (breaker or fuse) required
Response Time	Less than 0.5 nanoseconds
Standard Monitoring – 160kA – 240kA – 400kA	Status indicator lights (one per phase) Dual remote relay contacts – normal open and normal close. Relay contacts are rated 150VDC/125VAC with maximum switching power of 30WDC/60VA AC. Audible Alarm with Silence Button
Standard Monitoring – 100kA	Status indicator lights (one per phase)
General	
Maximum Surge Current Rating	100kA per phase; 50kA per mode
	160kA per phase; 80kA per mode
	240kA per phase; 120kA per mode
	400kA per phase; 200kA per mode
Repetitive Surge Current Rating	100kA 3250 impulses
10,000 amps/mode using the	160kA 4000 impulses
ANSI/IEEE C62	240kA 6500 impulses
	400kA 6500 impulses
Product Design	Parallel design with individual fused MOVs and optional UL 1283 listed EMI/RFI filter

UL 1283



DIMENSIONS

Dim	SPD	-F 100	SPD-	F 160	SPD-F	240, 400
H1	6.00	(152.4)	10.00	(254.0)	14.00	(254.0)
H2	6.75	(171.5)	10.75	(273.1)	14.75	(374.7)
НЗ	7.50	(190.5)	11.50	(292.1)	15.50	(393.7)
W1	6.00	(152.4)	8.00	(203.2)	12.00	(304.8)
W2	4.00	(101.6)	6.00	(152.4)	10.00	(354.0)
D	_	-	6.20	(157.5)	6.20	(157.5)
D1	4.16	(105.7)	-	-	-	-
D2	2.50	(63.5)	_	_	_	_

All measurements in inches (mm)

SURGE FACT

Regulatory Listing

In the United States, between five and ten times a day, an arc flash explosion occurs in electrical equipment resulting in personal injury. Of these burn victims, at least one will die as a result of injuries received.² Highly respected electrical industry organizations have recommended two ways of reducing injury or death associated with arc flash incidents. IEEE section 8.4.2.5 recommends that SPDs be mounted external to the gear to eliminate potential arc flash incidents. The NFPA advocates the use of PPE (personal protection equipment) outlined in NFPA 70E guidelines for working on live gear. The only way to effectively eradicate arc flash incidents is by reducing or eliminating the opportunity for exposure to "live" gear. Installing the SPD external to the gear eliminates the chance that the SPD could fail and possibly cause an arc flash. Also, keeping the SPD out of the gear eliminates the chance that an electrician might have to work on live gear to repair or replace a damaged SPD.

Listed to UL 1449 3rd Edition Type 1 SPD,

² Source: Statistics complied by CapSchell, Inc., a research and consulting firm specializing in preventing workplace injuries or deaths.



SPD-F Performance Data

				ANSI/IEEE C62.41.1-2002, C62.41.2-2002, & C62.45-2902 Measured Limiting Voltage			
Model Number	Voltage Configuration	Protection Mode	MCOV	B3 Ring Wave 6kV, 500A	B3/C1 Combo Wave 6kV, 3kA	C3 Combo Wave 20kV, 10kA	UL 1449 3rd Edition 6kV, 3kA VPR
SPD-F-100-1S240	1S240	L-N L-G L-L N-G	150V 150V 300V 150V	202V 529V 290V 548V	587V 564V 1029V 594V	1078V 1157V 1667V 1180V	700V 700V 1200V 700V
SPD-F-100-3Y208	3Y208	L-N L-G L-L N-G	150V 150V 300V 150V	202V 529V 290V 548V	587V 564V 1029V 594V	1078V 1157V 1667V 1180V	700V 700V 1200V 700V
SPD-F-100-3Y480	3Y480	L-N L-G L-L N-G	320V 320V 640V 320V	180V 855V 261V 840V	1036V 989V 1847V 989V	1553V 1483V 2520V 1470V	1000V 1000V 1800V 1000V
SPD-F-160-1S240	1S240	L-N L-G L-L N-G	150V 150V 300V 150V	440V 496V 544V 464V	629V 640V 971V 624V	1413V 1360V 1707V 1360V	700V 700V 1200V 700V
SPD-F-160-3Y208	3Y208	L-N L-G L-L N-G	150V 150V 300V 150V	440V 496V 544V 464V	629V 640V 971V 624V	1413V 1360V 1707V 1360V	700V 700V 1200V 700V
SPD-F-160-3Y480	3Y480	L-N L-G L-L N-G	320V 320V 640V 320V	347V 1145V 491V 1090V	525V 565V 860V 507V	1069V 1117V 1443V 930V	1000V 1000V 1800V 1000V
SPD-F-240-1S240	1S240	L-N L-G L-L N-G	150V 150V 300V 150V	464V 672V 576V 512V	502V 627V 864V 568V	907V 1173V 1267V 1090V	800V 800V 1200V 800V
SPD-F-240-3Y208	3Y208	L-N L-G L-L N-G	150V 150V 300V 150V	464V 672V 576V 512V	502V 627V 864V 568V	907V 1173V 1267V 1090V	800V 800V 1200V 800V
SPD-F-240-3Y480	3Y480	L-N L-G L-L N-G	320V 320V 640V 320V	427V 944V 555V 848V	828V 996V 1497V 899V	1170V 1540V 1950V 1500V	1200V 1200V 1800V 1200V
SPD-F-400-1S240	1S240	L-N L-G L-L N-G	150V 150V 300V 150V	464V 672V 576V 512V	502V 627V 864V 568V	907V 1173V 1267V 1090V	800V 800V 1200V 800V
SPD-F-400-3Y208	3Y208	L-N L-G L-L N-G	150V 150V 300V 150V	464V 672V 576V 512V	502V 627V 864V 568V	907V 1173V 1267V 1090V	800V 800V 1200V 800V
SPD-F-400-3Y480	3Y480	L-N L-G L-L N-G	320V 320V 640V 320V	427V 944V 555V 848V	828V 996V 1497V 899V	1170V 1540V 1950V 1500V	1200V 1200V 1800V 1200V

All SPD-F systems measured limited voltages are peak values ($\pm 10\%$) measured from the zero reference point and are in compliance with test and evaluation procedures outlined in ANSI/IEEE C62.

APPLICATIONS





COMMERCIAL/RETAIL

Many retail and commercial facilities are adopting innovative ways to help reduce the demand for power. New energy efficient ballasts, dimmers, and integrated renewable energy systems are just a few examples. These new technologies require sophisticated circuitry which is more susceptible to power quality events, resulting in a decrease in power demand, but an increase in maintenance costs.

- Surveillance equipment
- Security systems
- Building management systems
- Fire alarm panels
- Copiers
- Telephone systems
- Fax machines

Lightning-caused problems are one of the most common troubles faced by American business today. A recent Carnegie-Mellon study showed that 33% of U.S. businesses are affected by lightning – and that more businesses are affected by lightning storms than by floods, fires, explosions, hurricanes, and earthquakes.

Source: "Securing the Supply of Electrical Services," by Jay Apt, Carnegie Mellon University, presented at the Carnegie Mellon Conference on Crisis Readiness, "Before the Next Crisis: Steps to Secure America's Essential Systems," February 2006.

SPD-N

AVAILABLE CONFIGURATIONS

Model Number	System Voltage	System Configuration	Protection Mode	MCOV	3rd Edition Voltage Protective Rating 6kV, 3kA
			L-N	150	800
SPD-N-xx-1S240	120/240V	1-Phase	L-G	150	800
3FD-IN-XX-13240	120/2401	3-wire + grnd	L-L	300	1200
			N-G	150	800
		O Dhana	L-N	150	800
SPD-N-xx-3Y208	120/208V	3-Phase WYE 4-wire + grnd	L-G	150	800
01 D 11 AX 01200	120/2001		L-L	300	1200
			N-G	150	800
SPD-N-xx-3Y480	277/480V	0 Db	L-N	320	1200
		3-Phase	L-G	320	1200
		WYE	L-L	640	2000
		4-wire + grnd	N-G	320	1200

Where xx = kA/mode: 25, 50 or 100kA

All tests performed with 6" lead length, positive polarity.

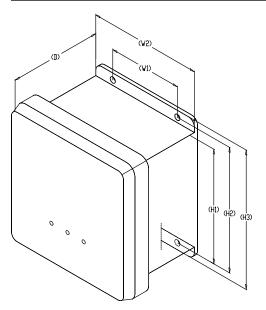
All voltages are peak values measured from the zero reference point.

Specifications subject to change without notice.

FEATURES AND BENEFITS

- Listed to UL 1449 as a Type 2 SPD
- Protects facilities and equipment against the harmful effects of lightning strikes and internally generated electrical transients
- Includes pre-wired pigtail conductors to streamline installation
- Features internal copper bus conduction path to minimize system impedances, reducing clamping voltage and increasing reliability
- 5-year warranty

DIMENSIONS



H1	6.17	(156.7)	
H2	6.75	(171.5)	
НЗ	7.50	(190.4)	
W1	4.01	(101.9)	
W2	6.12	(155.4)	
D	5.01	(127.5)	
All measurements in inches (mm)			



SPECIFICATIONS

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Electrical	
Connection Method	Parallel
Protection Modes	L-N, L-G, L-L, N-G
Prewired	24" stranded #10 AWG pigtail conductors
Status Indicators	LEDs for each phase illuminate to indicate protection is active

Short circuit current rating 65kAIC using a 20A max. circuit breaker

General

Weight	12.7 lbs.
Enclosure Type	NEMA 4X fiberglass-reinforced polyester (FRP), surface-mount, non-removable cover
Operating Environment	-40°C to +60°C, 5% to 95% noncondensing humidity
Approvals	UL 1449 3rd Edition UL 1283 ANSI/IEEE C62.41 ANSI/IEEE C62.1 ANSI/IEEE C62.45

EMI / RFI NOISE REJECTION

Filtering Attenuation Frequencies (L-N) w/ 6" Hook-Up Wire

Noise Source

Frequency	-50 ft.	100 ft.	
100kHz	-50dB	-50dB	
1MHz	-34dB	-39dB	
10MHz	-34dB	-40dB	
100MHz	-47dB	-53dB	

OPTIONS

Dry Contacts: Single Form "C" dry contacts for remote alarm monitoring are available as an option. To order a model with dry contacts, add suffix "-FCC" to the standard part number. Example: SPD-N-25-3Y208-**FCC**

APPLICATIONS







SPD AC SURGE PROTECTION

AVAILABLE CONFIGURATIONS

Туре	Model Number	Voltage	Configuration
Type 1	SPD-40-1P120	120V	1-Phase, 2 Wire + Ground
Type 1	SPD-40-1S240	120/240V	Split Phase, 3 Wire + Ground
Type 1	SPD-40-3Y208	120/208V	3-Phase, 4 Wire + Ground
Type 2	SPD-40-3Y480	277/480V	3-Phase, 4 Wire + Ground

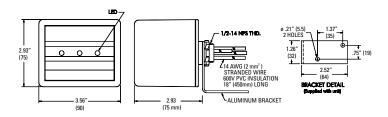
FEATURES AND BENEFITS

- UL Listed Surge Protection Devices
- Suitable for use on service entrance, distribution panels or point of use applications
- Suitable for installation on load side of the main service disconnect
- Technology Multiple Metal Oxide Varistors
- Features Individual fusing for each MOV, LED indication per phase indicates proper functioning of individual MOVs
- 3-year warranty

SPECIFICATIONS

OI EUII IUATIUNU	
Electrical	
Operating Frequency	47–63Hz
Connection Method	Parallel to Load, 14 AWG (2mm) wires 600V PVC insulation, 18" long
Short Circuit Current Rating Type 2	100kAIC behind a 30A maximum breaker
Short Circuit Current Rating Type 1	100kAIC, no upstream over current protection required
Modes of Protection (model specific)	L-N, L-G, L-L, N-G
Response Time	less than 1 nanosecond
Monitoring	Status Indicator lights (one per phase)
Leakage Current L-G	<100μΑ

DIMENSIONS



SPECIFICATIONS

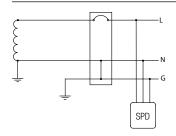
General	
Weight	2 lbs. (0.9 kg)
Dimensions	2.93" x 2.93" x 3.56" (75mm x 75mm x 90mm)
Enclosure Type	NEMA 1, Non-metallic
Surge Current	40kA per mode
Nominal Discharge Surge Current	20kA per UL 1449 3rd Edition
Surge Life @ 3kA 8/20us	> 3,000 impulses
Product Design	Individually fused MOVs
Mounting Method	1/2"-14 NPS thread, aluminum bracket option
Operating Temperature	-40° to +80°C (-40° to 149°F)
Operating Altitude	16,400 ft (5000 m)
Approvals	UL1449 3rd Edition

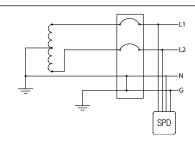
PERFORMANCE DATA

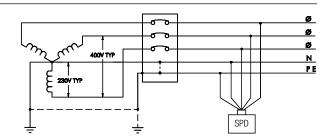
ANSI/IEEE C62.41.1-2002, C62.41.2-2002 & C62.45-2002 **Measure Limiting Voltage**

Model	Voltage Config.	Mode	MCOV	Ring Wave 6kV, 500A	Comb Wave 6kV, 3KA	Comb Wave 20kV, 10kA	Voltage Protection Rating UL 1449 3rd Edition
		L-N	150	460	480	740	700
SPD-40-1P120	120	L-G	300	765	910	1205	1200
		N-G	0	460	480	740	700
		L-N	150	460	480	740	700
CDD 40 10040	120/240	L-G	300	765	910	1205	1200
SPD-40-1S240	120/240	L-L	300	765	910	1205	1200
		N-G	0	460	480	740	700
		L-G	300	765	910	1205	1200
CDD 40 0V000	100/000	L-L	300	765	910	1205	1200
SPD-40-3Y208	120/208	N-G	0	460	480	740	700
		L-N	150	460	480	740	700
		L-N	320	730	900	1175	1200
SPD-40-3Y480	077/400	L-G	640	1683	1936	2826	2000
3PD-4U-3148U	277/480	N-G	0	956	1113	1906	1200
		L-L	640	1663	1933	2686	2500

CONNECTIONS







SPD-4Ø-1P120 SPD-4Ø-1S240 SPD-4Ø-3Y208, 3Y480

APPLICATIONS





SPD-S AC SURGE PROTECTION

AVAILABLE CONFIGURATIONS

Model Number	Voltage	Configuration
SPD-40-1S240-S	120/240V	1-Phase, 3 Wire 50-60Hz
SPD-60-1S240-S	120/240V	1-Phase, 3 Wire 50-60Hz
SPD-80-1S240-S	120/240V	1-Phase, 3 Wire 50-60Hz

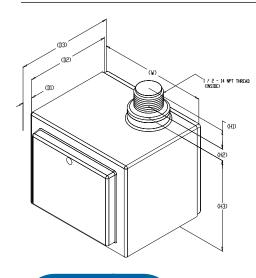
FEATURES AND BENEFITS

- UL 1449 3rd Edition (Type 2).
- SPD Category and Type Service entrance or distribution panel, permanently connected.
- Technology Multiple Metal Oxide Varistors with individual and overcurrent protection. LED on faceplate indicates proper functioning/fault of production elements.
- 3-year warranty

SPECIFICATIONS

Electrical	
Connection Means	60A max. breaker
Short Circuit Current Rating	65,000 Amps
Protection Modes (6)	L1-N, L2-N, L1-G, L2-G, N-G, and L1-L2
Maximum Continuous Operating Volta	age 150Vac
Nominal Varistor Voltage at 1 mAdc	235V
Leakage, L-G at 120Vac	<600μΑ

DIMENSIONS



H1	.75	(19.1)		
H2	.25	(6.4)		
НЗ	2.93	(74.4)		
W	3.56	(90.4)		
D1	.32	(8.1)		
D2	2.78	(70.6)		
D3	3.10	(78.7)		
All measurements				
in inches (mm)				

SPECIFICATIONS

01 2011 10/1110110				
General				
Maximum Surge Current				
Single Pulse, 8/20µs, Per Phase SPD-80-1S240-S 80				
	SPD-60-1S240-S	60kA		
	SPD-40-1S240-S	40kA		
Per Mode	SPD-80-1S240-S	40kA		
	SPD-60-1S240-S	30kA		
	SPD-40-1S240-S	20kA		

Transient Energy Ratin	g, 10/1000 µs	2720 joules	
Suppression Voltage, L (N+G) using ANSI/IEEE C62.41 Waveshapes			
200 A	100kHz	385V	
500 A	100kHz	435V	
500 A	8/20µs	365V	
3 kA	8/20µs	435V	
10 kA	8/20µs	660V	

UL 1449 3rd Edition Voltage Protection Rating 6kV, 3kA

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	L-N	600V
	L-G	600V
	N-G	900V
Surge Life, L-(N+G)		
	3 kA, 8/20µs	15,000 times
	10 kA, 8/20μs	300 times

Component Response Time	<1 ns
Operating Temperature	-40° to +85° C
Maximum Operating Altitude	7000 m
Approvals	UL1449 3rd Edition (effective 9/29/2009)

SURGE FACT

Lightning detection systems in the United States monitor an average of 25 million strikes of lightning from clouds to ground during some 100,000 thunderstorms every year. It is estimated that the earth is struck by an average of more than a hundred lightning bolts every second.



MORE POWER, MORE PROTECTION, INCREASED WARRANTY...

Thomas & Betts signature MasterPLAN® facility-wide network approach combines two or more suppression filter systems to yield dramatically increased performance and long-lasting protection of critical loads. MasterPLAN® benefits include improved clamping voltage, expanded distribution system reliability, increased product life expectancy and reduced surge current stress resulting from upstream higher exposure protection.

WARRANTY PERIOD

	Standard	MasterPlan®
SPD-F	10 Years	15 Years
SPD-N	5 Years	15 Years
SPD	3 Years	15 Years



