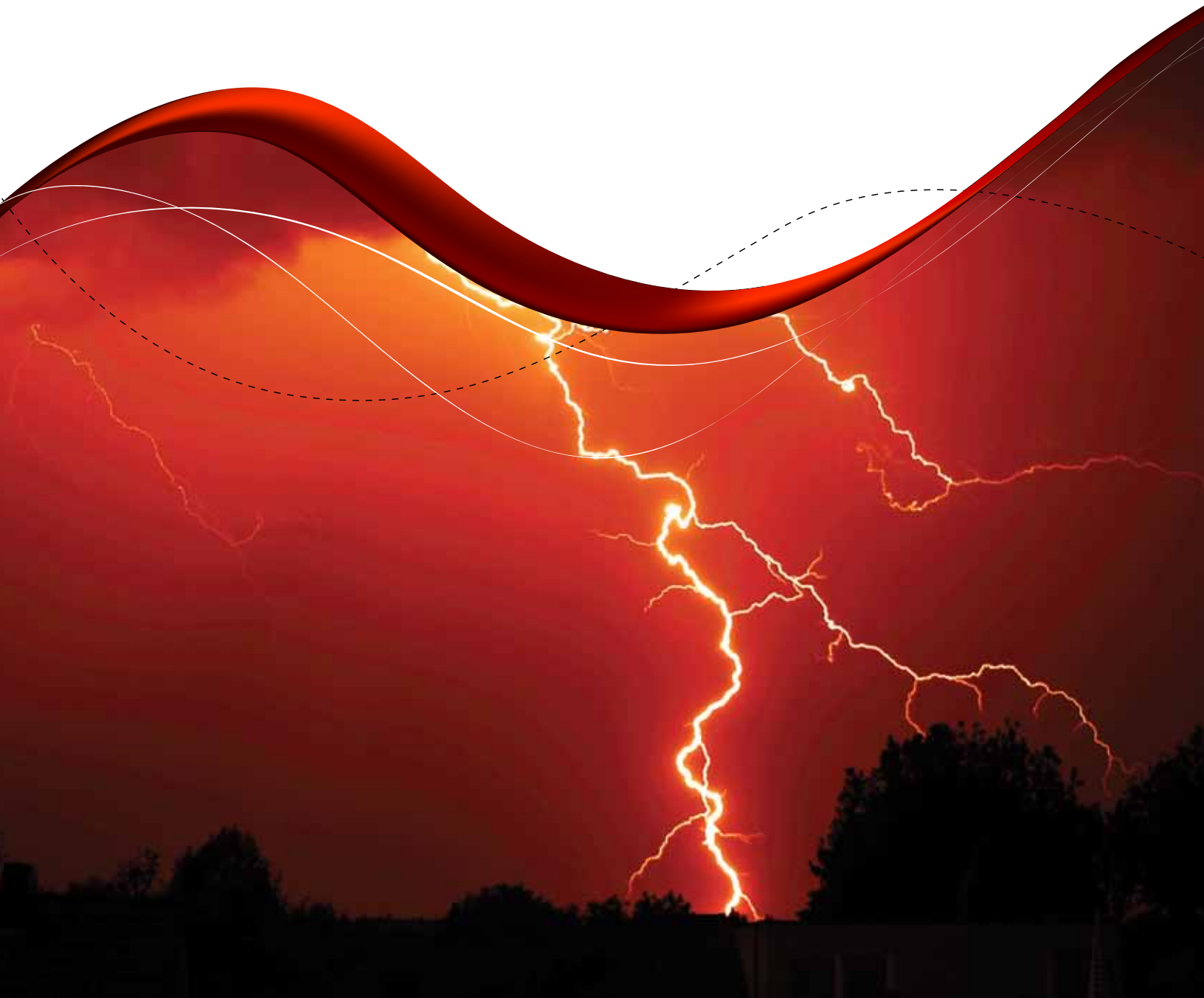


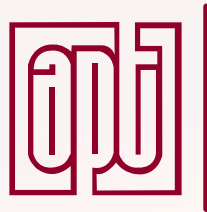


**ADVANCED PROTECTION
TECHNOLOGIES INC.**



Commercial Product Catalog

SURGE PROTECTIVE DEVICES



ADVANCED PROTECTION TECHNOLOGIES INC.

WHY APT?

Advanced Protection Technologies, Inc. (APT) has been a worldwide leader in the surge suppression industry since 1985. Headquartered in central Florida, heart of lightning activity, APT's surge protection products have long set the standard for protection of commercial and industrial facilities.

In addition to superior products, APT has received numerous awards for customer service including the coveted Frost and Sullivan Market Engineering Award.

Our commitment to service and exceeding expectations comes from our people and sophisticated system integration. We value the client relationship and support it with integrity, responsiveness and technical excellence. We are...

"Professionals Serving Professionals"

COMMERCIAL PRODUCT CATALOG

Table of Contents

APT Product Overview	4
SPD Quick Reference Guide.....	5
Type 1 SPDs	
SPDEE DC Series	6
SPDEE Series	8
TEXCS Series.....	10
TEXDS Series	12
TEXAS Series.....	14
TEXAL Series.....	16
TEXBS Series.....	18
TEXBL Series.....	20
Type 2 “MODULAR” SPDs	
TE/HP Series.....	22
TE/HPS Series.....	24
TE/XGA Series.....	26
What Electrical System is It?.....	28
A Simplified Explanation.....	29
Frequently Asked Questions.....	30

Protecting the electronic world from surges

————— Since 1985 —————

APT Product Overview



SURGE PROTECTIVE DEVICES (SPDs):

APT offers a full breadth of Type 1 and Type 2 SPDs. Our Type 1 SPDs use Large Block 50kA MOV's that have Thermal Protection and are very reliable and robust. Each Series offers service entrance protection which is ideal for remote locations and extreme duty applications where downtime is unacceptable, to models ideal for downstream applications. Our units offer protection from 50kA per phase up to 1000kA per phase. The XGA and the H Series products are Type 2 SPDs that offer individually replaceable modules per protection mode and is one of the few in the industry to offer SPDs with individually replaceable suppression modules. The H Series, which includes the HP and HPS Series, has individually replaceable modules per protection mode, where as the XGA has individually replaceable modules per phase. These replaceable module products utilize heavy duty 40kA MOV's with internal fusing and thermal disconnects.



ADDITIONALLY APT HAS INTERNAL-MOUNT, DIN RAIL, AND SPECIAL APPLICATION SPDs. PLEASE CHECK OUR WEBSITE FOR MORE INFORMATION ON THESE PRODUCTS.

SPD Quick Reference Guide

Service	Peak Current	Comments
Service Entrance		
4000A - 3000A	300,000A/Ø	XAS30 - Type 1, 20kA Inominal, 200kA SCCR, Audible Alarm, C3 Rated, Form C Dry Contacts, Feed with spare breaker or optional disconnect switch available.
3000A - 2000A	High Exposure 300,000A/Ø	XAS30 - Type 1, 20kA Inominal, 200kA SCCR, Audible Alarm, C3 Rated, Form C Dry Contacts, Feed with spare breaker or optional disconnect switch available.
	Medium Exposure 200,000A/Ø	XAS20 - Type 1, 20kA Inominal, 200kA SCCR, Audible Alarm, C3 Rated, Form C Dry Contacts, Feed with spare breaker or optional disconnect switch available.
	Low Exposure 150,000A/Ø	XAS15 - Type 1, 20kA Inominal, 200kA SCCR, Audible Alarm, C3 Rated, Form C Dry Contacts, Feed with spare breaker or optional disconnect switch available.
	Budget of V/E 100,000A/Ø	XDS10 - Type 1, 20kA Inominal, C3 Rated, 200kA SCCR, Feed with spare breaker.
2000A - 1200A	High Exposure 250,000A/Ø	XAS25 - Type 1, 20kA Inominal, 200kA SCCR, Audible Alarm, C3 Rated, Form C Dry Contacts, Feed with spare breaker or optional disconnect switch available.
	Medium Exposure 200,000A/Ø	XAS20 - Type 1, 20kA Inominal, 200kA SCCR, Audible Alarm, C3 Rated, Form C Dry Contacts, Feed with spare breaker or optional disconnect switch available.
	Low Exposure 150,000A/Ø	XDS15 - Type 1, 20kA Inominal, 200kA SCCR, C3 Rated, Feed with spare breaker.
	Budget of V/E 100,000A/Ø	XCS10 - Type 1, 20kA Inominal, 200kA SCCR, C3 Rated, Feed with spare breaker.
1200A - 800A	High Exposure 200,000A/Ø	XDS20 - Type 1, 20kA Inominal, 200kA SCCR, C3 Rated, Feed with spare breaker.
	Medium Exposure 150,000A/Ø	XDS15 - Type 1, 20kA Inominal, 200kA SCCR, C3 Rated, Feed with spare breaker.
	Low Exposure 100,000A/Ø	XCS10 - Type 1, 20kA Inominal, 200kA SCCR, C3 Rated, Feed with spare breaker.
	Budget of V/E 50,000A/Ø	SPDee - Type 1, 20kA Inominal, 200kA SCCR, C3 Rated, Feed with spare breaker.
Distribution /Branch		
1200A - 800A	High Exposure 200,000A/Ø	XDS20 - Type 1, 20kA Inominal, 200kA SCCR, C3 Rated, Feed with spare breaker.
	Medium Exposure 150,000A/Ø	XDS15 - Type 1, 20kA Inominal, 200kA SCCR, C3 Rated, Feed with spare breaker.
	Low Exposure 100,000A/Ø	XCS10 - Type 1, 20kA Inominal, 200kA SCCR, C3 Rated, Feed with spare breaker.
	Budget of V/E 50,000A/Ø	SPDee - Type 1, 20kA Inominal, 200kA SCCR, C3 Rated, Feed with spare breaker.
400A & under	High Exposure 150,000A/Ø	XDS15 - Type 1, 20kA Inominal, 200kA SCCR, C3 Rated, Feed with spare breaker.
	Medium Exposure 100,000A/Ø	XDS10 - Type 1, 20kA Inominal, 200kA SCCR, C3 Rated, Feed with spare breaker.
	Low Exposure 100,000A/Ø	XCS10 - Type 1, 20kA Inominal, 200kA SCCR, C3 Rated, Feed with spare breaker.
	Budget of V/E 50,000A/Ø	SPDee - Type 1, 20kA Inominal, 200kA SCCR, C3 Rated, Feed with spare breaker.

Contact APT Sales for jobs where you have specification criteria to meet, competitor units to cross reference or need help choosing the appropriate model for your application. Your APT Sales Contact will then develop the best SPD solution that meets your requirements.



UL Listed to UL 1449-3 Photovoltaic Standard
(VZCA.E321351 & VZCA7.E321351)

- UL Listed as opposed to Recognized - avoids scrutiny over Technical Considerations of Recognized products
- Avoids Certification Surprises
- No Unexpected Installation Requirements

Listed to UL 1449 as DC SPD for use in PV applications
Options & Configurations for OEMs (see back)

Does not require additional upstream fusing for SPD safety protection

- 100kA DC Short Circuit Current Rating (SCCR)
- Fail-Safe operation – arc breaking, slide-gate thermal disconnectors built-in
- Avoids safety challenges & fusing shortcomings of overseas-standard SPDs

Performance Specifications

- 50kA 8x20µs Per Mode
- 300Vdc, 600Vdc, 1000Vdc & OEM models
- All modes of protection: DC+ – G, DC- – G, DC+ – DC-
- UL 1449 tested I_n: 20kA (highest available)
- UL 1449 tested SCCR: 100kA DC
- UL 1449-3 Listed as Type 1 SPD
- UL 1449 Type 2 optional for cUL Mark
- Large-Block arrestor-grade 34mm square MOVs
- Individually Fused & Thermally Protected MOVs
- Repetitive Impulse: 5000 - 3kA-8x20µs; 1000 - 10kA-8x20µs
- Response Time: < 1nanosecond

Physical Specifications

- Relative Humidity Range: 0-95% non-condensing
- Operating Frequency: DC
- Operating Temperature: -40°C (-40°F) to +65°C (149°F)
- Solid State Bi-directional Operation
- NEMA 4X Polycarbonate Enclosure – UL746C(f1), UL 94-5VA
- Pre-wired with 3' (1m) of #8 AWG & #6 AWG ground conductor

Tri-Mount Installation - Mounting Kit Included



Std. 3/4"-14
Nipple



DIN-rail Mount
(rail not incl.)

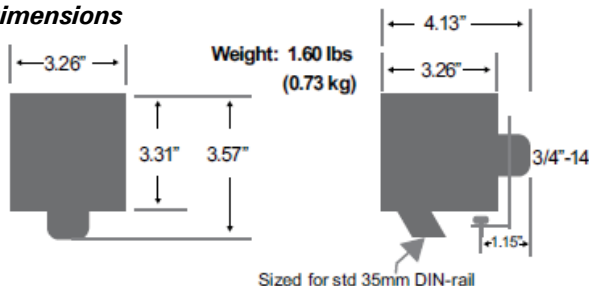


Bracket Mount
for flat surfaces

Monitoring Configurations

- Standard - Low consumption LED; monitors every MOV
 - Illuminates when power is produced
- Options:
 - R – Removes LED and its circuitry
 - M – MOV Microswitch access option (requires R above)

Dimensions



Quality, Standards & Validation

- 2 year warranty (longer optional)
- ANSI/IEEE C62.41.1-2002, C62.41.2-2002 & C62.45-2002
- Burn-In tested Prior to Shipment
- ISO 9001:2008 Quality Management System
- ISO 17025: Certified Test Lab
- IEC 61643, CE
- UL 96A Lightning Protection Master Label Eligible



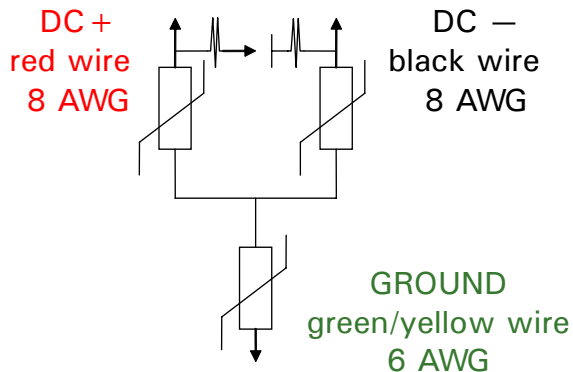
Applications & Models:

UL 1449-3 Model Number	S50A300VDC	S50A600VDC	S50A1000VDC
DC Voltage	0-300Vdc	0-600Vdc	0-1000Vdc
Maximum Continuous Operating Voltage	424Vdc	905Vdc	1188Vdc
Voltage Protection Level (Up) @ 6kV/3kA	< 1000Vp	< 2000Vp	< 2500Vp

SPDEE DC Model Number Configurator & Options

UL 1449:	S50A	Voltage	Options
	50kA default	300VDC 600VDC 1000VDC	2 = Type 2 SPD bearing cULus Mark (for Canada) R = Removes LED and its circuitry Visual Monitoring via pop-up indicator tabs on each MOV. M = Microswitch option – requires R option above. Allows remote access to logic connected MOV diagnostics. Includes 20 AWG wires out of nipple. Power must be limited to 50mA at 12Vdc
Examples: - S50A300VDCRM = 50kA, 300Vdc, Remove LED, Microswitch Monitoring			

Schematic: All Modes of Protection



Available Z Mounting Bracket Accessory



AC Voltage SPDEE's Also Available



OEM & Brand Label Opportunities
Please call 800.237.4567



Features:

- **UL 1449 Third Edition (Sept 2009) Listed**
- **50kA 8x20µs**
- **Type 1 SPD - 20kA I_n & 10kA (cUL Type 2 optional)**
 - 20kA In — Meets UL 96A Lightning Protection Master Label
 - Can be installed upstream or downstream of main disconnect
- **200kA SCCR (most models)**
- **All UL-required OCP & Safety Coordination Included Inside**
- **Voltage Specific Design: Performs better than 'one-size fits all'**
- **Tri-Mount Installation for more mounting flexibility:**
 - Same unit mounts on Pipe Nipple, Bracket or Din-Rail
- **Green = Go Visual Diagnostics: Easy to See; Easy to Understand**

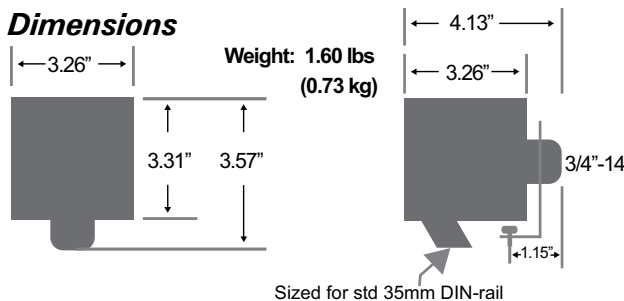
Performance Specifications

- 50kA 8x20µs Per Mode
- UL 1449 tested Inominal: 20kA (highest available) + 10kA
- UL 1449 tested SCCR: 200kA (most models)
- Large-Block, 34mm square, 50kA MOVs
- Individually Fused & Thermally Protected MOVs
- UL 1449 Voltage Protection Ratings (VPRs):
 - 600V for 120V, 120/240, 208Y/120
 - 1000V for 277V, 480Y/277V
- Repetitive Impulse: 5000 - 3kA-8x20µs; 1000 - 10kA-8x20µs
- Data table located on backpage

Physical Specifications

- Relative Humidity Range: 0-95% non-condensing
- Operating Frequency: 47-63Hz
- Peak Operating Temperature: +85°C (185°F)
- Typical Operating Temperature: -40°C (-40°F) to +60°C (140°F)
- Response Time: < 1 nanosecond
- Solid State Bi-directional Operation
- NEMA 4X Polycarbonate Enclosure—UL746C(f1), UL 94-5VA
- Pre-wired with 3' (1m) of #10 AWG conductor
- Typical Type 2 Connection: #10 AWG to 30A breaker

Dimensions



Green = Go Visual Diagnostic Monitoring

- Green LED = A-OK, Out = replace
- LED Visible from Multiple Sides & Angles - Better Viewing
- Every MOV is Monitored as opposed to 'power is present'

Tri-Mount Installation - L-bracket mounting kit is no cost accessory



Std. 3/4"-14 Nipple



DIN-rail Mount (rail not incl.)



Bracket Mount for flat surfaces

Options

- N-G protection
- Dry Contact & Audible Alarm
- Dry contact connection leads exit through nipple via #18 AWG
- Other configurations available for OEM - Call
- Lbracket mounting kit for DIN-rail is no cost accessory

Quality, Standards & Validation

- 2 year warranty (longer optional)
- UL 1449 Third Edition file: VZCA.E321351 at www.UL.com, cUL
- ANSI/IEEE C62.41.1-2002, C62.41.2-2002, and C62.45-2002
- NEMA LS-1
- IEC 61643, CE
- Burn-In tested Prior to Shipment
- ISO 9001:2008 Certified Quality Management System
- ISO 17025:2005 Certified Test Lab
- RoHS-compliant

Special *Thank You* to NASA/SATOP for design assistance & validation



SPDEE Model Numbers

S	50	A	Voltage	System	Options
	kA/Phase 50kA	Default	120V	1P	N
			127V	2P	D
			220V	3Y	2
			240V	3D	
			277V	3H	
			347V		
			480V		
<p>1P = One Pole, Single Phase 2P = Two Pole, Split Phase 3Y = Three Pole Wye 3D = Three Pole Delta 3H = Three Pole Hi-Leg Delta</p>			<p>N = N-G Protection D = Dry Contact & Audible Alarm 2 = Type 2 SPD Bearing cUL Mark</p>		
<p>No cost accessories: 9876 L-bracket mounting kit 8483 Supplementary label</p>					
<p>Examples: S50A120V3Y = 50kA, 120V, 3 pole (208Y/120V) S50A277V3YN = 50kA, 277V, 3 pole (480Y/277V), with N-G</p>					

SPDEE Performance Data

MODEL	System Voltage & Config	UL 1449 THIRD Edition (Sept 2009)				I _n	SCCR	MCOV
		Voltage Protection Rating VPR 3000A						
		L-N	L-L	N-G*	L-G*			
S50A120V1P	120V	600	600*	1000*	20kA	200kA	150	
S50A120V2P	120V/240V	600	1000	600*	1000*	20kA	200kA	
S50A120V3Y	208Y/120V	600	1000	600*	1000*	20kA	200kA	
S50A127V1P	127V	700	600*	1200*	20kA	100kA	180	
S50A127V2P	127/254V	700	1200	600*	1200*	20kA	100kA	
S50A127V3Y	220Y/127V	700	1200	600*	1200*	20kA	100kA	
S50A220V1P	220V-1 pole	1200	1000*	1800*	20kA	200kA	320	
S50A220V3Y	380Y/220V	1200	2000	1000*	1800*	20kA	200kA	
S50A240V3H	120/240V - Hi-Leg Delta	600	1000	600*	1000*	20kA	200kA	
S50A240V1P	240V-1 pole	1200	1000	1800	20kA	200kA	320	
S50A240V3D	240V Delta - 3 pole	1500	1200	20kA	200kA	320		
S50A277V1P	277V	1200	1000*	1800*	20kA	200kA	320	
S50A277V2P	240/480V	1200	2000	1000*	1800*	20kA	200kA	
S50A277V3Y	480Y/277V	1200	2000	1000*	1800*	20kA	200kA	
S50A347V3Y	600Y/347Y	1500	2500	1200*	2500*	20kA	200kA	
S50A480V1P	480V-1 pole		1800	10kA	200kA	550		
S50A480V3D	480V Delta - 3 pole	3000	1800	10kA	200kA	550		
S50A480V3H	240/480V - Hi-Leg Delta	1200/1800	2500	10kA	200kA	320/550		
S50A600V3D	600V Delta - 3 pole	2500	2500	20kA	200kA	690		
S100A120V2P	120/240V	600	1000	600	20kA	100kA	150	
S100A277V2P	240/480V	1000	1800	1000	20kA	100kA	320	

* with optional N-G protection

Optional Form C Dry Contact & Audible Alarm

Form C Dry Contact:
 Three (3) #18 wires exit the pipe nipple
 Gray is Common, Blue is Normally Open, Red is Normally Closed

- Normally Open: Use Gray & Blue
- Normally Closed: Use Gray & Red

Audible Alarm:
 Alarm sounds when any protection is lost (If diagnostic LED extinguishes (i.e. problem), alarm will sound)

SPDEE Application Guide

	INSTALLED AT OR NEAR SERVICE ENTRANCE OR TRANSFORMER	INSTALLED > 10'(3M) FROM SERVICE ENTRANCE OR TRANSFORMER
SYSTEM CONFIGURATION	N-G Bonded - Does not require N-G protection	Downstream of N-G Bond - N-G protection suggested

1 Pole - Single

Voltage	Model Number	Model Number
V = 120V	S50A120V1P	S50A120V1PN
V = 127V	S50A127V1P	S50A127V1PN
V = 240V	S50A240V1P	S50A240V1PN
V = 277V	S50A277V1P	S50A277V1PN
V = 480V	S50A480V1P	N/A

2 Pole - Split Phase

Voltage	Model Number	Model Number
V = 120V (120/240V)	S50A120V2P	S50A120V2PN
V = 127V (127/254V)	S50A127V2P	S50A127V2PN
V = 240V (277/480 or 240/480V)	S50A277V2P	S50A277V2PN

Wye

Voltage	Model Number	Model Number
V = 120V (208Y/120V)	S50A120V3Y	S50A120V3YN
V = 127V (220Y/127V)	S50A127V3Y	S50A127V3YN
V = 220V (380Y/220V)	S50A220V3Y	S50A220V3YN
V = 277V (480Y/277V)	S50A277V3Y	S50A277V3YN
V = 347V (600Y/347V)	S50A347V3Y	S50A347V3YN

Hi-Leg

Voltage	Model Number	Model Number
V = 120/240V Hi-Leg Delta	S50A240V3H	S50A240V3HN
V = 240/480V Hi-Leg Delta	S50A480V3H	N/A

Delta

Voltage	Model Number
V = 240V	S50A240V3D
V = 480V	S50A480V3D
V = 600V	S50A600V3D

Corner Grounded Delta?

Use same models & connect one SPD black & green to ground (diagnostics will function correctly)



Advanced Protection Technologies
 14550 58th Street North · Clearwater, Florida 33760
 (800) 237-4567 · (727) 535-6339 · Fax (727) 539-8955
 www.apttvss.com · info@apttvss.com





Features:

- **UL 1449 Third Edition Listed (Sept 2009)**
- **100kA per phase rating**
- **Type 1 SPD –**
 - All UL required OCP & Safety Coordination included inside
 - Can be installed line-side or load-side of main disconnect
- **20kA Inominal (I_n) (most models)**
- **200kA SCCRs (most models)**
- **UL 96A Lightning Protection Master Label compliant (@20kA I_n)**
- **Voltage Specific Design – Highly configurable**
- **All MOV suppression elements monitored**

Performance Specifications

- | Surge Capacities | L-N | L-G | N-G |
|--------------------|------|------|------|
| 100kA/phase | 50kA | 50kA | 50kA |
- UL 1449 Third Edition Listed
 - UL 1449-3 Type 1 SPD (cUL Type 2 optional)
 - UL 1449-3 tested Inominal (I_n): 20kA & 10kA
 - UL 1449-3 tested SCCR: 200kA & 100kA
 - UL 1449-3 Voltage Protection Ratings (VPRs):
 - 208Y/120V: as low as 600V
 - 480Y/277V: as low as 1000V (data table on back)
 - Less than 1 nanosecond response time
 - Repetitive Impulse: 5,000 hits

Physical Specifications

- Relative Humidity Range: 0 -95% non-condensing
- Operating Frequency: 47-63Hz (also 400Hz on <480V)
- Peak Operating Temperature: +85°C (185°F)
- Operating Temperature: -25°C (-15°F) to +60°C (140°F)
- Weight: 3 lbs (1.4 kg)
- NEMA 4X Polycarbonate enclosure – UL 746C(f1) & UL 94-5VA
- Dimensions: 8" x 3" x 3" (203mm x 76mm x 76mm)
- 3/4" threaded hub - weather resistant 4X
- Pre-wired with 3' (1m) of #10 AWG conductor
- Typical connection: #10 AWG and 30A breaker

Design Features

- Designed, Manufactured & Tested consistent with:
 - ANSI/IEEE C62.41.1-2002, C62.41.2-2002, and C62.45-2002
 - NEMA LS-1
 - NEC Article 285
 - IEC 61643, CE
- High Energy Parallel Design for Category C3 & C-High applications
- For External Mounting next to Switchgear, Motor Controls Centers or Panelboards
- Individually Fused & Thermally Protected MOVs
- Large-Block, 34mm square, 50kA MOVs
- Solid State Bidirectional Operation

Diagnostic Monitoring

- 100% monitoring – Every MOV is monitored, incl. N-G
- Green LED Status indicator per phase
- Phase Loss monitoring (toggles LED & dry contacts)
- Electrically isolated circuitry ensures surges do not damage diagnostics
- Optional: Audible Alarm & Form C Dry Contact, (Contact rated 240V, 5A; leads are pre-wired through nipple with #18 AWG)

Quality, Standards & Validation

- UL 1449 Third Edition, (cUL Type 2 optional)
- UL file: VZCA.E321351 at www.UL.com
- RoHS-compliant
- IEC 61643, CE
- 10 year warranty (longer optional)
- Burn-In tested Prior to Shipment
- ISO 9001:2008 Quality Management System
- ISO 17025:2005 Laboratory Qualification
- Made in USA



Voltage Code for Electrical System

Common North American Systems:
01 = 240/120V Split Phase - 1Ø 3W+Grnd (Fig 1)
02 = 208Y/120V Wye - 3Ø 4W+Grnd (Fig 2)
03 = 240/120V High Leg Delta (B High) (Fig 3)
04 = 480Y/277V Wye - 3Ø 4W+Grnd (Fig 2)
05 = 480V Delta - 3Ø 3W+Grnd (Fig 4) & HRG Wye
08 = 600Y/347V Wye - 3Ø 4W+Grnd (Fig 2)

Other Available Systems - Confirmation encouraged:
 15 = 254/127V Split Phase - 1Ø 3W+Grnd (Fig 1)
 18 = 480/277V 2-Pole, (480/240V Split Phase) (Fig 1)
 21 = 220Y/127V Wye - 3Ø 4W+Grnd (Fig 2)
 41 = 520Y/300V Wye - 3Ø 4W+Grnd (Fig 2)
 42 = 415Y/240V Wye - 3Ø 4W+Grnd (Fig 2)
 43 = 400Y/230V Wye - 3Ø 4W+Grnd (Fig 2)
 44 = 440Y/250V Wye - 3Ø 4W+Grnd (Fig 2)
 51 = 480V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6)
 06 = 240V Delta - 3Ø 3W+Grnd (Fig 4)
 61 = 240V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6)
 07 = 380Y/220V Wye - 3Ø 4W+Grnd (Fig 2)
 09 = 600V Delta - 3Ø 3W+Grnd (Fig 4) & HRG Wye
 91 = 600V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6)
 11 = 120V Single Phase (Fig 5)
 12 = 240V Single Phase (Fig 5) - Not split phase
 13 = 127V Single Phase (Fig 5)
 14 = 300V Single Phase (Fig 5)
 16 = 277V Single Phase (Fig 5)
 17 = 480V Single Phase (1 Hot, 1 Neu, 1 Grnd) (Fig 5)

Surge Current Rating
10 = 100kA/Phase

Options
 A = Audible Alarm & Dry Contacts Form C, 240V, 5A (pre-wired)
 E = Remote Indicator LED on 6' Cable (pre-wired through nipple)
 2 = Type 2 SPD bearing cUL Mark

Delete Options - Consult Factory for Order Code
 Delete L-N Protection (reduces kA rating)
 Delete L-G Protection (reduces kA rating)
 Delete N-G Protection (reduces kA rating)

Available Accessory (order separately)
 FMKITC = Flush Mount Kit
 RM = Remote Monitor

Enclosure Rating

4X = NEMA 4X Non-Metallic (size 8" x 3"x 3")

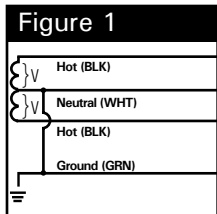


Figure 1
 SPLIT
 2 Hots, 1 Neu, 1 Grnd

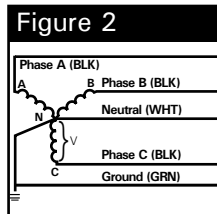


Figure 2
 WYE
 3 Hots, 1 Neu, 1 Grnd

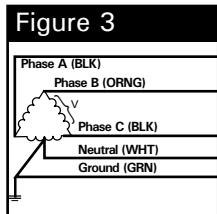


Figure 3
 HI-LEG DELTA (B High)
 3 Hots, (B HIGH),
 1 Neu, 1 Grnd

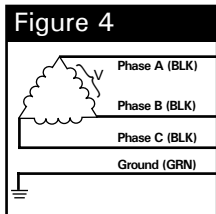


Figure 4
 DELTA & HRG WYE
 3 Hots, 1 Grnd

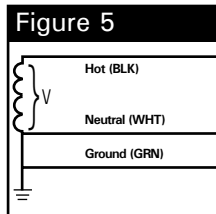


Figure 5
 SINGLE POLE
 1 Hot, 1 Neu, 1 Grnd

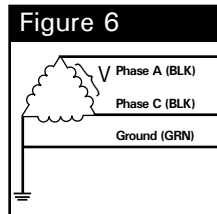


Figure 6
 CORNER GROUND
 DELTA (B grounded)
 2 Hots, 1 Grnd

Performance Data

Common North American Systems		UL 1449 THIRD Edition (Sept 2009) Test Data							
		Voltage Protection Ratings (VPR - 3kA)							
		L-N	L-G	N-G	L-L	Type	In	SCCR	MCOV
01	= 240/120V Split Phase	600	700	500	1000	Type 1	20kA	100kA	150
02	= 208Y/120V 3Ø Wye	600	700	500	1000	Type 1	20kA	200kA	150
03	= 240Y/120V B High Leg Delta	600/1200	700/1200	500	1000	Type 1	20kA	200kA	150 / 320
04	= 480Y/277V 3Ø Wye	1200	1200	1000	1800	Type 1	20kA	200kA	320
05	= 480V 3Ø Delta	-	1800	-	1800	Type 1	10kA	200kA	552
08	= 600Y/347V 3Ø Wye	1500	1500	1500	2500	Type 1	10kA	200kA	420

Other Available Systems:

Please see supplementary data sheet, contact us at info@aptvss.com, or confirm at www.UL.com using CCN of VZCA
 Optional disconnect switch may increase VPRs

Advanced Protection Technologies
 14550 58th Street North · Clearwater, Florida 33760
 (800) 237-4567 · (727) 535-6339 · Fax (727) 539-8955
 www.aptvss.com · info@aptvss.com





Features:

- **UL 1449 Third Edition Listed (Sept 2009)**
- **100kA – 200kA per phase ratings**
- **Type 1 SPD –**
 - All UL required OCP & Safety Coordination included inside
 - Can be installed line-side or load-side of main disconnect
- **20kA Inominal (I_n) (most models)**
- **200kA SCCRs (most models)**
- **UL 96A Lightning Protection Master Label compliant (@20kA I_n)**
- **Voltage Specific Design – Highly configurable**
- **All MOV suppression elements monitored**

Performance Specifications

- | Surge Capacities | L-N | L-G | N-G |
|------------------|-------|-------|-------|
| 100kA/phase | 50kA | 50kA | 50kA |
| 150kA/phase | 100kA | 50kA | 50kA |
| 200kA/phase | 100kA | 100kA | 100kA |
- UL 1449 Third Edition Listed, UL 1283 R/C and cUL
 - UL 1449-3 Type 1 SPD (cUL Type 2 optional)
 - UL 1449-3 tested Inominal (I_n): 20kA & 10kA
 - UL 1449-3 tested SCCR: 200kA & 100kA
 - UL 1449-3 Voltage Protection Ratings (VPRs):
 - 208Y/120V: as low as 600V
 - 480Y/277V: as low as 1000V (data table on back)
 - Less than 1 nanosecond response time
 - Repetitive Impulse: 5,000 hits
 - AC Sinewave Tracking Filter with EMI/RFI Filtering up to -50dB from 10kHz to 100MHz

Physical Specifications

- Relative Humidity Range: 0 -95% non-condensing
- Operating Frequency: 47-63Hz
- Operating Temperature: -25°C (-15°F) to +60°C (140°F)
- Weight: 5 lbs (2.3 kg)
- NEMA 4X Polycarbonate enclosure – UL 746C(f1) & UL 94-5VA
- Dimensions: 6" x 6" x 4" (152mm x 152mm x 102mm) (excluding removable mounting feet)
- Lug size: #8 - #10 AWG
- Typical connection: #8 AWG and 40A breaker

Design Features

- Designed, Manufactured & Tested consistent with:
 - ANSI/IEEE C62.41.1-2002, C62.41.2-2002, and C62.45-2002
 - NEMA LS-1
 - NEC Article 285
 - IEC 61643, CE
- High Energy Parallel Design for Category C3 & C-High applications
- For External Mounting next to Switchgear, Motor Controls Centers or Panelboards
- Individually Fused & Thermally Protected MOVs
- Large-Block, 34mm square, 50kA MOVs
- Solid State Bidirectional Operation

Diagnostic Monitoring

- 100% monitoring – Every MOV is monitored, incl. N-G
- Green LED Status indicator per phase
- Red LED service indicator
- Phase Loss monitoring (toggles LED & dry contact)
- Electrically isolated circuitry ensures surges do not damage diagnostics
- Optional: Audible Alarm & Form C Dry Contact (Contact rated 240V, 5A)

Quality, Standards & Validation

- UL 1449 Third Edition, cUL, UL 1283 R/C
- UL file: VZCA.E321351 at www.UL.com
- RoHS-compliant
- IEC 61643, CE
- 10 year warranty (longer optional)
- Burn-In tested Prior to Shipment
- ISO 9001:2008 Quality Management System
- ISO 17025:2005 Laboratory Qualification
- Made in USA



Voltage Code for Electrical System **Surge Current Rating** **Options**

Common North American Systems:
01 = 240/120V Split Phase - 1Ø 3W+Grnd (Fig 1)
02 = 208Y/120V Wye - 3Ø 4W+Grnd (Fig 2)
03 = 240/120V High Leg Delta (B High) (Fig 3)
04 = 480Y/277V Wye - 3Ø 4W+Grnd (Fig 2)
05 = 480V Delta - 3Ø 3W+Grnd (Fig 4) & HRG Wye
08 = 600Y/347V Wye - 3Ø 4W+Grnd (Fig 2)

10 = 100kA/Phase
15 = 150kA/Phase
20 = 200kA/Phase

A = Audible Alarm & Dry Contacts, Form C, 240V, 5A
 2 = Type 2 SPD Bearing cUL Mark

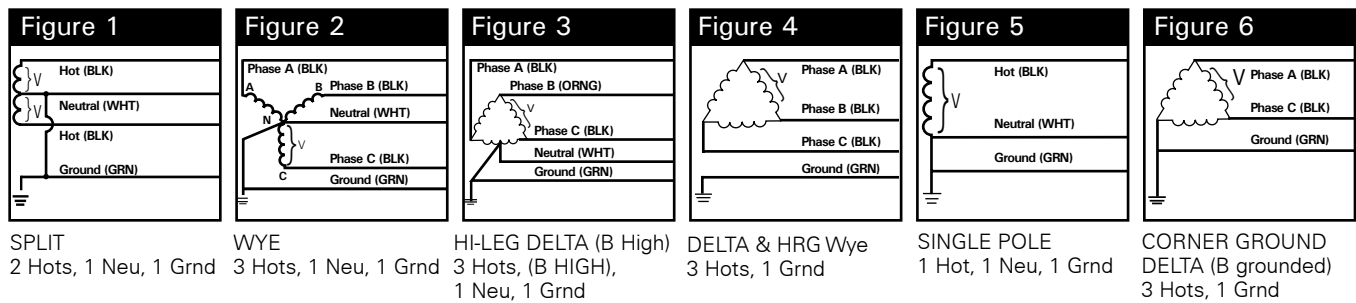
Other Available Systems - Confirmation encouraged:
 15 = 254/127V Split Phase - 1Ø 3W+Grnd (Fig 1)
 18 = 480/277V 2-Pole, (480/240V Split Phase) (Fig 1)
 21 = 220Y/127V Wye - 3Ø 4W+Grnd (Fig 2)
 41 = 520Y/300V Wye - 3Ø 4W+Grnd (Fig 2)
 42 = 415Y/240V Wye - 3Ø 4W+Grnd (Fig 2)
 43 = 400Y/230V Wye - 3Ø 4W+Grnd (Fig 2)
 44 = 440Y/250V Wye - 3Ø 4W+Grnd (Fig 2)
 51 = 480V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6)
 06 = 240V Delta - 3Ø 3W+Grnd (Fig 4)
 61 = 240V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6)
 07 = 380Y/220V Wye - 3Ø 4W+Grnd (Fig 2)
 09 = 600V Delta - 3Ø 3W+Grnd (Fig 4) & HRG Wye (Available: 100kA)
 91 = 600V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6) (Available: 100kA)
 11 = 120V Single Phase (Fig 5)
 12 = 240V Single Phase (Fig 5) - Not split phase
 13 = 127V Single Phase (Fig 5)
 14 = 300V Single Phase (Fig 5)
 16 = 277V Single Phase (Fig 5)
 17 = 480V Single Phase (1 Hot, 1 Neu, 1 Grnd) (Fig 5)

Enclosure Rating

4X = NEMA 4X Non-Metallic (size 6" x 6"x 4")

Delete Options - Consult Factory for Order Code
 Delete L-N Protection (reduces kA rating)
 Delete L-G Protection (reduces kA rating)
 Delete N-G Protection (reduces kA rating)
 Delete Noise Filtering

Available Accessory (order separately)
 KITFMXF = Flush Mount Kit
 RM = Remote Monitor



Performance Data

Common North American Systems		UL 1449 THIRD Edition (Sept 2009) Test Data							
		Voltage Protection Ratings (VPR - 3kA)							
		L-N	L-G	N-G	L-L	Type	In	SCCR	MCOV
01	= 240/120V Split Phase	700	700	600	1000	Type 1	20kA	100kA	150
02	= 208Y/120V 3Ø Wye	700	700	600	1000	Type 1	20kA	200kA	150
03	= 240Y/120V B High Leg Delta	700/1200	700/1200	600	1000/2000	Type 1	20kA	200kA	150 / 320
04	= 480Y/277V 3Ø Wye	1200	1200	1200	2000	Type 1	20kA	200kA	320
05	= 480V 3Ø Delta	-	1800	-	2000	Type 1	10kA	200kA	550
08	= 600Y/347V 3Ø Wye	1500	1500	1500	2500	Type 1	10kA	200kA	420

Other Available Systems:
 Please see supplementary data sheet, contact us at info@apptvss.com, or confirm at www.UL.com using CCN of VZCA
 Optional disconnect switch may increase VPRs

Advanced Protection Technologies
 14550 58th Street North · Clearwater, Florida 33760
 (800) 237-4567 · (727) 535-6339 · Fax (727) 539-8955
 www.apptvss.com · info@apptvss.com





Features:

- **UL 1449 Third Edition Listed (Sept 2009)**
- **100kA – 500kA per phase ratings**
- **Type 1 SPD –**
 - All UL required OCP & Safety Coordination included inside
 - Can be installed line-side or load-side of main disconnect
- **20kA Inominal (most models)**
- **200kA SCCRs (most models)**
- **UL 96A Lightning Protection Master Label compliant (@20kA In)**
- **Voltage Specific Design – Highly configurable**
- **All MOV suppression elements monitored**
- **Optional Rotary Disconnect Switch**

Performance Specifications

- | Surge Capacities | L-N | L-G | N-G |
|--------------------|-------|-------|-------|
| 100kA/phase | 50kA | 50kA | 50kA |
| 150kA/phase | 100kA | 50kA | 50kA |
| 200kA/phase | 100kA | 100kA | 100kA |
| 250kA/phase | 150kA | 100kA | 100kA |
| 300kA/phase | 150kA | 150kA | 150kA |
| 400kA/phase | 200kA | 200kA | 200kA |
| 500kA/phase | 250kA | 250kA | 250kA |
- UL 1449 Third Edition Listed, cUL, UL 1283 R/C
 - UL 1449-3 Type 1 SPD (cUL Type 2 optional)
 - UL 1449-3 tested Inominal: 20kA & 10kA
 - UL 1449-3 tested SCCR: 200kA & 100kA
 - UL 1449-3 Voltage Protection Ratings (VPRs):
 - 208Y/120V: as low as 600V
 - 480Y/277V: as low as 1000V
 - Less than 1 nanosecond response time
 - Repetitive Impulse: 5,000 hits
 - AC Sinewave Tracking Filter with EMI/RFI Filtering up to -50dB from 10kHz to 100MHz

Diagnostic Monitoring

- 100% monitoring – Every MOV is monitored, incl. N-G
- Green LED Status indicator per phase
- Red LED service indicator
- Audible Alarm with Silence Switch
- Test Function: toggles red service LED, audible alarm & dry contact (if equipped)
- N-G overvoltage detection
- Phase Loss monitoring (toggles LED & dry contacts)
- Electrically isolated circuitry ensures surges do not damage diagnostics
- Form C Dry Contacts, 240V, 5A (two sets)
- Optional Surge Counter, six-digit LCD, with test function, reset & no-maintenance Eprom memory

Design Features

- Designed, Manufactured & Tested consistent with:
 - ANSI/IEEE C62.41.1-2002, C62.41.2-2002, and C62.45-2002
 - NEMA LS-1
 - NEC Article 285
 - IEC 61643
- High Energy Parallel Design for Category C3 & C-High applications
- For External Mounting next to Switchgear, Motor Controls Centers or Panelboards
- Individually Fused & Thermally Protected MOVs
- Large-Block, 34mm square, 50kA MOVs
- Replaceable Module Construction
- Solid State Bidirectional Operation

Physical Specifications

- Relative Humidity Range: 0 -95% non-condensing
- Operating Frequency: 47-63Hz
- Operating Temperature: -25°C (-15°F) to +60°C (140°F)
- Weight: 24 lbs (11 kg)
- Standard NEMA 1/12/3R/4 enclosure
- Standard size: 12" x 12" x 6.5" (305mm x 305mm x 165mm)
- Lug size: #2 - #14 AWG (w/opt. disconnect: #6 - #1/0)
- Typical connection: #6 AWG and 60A breaker

Quality, Standards & Validation

- UL 1449 Third Edition, cUL, UL 1283 R/C
- UL file: VZCA.E321351 at www.UL.com
- RoHS-compliant
- IEC 61643, CE
- 10 year warranty (longer optional)
- Burn-In tested Prior to Shipment
- ISO 9001:2008 Quality Management System
- ISO 17025:2005 Laboratory Qualification
- Made in USA



TE XAS ...

Voltage Code for Electrical System

- Common North American Systems:**
01 = 240/120V Split Phase - 1Ø 3W+Grnd (Fig 1)
02 = 208Y/120V Wye - 3Ø 4W+Grnd (Fig 2)
03 = 240/120V High Leg Delta (B High) (Fig 3)
04 = 480Y/277V Wye - 3Ø 4W+Grnd (Fig 2)
05 = 480V Delta - 3Ø 3W+Grnd (Fig 4) & HRG Wye (450kA replaces 400kA or 500kA)
08 = 600Y/347V Wye - 3Ø 4W+Grnd (Fig 2)
- Other Available Systems - Confirmation encouraged:**
 15 = 254/127V Split Phase - 1Ø 3W+Grnd (Fig 1)
 18 = 480/277V 2-Pole, (480/240V Split Phase) (Fig 1)
 21 = 220Y/127V Wye - 3Ø 4W+Grnd (Fig 2)
 41 = 520Y/300V Wye - 3Ø 4W+Grnd (Fig 2)
 42 = 415Y/240V Wye - 3Ø 4W+Grnd (Fig 2)
 43 = 400Y/230V Wye - 3Ø 4W+Grnd (Fig 2)
 44 = 440Y/250V Wye - 3Ø 4W+Grnd (Fig 2)
 51 = 480V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6) (450kA replaces 400kA or 500kA)
 06 = 240V Delta - 3Ø 3W+Grnd (Fig 4) (450kA replaces 400kA or 500kA)
 61 = 240V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6) (450kA replaces 400kA or 500kA)
 07 = 380Y/220V Wye - 3Ø 4W+Grnd (Fig 2)
 09 = 600V Delta - 3Ø 3W+Grnd (Fig 4) & HRG Wye (Available: 100kA, 150kA, 200kA, 250kA)
 91 = 600V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6) (Available: 100kA, 150kA, 200kA, 250kA)
 11 = 120V Single Phase (Fig 5)
 12 = 240V Single Phase (Fig 5) - Not split phase
 13 = 127V Single Phase (Fig 5)
 14 = 300V Single Phase (Fig 5)
 16 = 277V Single Phase (Fig 5)
 17 = 480V Single Phase (1 Hot, 1 Neu, 1 Grnd) (Fig 5)

Surge Current Rating

- 10 = 100kA/Phase**
15 = 150kA/Phase
20 = 200kA/Phase
25 = 250kA/Phase
30 = 300kA/Phase
40 = 400kA/Phase
45 = 450kA/Phase
 (Voltage Codes 05, 51, 06 & 61)
50 = 500kA/Phase

Options

- X = Surge Counter, six-digit LCD counter includes maintenance-free Eprom memory backup
 E = Remote Locatable Display on 4 ft Cable custom cable lengths available
 F = Noise Filtering - Extended Range & Attenuation (available on 400kA & 500kA models)
 D = Rotary Disconnect Switch, Bussmann, UL98
 T = Thru-Door Rotary Disconnect Switch, Bussmann, UL98, E1 enclosure only (Consult factory for other disconnect switch options)
 2 = Type 2 SPD Bearing cUL Mark

Delete Options - Consult Factory for Order Code
 Delete L-N Protection (reduces kA rating)
 Delete L-G Protection (reduces kA rating)
 Delete N-G Protection (reduces kA rating)
 Delete Noise Filtering

Available Accessory (order separately)
 RM = Remote Monitor

Enclosure Rating

- E1 = NEMA 1/12/3R/4 (size: 12" x 12" x 7.5")**
4X = NEMA 4X Non-Metallic (size: 14" x 12" x 6")
 (polycarbonate, display inside clear front door)
4S = NEMA 4X Stainless Steel (size: 12" x 12" x 6")
 (display inside door)
FM = NEMA 1 Flush Mount (wall cavity size: 12" x 12" x 6" deep)
P1 = NEMA 1 pullbox 'indoor' (size: 12" x 12" x 6") includes 'E' option
 (Optional rotary disconnect increases enclosure sizes to 16" x 14" x 6" on models > 300kA)

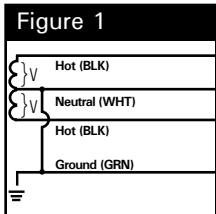


Figure 1
 SPLIT
 2 Hots, 1 Neu, 1 Grnd

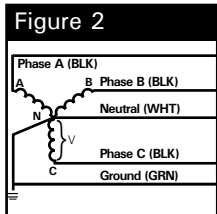


Figure 2
 WYE
 3 Hots, 1 Neu, 1 Grnd

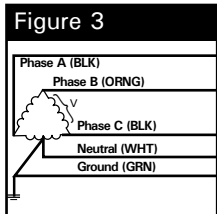


Figure 3
 HI-LEG DELTA (B High)
 3 Hots, (B HIGH),
 1 Neu, 1 Grnd

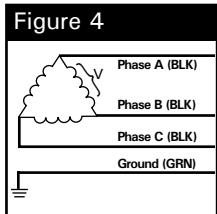


Figure 4
 DELTA & HRG WYE
 3 Hots, 1 Grnd

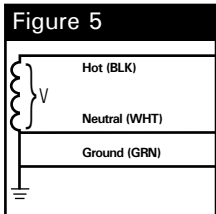


Figure 5
 SINGLE POLE
 1 Hot, 1 Neu, 1 Grnd

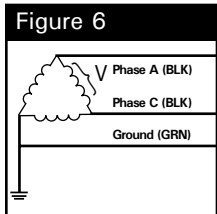


Figure 6
 CORNER GROUND
 DELTA (B grounded)
 2 Hots, 1 Grnd

Performance Data

Common North American Systems		UL 1449 THIRD Edition (Sept 2009) Test Data							
		Voltage Protection Ratings (VPR - 3kA)							
		L-N	L-G	N-G	L-L	Type	In	SCCR	MCOV
01	= 240/120V Split Phase (<300kA)	700	700	700	1200	Type 1	20kA	100kA	150
01	= 240/120V Split Phase (=>300kA)	700	600	600	1000	Type 1	20kA	100kA	150
02	= 208Y/120V 3Ø Wye (<300kA)	700	700	700	1200	Type 1	20kA	200kA	150
02	= 208Y/120V 3Ø Wye (=>300kA)	700	600	600	1000	Type 1	20kA	200kA	150
03	= 240Y/120V B High Leg Delta	700/1200	700/1200	700	1800	Type 1	20kA	200kA	150 / 320
04	= 480Y/277V 3Ø Wye (<300kA)	1200	1200	1200	2000	Type 1	20kA	200kA	320
04	= 480Y/277V 3Ø Wye (=>300kA)	1200	1000	1000	1800	Type 1	20kA	200kA	320
05	= 480V 3Ø Delta (<300kA)	-	1800	-	1800	Type 1	10kA	200kA	550
05	= 480V 3Ø Delta (=>450kA)	-	1800	-	1800	Type 1	20kA	200kA	550
07	= 380Y/220V 3Ø Wye (<300kA)	1200	1200	1200	2000	Type 1	20kA	200kA	320
08	= 600Y/347V 3Ø Wye (<300kA)	1500	1500	1500	2500	Type 1	10kA	200kA	420
08	= 600Y/347V 3Ø Wye (=>300kA)	1500	1500	1500	2500	Type 1	20kA	200kA	420

Other Available Systems:

Please see supplementary data sheet, contact us at info@aptvss.com, or confirm at www.UL.com using CCN of VZCA
 Optional disconnect switch may increase VPRs

Advanced Protection Technologies
 14550 58th Street North · Clearwater, Florida 33760
 (800) 237-4567 · (727) 535-6339 · Fax (727) 539-8955
 www.aptvss.com · info@aptvss.com





Features:

- **Directly Connected, Discrete Protection Elements Between All Possible Modes**
- **UL 1449 Third Edition Listed (Sept 2009)**
- **150kA – 450kA per phase ratings**
- **Type 1 SPD –**
 - All UL required OCP & Safety Coordination included inside
 - Can be installed line-side or load-side of main disconnect
- **20kA Inominal (I_n)**
- **200kA SCCRs (most models)**
- **UL 96A Lightning Protection Master Label compliant (@20kA I_n)**
- **All MOV suppression elements monitored**

Performance Specifications

- **Directly Connected, Discrete Protection Elements Between All Possible Modes with True 10-Mode Protection**

Surge Capacities	L-N	L-G	L-L	N-G
150kA/phase	50kA	50kA	50kA	50kA
300kA/phase	100kA	100kA	100kA	100kA
450kA/phase	150kA	150kA	150kA	150kA

- UL 1449 Third Edition Listed, cUL, UL 1283 R/C
- UL 1449-3 Type 1 SPD (cUL Type 2 optional)
- UL 1449-3 tested Inominal (I_n): 20kA
- UL 1449-3 tested SCCR: 200kA & 100kA
- UL 1449-3 Voltage Protection Ratings (VPRs):
 - 208Y/120V: as low as 600V
 - 480Y/277V: as low as 1000V
- Less than 1 nanosecond response time
- Repetitive Impulse: 5,000 hits
- **AC Sinewave True Tracking Filter with EMI/RFI Filtering up to -50dB from 10kHz to 100MHz**

Diagnostic Monitoring

- 100% monitoring – Every MOV is monitored, incl. N-G
- Green LED Status indicator per phase
- Red LED service indicator
- Audible Alarm with Silence Switch
- Test Function: toggles red service LED, audible alarm & dry contact (if equipped)
- N-G overvoltage detection
- Phase Loss monitoring
- Electrically isolated diagnostic circuitry
- Form C Dry Contacts, 240V, 5A (two sets)
- Optional Surge Counter, six-digit LCD, with test function, reset & no-maintenance Eprom memory

Design Features

- Designed, Manufactured & Tested consistent with:
 - ANSI/IEEE C62.41.1-2002, C62.41.2-2002, and C62.45-2002
 - NEMA LS-1
 - NEC Article 285
 - IEC 61643, CE
- High Energy Parallel Design for Category C3 & C-High applications
- For External Mounting next to Switchgear, Motor Controls Centers or Panelboards
- Individually Fused & Thermally Protected MOVs
- Large-Block, 34mm square, 50kA MOVs
- Replaceable Module Construction
- Solid State Bidirectional Operation

Physical Specifications

- Relative Humidity Range: 0 -95% non-condensing
- Operating Frequency: 47-63Hz
- Operating Temperature: -25°C (-15°F) to +60°C (140°F)
- Weight: 24 lbs (11 kg)
- Standard NEMA 1/12/3R/4 enclosure
- Standard size: 12" x 12" x 6.5" (30.5cm x 30.5cm x 16.5cm)
- Lug size: #2 - #14 AWG (w/opt. disconnect: #6 - #1/0)
- Typical connection: #6 AWG and 60A breaker

Quality, Standards & Validation

- UL 1449 Third Edition, cUL, UL 1283
- UL file: VZCA.E321351 at www.UL.com
- RoHS-compliant
- IEC 61643, CE
- 10 year warranty (longer optional)
- Burn-In tested Prior to Shipment
- ISO 9001:2008 Quality Management System
- ISO 17025:2005 Laboratory Qualification
- Made in USA



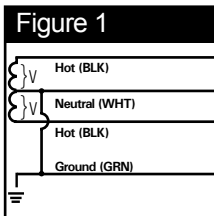
TE XAL ...

Voltage Code for Electrical System

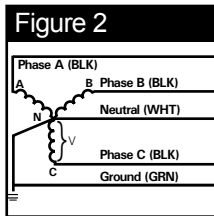
- Common North American Systems:**
01 = 240/120V Split Phase - 1Ø 3W+Grnd (Fig 1)
02 = 208Y/120V Wye - 3Ø 4W+Grnd (Fig 2)
03 = 240/120V High Leg Delta (B High) (Fig 3)
04 = 480Y/277V Wye - 3Ø 4W+Grnd (Fig 2)

Other Available Systems - Confirmation encouraged:

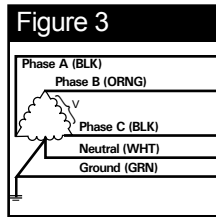
- 15 = 254/127V Split Phase - 1Ø 3W+Grnd (Fig 1)
 18 = 480/277V 2-Pole, (480/240V Split Phase) (Fig 1)
 21 = 220Y/127V Wye - 3Ø 4W+Grnd (Fig 2)
 42 = 415Y/240V Wye - 3Ø 4W+Grnd (Fig 2)
 43 = 400Y/230V Wye - 3Ø 4W+Grnd (Fig 2)
 44 = 440Y/250V Wye - 3Ø 4W+Grnd (Fig 2)
 07 = 380Y/220V Wye - 3Ø 4W+Grnd (Fig 2)



SPLIT
2 Hots, 1 Neu, 1 Grnd



WYE
3 Hots, 1 Neu, 1 Grnd



HI-LEG DELTA (B High)
3 Hots, (B HIGH),
1 Neu, 1 Grnd

Surge Current Rating

- 15 = 150kA/Phase**
30 = 300kA/Phase
45 = 450kA/Phase

Options

- X = Surge Counter, six-digit LCD counter includes maintenance-free Eprom memory backup
 E = Remote Locatable Display on 4 ft Cable custom cable lengths available
 F = Noise Filtering - Extended Range & Attenuation (available on 400kA & 500kA models)
 D = Rotary Disconnect, Bussmann, UL98
 T = Thru-door Rotary Disconnect Switch, Katko, UL 508, E1 enclosure only (Consult factory for other disconnect switch options)
 2 = Type 2 SPD bearing cUL mark

Delete Options - Consult Factory for Order Code
 Delete L-N Protection (reduces kA rating)
 Delete L-G Protection (reduces kA rating)
 Delete N-G Protection (reduces kA rating)
 Delete Noise Filtering

Available Accessory (order separately)
 RM = Remote Monitor

Enclosure Rating

- E1 = NEMA 1/12/3R/4 (size: 12" x 12" x 7.5")**
4X = NEMA 4X Non-Metallic (size: 14" x 12" x 6")
(polycarbonate, display inside clear front door)
4S = NEMA 4X Stainless Steel (size: 12" x 12" x 6")
(display inside door)
FM = NEMA 1 Flush Mount (wall cavity size: 12" x 12" x 6" deep)
P1 = NEMA 1 pullbox 'indoor' (size: 12" x 12" x 6") - includes 'E' option
(Optional rotary disconnect increases enclosure sizes to 16" x 14" x 6" on 450kA only)

Performance Data

Common North American Systems		UL 1449 THIRD Edition (Sept 2009) Test Data							
		Voltage Protection Ratings (VPR - 3kA)							
		L-N	L-G	N-G	L-L	Type	In	SCCR	MCOV
01	= 240/120V Split Phase	700	700	700	1000	Type 1	20kA	100kA	150
02	= 208Y/120V 3Ø Wye	700	700	700	1000	Type 1	20kA	200kA	150
03	= 240Y/120V B High Leg Delta	800/1500	700/1200	700	1800	Type 1	20kA	200kA	150 / 320
04	= 480Y/277V 3Ø Wye	1200	1200	1200	1800	Type 1	20kA	200kA	320
Other Available Systems - Confirmation encouraged:									
15	= 254/127V Split Phase	700	700	700	1000	Type 1	20kA	200kA	150
21	= 220Y/127V 3Ø Wye	700	700	700	1000	Type 1	20kA	200kA	180
42	= 415Y/240V 3Ø Wye	1200	1200	1200	1800	Type 1	20kA	200kA	320
43	= 400Y/230V 3Ø Wye	1200	1200	1200	1800	Type 1	20kA	200kA	320
44	= 440Y/250V 3Ø Wye	1200	1200	1200	1800	Type 1	20kA	200kA	320
07	= 380Y/220V 3Ø Wye	1200	1200	1200	1800	Type 1	20kA	200kA	320

Other Available Systems:

Please see supplementary data sheet, contact us at info@aptvss.com, or confirm at www.UL.com using CCN of VZCA
 Optional disconnect switch may increase VPRs

Advanced Protection Technologies
 14550 58th Street North · Clearwater, Florida 33760
 (800) 237-4567 · (727) 535-6339 · Fax (727) 539-8955
 www.aptvss.com · info@aptvss.com





Features:

- **UL 1449 Third Edition Listed (Sept 2009)**
- **400kA – 1,000kA per phase ratings**
- **Type 1 SPD –**
 - All UL required OCP & Safety Coordination included inside
 - Can be installed line-side or load-side of main disconnect
- **20kA Inominal (In)**
- **200kA SCCRs (most models)**
- **UL 96A Lightning Protection Master Label compliant**
- **Rotary Disconnect Switch included as Standard Equipment**
- **Dual Redundant Replaceable Modules**
- **Voltage Specific Design – Highly configurable**
- **All MOV suppression elements monitored**

Performance Specifications

- | Surge Capacities | L-N | L-G | N-G |
|---------------------|-------|-------|-------|
| 400kA/phase | 200kA | 200kA | 200kA |
| 600kA/phase | 300kA | 300kA | 300kA |
| 800kA/phase | 400kA | 400kA | 400kA |
| 1000kA/phase | 500kA | 500kA | 500kA |
- UL 1449 Third Edition Listed, UL 1283 and cUL
 - UL 1449-3 Type 1 SPD
 - UL 1449-3 tested Inominal (In): 20kA
 - UL 1449-3 tested SCCR: 200kA & 100kA
 - UL 1449-3 Voltage Protection Ratings (VPRs):
 - 208Y/120V: as low as 700V
 - 480Y/277V: as low as 1200V
 - Less than 1 nanosecond response time
 - Repetitive Impulse: 5,000 hits
 - AC Sinewave Tracking Filter with EMI/RFI Filtering up to -50dB from 10kHz to 100MHz

Diagnostic Monitoring

- 100% monitoring – Every MOV is monitored, incl. N-G
- Green LED Status indicator per phase
- Red LED service indicator
- Audible Alarm with Silence Switch
- Test Function: toggles red service LED, audible alarm & dry contact (if equipped)
- N-G overvoltage detection
- Phase Loss monitoring (toggles LED & dry contacts)
- Electrically isolated circuitry ensures surges do not damage diagnostics
- Form C Dry Contacts, 240V, 5A (two sets)
- Optional Surge Counter, six-digit LCD, with test function, reset & no-maintenance Eprom memory

Design Features

- Designed, Manufactured & Tested consistent with:
 - ANSI/IEEE C62.41.1-2002, C62.41.2-2002, and C62.45-2002
 - NEMA LS-1
 - NEC Article 285
 - IEC 61643, CE
- High Energy Parallel Design for Category C3 & C-High applications
- For External Mounting next to Switchgear, Motor Controls Centers or Panelboards
- Individually Fused & Thermally Protected MOVs
- Large-Block, 34mm square, 50kA MOVs
- Dual Replaceable Module Construction
- Solid State Bidirectional Operation

Physical Specifications

- Relative Humidity Range: 0 -95% non-condensing
- Operating Frequency: 47-63Hz
- Operating Temperature: -25°C (-15°F) to +60°C (140°F)
- Weight: 52 lbs (23.6 kg)
- Standard NEMA 1/12/3R/4 enclosure
- Standard size: 20" x 20" x 7.5" (50.8cm x 50.8cm x 19cm)
- Lug size: #6 - #1/0 AWG
- Typical connection: #6 AWG and 60A breaker

Quality, Standards & Validation

- UL 1449 Third Edition, cUL, UL 1283
- UL file: VZCA.E321351 at www.UL.com
- RoHS-compliant
- IEC 61643, CE
- 10 year warranty (longer optional)
- Burn-In tested Prior to Shipment
- ISO 9001:2008 Quality Management System
- ISO 17025:2005 Laboratory Qualification
- Made in USA





Voltage Code for Electrical System **Surge Current Rating** **Options**

Common North American Systems:
01 = 240/120V Split Phase - 1Ø 3W+Grnd (Fig 1)
02 = 208Y/120V Wye - 3Ø 4W+Grnd (Fig 2)
03 = 240/120V High Leg Delta (B High) (Fig 3)
04 = 480Y/277V Wye - 3Ø 4W+Grnd (Fig 2)
05 = 480V Delta - 3Ø 3W+Grnd (Fig4) & HRG Wye (Available: 400kA, 600kA, 900kA)
08 = 600Y/347V Wye - 3Ø 4W+Grnd (Fig2)

Other Available Systems - Confirmation encouraged:
 15 = 254/127V Split Phase - 1Ø 3W+Grnd (Fig 1)
 18 = 480/277V 2-Pole, (480/240V Split Phase) (Fig 1)
 21 = 220Y/127V Wye - 3Ø 4W+Grnd (Fig 2)
 41 = 520Y/300V Wye - 3Ø 4W+Grnd (Fig 2)
 42 = 415Y/240V Wye - 3Ø 4W+Grnd (Fig 2)
 43 = 400Y/230V Wye - 3Ø 4W+Grnd (Fig 2)
 44 = 440Y/250V Wye - 3Ø 4W+Grnd (Fig 2)
 51 = 480V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6) (Available: 600kA & 900kA)
 06 = 240V Delta - 3Ø 3W+Grnd (Fig 4) (Available: 600kA & 900kA)
 61 = 240V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6) (Available: 600kA & 900kA)
 07 = 380Y/220V Wye - 3Ø 4W+Grnd (Fig 2)
 09 = 600V Delta - 3Ø 3W+Grnd (Fig 4) & HRG Wye (Available: 400kA & 500kA)
 91 = 600V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6) (Available: 400kA & 500kA)
 11 = 120V Single Phase (Fig 5)
 12 = 240V Single Phase (Fig 5) - Not split phase
 13 = 127V Single Phase (Fig 5)
 14 = 300V Single Phase (Fig 5)
 16 = 277V Single Phase (Fig 5)
 17 = 480V Single Phase (1 Hot, 1 Neu, 1 Grnd) (Fig 5)

40 = 400kA/Phase (Voltage Codes 09 & 91 only)
50 = 500kA/Phase (Voltage Codes 09 & 91 only)
60 = 600kA/Phase
80 = 800kA/Phase
90 = 900kA/Phase (Voltage codes 05, 51, 06, 61 only)
1K = 1000kA/Phase

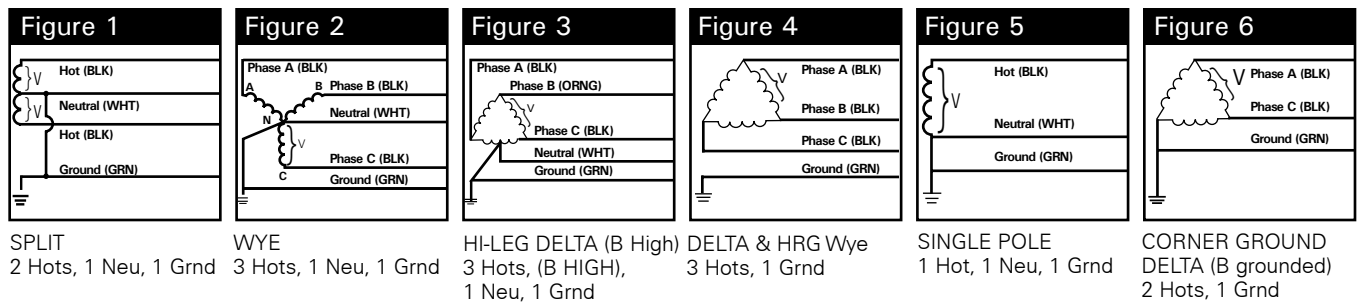
X = Surge Counter, six-digit LCD counter includes maintenance-free Eprom memory backup
 E = Remote Locatable Display on 4 ft Cable custom cable lengths available
 F = Noise Filtering - Extended Range & Attenuation (available on 400kA & 500kA models)
 T = Thru-Door Rotary Disconnect Switch, Bussmann, UL98, E1 enclosure only
 K = Rotary Disconnect Switch, Katko, UL508
 S = Thru-Door Rotary Disconnect Switch, Katko, UL 508, E1 enclosure only

Delete Options - Consult Factory for Order Code
 Delete L-N Protection (reduces kA rating)
 Delete L-G Protection (reduces kA rating)
 Delete N-G Protection (reduces kA rating)
 Delete Noise Filtering

Available Accessory (order separately)
 RM = Remote Monitor

Enclosure Rating

E1 = NEMA 1/12/3R/4 (size: 20" x 20" x 7.5")
4X = NEMA 4X Non-Metallic (size: 24" x 24" x 8") (fiberglass, display inside door)
4S = NEMA 4X Stainless Steel (size: 20" x 20" x 7") (display inside door)
P1 = NEMA 1 pullbox 'indoor' (size: 20" x 20" x 6") - includes 'E' option
FM = NEMA 1 Flush Mount (wall cavity size: 20" x 20" x 6" deep)
 (Dimensions include standard rotary disconnect switch. Optional Thru-Door handle does not increase enclosure sizes.)



Performance Data

Common North American Systems		UL 1449 THIRD Edition (Sept 2009) Test Data: Voltage Protection Ratings (VPR - 3kA)							
		L-N	L-G	N-G	L-L	Type	In	SCCR	MCOV
01	= 240/120V Split Phase	700	700	700	1000	Type 1	20kA	100kA	150
02	= 208Y/120V 3Ø Wye	700	700	700	1000	Type 1	20kA	200kA	150
03	= 240/120V B High Leg Delta	700/1200	700/1200	700/1000	1000/1800	Type 1	20kA	200kA	150 / 320
04	= 480Y/277V 3Ø Wye	1200	1200	1200	1800	Type 1	20kA	200kA	320
05	= 480V 3Ø Delta	-	1800	-	1800	Type 1	20kA	200kA	550
08	= 600Y/347V 3Ø Wye	1500	1500	1500	2500	Type 1	20kA	200kA	420

Other Available Systems:
 Please see supplementary data sheet, contact us at info@apttvss.com, or confirm at www.UL.com using CCN of VZCA
 Optional disconnect switch may increase VPRs

Advanced Protection Technologies
 14550 58th Street North · Clearwater, Florida 33760
 (800) 237-4567 · (727) 535-6339 · Fax (727) 539-8955
 www.apttvss.com · info@apttvss.com





Features:

- **Directly Connected, Discrete Protection Elements Between All Possible Modes**
- **UL 1449 Third Edition Listed (Sept 2009)**
- **600 & 900kA per phase ratings**
- **Type 1 SPD –**
 - All UL required OCP & Safety Coordination included inside
 - Can be installed line-side or load-side of main disconnect
- **20kA Inominal (I_n)**
- **200kA SCCRs (most models)**
- **UL 96A Lightning Protection Master Label compliant**
- **Rotary Disconnect Switch included as Standard Equipment**
- **Dual Redundant Replaceable Module Construction**
- **All MOV suppression elements monitored**

Performance Specifications

- **Directly Connected, Discrete Protection Elements Between All Possible Modes with True 10-Mode Protection**

Surge Capacities	L-N	L-G	L-L	N-G
600kA/phase	200kA	200kA	200kA	200kA
900kA/phase	300kA	300kA	300kA	300kA

- UL 1449 Third Edition Listed, UL 1283 and cUL
- UL 1449-3 Type 1 SPD
- UL 1449-3 tested Inominal (I_n): 20kA
- UL 1449-3 tested SCCR: 200kA & 100kA
- UL 1449-3 Voltage Protection Ratings (VPRs):
 - 208Y/120V: as low as 700V
 - 480Y/277V: as low as 1200V
- Less than 1 nanosecond response time
- Repetitive Impulse: 5,000 hits
- **AC Sinewave True Tracking Filter with EMI/RFI**
- **Filtering up to -50dB from 10kHz to 100MHz**

Diagnostic Monitoring

- 100% monitoring – Every MOV is monitored, incl. N-G
- Green LED Status indicator per phase
- Red LED service indicator
- Audible Alarm with Silence Switch
- Test Function: toggles red service LED, audible alarm & dry contact (if equipped)
- N-G overvoltage detection
- Phase Loss monitoring
- Electrically isolated diagnostic circuitry
- Form C Dry Contacts, 240V, 5A (two sets)
- Optional Surge Counter, six-digit LCD, with test function, reset & no-maintenance Eprom memory

Design Features

- Designed, Manufactured & Tested consistent with:
 - ANSI/IEEE C62.41.1-2002, C62.41.2-2002, and C62.45-2002
 - NEMA LS-1
 - NEC Article 285
 - IEC 61643, CE
- High Energy Parallel Design for Category C3 & C-High applications
- For External Mounting next to Switchgear, Motor Controls Centers or Panelboards
- Individually Fused & Thermally Protected MOVs
- Large-Block, 34mm square, 50kA MOVs
- Dual Redundant Replaceable Module Construction
- Solid State Bidirectional Operation

Physical Specifications

- Relative Humidity Range: 0 -95% non-condensing
- Operating Frequency: 47-63Hz
- Operating Temperature: -25°C (-15°F) to +60°C (140°F)
- Weight: 52 lbs (23.6 kg)
- Standard NEMA 1/12/3R/4 enclosure
- Standard size: 20" x 20" x 7.5" (50.8cm x 50.8cm x 19cm)
- Lug size: #6 - #1/0 AWG
- Typical connection: #6 AWG and 60A breaker

Quality, Standards & Validation

- UL 1449 Third Edition, cUL, UL 1283
- UL file: VZCA.E321351 at www.UL.com
- RoHS-compliant
- IEC 61643, CE
- 10 year warranty (longer optional)
- Burn-In tested Prior to Shipment
- ISO 9001:2008 Quality Management System
- ISO 17025:2005 Laboratory Qualification
- Made in USA





Voltage Code for Electrical System

- Common North American Systems:**
- 01 = 240/120V Split Phase - 1Ø 3W+Grnd (Fig 1)**
 - 02 = 208Y/120V Wye - 3Ø 4W+Grnd (Fig 2)**
 - 03 = 240/120V High Leg Delta (B High) (Fig 3)**
 - 04 = 480Y/277V Wye - 3Ø 4W+Grnd (Fig 2)**

Other Available Systems - Confirmation encouraged:

- 41 = 520Y/300V Wye - 3Ø 4W+Grnd (Fig 2)
- 42 = 415Y/240V Wye - 3Ø 4W+Grnd (Fig 2)
- 43 = 400Y/230V Wye - 3Ø 4W+Grnd (Fig 2)
- 44 = 440Y/250V Wye - 3Ø 4W+Grnd (Fig 2)
- 07 = 380Y/220V Wye - 3Ø 4W+Grnd (Fig 2)

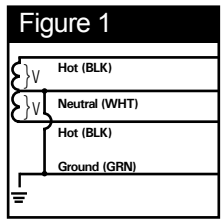


Figure 1
SPLIT
2 Hots, 1 Neu, 1 Grnd

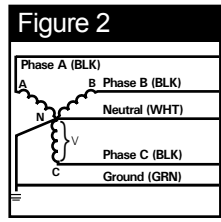


Figure 2
WYE
3 Hots, 1 Neu, 1 Grnd

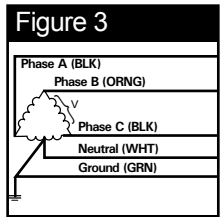


Figure 3
HI-LEG DELTA (B High)
3 Hots, (B HIGH),
1 Neu, 1 Grnd

Surge Current Rating

- 60 = 600kA/Phase**
- 90 = 900kA/Phase**

Options

- X = Surge Counter, six-digit LCD counter includes maintenance-free Eprom memory backup
- E = Remote Locatable Display on 4 ft Cable custom cable lengths available
- F = Noise Filtering - Extended Range & Attenuation (available on 400kA & 500kA models)
- T = Thru-Door Rotary Disconnect Switch, Bussmann, UL98, E1 enclosure only
- K = Rotary Disconnect Switch, Katko, UL 508
- S = Thru-Door Rotary Disconnect Switch, Katko, UL 508, E1 enclosure only

Delete Options - Consult Factory for Order Code
Delete L-N Protection (reduces kA rating)
Delete L-G Protection (reduces kA rating)
Delete N-G Protection (reduces kA rating)
Delete Noise Filtering

Available Accessory (order separately)
RM = Remote Monitor

Enclosure Rating

- E1 = NEMA 1/12/3R/4 (size: 20" x 20" x 7.5")**
- 4X = NEMA 4X Non-Metallic (size: 24" x 24" x 8")**
(fiberglass, display inside door)
- 4S = NEMA 4X Stainless Steel (size: 20" x 20" x 7.5")**
(display inside door)
- P1 = NEMA 1 pullbox 'indoor' (size: 20" x 20" x 6") - includes 'E' option**
- FM = NEMA 1 Flush Mount (wall cavity size: 20" x 20" x 6" deep)**
(Dimensions include standard rotary disconnect switch. Optional Thru-Door handle does not increase enclosure sizes.)

Performance Data

Common North American Systems	UL 1449 THIRD Edition (Sept 2009) Test Data							
	Voltage Protection Ratings (VPR - 3kA)							
	L-N	L-G	N-G	L-L	Type	In	SCCR	MCOV
01 = 240/120V Wye	700	700	700	1200	Type 1	20kA	100kA	150
02 = 208Y/120V 3Ø Wye	700	700	700	1200	Type 1	20kA	200kA	150
03 = 240Y/120V B High Leg Delta	700/1200	700/1200	700	1200/1800	Type 1	20kA	200kA	150 / 320
04 = 480Y/277V 3Ø Wye	1200	1200	1200	1800	Type 1	20kA	200kA	320
Less Common & Specialty								
42 = 415V/240V 3Ø Wye	1200	1200	1200	1800	Type 1	20kA	200kA	320
43 = 400V/230V 3Ø Wye	1200	1200	1200	1800	Type 1	20kA	200kA	320
44 = 440V/250V 3Ø Wye	1200	1200	1200	1800	Type 1	20kA	200kA	320
07 = 380V/220V 3Ø Wye	1200	1200	1200	1800	Type 1	20kA	200kA	320

Other Available Systems:
Please see supplementary data sheet, contact us at info@apttvss.com, or confirm at www.UL.com using CCN of VZCA

Advanced Protection Technologies
14550 58th Street North · Clearwater, Florida 33760
(800) 237-4567 · (727) 535-6339 · Fax (727) 539-8955
www.apttvss.com · info@apttvss.com





Features:

- **UL 1449 Third Edition Listed (Sept 2009)**
- **120kA & 160kA per phase ratings**
- **Type 2 SPD –**
 - All UL required OCP & Safety Coordination included inside
 - Can be installed load-side of main disconnect
- **Replaceable module construction**
- **200kA SCCRs**
- **Voltage Specific Design – Highly configurable**
- **MOV suppression elements monitored**

Performance Specifications

- **Surge Capacities**

	L-N	N-G	
120kA/phase	120kA	120kA	Standard
160kA/phase	160kA	160kA	Optional
- UL 1449 Third Edition Listed, UL 1283 and cUL
- UL 1449-3 Type 2 SPD
- UL 1449-3 tested SCCR: 200kA
- UL 1449-3 Voltage Protection Ratings (VPRs):
 - 208Y/120V: as low as 600V
 - 480Y/277V: as low as 1000V
- Less than 1 nanosecond response time
- Repetitive Impulse: 5,000 hits
- AC Sinewave Tracking Filter with EMI/RFI Filtering up to -50dB from 10kHz to 100MHz

Diagnostic Monitoring

- Green LED Status indicator per phase
- Red LED service indicator
- Audible Alarm with Silence Switch
- Test Function: toggles red service LED, audible alarm
- Redundant monitoring LEDs on modules
- Phase Loss monitoring (toggles LED & dry contacts)
- Electrically isolated circuitry ensures surges do not damage diagnostics
- Optional Form C Dry Contacts, 240V, 5A (two sets)
- Optional Surge Counter, six-digit LCD, with test function, reset & no-maintenance SuperCap energy storage device

Design Features

- Designed, Manufactured & Tested consistent with:
 - ANSI/IEEE C62.41.1-2002, C62.41.2-2002, and C62.45-2002
 - NEMA LS-1
 - NEC Article 285
 - IEC 61643
- High Energy Parallel Design for Category C3 & C-High applications
- For External Mounting next to Switchgear, Motor Controls Centers or Panelboards
- Individually Fused Suppression Modules
- Large-Block 34mm square MOVs
- Replaceable Phase Module Construction
- Thermal Cutout in Each Mode
- Busbar Construction
- Solid State Bidirectional Operation
- Enclosure-less version for OEM available

Physical Specifications

- Relative Humidity Range: 0 -95% non-condensing
- Operating Frequency: 47-63Hz
- Operating Temperature: -25°C (-15°F) to +60°C (140°F)
- Weight: 25 lbs (11.4 kg)
- Standard NEMA 1/12/3R/4 enclosure
- Standard size: 12" x 12" x 7.5" (30.5cm x 30.5cm x 19cm)
- Lug size: #1/0 - #14 AWG
- Typical connection: #6 AWG and 60A breaker

Quality, Standards & Validation

- UL 1449 Third Edition, cUL, UL 1283
- UL file: VZCA.E321351 at www.UL.com
- RoHS-compliant
- IEC 61643, CE
- 10 year warranty (longer optional)
- Burn-In tested Prior to Shipment
- ISO 9001:2008 Quality Management System
- ISO 17025:2005 Laboratory Qualification
- Made in USA



TE/HP MODEL NUMBER CONFIGURATOR & OPTIONS



TE = Transient Eliminator, Listed Type 2 SPD in NEMA 1/3R/04/12 enclosure

XTE = Transient Eliminator, Recognized Type 4 SPD on backplane for installation within gear in Type 2 installation (display on 6' cable)

Model Family

HP = HP Family 120kA rating standard

Option Suffixes (Seperated by slashes -/)

- CL = 160kA Option
- DC = Dry Contacts
Two sets Form C on terminal strip
- FM = Flush Mount enclosure, NEMA 1 only
(wall cavity size: 12"x12"x6" deep)
- SC = Surge Counter

- Available Accessory (order seperately):
RM = Remote Monitor

Voltage Code for Electrical System

Common North American Systems:

- 1 = 240/120V Split Phase - 1Ø 3W+Grnd (Fig 1)**
- 2 = 208Y/120V Wye - 3Ø 4W+Grnd (Fig 2)**
- 3 = 240/120V High Leg Delta (B High) (Fig 3)**
- 4 = 480Y/277V Wye - 3Ø 4W+Grnd (Fig 2)**
- 5 = 480V Delta - 3Ø 3W+Grnd (Fig 4) & HRG Wye**
- 8 = 600Y/347V Wye - 3Ø 4W+Grnd (Fig 2)**

Enclosure Rating

- 04 = Standard: NEMA 1/3R/04/12 (size: 12" x 12" x 7.5")**
- FM = Flush Mount Enclosure, NEMA 1 only**
(wall cavity size: 12" x 12" x 6")
- 4X = NEMA 4X Non-Metallic (size: 14" x 12" x 6")**
(polycarbonate, display inside clear front door)
- 4S = NEMA 4X Stainless Steel (size: 12" x 12" x 6")**
(display inside door)

Other Available Systems - Confirmation encouraged:

- 11 = 120V Single Phase - 1Ø 2W + Grnd (Fig 5)
- 12 = 240V Single Phase - 1Ø 2W + Grnd (Fig 5)
- 51 = 480V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6)
- 6 = 240V Delta - 3Ø 3W+Grnd (Fig 4)
- 61 = 240V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6)
- 7 = 380Y/220V Wye - 3Ø 4W+Grnd (Fig 2)
- 9 = 600V Delta - 3Ø 3W+Grnd (Fig 4) & HRG Wye
- 91 = 600V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6)

(Note: Enclosure-less version for OEM uses XTE prefix)

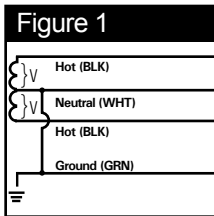


Figure 1
SPLIT
2 Hots, 1 Neu, 1 Grnd

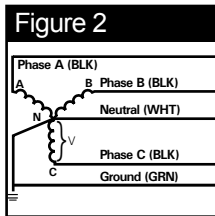


Figure 2
WYE
3 Hots, 1 Neu, 1 Grnd

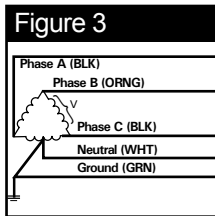


Figure 3
HI-LEG DELTA (B High)
3 Hots, (B HIGH),
1 Neu, 1 Grnd

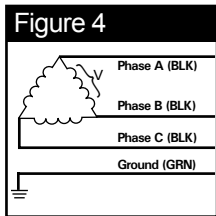


Figure 4
DELTA & HRG WYE
3 Hots, 1 Grnd

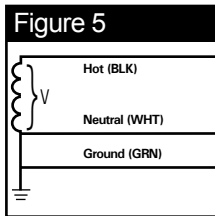


Figure 5
SINGLE POLE
1 Hot, 1 Neu, 1 Grnd

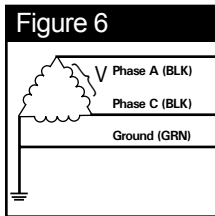


Figure 6
CORNER GROUND
DELTA (B grounded)
2 Hots, 1 Grnd

Performance Data

Common North American Systems	UL 1449 THIRD Edition (Sept 2009) Test Data Voltage Protection Ratings (VPR - 3kA)							
	L-N	N-G	L-L	Type	In	SCCR	MCOV	
01 = 240/120V Split Phase	800	600	1200	Type 2	5kA	200kA	150	
02 = 208Y/120V 3Ø Wye	800	600	1200	Type 2	5kA	200kA	150	
03 = 240Y/120V B High Leg Delta	800/1200	600	1200	Type 2	5kA	200kA	150 / 320	
04 = 480Y/277V 3Ø Wye	1200	1000	1800	Type 2	5kA	200kA	320	
05 = 480V 3Ø Delta	—	—	1800	Type 2	5kA	200kA	550	
08 = 600Y/347V 3Ø Wye	1500	1200	2500	Type 2	5kA	200kA	420	

Other Available Systems:

Please see supplementary data sheet, contact us at info@aptvss.com, or confirm at www.UL.com using CCN of VZCA

Advanced Protection Technologies
14550 58th Street North · Clearwater, Florida 33760
(800) 237-4567 · (727) 535-6339 · Fax (727) 539-8955
www.aptvss.com · info@aptvss.com





Features:

- **UL 1449 Third Edition Listed (Sept 2009)**
- **80kA, 120kA & 160kA per phase ratings**
- **Type 2 SPD –**
 - All UL required OCP & Safety Coordination included inside
 - Can be installed load-side of main disconnect
- **Replaceable module construction**
- **200kA SCCRs**
- **Voltage Specific Design – Highly configurable**
- **MOV suppression elements monitored**

Performance Specifications

- **Surge Capacities**

	<u>L-N</u>	<u>N-G</u>	
80kA/phase	80kA	80kA	Standard
120kA/phase	120kA	120kA	Optional
160kA/phase	160kA	160kA	Optional
- UL 1449 Third Edition Listed, UL 1283 and cUL
- UL 1449-3 Type 2 SPD
- UL 1449-3 tested SCCR: 200kA
- UL 1449-3 Voltage Protection Ratings (VPRs):
 - 208Y/120V: as low as 600V
 - 480Y/277V: as low as 1000V
- Less than 1 nanosecond response time
- Repetitive Impulse: 5,000 hits
- AC Sinewave Tracking Filter with EMI/RFI Filtering up to -50dB from 10kHz to 100MHz

Diagnostic Monitoring

- Green LED Status indicator per phase
- Redundant monitoring LEDs on modules
- Phase Loss monitoring (toggles LED & dry contacts)
- Electrically isolated circuitry ensures surges do not damage diagnostics
- Optional Form C Dry Contacts, 240V, 5A (two sets)

Design Features

- Designed, Manufactured & Tested consistent with:
 - ANSI/IEEE C62.41.1-2002, C62.41.2-2002, and C62.45-2002
 - NEMA LS-1
 - NEC Article 285
 - IEC 61643
- High Energy Parallel Design for Category C3 & C-High applications
- For External Mounting next to Switchgear, Motor Controls Centers or Panelboards
- Individually Fused Suppression Modules
- Large-Block 34mm square MOVs
- Replaceable Phase Module Construction
- Thermal Cutout in Each Mode
- Busbar Construction
- Solid State Bidirectional Operation
- Enclosure-less version for OEM available

Physical Specifications

- Relative Humidity Range: 0 -95% non-condensing
- Operating Frequency: 47-63Hz
- Operating Temperature: -25°C (-15°F) to +60°C (140°F)
- Weight: 25 lbs (11.4 kg)
- Standard NEMA 1/12/3R/4 enclosure
- Standard size: 12" x 12" x 7.5" (30.5cm x 30.5cm x 19cm)
- Lug size: #1/0 - #14 AWG
- Typical connection: #6 AWG and 60A breaker

Quality, Standards & Validation

- UL 1449 Third Edition, cUL, UL 1283
- UL file: VZCA.E321351 at www.UL.com
- RoHS-compliant
- IEC 61643, CE
- 10 year warranty (longer optional)
- Burn-In tested Prior to Shipment
- ISO 9001:2008 Quality Management System
- ISO 17025:2005 Laboratory Qualification
- Made in USA



TE/HPS MODEL NUMBER CONFIGURATOR & OPTIONS



TE = Transient Eliminator, Listed Type 2 SPD in NEMA 1/3R/04/12 enclosure

XTE = Transient Eliminator, Recognized Type 4 SPD on backplane for installation within gear in Type 2 installation (display on 6' cable)

Voltage Code for Electrical System

Common North American Systems:

- 1 = 240/120V Split Phase - 1Ø 3W+Grnd (Fig 1)
- 2 = 208Y/120V Wye - 3Ø 4W+Grnd (Fig 2)
- 3 = 240/120V High Leg Delta (B High) (Fig 3)
- 4 = 480Y/277V Wye - 3Ø 4W+Grnd (Fig 2)
- 5 = 480V Delta - 3Ø 3W+Grnd (Fig 4) & HRG Wye
- 8 = 600Y/347V Wye - 3Ø 4W+Grnd (Fig 2)

Other Available Systems - Confirmation encouraged:

- 11 = 120V Single Phase - 1Ø 2W + Grnd (Fig 5)
- 12 = 240V Single Phase - 1Ø 2W + Grnd (Fig 5)
- 51 = 480V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6)
- 6 = 240V Delta - 3Ø 3W+Grnd (Fig 4)
- 61 = 240V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6)
- 7 = 380Y/220V Wye - 3Ø 4W+Grnd (Fig 2)
- 9 = 600V Delta - 3Ø 3W+Grnd (Fig 4) & HRG Wye
- 91 = 600V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6)

Model Family

HPS = HPS Family 80kA rating standard

Option Suffixes (Seperated by slashes -/)

- CX = 120kA Option
- CL = 160kA Option
- DC = Dry Contacts
Two sets Form C on terminal strip
- FM = Flush Mount enclosure, NEMA 1 only
(wall cavity size: 12"x12"x6" deep)

Available Accessory (order seperately):

- RM = Remote Monitor

Enclosure Rating

04 = Standard: NEMA 1/3R/04/12 (size: 12" x 12" x 7.5")

FM = Flush Mount Enclosure, NEMA 1 only

(wall cavity size: 12" x 12" x 6")

4X = NEMA 4X Non-Metallic (size: 14" x 12"x 6")

(polycarbonate, display inside clear front door)

4S = NEMA 4X Stainless Steel (size: 12" x 12"x 6")

(display inside door)

(Note: Enclosure-less version for OEM uses XTE prefix)

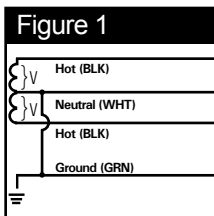


Figure 1
SPLIT
2 Hots, 1 Neu, 1 Grnd

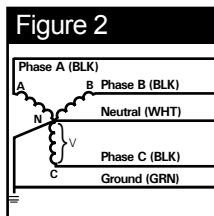


Figure 2
WYE
3 Hots, 1 Neu, 1 Grnd

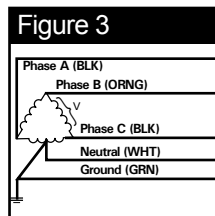


Figure 3
HI-LEG DELTA (B High)
3 Hots, (B HIGH),
1 Neu, 1 Grnd

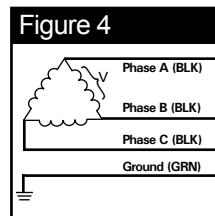


Figure 4
DELTA & HRG WYE
3 Hots, 1 Grnd

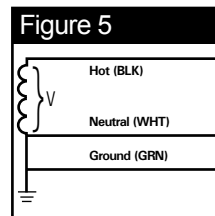


Figure 5
SINGLE POLE
1 Hot, 1 Neu, 1 Grnd

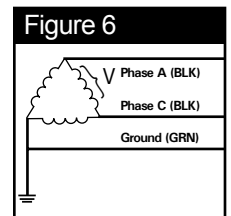


Figure 6
CORNER GROUND
DELTA (B grounded)
2 Hots, 1 Grnd

Performance Data

Common North American Systems		UL 1449 THIRD Edition (Sept 2009) Test Data						
		Voltage Protection Ratings (VPR - 3kA)						
		L-N	N-G	L-L	Type	In	SCCR	MCOV
01	= 240/120V Split Phase	800	600	1200	Type 2	5kA	200kA	150
02	= 208Y/120V 3Ø Wye	800	600	1200	Type 2	5kA	200kA	150
03	= 240Y/120V B High Leg Delta	800/1200	600	1200	Type 2	5kA	200kA	150 / 320
04	= 480Y/277V 3Ø Wye	1200	1000	1800	Type 2	5kA	200kA	320
05	= 480V 3Ø Delta	—	—	1800	Type 2	5kA	200kA	550
08	= 600Y/347V 3Ø Wye	1500	1200	2500	Type 2	5kA	200kA	420

Other Available Systems:

Please see supplementary data sheet, contact us at info@aptvss.com, or confirm at www.UL.com using CCN of VZCA

Advanced Protection Technologies
14550 58th Street North · Clearwater, Florida 33760
(800) 237-4567 · (727) 535-6339 · Fax (727) 539-8955
www.apttvss.com · info@aptvss.com





TE/XGA Series Type 2 Surge Protective Device/SPD/TVSS



Features:

- **UL 1449 Third Edition Listed (Sept 2009)**
- **160kA & 240kA per phase ratings**
- **Type 2 SPD –**
 - All UL required OCP & Safety Coordination included inside
 - Can be installed load-side of main disconnect
- **Replaceable module construction**
- **200kA SCCR**s
- **Voltage Specific – Highly configurable**
- **All MOV suppression elements monitored**
- **Optional Silicon Avalanche Diode (SAD) Hybrid System**

Performance Specifications

Surge Capacities	L-N	L-G	N-G	
160kA/phase	80kA	80kA	120kA	Standard
240kA/phase	120kA	120kA	120kA	Optional
Silicon Avalanche Diode (SAD) Hybrid (120/240 & 208Y/120)				
90kA/phase	50kA	40kA	120kA	Optional
130kA/phase	50kA	80kA	120kA	Optional
170kA/phase	90kA	80kA	120kA	Optional

- UL 1449 Third Edition Listed, cUL, UL 1283 R/C
- UL 1449-3 Type 2 SPD
- UL 1449-3 tested SCCR: 200kA
- UL 1449-3 Voltage Protection Ratings (VPRs):
 - 208Y/120V: as low as 500V
 - 480Y/277V: as low as 900V
- 200kAIR rated fusing
- Less than 1 nanosecond response time
- Repetitive Impulse: 5,000 hits
- AC Sinewave Tracking Filter with EMI/RFI Filtering up to -50dB from 10kHz to 100MHz

Diagnostic Monitoring

- Tri-color Green, Amber, Red LED Status indicator per phase
- Red LED service indicator
- Audible Alarm with Silence Switch
- Test Function: toggles red service LED, audible alarm
- Redundant monitoring LEDs on modules
- Phase Loss monitoring (toggles LED & dry contacts)
- Electrically isolated circuitry ensures surges do not damage diagnostics
- Optional Form C Dry Contacts, 24V, 1A (two sets)
- Optional Surge Counter, six-digit LCD, with test function, reset & no-maintenance SuperCap energy storage device

Design Features

- Designed, Manufactured & Tested consistent with:
 - ANSI/IEEE C62.41.1-2002, C62.41.2-2002, and C62.45-2002
 - NEMA LS-1
 - NEC Article 285
 - IEC 61643
- High Energy Parallel Design for Category C3 & C-High applications
- For External Mounting next to Switchgear, Motor Controls Centers or Panelboards
- Individually Fused Suppression Modes
- Large-Block utility grade 34mm square MOVs
- Replaceable Phase Module Construction
- Thermal Sensitivity in Each Mode
- Busbar Construction
- Solid State Bidirectional Operation
- Busbar connection
- Enclosure-less version for OEM available (XTE Series)

Physical Specifications

- Relative Humidity Range: 0 -95% non-condensing
- Operating Frequency: 47-63Hz
- Operating Temperature: -25°C (-15°F) to +60°C (140°F)
- Weight: 25 lbs (11.5 kg)
- Standard NEMA 1 (Other Enclosures Optional)
- Standard size: 12" x 12" x 6" (30.5cm x 30.5cm x 15cm)
- Lug size: #2 - #14 AWG
- Typical connection: #6 AWG and 60A breaker

Quality, Standards & Validation

- UL 1449 Third Edition, cUL, UL 1283 R/C
- UL file: VZCA.E321351 at www.UL.com
- RoHS-compliant
- IEC 61643, CE
- 10 year warranty (longer optional)
- Burn-In tested Prior to Shipment
- ISO 9001:2008 Quality Management System
- ISO 17025:2005 Laboratory Qualification
- Made in USA



TE/XGA MODEL NUMBER CONFIGURATOR & OPTIONS



TE = Transient Eliminator, Listed Type 2 SPD in NEMA 1 enclosure

XTE = Transient Eliminator, Recognized Type 4 SPD on backplane for installation within gear in Type 2 installation (display on 6' cable)

Voltage Code for Electrical System

Common North American Systems:

- 1 = 240/120V Split Phase - 1Ø 3W+Grnd (Fig 1)
- 2 = 208Y/120V Wye - 3Ø 4W+Grnd (Fig 2)
- 3 = 240/120V High Leg Delta (B High) (Fig 3)
- 4 = 480Y/277V Wye - 3Ø 4W+Grnd (Fig 2)
- 5 = 480V Delta - 3Ø 3W+Grnd (Fig 4) & HRG Wye
- 8 = 600Y/347V Wye - 3Ø 4W+Grnd (Fig 2)

Other Available Systems - Confirmation encouraged:

- 11 = 120V Single Phase - 1Ø 2W + Grnd (Fig 5)
- 12 = 240V Single Phase - 1Ø 2W + Grnd (Fig 5)
- 51 = 480V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6)
- 6 = 240V Delta - 3Ø 3W+Grnd (Fig 4)
- 61 = 240V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6)
- 7 = 380Y/220V Wye - 3Ø 4W+Grnd (Fig 2)
- 9 = 600V Delta - 3Ø 3W+Grnd (Fig 4) & HRG Wye
- 91 = 600V B Corner Grnd Delta, 3Ø 3W+Grnd (Fig 6)

Model Family

XGA = XGA Family 160kA rating standard

Option Suffixes (Separated by slashes -/)

- /240 = 240kA Option
- /090 = 090kA SAD option (120/240V & 208Y/120)
- /130 = 130kA SAD option (120/240V & 208Y/120)
- /170 = 170kA SAD option (120/240V & 208Y/120)
- /DC = Dry Contacts
 - Two sets Form C (24V, 1A)
- /SC = Surge Counter, six digit LCD
- /2S = Dual Surge Counter
 - (12"x12"x6" - display inside door)

Available Accessory (order separately):

RM = Remote Monitor

Enclosure Rating

04 = Standard: NEMA 1/3R/04/12 (size: 12" x 12" x 7.5")

FM = Flush Mount Enclosure, NEMA 1 only

(wall cavity size: 12" x 12" x 6")

4X = NEMA 4X Non-Metallic (size: 14" x 12" x 6")

(polycarbonate, display inside clear front door)

4S = NEMA 4X Stainless Steel (size: 12" x 12" x 6")

(display inside door)

(Note: Enclosure-less version for OEM uses XTE prefix)

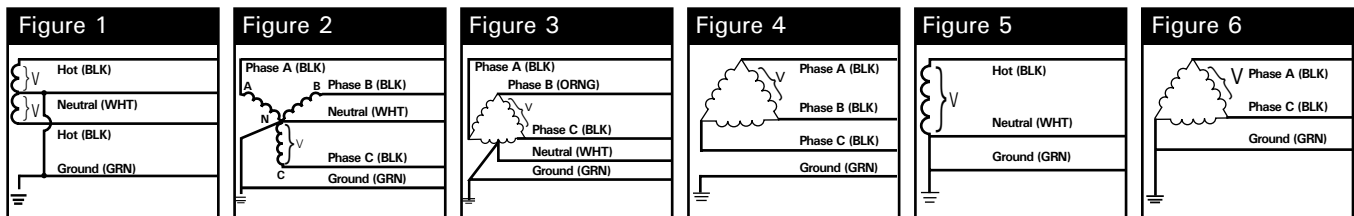


Figure 1 SPLIT 2 Hots, 1 Neu, 1 Grnd
Figure 2 WYE 3 Hots, 1 Neu, 1 Grnd
Figure 3 HI-LEG DELTA (B High) 3 Hots, (B HIGH), 1 Neu, 1 Grnd
Figure 4 DELTA & HRG WYE 3 Hots, 1 Grnd
Figure 5 SINGLE POLE 1 Hot, 1 Neu, 1 Grnd
Figure 6 CORNER GROUND DELTA (B grounded) 2 Hots, 1 Grnd

Performance Data

Common North American Systems		UL 1449 THIRD Edition (Sept 2009) Test Data							
		Voltage Protection Ratings (VPR - 3kA)							
		L-N	L-G	N-G	LL	Type	In	SCCR	MCOV
01	= 240/120V Split Phase	600	600	600	900	Type 2	5kA	200kA	150
02	= 208Y/120V 3Ø Wye	600	600	600	900	Type 2	5kA	200kA	150
03	= 240Y/120V B High Leg Delta	600/900	600/900	600	900/1500	Type 2	5kA	200kA	150 / 320
04	= 480Y/277V 3Ø Wye	900	900	800	1500	Type 2	5kA	200kA	320
05	= 480V 3Ø Delta	—	1500	—	1800	Type 2	5kA	200kA	550
08	= 600Y/347V 3Ø Wye	1200	1500	1200	2500	Type 2	5kA	200kA	420
SAD Models									
01	= 240/120V Split Phase	500	600	600	800	Type 2	5kA	200kA	138
02	= 208Y/120V 3Ø Wye	500	600	600	800	Type 2	5kA	200kA	138

Other Available Systems:

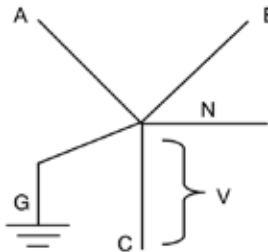
Please see supplementary data sheet, contact us at info@aptvss.com, or confirm at www.UL.com using CCN of VZCA

Advanced Protection Technologies
 14550 58th Street North · Clearwater, Florida 33760
 (800) 237-4567 · (727) 535-6339 · Fax (727) 539-8955
www.aptvss.com · info@aptvss.com



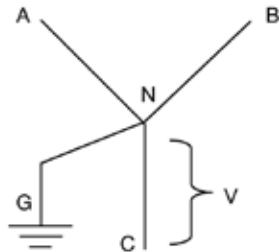
What Electrical System is It?

- Based on secondary side of upstream transformer, NOT by how load is connected
- Most SPD/TVSS miss-orders are misunderstandings related to grounding or neutrals
- Grounded system means that the system is referenced to ground, NOT that there is a safety ground
- By convention, ground wires are not 'counted' as one of the wires (3-wire, 4-wire, etc.)



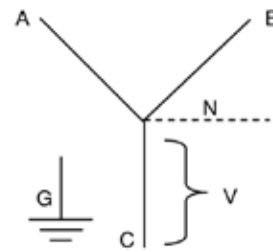
3-phase 4-wire Grounded Wye

Neutral bonded to ground
Neutral pulled into facility
Common system configuration
V = 120V (208Y/120V) APT '2'
V = 277V (480Y/277V) APT '4'
V = 347V (600Y/347V) APT '8'
V = 127V (220Y/127V) APT '21' (non-USA)
V = 220V (380Y/220V) APT '7' (non-USA)



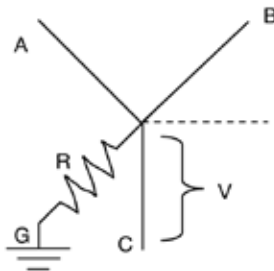
3-phase 4-wire Grounded Wye

Neutral bonded to ground
Neutral NOT pulled into facility
Common system configuration at MCC, pumping and water treatment
V = 120V (208Y/120V) APT '2'
V = 277V (480Y/277V) APT '4'
V = 347V (600Y/347V) APT '8'
V = 127V (220Y/127V) APT '21' (non-USA)
V = 220V (380Y/220V) APT '7' (non-USA)



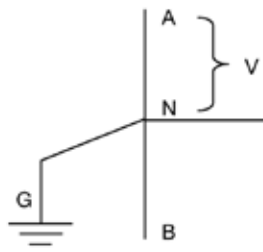
3-phase 4-wire Ungrounded Wye

Neutral NOT bonded to ground
Neutral may or may not be pulled into facility
Rare system configuration; Error/miss-wire?
Note NEC 285.3(2),
V = 120V (208Y/120V) Rare - Call
V = 277V (480Y/277V) APT '5'
V = 347V (600Y/347V) APT '9'
V = 127V (220Y/127V) Call (non-USA)
V = 220V (380Y/220V) Call (non-USA)



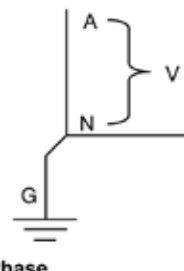
Resistive or Impedance Grounded Wye

Neutral bonded to ground via grounding resistor
Neutral may, or may not, be pulled into facility
Becoming popular system on high-tech
V = 120V (208Y/120V) Rare - Call
V = 277V (480Y/277V) APT '5'
V = 347V (600Y/347V) APT '9'



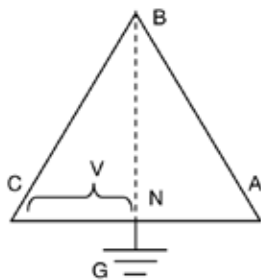
Split-Phase 'Single-Phase'

Neutral bonded to ground
Neutral usually pulled into facility
Very, very Common
V = 120V (120/240V) APT '1'
V = 240V (240/480V) Rare - Call
V = 127V (127/254V) APT '15' (non-USA)



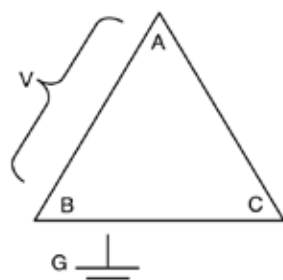
Single-Phase

Verify where Neutral and Ground are!
Often for one leg or one piece of equip.
Neutral bonded to ground
Less common than perceived!
V = 120V APT '11'
V = 240V APT '12'
V = 277V APT '16'
V = 480V APT '17' Call - almost always different
V = 127V APT '13' (non-USA)
V = 220V APT '12' (non-USA)



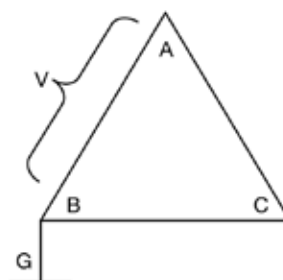
Hi-Leg Grounded Delta

Neutral bonded to ground
Neutral often pulled into facility
Common system configuration
V = 120/240V APT '3'
V = 240/480V Call



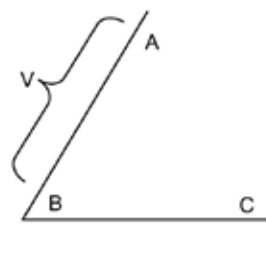
3-phase 3-wire Ungrounded Delta

System has no reference to ground
L-L voltages fixed by transformer, but L-G voltages can vary; Known to become unstable.
V = 240V APT '6'
V = 480V APT '5'
V = 600V APT '9'
Note NEC 285.3(2)
Common system configuration at older industrial facilities, normally not used on new construction



3-phase 3-wire Corner Grounded Delta

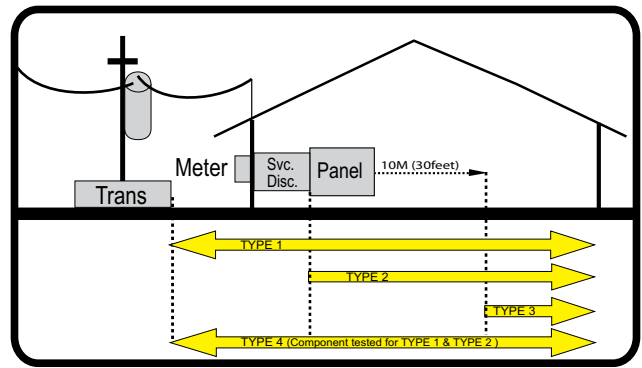
System has reference to ground because B phase is grounded
V = 240V APT '61'
V = 480V APT '51'
V = 600V APT '91'
Note NEC 285.3(2)
Occasionally seen at industrial facilities, normally not used on new construction



Open Delta

3-phase 3 or 4-wire
Could be ungrounded, corner grounded or Hi-leg
Very rare, tend to be rural
Various solutions, Call for info

UL 1449 Third Edition & NEC® Article 285 Changes ~ A Simplified Explanation



UL 1449 Third Edition (Sept 2009) and 2008 NEC® Article 285 generated substantial changes regarding SPDs. There is new emphasis on installation location, identified as Types 1, 2, 3 and 4, outlined below.

SPD Types

(see 2008 NEC® Article 285 and/or UL 1449-3):

Type 1: Installation on the line side or load side of the service disconnect overcurrent device, and may be used in Type 2 or Type 4 installations. Examples: Surge arresters, lightning arrestors, meter hubs, metering cabinets, ran out of breaker positions, etc.

Type 2: Downstream of service disconnect; probably will connect via breaker. Examples: Switchboards, power panels, panelboards, equipment, motors, pumps, etc.

Type 3: Plug-in SPD

Type 4: Usually treated as a UL Recognized component in a larger UL Listed finished product. Examples: UL 508 control panels, medical equipment, wind turbines, signage, conveyers, elevators, etc.

For further details about the UL 1449 Third Edition changes please review APT's Engineer Bulletin titled: *UL 1449 Third Edition* on our website: www.apt surge.com or contact APT Engineering Sales at 800-237-4567 or info@apt surge.com. We also recommend you review the latest edition of NEC Article 285 for code requirements.

All of APT's SPDs comply with the latest regulatory actions and are UL 1449 Listed (see opposite page on How to Verify UL listings for SPDs).

APT Type 1 SPDs:

Type 1 SPDs are evaluated more rigorously by UL 1449 for 2008 NEC® Article 285 compliance. Type 1 SPDs and their connecting leads have been evaluated for line side applications without need for supplemental overcurrent protection. Type 1 SPDs include internal overcurrent protection. As a generalization, there are practical maintenance reasons for installing on the load side of the main overcurrent device (i.e. Type 2 installation). When connected on load side of main disconnect, we recommend connecting via an appropriate sized breaker for the SPDs conductors. The circuit breaker serves as a disconnect switch and provides NEC® imposed short circuit protection to the conductors in Type 2 or 4 applications. (cUL models are Type 2 due to different cUL criteria.)

APT Type 2 SPDs:

APT Type 2 SPDs include internal overcurrent protection. Type 2 SPDs are suitable for installation on the load side of the service disconnect overcurrent device. APT's devices feature internal overcurrent and overtemperature protection that will disconnect effected surge suppression components at the end of their useful life, but will maintain power to the load – now unprotected.

Frequently Asked Questions

WHAT IS TVSS OR SPD?

TVSS is an abbreviation for “transient voltage surge suppressor”. This term is giving way to “surge protective device” or SPD. A TVSS or SPD is a device that attenuates (reduces in magnitude) random, high energy, short duration overvoltages caused by lightning, utilities, switching, etc. Such anomalies occur in the form of voltage and current spikes with a duration of less than half an ac voltage cycle. These high energy power spikes can damage sensitive electronic equipment, such as computers, instrumentation, and process controllers.

HOW DO SPDs WORK?

Surge Suppressors divert high energy power away from a load by providing a lower impedance path to common point earth ground. This is similar in concept to pressure relief valves that protect water heaters from overpressure. Surge suppressors used most often for protection of AC Power have metal oxide varistors (MOVs) connected in parallel.

WHAT TYPES OF COMPONENTS MAKE UP A SPD?

The device most commonly used in AC voltage surge suppressors are MOVs, a solid-state device made of zinc oxide materials.

MOVs are voltage sensitive semiconductors, which change from high impedance to low impedance when sensing an overvoltage condition. MOVs are packaged for specific voltages and current handling capacities.

Other devices (more typically found in DC applications) include single junction diodes and gas tubes that ionize at preset voltages.

WHERE ARE SPDs INSTALLED?

AC voltage surge suppressors are typically installed in these three areas: at a utility service entrance for protection of an entire facility, in distribution panelboards and switchboards for protection of sensitive downstream loads; connected to a wall outlet for individual protection of a specific piece of equipment, such as a computer or solid-state controller.

WHAT FEATURES SHOULD BE CONSIDERED WHEN SELECTING SPDs?

Two important areas to consider during the selection of a surge suppressor are performance and safety, and include the following criteria:

Performance: 1) surge current capacity; and 2) clamping voltage.

Safety: 1) the individual suppression circuit should be fused to clear an inoperative MOV during an extreme transient event, and 2) provide overcurrent protection for the surge suppressor during a fault condition.

WHAT IS CLAMPING VOLTAGE?

Clamping voltage, also referred to as peak let through or suppressed voltage rating, is the amount of voltage a surge suppressor permits to pass through it to the attached load during a transient event. Clamping voltage is a performance measurement of a surge suppressor’s ability to attenuate a transient. For example, a surge suppressor might limit a 6,000V surge so that only 400V is ‘visible’ to the load. The clamping voltage is 400V. This performance value is confirmed by Underwriters Laboratories during tests conducted while evaluating a surge suppressor for listing.

WHAT IS SURGE CURRENT CAPACITY?

Surge current capacity is the maximum amount of surge current that a surge suppressor can pass for a single transient event. This level is used to indicate the protection capacity of a particular surge suppressor design, and when specifying surge suppressors. For example, in a high exposure application with very large transients present from lightning, a higher level surge current capacity might be desired. Be aware that surges have natural limitations and that larger surge current capacity tends to add redundancy rather than the implied ability to handle an extremely large surge. For example, an entire lightning strike cannot go through wire; much like a fire hose has difficulty shooting through a soda straw. Consequently, suppressors do not need to be sized for entire lightning strikes. There are valid reasons for adding excess surge current capacity for redundancy reasons.

WHAT SURGE CURRENT CAPACITY IS REQUIRED?

Surge current capacity is dependent on the application and the amount of required protection. The selection of the proper surge suppressor is not an exact science and cannot be scientifically calculated from a standard algorithm.

Questions to consider when specifying the proper surge current capacity for a surge suppressor include:

- What is the geographic location of the facility and it’s susceptibility to lightning? (For example, Florida is a high-lightning area; California is a low lightning area.)
- Is the facility in a rural or urban setting?
- Is the facility the tallest building around?
- Is the facility at the end of the utility grid?
- If it is an existing facility, what is its power quality history?

Based on the above information, and taking into account the cost of protection, the following is a good rule of thumb: a surge suppressor with a surge current capacity in the range of 100kA to 240kA would be used in conjunction with a service entrance panelboard or switchboard. A surge suppressor with a surge current capacity in the range of 80kA to 160kA would be used in conjunction with a downstream panelboard.



Don't Leave Your Home UNPROTECTED

Protect your investments by preventing surge damage and enjoy the peace of mind that **surgeassure™ Whole Home Surge Protection** can provide.



**STOP SURGES
BEFORE THEY GET IN!**

For more information on the Residential Products please request a copy of the surgeassure™ catalog

Visit
www.surgeassure.com
or call
800.727.0669

FOR TECHNICAL OR APPLICATION
QUESTIONS, CONTACT:
800.237.4567



**ADVANCED PROTECTION
TECHNOLOGIES INC.**

14550 58th Street North, Clearwater, FL 33760

info@aptsurge.com

www.aptsurge.com