



# STANDARD UNITS

ST-SSLA / ST-SKLA / ST-SDLA / ST-LSEA / ST-SMLA / ST-SILAM / ST-SHDLAM

# ST-SSLx

90kA Per Phase ANSI/UL 1449-2006 3rd Edition

A=Type 2 SPD, I<sub>2</sub> = 10kA B=Type 2 SPD,  $I_n = 20kA$ C=Type 1 SPD, I<sub>x</sub> = 10kA D=Type 1 SPD,  $I_2 = 20kA$ 



\* Based on 3 Phase Wve. 4 Wire and Ground L = Nominal Discharge Current per ANSI/UL 1449-2006

#### **KEY FEATURES**

Discrete "All Mode" Circuitry: Directly Connected Protection Elements in "All Modes" (10 modes for 3 phase Wye circuits) as recommended by IEEE Std. 1100-2005

**Industry Leading Measured Limiting** Voltage (let-through) Performance

Local & Remote Diagnostics

Independent Verification of Performance and Safety

No moving parts or springs - No mechanical or electro-mechanical thermal/ over-current protection

Component-Level, Thermal Fusing

Patent Pending, Internal, Circuit Board Mounted, Over-Current Fusing

#### GENERAL

#### **Application**

The ST-SSLx series is one of the most versatile units in our product line. This device is intended for general load applications at locations ranging from individual equipment disconnects to small service entrances. It is extremely effective in limiting internally generated transients when used on lighting or HVAC panels.

#### Warrantv

#### 25 Years Unlimited Free Replacement

#### IEEE -C62.41.1 & C62.41.2-2002 environments

Suitable for Categories: A, B & C (Most Severe Electrical Environments)

#### IFC Environments

Suitable for use in IEC 61643-11 environments

#### Circuit Topology

Parallel configured Voltage Responsive Circuitry circuit design incorporating component-level, thermal fusing and circuit board mounted, Patented internal over-current fusing methodology with discrete "All Mode" protection (10 modes for 3 phase Wye units). All protection circuits are encapsulated in our high- dielectric compound to promote long component life and protection from the weather and vibration.

#### **Protection Modes**

Industry-best practice of dedicated protection components for all operational modes of the electrical system. Discrete L-N, L-L (Normal Mode) and L-G, N-G (Common Mode) Example: Directly Connected Protection Elements in All 10 modes for a 3 phase, 4 wire, Wye system, (i.e. 3 L-N modes, 3 L-L modes, 3 L-G modes and 1 N-G mode).

#### **Input Power**

50-400 Hz (60 Hz nominal)

#### **Temperature Rating**

Up to 80°C

#### Insertion Loss Data (L-N)

Frequency	280 kHz	1 MHz	Max Attenuation & Freq.
Attenuation	3 dB	17 dB	40 dB @ 135 kHz

#### Standard Enclosure

NEMA 1 Rated Standard Enclosure (Other enclosure options available)

#### Nominal Discharge Current (I<sub>n</sub>) Rating

20 kA (ST-SSLB, ST-SSLD) 10 kA (ST-SSLC, ST-SSLA)

#### Diagnostics

Green LED's, one per phase, normally on. A wide range of optional diagnostics is available.

#### Circuit Interrupt

Internal component-level, thermal fusing and patented circuit board mounted, over-current fusing. No external over-current protection required.

**UL Short Circuit Current Rating** 

200 kAIC

## **Product Qualifications**

Listed to ANSI/UL 1449-2006 3rd Edition by UL (E340498), CSA (MC#241804);

UL1283\* and CE Compliant (\*Type 2 SPDs only)

ISO 9001-2008 Certified Manufacturing Facility

2004/2006 TVSS Customer Value Enhancement Award from Frost & Sullivan

#### **OPTIONS**

AC = Internal Audible Alarm w/ test button, mute switch and red LED

**C** = Form C dry relay contacts

**D1** = Integral, non-fused disconnect switch (TVSS unit mounts inside)

**D3** = Same as D1, except no external handle

**E1** = Hub on side of enclosure

K = Gasket Kit

**LP** = Remote LED indicators in individual NEMA 4X housings

M = NEMA 12 Steel Enclosure

P = Flush Mount Plate

**R2** = Remote lights on separate circuit board in separate enclosure

**S** = Surge counter w/ reset button

W = NEMA 4 Steel Enclosure

**X** = NEMA 4X Composite Enclosure (Box-in-box)

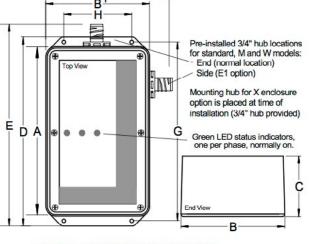
X1 = NEMA 4X Composite Enclosure with Clear Lid (Box-in-box) **X2** = NEMA 1, 2, 3, 3S, 4, 4X and 12 composite enclosure

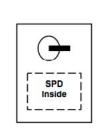
**XS** = NEMA 4X Stainless Steel Enclosure

External Accessories: EACS = Externally mounted diagnostic module, combines AC, C, and S options (Also available: EAC, EC, ECS, and ES) Other options may be available upon request.

#### MECHANICAL (Model Number Ex: ST-SSLC3Y2D3 / Base Model: ST-SSL / SPD type & Nominal Discharge Current (I\_) Rating: A, B, C, D / Voltage Code: 3Y2 / Options Code: D3)

Enclosure Dimensions								
Inches	Standard	1	closure Op	tions				
(mm)	Model	М	w	X,X1				
Α	8.25	10.00	10.00	12.00				
	(210)	(254)	(254)	(305)				
В	5.00	8.00	8.00	10.50				
	(127)	(204)	(204)	(267)				
С	3.00	4.00	4.00	6.00				
	(77)	(102)	(102)	(153)				
D	9.37	11.50	11.50	12.50				
	(238)	(293)	(293)	(337)				
E	9.48	12.00	12.00	11.73				
	(242)	(305)	(305)	(299)				
F	6.23	9.00	9.00	11.00				
	(159)	(229)	(229)	(280)				
G	8.87	10.75	10.75	12.00				
	(226)	(274)	(274)	(305)				
Н	3.37	6.00	6.00	8.00				
	(86)	(153)	(153)	(204)				
Туре	NEMA 1	NEMA	NEMA 4	NEMA 4X				
	ABS	12 Steel	Steel	Composite				
lbs. (kg)	5	14	14	11				
	(2.27)	(6.36)	(6.36)	(4.99)				
Flush mount trim plate available for standard and "M" option models.								





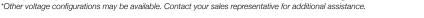
Integral Disconnect D1, D3 option configuration (Enclosure 12x10x6) (CSA)

Circuit Connection: #10 AWG wire (pre-installed)

Voltage	ANSI	ANSI/UL 1449-2006 (Third Edition) Voltage Protection Rating (VPR)						
Code	L-N	HL-N	L-G	HL-G	N-G	L-L	HL-L	
1S1	500	-	500	-	500	1000	-	
3Y1	500	-	500	-	500	1000	-	
3D1	500	1000	500	1000	500	1000	1000	
3Y2	1000	-	1000	-	1200	1800	-	
3N2	-	-	1000	-	-	1000	-	
3N4	-	-	1800	-	-	1800	-	

Voltage Code	Circuit Type	Peak Surge Current	MCOV	ANSI/IEEE C62.41.1 <sup>™</sup> -2002, C62.41.2 <sup>™</sup> -2002, C62.45 <sup>™</sup> -2002, and C62.62 <sup>™</sup> -2010 Measured Limiting Voltages (tested with 6 inches of lead length external to the enclosure per Clauses 6.1.1 of C62.62 <sup>™</sup> -2010 and 37.4.4 of ANSI/UL 1449-2006)			
Odde		Current		Test Mode	Cat A 30 Ω 100 kHz Ring Wave 6 kV 200 A @ 90° Phase Angle	Category C (High) 10 kA 8/20 Current Driven Test <sup>†</sup>	
		30 kA L-N	150 V	L-N	296 V	1011 V	
404	120/240V 1Ø (Split)	30 kA L-L	300 V	L-L	473 V	1291 V	
1S1	(3 wire + ground)	30 kA L-G 30 kA N-G	150 V	L-G	297 V	991 V	
		180 kA Total	150 V	N-G	578 V	1431 V	
		30 kA L-N	150 V	L-N	296 V	1068 V	
0)/4	120/208 V 3Ø Wye	30 kA L-L	300 V	L-L	473 V	1381 V	
311	(4 wire + ground) 30 kA h	30 kA L-G 30 kA N-G	150 V	L-G	297 V	1048 V	
		300 kA Total	150 V	N-G	578 V	1431 V	
		30 kA L-N	150 V	L-N	296 V	1091 V	
	120/240 V 3Ø	30 kA L-L	320 V	HL-N	443 V	1411 V	
3D1	High- Leg Delta	30 kA HL-N 30 kA L-G	300 V	L-L	473 V	1381 V	
301	(4 wire + ground)	30 kA HL-G	150 V	L-G	297 V	1076 V	
	(4 wire + ground)	30 kA N-G	320 V	HL-G	450 V	1371 V	
		300 kA Total	150 V	N-G	578 V	1431 V	
		30 kA L-N	320 V	L-N	443 V	1334 V	
3Y2	277/480V 3Ø Wye	30 kA L-L 30 kA L-G	550 V	L-L	721 V	1981 V	
312	(4 wire + ground)	30 kA L-G 30 kA N-G	320 V	L-G	450 V	1304 V	
		300 kA Total	320 V	N-G	942 V	1721 V	
21.10	240 V 3Ø Delta (NN)	30 kA L-L	320 V	L-L	450 V	1381 V	
3N2	(3 wire + ground)	30 kA L-G 180 kA Total	320 V	L-G		1304 V	
	480V 3Ø Delta (NN)	30 kA L-L	550 V	L-L	721 V	1981 V	
3N4	(3 wire + ground)	30 kA L-G 180 kA Total	550 V	L-G		2144 V	

sured Limiting Voltage (MLV) Test Parameters: Positive polarity, Category A: Line power applied, Category C: No line power applied, Voltages are peak (±10%). Measured Limiting Voltages are measured from the insertion point on the sine wave to the peak of the surge for powered tests. Each phase is the average of the modes within that mode of protection. In order to duplicate the results, the specified mode of protection must be tested in all modes (except N-G) and averaged together. (Individual mode or shot results may vary by more than 10%. Scope Settings: Time Base = 10 microseconds per division, Sampling Rate = 2.5 Gioasamples/sec, Bandwidth = 400 MHz (200 MHz for Cat C), Probes; Tektronix P5100/P6015A, These settings help to assure MLV results are accurate), All tests performed with 6" lead length (external to the enclosure), simulating actual installed performance. The MLVs reported above are certified by Third-Party, Independent Testing. Individual test reports are available upon request †Category C High, 10 kA is equivalent to the MLV recorded during the Nominal Discharge Current (L) Test from C62.62™-2010 and ANSI/UL 1449-2006.





# ST-SKLx

120kA Per Phase ANSI/UL 1449-2006 3rd Edition

A=Type 2 SPD, I<sub>2</sub> = 10kA B=Type 2 SPD,  $I_n = 20kA$ C=Type 1 SPD, I<sub>x</sub> = 10kA D=Type 1 SPD,  $I_2 = 20kA$ 



\* Based on 3 Phase Wve. 4 Wire and Ground L = Nominal Discharge Current per ANSI/UL 1449-2006

#### **KEY FEATURES**

Discrete "All Mode" Circuitry: Directly Connected Protection Elements in "All Modes" (10 modes for 3 phase Wye circuits) as recommended by IEEE Std. 1100-2005

**Industry Leading Measured Limiting** Voltage (let-through) Performance

Local & Remote Diagnostics

Independent Verification of Performance and Safety

No moving parts or springs - No mechanical or electro-mechanical thermal/ over-current protection

Component-Level, Thermal Fusing

Patent Pending, Internal, Circuit Board Mounted, Over-Current Fusing

#### GENERAL

#### **Application**

The ST-SKLx series is one of the most versatile units in our product line. This device is intended for general load applications at locations ranging from individual equipment disconnects to small service entrances. It is extremely effective in limiting internally generated transients when used on lighting or HVAC panels.

#### Warrantv

#### 25 Years Unlimited Free Replacement

#### IEEE -C62.41.1 & C62.41.2-2002 environments

Suitable for Categories: A, B & C (Most Severe Electrical Environments)

#### IFC Environments

Suitable for use in IEC 61643-11 environments

## Circuit Topology

Parallel configured Voltage Responsive Circuitry circuit design incorporating component-level, thermal fusing and circuit board mounted, Patented internal over-current fusing methodology with discrete "All Mode" protection (10 modes for 3 phase Wye units). All protection circuits are encapsulated in our high- dielectric compound to promote long component life and protection from the weather and vibration.

#### **Protection Modes**

Industry-best practice of dedicated protection components for all operational modes of the electrical system. Discrete L-N, L-L (Normal Mode) and L-G, N-G (Common Mode) Example: Directly Connected Protection Elements in All 10 modes for a 3 phase, 4 wire, Wye system, (i.e. 3 L-N modes, 3 L-L modes, 3 L-G modes and 1 N-G mode).

#### Input Power

50-400 Hz (60 Hz nominal)

#### **Temperature Rating**

Up to 80°C

#### Insertion Loss Data (L-N)

Frequency	280 kHz	1 MHz	Max Attenuation & Freq.
Attenuation	3 dB	17 dB	40 dB @ 135 kHz

#### Standard Enclosure

NEMA 1 Rated Standard Enclosure (Other enclosure options available)

#### Nominal Discharge Current (I<sub>n</sub>) Rating

20 kA (ST-SKLB, ST-SKLD) 10 kA (ST- SKLC, ST-SKLA)

#### Diagnostics

Green LED's, one per phase, normally on. A wide range of optional diagnostics is available.

Internal component-level, thermal fusing and patented circuit board mounted, over-current fusing. No external over-current protection required.

**UL Short Circuit Current Rating** 200 kAIC

#### **Product Qualifications**

Listed to ANSI/UL 1449-2006 3rd Edition by UL (E340498), CSA (MC#241804);

UL1283\* and CE Compliant (\*Type 2 SPDs only)

ISO 9001-2008 Certified Manufacturing Facility

2004/2006 TVSS Customer Value Enhancement Award from Frost & Sullivan

## **OPTIONS**

AC = Internal Audible Alarm w/ test button, mute switch and red LED

**C** = Form C dry relay contacts

**D1** = Integral, non-fused disconnect switch (TVSS unit mounts inside)

**D3** = Same as D1, except no external handle

**E1** = Hub on side of enclosure

K = Gasket Kit

**LP** = Remote LED indicators in individual NEMA 4X housings

M = NEMA 12 Steel Enclosure

P = Flush Mount Plate

**R2** = Remote lights on separate circuit board in separate enclosure

**S** = Surge counter w/ reset button

W = NEMA 4 Steel Enclosure

**X** = NEMA 4X Composite Enclosure (Box-in-box)

X1 = NEMA 4X Composite Enclosure with Clear Lid (Box-in-box)

**X2** = NEMA 1, 2, 3, 3S, 4, 4X and 12 composite enclosure

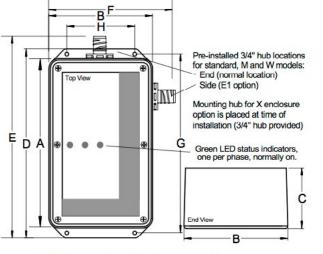
**XS** = NEMA 4X Stainless Steel Enclosure

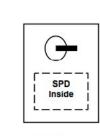
External Accessories: EACS = Externally mounted diagnostic module, combines AC, C, and S options (Also available: EAC, EC, ECS, and ES) Other options may be available upon request.

#### MECHANICAL (Model Number Ex: ST-SKLC3Y2D3 / Base Model: ST-SKL / SPD type & Nominal Discharge Current (I\_) Rating: A, B, C, D / Voltage Code: 3Y2 / Options Code: D3)

Enclosure Dimensions								
Inches	Standard	Enclosure Options						
(mm)	Model	М	w	X, X1				
Α	8.25	10.00	10.00	12.00				
	(210)	(254)	(254)	(305)				
В	5.00	8.00	8.00	10.50				
	(127)	(204)	(204)	(267)				
С	3.00	4.00	4.00	6.00				
	(77)	(102)	(102)	(153)				
D	9.37	11.50	11.50	12.50				
	(238)	(293)	(293)	(318)				
Е	9.48	12.00	12.00	13.23				
	(242)	(305)	(305)	(337)				
F	6.23	9.00	9.00	11.73				
	(159)	(229)	(229)	(299)				
G	8.87	10.75	10.75	12.00				
	(226)	(274)	(274)	(305)				
Н	3.37	6.00	6.00	8.00				
	(86)	(153)	(153)	(204)				
Туре	NEMA 1	NEMA	NEMA 4	NEMA 4X				
	ABS	12 Steel	Steel	Composite				
lbs. (kg)	5	14	14	11				
	(2.27)	(6.36)	(6.36)	(4.99)				

Flush mount trim plate available for standard and "M" option models





Integral Disconnect D1, D3 option configuration (Enclosure 12x10x6) (CSA)

Circuit Connection: #10 AWG wire (pre-installed)

Voltage	ANSI/UL 1449-2006 (Third Edition) Voltage Protection Rating (VPR)						
Code	L-N	HL-N	L-G	HL-G	N-G	L-L	HL-L
1S1	500	-	500	-	500	1000	-
3Y1	500	-	500	-	500	1000	-
3D1	500	1000	500	1000	500	1000	1000
3Y2	1000	-	1000	-	1200	1800	-
3N2	-	-	1000	-	-	1000	-
3N4	-	-	1800	-	-	1800	-

/oltage Circuit Type	Peak Surge Current	MCOV	Measu	EE C62.41.1 <sup>™</sup> -2002, C62.41.2 <sup>™</sup> -2002 red Limiting Voltages (tested with 6 ir ire per Clauses 6.1.1 of C62.62 <sup>™</sup> -2010	nches of lead length external to the	
Code		Current		Test Mode	Cat A 30 Ω 100 kHz Ring Wave 6 kV 200 A @ 90° Phase Angle	Category C (High) 10 kA 8/20 Current Driven Test <sup>†</sup>
		40 kA L-N	150 V	L-N	296 V	1011 V
	120/240V 1Ø (Split)	40 kA L-L	300 V	L-L	473 V	1291 V
1S1	(3 wire + ground)	40 kA L-G	150 V	L-G	297 V	991 V
	(o who i ground)	40 kA N-G 240 kA Total	150 V	N-G	578 V	1431 V
		40 kA L-N	150 V	L-N	296 V	1068 V
	120/208 V 3Ø Wye	40 kA L-L	300 V	L-L	473 V	1381 V
3Y1 (4 wire + ground)	40 kA L-G	150 V	L-G	297 V	1048 V	
	(1.1.1.0.1.9.00.1.0)	40 kA N-G 400 kA Total	150 V	N-G	578 V	1431 V
		40 kA L-N	150 V	L-N	296 V	1091 V
	100/0401/06	40 kA L-L	320 V	HL-N	443 V	1411 V
	120/240 V 3Ø	40 kA HL-N	300 V	L-L	473 V	1381 V
3D1	High- Leg Delta	40 kA L-G	150 V	L-G	297 V	1076 V
	(4 wire + ground)	40 kA HL-G 40 kA N-G	320 V	HL-G	450 V	1371 V
		400 kA Total	150 V	N-G	578 V	1431 V
		40 kA L-N	320 V	L-N	443 V	1334 V
	277/480V 3Ø Wye	40 kA L-L	550 V	L-L	721 V	1981 V
3Y2	(4 wire + ground)	40 kA L-G	320 V	L-G	450 V	1304 V
	(+ Wile i glodila)	40 kA N-G 400 kA Total	320 V	N-G	942 V	1721 V
	240 V 3Ø Delta (NN)	40 kA L-L	320 V	L-L	450 V	1381 V
3N2	(3 wire + ground)	40 kA L-G	320 V	L-G	430 V	1304 V
	(o wile + glouild)	240 kA Total	320 V	L-G		1304 V
01.14	480V 3Ø Delta (NN)	40 kA L-L	550 V	L-L	721 V	1981 V
3N4	(3 wire + ground)	40 kA L-G 240 kA Total	550 V	L-G		2144 V

Measured Limiting Voltage (MLV) Test Parameters: Positive polarity. Category A: Line power applied, Category C: No line power applied, Voltages are peak (±10%), Measured Limiting Voltages are measured from the insertion point on the sine wave to the peak of the surge for powered tests. Each phase is the average of the modes within that mode of protection. In order to duplicate the results, the specified mode of protection must be tested in all modes (except N-G) and averaged together. (Individual mode or shot results may vary by more than 10%. Scope Settings: Time Base = 10 microseconds per division, Sampling Rate = 2.5 Gioasamples/sec, Bandwidth = 400 MHz (200 MHz for Cat C), Probes; Tektronix P5100/P6015A, These settings help to assure MLV results are accurate), All tests performed with 6" lead length (external to the enclosure), simulating actual installed performance. The MLVs reported above are certified by Third-Party, Independent Testing. Individual test reports are available upon request †Category C High, 10 kA is equivalent to the MLV recorded during the Nominal Discharge Current (I,) Test from C62.62<sup>TM</sup>-2010 and ANSI/UL 1449-2006. \*Other voltage configurations may be available. Contact your sales representative for additional assistance



# ST-SDLx

180kA Per Phase ANSI/UL 1449-2006 3rd Edition

A=Type 2 SPD, I<sub>2</sub> = 10kA B=Type 2 SPD,  $I_n = 20kA$ C=Type 1 SPD, I<sub>x</sub> = 10kA D=Type 1 SPD,  $I_2 = 20kA$ 



\* Based on 3 Phase Wve. 4 Wire and Ground L = Nominal Discharge Current per ANSI/UL 1449-2006

#### **KEY FEATURES**

Discrete "All Mode" Circuitry: Directly Connected Protection Elements in "All Modes" (10 modes for 3 phase Wye circuits) as recommended by IEEE Std. 1100-2005

**Industry Leading Measured Limiting** Voltage (let-through) Performance

UL 1283 EMI/RFI Parallel Configured

Local & Remote Diagnostics

Independent Verification of Performance and Safety

No moving parts or springs - No mechanical or electro-mechanical thermal/ over-current protection

Patent Pending, Internal, Circuit Board Mounted, Over-Current Fusing

#### GENERAL

#### **Application**

The ST-SDLA series is one of the most versatile units in our product line. This device is intended for general load applications at locations ranging from individual equipment disconnect to small service entrances. It is extremely effective in limiting internally generated transients when used on lighting or HVAC panels.

#### Warrantv

#### 25 Years Unlimited Free Replacement

IEEE -C62.41.1 & C62.41.2-2002 environments

Suitable for Categories: A, B & C (Most Severe Electrical Environments)

#### IFC Environments

Suitable for use in IEC 61643-11 environments

#### Circuit Topology

Parallel configured circuit design incorporating component-level, thermal fusing and circuit board mounted, Patented internal over-current fusing methodology with discrete "All Mode" protection (10 modes for 3 phase Wye units). All protection circuits are encapsulated in our high-dielectric compound to promote long component life and protection from the weather and vibration.

#### **Protection Modes**

ndustry-best practice of dedicated protection components for all operational modes of the electrical system. Discrete L-N, L-L (Normal Mode) and L-G, N-G (Common Mode) Example: Directly Connected Protection Elements in All 10 modes for a 3 phase, 4 wire, Wye system, (i.e. 3 L-N modes, 3 L-L modes, 3 L-G modes and 1 N-G mode).

#### **Input Power**

50-400 Hz (60 Hz nominal)

#### Temperature Rating

Up to 80°C

#### Insertion Loss Data (L-N)

Frequency	280 kHz	1 MHz	Max Attenuation & Freq.
Attenuation	3 dB	17 dB	40 dB @ 135 kHz

#### Standard Enclosure

NEMA 1 Rated Standard Enclosure (Other enclosure options available)

## Nominal Discharge Current (I) Rating

20 kA (ST-SDLB, ST-SDLD) 10 kA (ST-SDLC, ST-SDLA)

Green LED's, one per phase, normally on. A wide range of optional diagnostics is available.

Internal component-level, thermal fusing and patented circuit board mounted, over-current fusing. No external over-current protection required.

#### **UL Short Circuit Current Rating**

200 kAIC

#### **Product Qualifications**

Listed to ANSI/UL 1449-2006 3rd Edition by UL (E340498), CSA (MC#241804);

UL1283\* and CE Compliant (\*Type 2 SPDs only)

ISO 9001-2008 Certified Manufacturing Facility

2004/2006 TVSS Customer Value Enhancement Award from Frost & Sullivan

#### **OPTIONS**

AC = Internal Audible Alarm w/ test button, mute switch and red LED

**C** = Form C dry relay contacts

**D1** = Integral, non-fused disconnect switch (TVSS unit mounts inside)

**D3** = Same as D1, except no external handle

**E1** = Hub on side of enclosure

K = Gasket Kit

**LP** = Remote LED indicators in individual NEMA 4X housings

M = NEMA 12 Steel Enclosure

P = Flush Mount Plate

**R2** = Remote lights on separate circuit board in separate enclosure

**S** = Surge counter w/ reset button

W = NEMA 4 Steel Enclosure

**X** = NEMA 4X Composite Enclosure (Box-in-box)

X1 = NEMA 4X Composite Enclosure with Clear Lid (Box-in-box)

**X2** = NEMA 1, 2, 3, 3S, 4, 4X and 12 composite enclosure

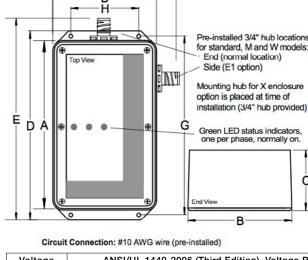
**XS** = NEMA 4X Stainless Steel Enclosure

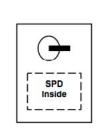
External Accessories: EACS = Externally mounted diagnostic module, combines AC, C, and S options (Also available: EAC, EC, ECS, and ES) Other options may be available upon request.

## MECHANICAL (Model Number Ex: ST-SDLC3Y2D3/ Base Model: ST-SDL / SPD type & Nominal Discharge Current (In) Rating: A, B, C, D / Voltage Code: 3Y2 / Options Code: D3)

	<b>Enclosure Dimensions</b>									
Inches	Standard	Enclosure Options								
(mm)	Model	М	w	X, X1						
Α	8.25	10.00	10.00	12.00						
	(210)	(254)	(254)	(305)						
В	5.00	8.00	8.00	10.50						
	(127)	(204)	(204)	(267)						
С	3.00	4.00	4.00	6.00						
	(77)	(102)	(102)	(153)						
D	9.37	11.50	11.50	12.50						
	(238)	(293)	(293)	(318)						
E	9.48	12.00	12.00	13.23						
	(242)	(305)	(305)	(337)						
F	6.23	9.00	9.00	11.73						
	(159)	(229)	(229)	(299)						
G	8.87	10.75	10.75	12.00						
	(226)	(274)	(274)	(305)						
Н	3.37	6.00	6.00	8.00						
	(86)	(153)	(153)	(204)						
Туре	NEMA 1	NEMA	NEMA 4	NEMA 4X						
	ABS	12 Steel	Steel	Composite						
lbs. (kg)	5	14	14	11						
	(2.27)	(6.36)	(6.36)	(4.99)						
	·									

Flush mount trim plate available for standard and "M" option models





Integral Disconnect D1, D3 option configuration (Enclosure 12x10x6) (CSA)

Voltage	ANSI	I/UL 1449-2006 (Third Edition) Voltage Protection Rating (VPR)					
Code	L-N	HL-N	L-G	HL-G	N-G	L-L	HL-L
1S1	500	-	500	-	500	1000	-
3Y1	500	-	500	-	500	1000	-
3D1	500	1000	500	1000	500	1000	1000
3Y2	1000	-	1000	-	1200	1800	-
3N2	-	-	1000	-	-	1000	-
3N4	-	-	1800	-	-	1800	-

Voltage Code	Circuit Type	Peak Surge	MCOV	ANSI/IEEE C62.41.1 <sup>™</sup> -2002, C62.41.2 <sup>™</sup> -2002, C62.45 <sup>™</sup> -2002, and C62.62 <sup>™</sup> -2010 Measured Limiting Voltages (tested with 6 inches of lead length external to the enclosure per Clauses 6.1.1 of C62.62 <sup>™</sup> -2010 and 37.4.4 of ANSI/UL 1449-2006)			
Code		Current		Test Mode	Cat A 30 Ω 100 kHz Ring Wave 6 kV 200 A @ 90° Phase Angle	Category C (High) 10 kA 8/20 Current Driven Test <sup>†</sup>	
		60 kA L-N	150 V	L-N	296 V	1011 V	
404	120/240V 1Ø (Split)	60 kA L-L	300 V	L-L	473 V	1291 V	
1S1	(3 wire + ground)	60 kA L-G 60 kA N-G	150 V	L-G	297 V	991 V	
	, ,	360 kA Total	150 V	N-G	578 V	1431 V	
		60 kA L-N	150 V	L-N	296 V	1068 V	
3Y1	120/208 V 3Ø Wye	60 kA L-L 60 kA L-G	300 V	L-L	473 V	1381 V	
311	(4 wire + ground)	60 kA L-G 60 kA N-G	150 V	L-G	297 V	1048 V	
		600 kA Total	150 V	N-G	578 V	1431 V	
		60 kA L-N	150 V	L-N	296 V	1091 V	
	120/240 V 3Ø	60 kA L-L	320 V	HL-N	443 V	1411 V	
3D1	High- Leg Delta	60 kA HL-N 60 kA L-G	300 V	L-L	473 V	1381 V	
301	(4 wire + ground)	60 kA HL-G	150 V	L-G	297 V	1076 V	
	(4 Wife + ground)	60 kA N-G	320 V	HL-G	450 V	1371 V	
		600 kA Total	150 V	N-G	578 V	1431 V	
		60 kA L-N	320 V	L-N	443 V	1334 V	
3Y2	277/480V 3Ø Wye	60 kA L-L 60 kA L-G	550 V	L-L	721 V	1981 V	
312	(4 wire + ground)	60 kA N-G	320 V	L-G	450 V	1304 V	
		600 kA Total	320 V	N-G	942 V	1721 V	
	240 V 3Ø Delta (NN)	60 kA L-L	320 V	L-L	450 V	1381 V	
3N2	(3 wire + ground)	60 kA L-G 360 kA Total	320 V	L-G		1304 V	
0114	480V 3Ø Delta (NN)	60 kA L-L	550 V	L-L	721 V	1981 V	
3N4	(3 wire + ground)	60 kA L-G 360 kA Total	550 V	L-G		2144 V	

Measured Limiting Voltage (MLV) Test Parameters: Positive polarity. Category A: Line power applied, Category C: No line power applied, Voltages are peak (±10%), Measured Limiting Voltages are measured from the insertion point on the sine wave to the peak of the surge for powered tests. Each phase is the average of the modes within that mode of protection. In order to duplicate the results, the specified mode of protection must be tested in all modes (except N-G) and averaged together. (Individual mode or shot results may vary by more than 10%. Scope Settings: Time Base = 10 microseconds per division, Sampling Rate = 2.5 Gioasamples/sec, Bandwidth = 400 MHz (200 MHz for Cat C), Probes; Tektronix P5100/P6015A, These settings help to assure MLV results are accurate), All tests performed with 6" lead length (external to the enclosure), simulating actual installed performance. The MLVs reported above are certified by Third-Party, Independent Testing. Individual test reports are available upon request

†Category C High, 10 kA is equivalent to the MLV recorded during the Nominal Discharge Current (I,) Test from C62.62<sup>TM</sup>-2010 and ANSI/UL 1449-2006.

\*Other voltage configurations may be available. Contact your sales representative for additional assistance



# ST-LSEx

240kA Per Phase ANSI/UL 1449-2006 3rd Edition

A=Type 2 SPD, I<sub>2</sub> = 10kA B=Type 2 SPD,  $I_n = 20kA$ C=Type 1 SPD, I<sub>x</sub> = 10kA D=Type 1 SPD,  $I_2 = 20kA$ 



\* Based on 3 Phase Wve. 4 Wire and Ground L = Nominal Discharge Current per ANSI/UL 1449-2006

#### **KEY FEATURES**

Discrete "All Mode" Circuitry: Directly Connected Protection Elements in "All Modes" (10 modes for 3 phase Wye circuits) as recommended by IEEE Std. 1100-2005

**Industry Leading Measured Limiting** Voltage (let-through) Performance

Local & Remote Diagnostics

Independent Verification of Performance and Safety

No moving parts or springs - No mechanical or electro-mechanical thermal/ over-current protection

Component-Level, Thermal Fusing

Patent Pending, Internal, Circuit Board Mounted, Over-Current Fusing

#### GENERAL

#### **Application**

The ST-LSEx series is one of the most versatile units in our product line. This device is intended for general load applications at locations ranging from individual equipment disconnects to service entrances. It is extremely effective in limiting internally generated transients when used on lighting or HVAC panels.

#### Warrantv

#### 25 Years Unlimited Free Replacement

#### IEEE -C62.41.1 & C62.41.2-2002 environments

Suitable for Categories: A, B & C (Most Severe Electrical Environments)

#### IFC Environments

Suitable for use in IEC 61643-11 environments

#### Circuit Topology

Parallel configured combination Voltage Responsive Circuitry circuit design incorporating component-level, thermal fusing and circuit board mounted, Patented internal over-current fusing methodology with discrete "All Mode" protection (10 modes for 3 phase Wye units). All protection circuits are encapsulated in our high-dielectric compound to promote long component life and protection from the weather and vibration.

#### **Protection Modes**

Industry-best practice of dedicated protection components for all operational modes of the electrical system. Discrete L-N, L-L (Normal Mode) and L-G, N-G (Common Mode) Example: Directly Connected Protection Elements in All 10 modes for a 3 phase, 4 wire, Wye system, (i.e. 3 L-N modes, 3 L-L modes, 3 L-G modes and 1 N-G mode).

#### **Input Power**

50-400 Hz (60 Hz nominal)

#### **Temperature Rating**

Up to 80°C

#### Insertion Loss Data (L-N)

Frequency	280 kHz	1 MHz	Max Attenuation & Freq.
Attenuation	3 dB	17 dB	40 dB @ 135 kHz

#### Standard Enclosure

NEMA 1 Rated Standard Enclosure (Other enclosure options available)

#### Nominal Discharge Current (I<sub>n</sub>) Rating

20 kA (ST-LSEB, ST-LSED) 10 kA (ST-LSEC, ST-LSEA)

#### Diagnostics

Green LED's, one per phase, normally on. A wide range of optional diagnostics is available.

Internal component-level, thermal fusing and patented circuit board mounted, over-current fusing. No external over-current protection required.

**UL Short Circuit Current Rating** 200 kAIC

#### **Product Qualifications**

Listed to ANSI/UL 1449-2006 3rd Edition by UL (E340498), CSA (MC#241804);

UL1283\* and CE Compliant (\*Type 2 SPDs only)

ISO 9001-2008 Certified Manufacturing Facility

2004/2006 TVSS Customer Value Enhancement Award from Frost & Sullivan

#### **OPTIONS**

AC = Internal Audible Alarm w/ test button, mute switch and red LED

**C** = Form C dry relay contacts

**D1** = Integral, non-fused disconnect switch (TVSS unit mounts inside)

**D3** = Same as D1, except no external handle

**E1** = Hub on side of enclosure

K = Gasket Kit

**LP** = Remote LED indicators in individual NEMA 4X housings

M = NEMA 12 Steel Enclosure

P = Flush Mount Plate

**R2** = Remote lights on separate circuit board in separate enclosure

**S** = Surge counter w/ reset button

W = NEMA 4 Steel Enclosure

**X** = NEMA 4X Composite Enclosure (Box-in-box)

X1 = NEMA 4X Composite Enclosure with Clear Lid (Box-in-box)

**X2** = NEMA 1, 2, 3, 3S, 4, 4X and 12 composite enclosure

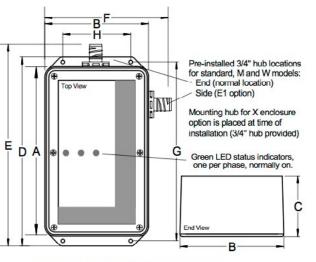
**XS** = NEMA 4X Stainless Steel Enclosure

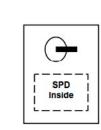
External Accessories: EACS = Externally mounted diagnostic module, combines AC, C, and S options (Also available: EAC, EC, ECS, and ES) Other options may be available upon request.

#### MECHANICAL (Model Number Ex: ST-LSEC3Y2D3 / Base Model: ST-LSE / SPD type & Nominal Discharge Current (I\_) Rating: A, B, C, D / Voltage Code: 3Y2 / Options Code: D3)

	Enclo	sure Dime	nsions	
Inches	Standard	En	closure Op	tions
(mm)	Model	М	w	Х
Α	8.25	10.00	10.00	12.00
	(210)	(254)	(254)	(305)
В	5.00	8.00	8.00	10.50
	(127)	(204)	(204)	(267)
С	3.00	4.00	4.00	6.00
	(77)	(102)	(102)	(153)
D	9.37	11.50	11.50	12.50
	(238)	(293)	(293)	(318)
E	9.48	12.00	12.00	13.23
	(242)	(305)	(305)	(337)
F	6.23	9.00	9.00	11.73
	(159)	(229)	(229)	(299)
G	8.87	10.75	10.75	12.00
	(226)	(274)	(274)	(305)
Н	3.37	6.00	6.00	8.00
	(86)	(153)	(153)	(204)
Туре	NEMA 1	NEMA	NEMA 4	NEMA 4X
	ABS	12 Steel	Steel	Composite
lbs. (kg)	5	14	14	11
	(2.27)	(6.36)	(6.36)	(4.99)

ibs. (kg)	(2.27)	(6.36)	(6.36)	(4.99)	
Flush mount	trim plate availal	ole for standar	d and "M" op	tion models.	





Integral Disconnect D1, D3 option configuration (Enclosure 12x10x6) (CSA)

Circuit Connection: #10 AWG wire (pre-installed)

Voltage	ANSI/UL 1449-2006 (Third Edition) Voltage Protection Rating (VPR)								
Code	L-N	HL-N	L-G	HL-G	N-G	L-L	HL-L		
1S1	500	-	500	-	500	1000	-		
3Y1	500	-	500	-	500	1000	-		
3D1	500	1000	500	1000	500	1000	1000		
3Y2	1000	-	1000	-	1200	1800	-		
3N2	-	-	1000	-	-	1000	-		
3N4	-	-	1800	-	-	1800	-		

/oltage Code	Circuit Type	Peak Surge Current	MCOV	ANSI/IEEE C62.41.1 <sup>™</sup> -2002, C62.41.2 <sup>™</sup> -2002, C62.45 <sup>™</sup> -2002, and C62.62 <sup>™</sup> -2010 Measured Limiting Voltages (tested with 6 inches of lead length external to the enclosure per Clauses 6.1.1 of C62.62 <sup>™</sup> -2010 and 37.4.4 of ANSI/UL 1449-2006)			
		Guirent		Test Mode	Cat A 30 Ω 100 kHz Ring Wave 6 kV 200 A @ 90° Phase Angle	Category C (High) 10 kA 8/20 Current Driven Test <sup>†</sup>	
		80 kA L-N	150 V	L-N	289 V	1011 V	
101	120/240V 1Ø (Split)	80 kA L-L	300 V	L-L	436 V	1291 V	
1S1	(3 wire + ground)	80 kA L-G 80 kA N-G	150 V	L-G	296 V	991 V	
		480 kA Total	150 V	N-G	570 V	1431 V	
		80 kA L-N	150 V	L-N	289 V	1068 V	
0)/1	120/208 V 3Ø Wye (4 wire + ground)	80 kA L-L	300 V	L-L	436 V	1381 V	
3Y1		80 kA L-G 80 kA N-G	150 V	L-G	296 V	1048 V	
		800 kA Total	150 V	N-G	570 V	1431 V	
		80 kA L-N	150 V	L-N	289 V	1091 V	
	120/240 V 3Ø	80 kA L-L	320 V	HL-N	410 V	1411 V	
3D1	High- Leg Delta	80 kA HL-N 80 kA L-G	300 V	L-L	436 V	1381 V	
301	(4 wire + ground)	80 kA HL-G	150 V	L-G	296 V	1076 V	
	(4 wire + ground)	80 kA N-G	320 V	HL-G	420 V	1371 V	
		800 kA Total	150 V	N-G	570 V	1431 V	
		80 kA L-N	320 V	L-N	410 V	1334 V	
3Y2	277/480V 3Ø Wye	80 kA L-L 80 kA L-G	550 V	L-L	686 V	1981 V	
312	(4 wire + ground)	80 kA N-G	320 V	L-G	420 V	1304 V	
		800 kA Total	320 V	N-G	806 V	1721 V	
	240 V 3Ø Delta (NN)	80 kA L-L	320 V	L-L	420 V	1381 V	
3N2	(3 wire + ground)	80 kA L-G 480 kA Total	320 V	L-G		1304 V	
	480V 3Ø Delta (NN)	80 kA L-L	550 V	L-L	686 V	1981 V	
3N4	(3 wire + ground)	80 kA L-G 480 kA Total	550 V	L-G		2144 V	

from the insertion point on the sine wave to the peak of the surge for powered tests. Each phase is the average of the modes within that mode of protection. In order to duplicate the results, the specified mode of protection must be tested in all modes (except N-G) and averaged together. (Individual mode or shot results may vary by more than 10%. Scope Settings: Time Base = 10 microseconds per division, Sampling Rate = 2.5 Gioasamples/sec, Bandwidth = 400 MHz (200 MHz for Cat C), Probes; Tektronix P5100/P6015A, These settings help to assure MLV results are accurate), All tests performed with 6" lead length (external to the enclosure), simulating actual installed performance. The MLVs reported above are certified by Third-Party, Independent Testing. Individual test reports are available upon request †Category C High, 10 kA is equivalent to the MLV recorded during the Nominal Discharge Current (L) Test from C62.62TM-2010 and ANSI/UL 1449-2006. \*Other voltage configurations may be available. Contact your sales representative for additional assistance



# ST-SMLx

300kA Per Phase ANSI/UL 1449-2006 3<sup>rd</sup> Edition

A=Type 2 SPD,  $I_n = 10kA$ B=Type 2 SPD,  $I_n = 20kA$ C=Type 1 SPD,  $I_n = 10kA$ D=Type 1 SPD,  $I_n = 20kA$ 



\* Based on 3 Phase Wye, 4 Wire and Ground  $I_n =$  Nominal Discharge Current per ANSI/UL 1449-2006

#### **KEY FEATURES**

Discrete "All Mode" Circuitry: Directly Connected Protection Elements in "All Modes" (10 modes for 3 phase Wye circuits) as recommended by IEEE Std. 1100-2005

Industry Leading Measured Limiting Voltage (let-through) Performance

Local & Remote Diagnostics

Independent Verification of Performance and Safety

No moving parts or springs - No mechanical or electro-mechanical thermal/ over-current protection

Component-Level, Thermal Fusing

Patent Pending, Internal, Circuit Board Mounted, Over-Current Fusing

#### GENERAL

#### **Application**

The ST-SMLx series was developed to answer a broad variety of demands from our customers. This device is robust enough to handle the punishment of service entrance applications while providing protection from transients that are generated inside the facility. The constant bombardment of this combination of transients can damage valuable equipment and waste budget dollars.

#### Warrantv

#### 25 Years Unlimited Free Replacement

#### IEEE -C62.41.1 & C62.41.2-2002 environments

Suitable for Categories: A, B & C (Most Severe Electrical Environments)

#### **IEC Environments**

Suitable for use in IEC 61643-11 environments

## **Circuit Topology**

Parallel configured Voltage Responsive Circuitry circuit design incorporating component-level, thermal fusing and circuit board mounted, Patented internal over-current fusing methodology with discrete "All Mode" protection (10 modes for 3 phase Wye units). All protection circuits are encapsulated in our high- dielectric compound to promote long component life and protection from the weather and vibration.

#### **Protection Modes**

Industry-best practice of dedicated protection components for all operational modes of the electrical system. Discrete L-N, L-L (Normal Mode) and L-G, N-G (Common Mode) Example: Directly Connected Protection Elements in All 10 modes for a 3 phase, 4 wire, Wye system, (i.e. 3 L-N modes, 3 L-L modes, 3 L-G modes and 1 N-G mode).

#### **Input Power**

50-400 Hz (60 Hz nominal)

#### Temperature Rating

Up to 80°C

#### Insertion Loss Data (L-N)

Frequency	280 kHz	1 MHz	Max Attenuation & Freq.
Attenuation	3 dB	17 dB	40 dB @ 135 kHz

#### Standard Enclosure

NEMA 1 Rated Standard Enclosure (Other enclosure options available)

#### Nominal Discharge Current (I<sub>n</sub>) Rating

20 kA (ST-SMLB, ST-SMLD) 10 kA (ST-SMLC, ST-SMLA)

#### Diagnostics

Green LED's, one per phase, normally on. A wide range of optional diagnostics is available.

#### Circuit Interrupt

Internal component-level, thermal fusing and patented circuit board mounted, over-current fusing. No external over-current protection required.

UL Short Circuit Current Rating 200 kAIC

## Product Qualifications

Listed to ANSI/UL 1449-2006 3rd Edition by UL (E340498), CSA (MC#241804);

UL1283\* and CE Compliant (\*Type 2 SPDs only)

ISO 9001-2008 Certified Manufacturing Facility

2004/2006 TVSS Customer Value Enhancement Award from Frost & Sullivan

#### OPTIONS

AC = Internal Audible Alarm w/ test button, mute switch and red LED

**C** = Form C dry relay contacts

**D1** = Integral, non-fused disconnect switch (TVSS unit mounts inside)

**D3** = Same as D1, except no external handle

**E1** = Hub on side of enclosure

K = Gasket Kit

**LP** = Remote LED indicators in individual NEMA 4X housings

M = NEMA 12 Steel Enclosure

P = Flush Mount Plate

R2 = Remote lights on separate circuit board in separate enclosure

**S** = Surge counter w/ reset button

W = NEMA 4 Steel Enclosure

**X** = NEMA 4X Composite Enclosure (Box-in-box)

X1 = NEMA 4X Composite Enclosure with Clear Lid (Box-in-box)

 $\mathbf{X2} = \mathsf{NEMA}\ 1,\,2,\,3,\,3\mathsf{S},\,4,\,4\mathsf{X}$  and 12 composite enclosure

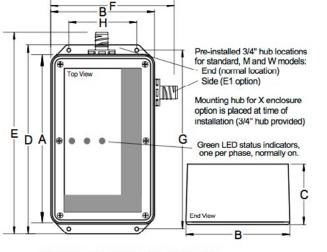
**XS** = NEMA 4X Stainless Steel Enclosure

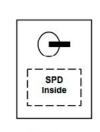
External Accessories: EACS = Externally mounted diagnostic module, combines AC, C, and S options (Also available: EAC, EC, ECS, and ES)

Other options may be available upon request.

## MECHANICAL (Model Number Ex: ST-SMLC3Y2D3 / Base Model: ST-SML / SPD type & Nominal Discharge Current (I,) Rating: A, B, C, D / Voltage Code: 3Y2 / Options Code: D3)

	Enclo	sure Dime	nsions				
Inches	Standard	Enclosure Options					
(mm)	Model	М	w	X,X1			
Α	8.25	10.00	10.00	12.00			
	(210)	(254)	(254)	(305)			
В	5.00	8.00	8.00	10.50			
	(127)	(204)	(204)	(267)			
С	3.00	4.00	4.00	6.00			
	(77)	(102)	(102)	(153)			
D	9.37	11.50	11.50	12.50			
	(238)	(293)	(293)	(318)			
E	9.48	12.00	12.00	13.23			
	(242)	(305)	(305)	(337)			
F	6.23	9.00	9.00	11.73			
	(159)	(229)	(229)	(299)			
G	8.87	10.75	10.75	12.00			
	(226)	(274)	(274)	(305)			
Н	3.37	6.00	6.00	8.00			
	(86)	(153)	(153)	(204)			
Туре	NEMA 1	NEMA	NEMA 4	NEMA 4X			
	ABS	12 Steel	Steel	Composite			
lbs. (kg)	5	14	14	11			
	(2.27)	(6.36)	(6.36)	(4.99)			
Flush mount	trim plate availa	ble for standar	d and "M" op	tion models.			





Integral Disconnect D1, D3 option configuration (Enclosure 12x10x6) (CSA)

Circuit Connection: #10 AWG wire (pre-installed)

Voltage	ANSI/UL 1449-2006 (Third Edition) Voltage Protection Rating (						
Code	L-N	HL-N	L-G	HL-G	N-G	L-L	HL-L
1S1	500	-	500	-	500	1000	-
3Y1	500	-	500	-	500	1000	-
3D1	500	1000	500	1000	500	1000	1000
3Y2	1000	-	1000	-	1200	1800	-
3N2	-	-	1000	-	-	1000	-
3N4	-	-	1800	-	-	1800	-

MEASUF	RED LIMITING VOLTAG	GE PERFORMAN	CE AND EI	ECTRICAL	. SPECIFICATIONS			
Voltage Code	Circuit Type	Peak Surge Current	MCOV	ANSI/IEEE C62.41.1 <sup>™</sup> -2002, C62.41.2 <sup>™</sup> -2002, C62.45 <sup>™</sup> -2002, and C62.62 <sup>™</sup> -2010 Measured Limiting Voltages (tested with 6 inches of lead length external to the enclosure per Clauses 6.1.1 of C62.62 <sup>™</sup> -2010 and 37.4.4 of ANSI/UL 1449-2006)				
Code		Current		Test Mode	Cat A 30 Ω 100 kHz Ring Wave 6 kV 200 A @ 90° Phase Angle	Category C (High) 10 kA 8/20 Current Driven Test <sup>†</sup>		
191	120/240V 1Ø (Split)	100 kA L-N 100 kA L-L	150 V 300 V	L-N L-L	289 V 436 V	1011 V 1291 V		

Code	Code Cuit Type Cui		IVIOOV					
Code		Current		Test Mode	Cat A 30 Ω 100 kHz Ring Wave 6 kV 200 A @ 90° Phase Angle	Category C (High) 10 kA 8/20 Current Driven Test <sup>†</sup>		
1S1	120/240V 1Ø (Split) (3 wire + ground)	100 kA L-N 100 kA L-L 100 kA L-G 100 kA N-G 600 kA Total	150 V 300 V 150 V 150 V	L-N L-L L-G N-G	289 V 436 V 296 V 570 V	1011 V 1291 V 991 V 1431 V		
3Y1	120/208 V 3Ø Wye (4 wire + ground)	100 kA L-N 100 kA L-L 100 kA L-G 100 kA N-G 1000 kA Total	150 V 300 V 150 V 150 V	L-N L-L L-G N-G	289 V 436 V 296 V 570 V	1068 V 1381 V 1048 V 1431 V		
3D1	120/240 V 3Ø High- Leg Delta (4 wire + ground)	100 kA L-N 100 kA L-L 100 kA HL-N 100 kA L-G 100 kA HL-G 100 kA N-G 1000 kA Total	150 V 320 V 300 V 150 V 320 V 150 V	L-N HL-N L-L L-G HL-G N-G	289 V 410 V 436 V 296 V 420 V 570 V	1091 V 1411 V 1381 V 1076 V 1371 V 1431 V		
3Y2	277/480V 3Ø Wye (4 wire + ground)	100 kA L-N 100 kA L-L 100 kA L-G 100 kA N-G 1000 kA Total	320 V 550 V 320 V 320 V	L-N L-L L-G N-G	410 V 686 V 420 V 806 V	1334 V 1981 V 1304 V 1721 V		
3N2	240 V 3Ø Delta (NN) (3 wire + ground)	100 kA L-L 100 kA L-G 600 kA Total	320 V 320 V	L-L L-G	420 V	1381 V 1304 V		
3N4	480V 3Ø Delta (NN) (3 wire + ground)	100 kA L-L 100 kA L-G 600 kA Total	550 V 550 V	L-L L-G	686 V	1981 V 2144 V		

Measured Limiting Voltage (MLV) Test Parameters: Positive polarity, Category A: Line power applied, Category C: No line power applied, Voltages are peak (±10%). Measured Limiting Voltages are measured from the insertion point on the sine wave to the peak of the surge for powered tests. Each phase is the average of the modes within that mode of protection. In order to duplicate the results, the specified mode of protection must be tested in all modes (except N-G) and averaged together. (Individual mode or shot results may vary by more than 10%. Scope Settings: Time Base = 10 microseconds per division, Sampling Rate = 2.5 Gigasamples/sec, Bandwidth = 400 MHz (200 MHz for Cat C), Probes: Tektronix P5100/P6015A. These settings help to assure MLV results are accurate). All tests performed with 6" lead length (external to the enclosure), simulating actual installed performance. The MLVs reported above are certified by Third-Party, Independent Testing. Individual test reports are available upon request. †Category C High, 10 kA is equivalent to the MLV recorded during the Nominal Discharge Current (I) Test from C62.62" 2010 and ANSI/UL 1449-2006.

\*Other voltage configurations may be available. Contact your sales representative for additional assistance.



# ST-SILxM 360kA Per Phase



\* Based on 3 Phase Wye, 4 Wire and Ground

#### **KEY FEATURES**

Discrete "All Mode" Circuitry: Directly Connected Protection Elements in "All Modes" (10 modes for 3 phase Wve circuits) as recommended by NEMA LS-1 and IEEE Std. 1100-2005

Industry Leading Measured Limiting Voltage (let-through) Performance

UL 1283 Listed EMI/RFI Parallel Configured Optimal Response Circuitry™

Local & Remote Diagnostics

Independent Verification of Performance and Safety

No moving parts or springs - No mechanical or electro-mechanical thermal/ over-current protection

Rated as Type 1 or Type 2 SPD

Component-Level, Thermal Fusing

Patent Pending, Internal, Circuit Board Mounted, Over-Current Fusing

#### **GENERAL**

#### **Application**

The ST-SILxM series was developed to answer a broad variety of demands from our customers. This device is robust enough to handle the punishment of service entrance applications while providing protection from transients that are generated inside the facility. The constant bombardment of these combination transients damages valuable equipment and wastes budget dollars.

#### Warranty

#### 25 Years Unlimited Free Replacement

IEEE -C62.41.1 & C62.41.2-2002 environments

Suitable for Categories: A, B & C (Most Severe Electrical Environments)

#### IEC Environments

Suitable for use in IEC 61643-11 environments

Parallel configured Optimal Response Circuitry™ circuit design incorporating component-level thermal fusing and Patent Pending internal, circuit board mounted, over-current fusing; and discrete "All Mode" protection (10 modes for 3 phase Wye units). All protection circuits are encapsulated in our high dielectric compound to assure long component life and complete protection from the weather and vibration.

#### **Protection Modes**

Industry-best practice of true all mode dedicated protection components for all operational modes of the electrical system. Discrete L-N, L-L (Normal Mode) and L-G, N-G (Common Mode) Example: Directly Connected Protection Elements in All 10 modes for a 3 phase, 4 wire, Wye system, (i.e. 3 L-N modes, 3 L-L modes, 3 L-G modes and 1 N-G mode).

#### **Input Power**

50-400 Hz (60 Hz nominal)

#### **Temperature Rating**

Up to 80°C

#### Standard Enclosure

NEMA 12 rated, painted steel enclosure (Other enclosure options available)

#### **SPD Type**

Type 1 SPD (SILCM, SILDM)

Type 2 SPD (SILBM, SILAM)

## Nominal Discharge Current (I<sub>n</sub>) Rating

20 kA (SILBM, SILDM) 10 kA (SILCM, SILAM)

Green LED's, one per phase, normally on. A wide range of optional diagnostics is available

#### Circuit Interrupt

Internal component-level, thermal fusing and patented circuit board mounted, over-current fusing. No external over-current protection required.

#### **UL Short Circuit Current Rating**

#### 200 kAIC

## **Product Qualifications**

ANSI/UL 1449-2006 (3rd Edition) by CSA (CSA MC#241804); UL1283\* and CE Compliant (\* Type 2 SPDs only)

ISO 9001 Certified Manufacturing Facility

2004/2006 TVSS Customer Value Enhancement Award from Frost & Sullivan

#### OPTIONS

AC = Internal Audible Alarm w/ test button, mute switch and red LED

C = Form C dry relay contacts

**D2** = External non-fused disconnect switch (TVSS mounts to outside)

**D5** = SIntegral, non-fused disconnect switch (TVSS unit mounts inside)

**D6** = Same as D5, except no external handle

**E1** = Hub on side of enclosure

**LP** = Remote LED indicators in individual NEMA 4X housings

**P** = Flush Mount Plate

R1 = Remote lights on separate circuit board (board only - no enclosure)

R2 = Remote lights on separate circuit board in separate enclosure

**S** = Surge counter w/ reset button

W = NEMA 4 Steel Enclosure

**X** = NEMA 4X Composite Fiberglass Enclosure

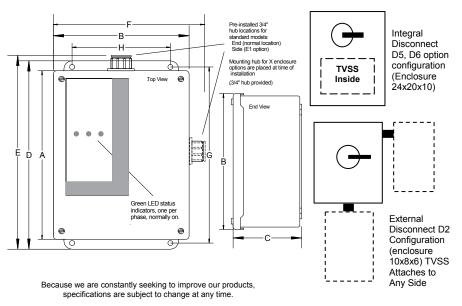
XS = NEMA 4X Stainless Steel Enclosure

External Accessories: EACS = Externally mounted diagnostic module, combines AC, C, and S options (Also available: EAC, EC, ECS, and ES) Other options may be available upon request. Type 1 SPDs are intended for installation on the line side of the service equipment

#### MECHANICAL (MODEL NUMBER EX: ST-SILA3Y2D6 / BASE MODEL: ST-SIL / SPD TYPE: A, B, C, D)

Circuit Connection: #10 AWG wire (pre-installed) Mounting: 3/4" hub (provided) and integrat fee

Enclosure Dimensions								
Inches	Standard	Enclosur	e Options					
(mm)	Model	W	Х					
Α	10.00	10.00	16.00					
	(354)	(354)	(407)					
В	8.00	8.00	14.00					
	(204)	(204)	(356)					
С	4.00	4.00	8.00					
	(102)	(102)	(204)					
D	11.50	11.50	12.00					
	(293)	(293)	(305)					
E	11.98	11.98	17.98					
	(305)	(305)	(457)					
F	9.98	9.98	15.98					
	(254)	(254)	(406)					
G	10.75	10.75	16.94					
	(274)	(274)	(431)					
Н	6.00	6.00	12.00					
	(153)	(153)	(305)					
Туре	NEMA 12	NEMA 4	NEMA 4X					
	Steel	Steel	Composite					
lbs. (kg)	14	14	32					
	(6.36)	(6.36)	(14.52)					



Voltage	ANSI	ANSI/UL 1449-2006 (Third Edition) Voltage Protection Rating (VPR)								
Code	L-N	HL-N	L-G	HL-G	N-G	L-L	HL-L			
1S1	500	-	500	-	500	1000	-			
3Y1	500	-	500	-	500	1000	-			
3D1	500	1000	500	1000	500	1000	1000			
3Y2	1000	-	1000	-	1000	1800	-			
3N2	-	-	1000	-	-	1000	-			
3N4	-	-	1800	-	-	1800	-			

Voltage			Peak	ANSI/IEEE C62.41.1 & .2-2002 and C62.45-2002 Let-through Voltage (tested w/6" lead length external to the enclosure per UL 14				
Code	Circuit Type	MCOV	Surge Current	Mode	Cat A 30 Ω 100 kHz Ring Wave 6 kV 200 A @ 90° Phase Angle	Cat C, 2 Ω Combination Wave 20 kV / 10 kA @ 90° Phase Angle		
		120 kA L-N	150 V	L-N	295 V	902 V		
101	120/240V 1Ø (Split)	120 kA L-L	300 V	L-L	444 V	1103 V		
1S1	(3 wire + ground)	120 kA L-G 120 kA N-G	150 V	L-G	287 V	985 V		
		720 kA Total	150 V	N-G	493 V	1086 V		
		120 kA L-N	150 V	L-N	295 V	902 V		
0)/4	120/208 V 3Ø Wye	120 kA L-L	300 V	L-L	444 V	1103 V		
3Y1	(4 wire + ground)	120 kA L-G 120 kA N-G	150 V	L-G	287 V	985 V		
	, ,	1,200 kA Total	150 V	N-G	493 V	1086 V		
		120 kA L-N	150 V	L-N	295 V	902 V		
	100/040 \/ 00	120 kA L-L	320 V	HL-N	429 V	1066 V		
3D1	120/240 V 3Ø	120 kA HL-N 120 kA L-G	300 V	L-L	444 V	1103 V		
301	High- Leg Delta (4 wire + ground)	120 kA L-G 120 kA HL-G	150 V	L-G	287 V	985 V		
	(4 wire + ground)	120 kA N-G	320 V	HL-G	409 V	1158 V		
		1,200 kA Total	150 V	N-G	493 V	1086 V		
		120 kA L-N	320 V	L-N	429 V	1066 V		
3Y2	277/480V 3Ø Wye	120 kA L-L	550 V	L-L	689 V	1456 V		
312	(4 wire + ground)	120 kA L-G 120 kA N-G	320 V	L-G	409 V	1158 V		
		1,200 kA Total	320 V	N-G	833 V	1481 V		
	240 V 3Ø Delta (NN)	120 kA L-L	320 V	L-L	409 V	1158 V		
3N2	(3 wire + ground)	120 kA L-G 720 kA Total	320 V	L-G	409 V	1158 V		
	480V 3Ø Delta (NN)	120 kA L-L	550 V	L-L	689 V	1456 V		
3N4	(3 wire + ground)	120 kA L-G 720 kA Total	550 V	L-G	689 V	1456 V		

\*Measured Limiting Voltage (Let-Through) Test Environment: Positive Polarity, All voltages are peak (±10%). All tests are static except 150 V MCOV modes. Let-through voltages on static tests calculated by subtracting sinewave peak from let-through measured from zero. 150 V MCOV mode let-through voltages measured from the insertion point on the sinewave. (Scope Settings: Time Base = 20 Microseconds, Sampling Rate = 250 Megasamples/sec. These settings assure Let-through voltages test results are accurate). All tests performed with 6" lead length (external to the enclosure), simulating actual installed performance.



# ST-SHLxM 480kA Per Phase



\* Based on 3 Phase Wve. 4 Wire and Ground

#### **KEY FEATURES**

Discrete "All Mode" Circuitry: Directly Connected Protection Elements in "All Modes" (10 modes for 3 phase Wve circuits) as recommended by NEMA LS-1 and IEEE Std. 1100-2005

Industry Leading Measured Limiting Voltage (let-through) Performance

UL 1283 Listed EMI/RFI Parallel Configured Optimal Response Circuitry™

Local & Remote Diagnostics

Independent Verification of Performance and Safety

No moving parts or springs - No mechanical or electro-mechanical thermal/ over-current protection

Rated as Type 1 or Type 2 SPD

Component-Level, Thermal Fusing

Patent Pending, Internal, Circuit Board Mounted, Over-Current Fusing

#### **GENERAL**

#### Application

The ST-SHLxM series was developed to answer a broad variety of demands from our customers. This device is robust enough to handle the punishment of service entrance applications while providing protection from transients that are generated inside the facility. The constant bombardment of these combination transients can damage valuable equipment and waste budget

#### Warranty

#### 25 Years Unlimited Free Replacement

#### IEEE -C62.41.1 & C62.41.2-2002 environments

Suitable for Categories: A, B & C (Most Severe Electrical Environments)

#### **IEC Environments**

Suitable for use in IEC 61643-11 environments

#### **Circuit Topology**

Parallel configured Optimal Response Circuitry™ circuit design incorporating component-level thermal fusing and Patent Pending internal, circuit board mounted, over-current fusing; and discrete "All Mode" protection (10 modes for 3 phase Wye units). All protection circuits are encapsulated in our high dielectric compound to assure long component life and complete protection from the weather and vibration.

#### **Protection Modes**

Industry-best practice of true all mode dedicated protection components for all operational modes of the electrical system. Discrete L-N, L-L (Normal Mode) and L-G, N-G (Common Mode) Example: Directly Connected Protection Elements in All 10 modes for a 3 phase, 4 wire, Wye system, (i.e. 3 L-N modes, 3 L-L modes, 3 L-G modes and 1 N-G mode).

50-400 Hz (60 Hz nominal)

#### **Temperature Rating**

Up to 80°C

#### Standard Enclosure

NEMA 12 rated, painted steel enclosure (Other enclosure options available)

Type 1 SPD (SHLCM, SHLDM)

Type 2 SPD (SHLBM, SHLAM)

Nominal Discharge Current (I<sub>n</sub>) Rating 20 kA (SHLBM, SHLDM) 10 kA (SHLCM, SHLAM)

#### **Diagnostics**

Green LED's, one per phase, normally on. A wide range of optional diagnostics is available

Internal component-level, thermal fusing and patented circuit board mounted, over-current fusing. No external over-current protection required.

#### **UL Short Circuit Current Rating**

200 kAIC

#### **Product Qualifications**

ANSI/UL 1449-2006 (3rd Edition) by CSA (CSA MC#241804); UL1283\* and CE Compliant (\* Type 2 SPDs only)

ISO 9001 Certified Manufacturing Facility

2004/2006 TVSS Customer Value Enhancement Award from Frost & Sullivan

#### OPTIONS

AC = Internal Audible Alarm w/ test button, mute switch and red LED

C = Form C dry relay contacts

**D2** = External non-fused disconnect switch (TVSS mounts to outside)

**D5** = SIntegral, non-fused disconnect switch (TVSS unit mounts inside)

**D6** = Same as D5, except no external handle

**E1** = Hub on side of enclosure

**LP** = Remote LED indicators in individual NEMA 4X housings

P = Flush Mount Plate

R1 = Remote lights on separate circuit board (board only - no enclosure)

R2 = Remote lights on separate circuit board in separate enclosure

**S** = Surge counter w/ reset button

W = NEMA 4 Steel Enclosure

**X** = NEMA 4X Composite Fiberglass Enclosure

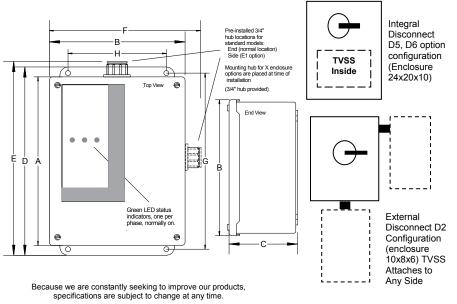
XS = NEMA 4X Stainless Steel Enclosure

External Accessories: EACS = Externally mounted diagnostic module, combines AC, C, and S options (Also available: EAC, EC, ECS, and ES) Other options may be available upon request. Type 1 SPDs are intended for installation on the line side of the service equipment

## MECHANICAL (MODEL NUMBER EX: ST-SHDLA3Y2D6 / BASE MODEL: ST-SHDL / SPD TYPE: A, B, C, D)

Circuit Connection: #10 AWG wire (pre-installed) Mounting: 3/4" hub (provided) and integrat fee

Enclosure Dimensions							
Inches	Standard	<b>Enclosure Options</b>					
(mm)	Model	W	Х				
Α	14.00	14.00	18.00				
	(356)	(356)	(458)				
В	12.00	12.00	16.00				
	(305)	(305)	(407)				
С	6.00	6.00	10.00				
	(153)	(153)	(254)				
D	15.50	15.50	19.50				
	(394)	(394)	(496)				
E	15.98	15.98	19.98				
	(406)	(406)	(508)				
F	13.23	13.23	17.23				
	(309)	(309)	(411)				
G	14.75	14.75	18.94				
	(375)	(375)	(482)				
Н	10.00	10.00	14.00				
	(254)	(254)	(356)				
Туре	NEMA 12	NEMA 4	NEMA 4X				
	Steel	Steel	Composite				
lbs. (kg)	30	30	55				
	(13.61)	(13.61)	(24.95)				

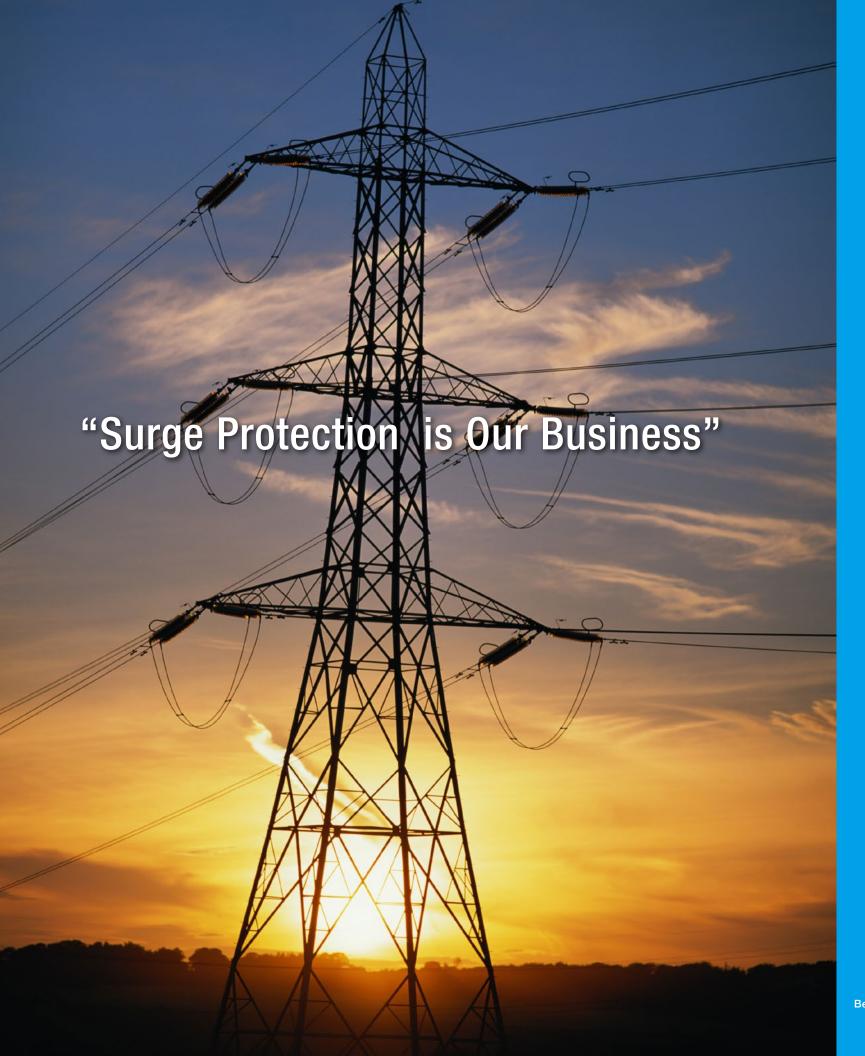


ANSI/UL 1449-2006 (Third Edition) Voltage Protection Rating (VPR) Voltage Code HL-G N-G L-N HL-N L-G L-L HL-L 1S1 500 500 1000 500 500 500 1000 3Y1 1000 1000 500 1000 1000 500 500 3D1 1000 1000 1000 1800 3Y2 3N2 1000 1000 1800 1800

Voltage	Circuit Type	MCOV	Peak	ANSI/IE	EE C62.41.1 & .2-2002 and C62.45-2 (tested w/6" lead length external t	2002 Let-through Voltage Test Results o the enclosure per UL 1449)
Code	Circuit Type	MCOV	Surge Current	Mode	Cat A 30 Ω 100 kHz Ring Wave 6 kV 200 A @ 90° Phase Angle	Cat C, 2 Ω Combination Wave 20 kV / 10 kA @ 90° Phase Angle
		160 kA L-N	150 V	L-N	292 V	899 V
1S1	120/240V 1Ø (Split)	160 kA L-L	300 V	L-L	441 V	1195 V
151	(3 wire + ground)	160 kA L-G 160 kA N-G	150 V	L-G	296 V	1058 V
		960 kA Total	150 V	N-G	451 V	1115 V
		160 kA L-N	150 V	L-N	292 V	899 V
0) (4	120/208 V 3Ø Wye	160 kA L-L	300 V	L-L	441 V	1195 V
3Y1	3Y1 (4 wire + ground)	160 kA L-G 160 kA N-G	150 V	L-G	296 V	1058 V
		1,600 kA Total	150 V	N-G	451 V	1115 V
		160 kA L-N	150 V	L-N	292 V	899 V
	100/040 \/ 00	160 kA L-L	320 V	HL-N	462 V	1142 V
001	120/240 V 3Ø	160 kA HL-N	300 V	L-L	441 V	1195 V
3D1	High- Leg Delta	160 kA L-G 160 kA HL-G	150 V	L-G	296 V	1085 V
	(4 wire + ground)	160 kA N-G	320 V	HL-G	457 V	1226 V
		1,600 kA Total	150 V	N-G	451 V	1115 V
		160 kA L-N	320 V	L-N	462 V	1142 V
3Y2	277/480V 3Ø Wye	160 kA L-L	550 V	L-L	735 V	1531 V
312	(4 wire + ground)	160 kA L-G 160 kA N-G	320 V	L-G	457 V	1226 V
		1,600 kA Total	320 V	N-G	796 V	1467 V
	240 V 3Ø Delta (NN)	160 kA L-L	320 V	L-L	457 V	1226 V
3N2	(3 wire + ground)	160 kA L-G 960 kA Total	320 V	L-G	457 V	1226 V
0114	480V 3Ø Delta (NN)	160 kA L-L	550 V	L-L	735 V	1531 V
3N4	(3 wire + ground)	160 kA L-G 960 kA Total	550 V	L-G	735 V	1531 V

\*Measured Limiting Voltage (Let-Through) Test Environment: Positive Polarity, All voltages are peak (±10%). All tests are static except 150 V MCOV modes. Let-through voltages on static tests calculated by subtracting sinewave peak from let-through measured from zero. 150 V MCOV mode let-through voltages measured from the insertion point on the sinewave. (Scope Settings: Time Base = 20 Microseconds, Sampling Rate = 250 Megasamples/sec. These settings assure Let-through voltages test results are accurate). All tests performed with 6" lead length (external to the enclosure), simulating actual installed performance.





# TRACKING UNITS

ST-CSLA / ST-CKLA / ST-CDLA / ST-CSEA / ST-CMLA / ST-CILA

# ST-CSLx

90kA Per Phase with Sinewave Tracking ANSI/UL 1449-2006 3rd Edition

A=Type 2 SPD,  $I_n = 10kA$ B=Type 2 SPD,  $I_n = 20kA$ 



\* Based on 3 Phase Wye, 4 Wire and Ground I<sub>n</sub> = Nominal Discharge Current per ANSI/UL 1449-2006

#### **KEY FEATURES**

Discrete "All Mode" Circuitry: Directly Connected Protection Elements in "All Modes" (10 modes for 3 phase Wye circuits) as recommended by IEEE Std. 1100-2005

**Industry Leading Measured Limiting** Voltage (let-through) Performance

Multi-stage Hybrid Frequency Attenuation Network

Local & Remote Diagnostics

Independent Verification of Performance and Safety

No moving parts or springs - No mechanical or electro-mechanical thermal/ over-current protection

Component-Level, Thermal Fusing

Patent Pending, Internal, Circuit Board Mounted, Over-Current Fusing

#### GENERAL

#### Application

The ST-CSLx series is one of the most versatile and effective devices in our product line. This durable, high performance device is intended for sensitive and critical load applications at main distribution panels, branch panels, motor control centers, and individual equipment disconnects. It is equally effective against externally generated high energy impulses and internally generated switching events.

#### Warranty

#### 25 Years Unlimited Free Replacement

#### IEEE -C62.41.1 & C62.41.2-2002 environments

Suitable for Categories: A, B & C (Most Severe Electrical Environments)

#### **IEC Environments**

Suitable for use in IEC 61643-11 environments

#### **Circuit Topology**

Parallel configured combination Frequency Attenuation Network and Voltage Responsive Circuitry circuit design incorporating component-level, thermal fusing and circuit board mounted, Patented internal over- current fusing methodology with discrete "All Mode" protection (10 modes for 3 phase Wye units). All protection circuits are encapsulated in our high-dielectric compound to promote long component life and protection from the weather and vibration.

#### **Protection Modes**

Industry-best practice of dedicated protection components for all operational modes of the electrical system. Discrete L-N, L-L (Normal Mode) and L-G, N-G (Common Mode) Example: Directly Connected Protection Elements in All 10 modes for a 3 phase, 4 wire, Wye system, (i.e. 3 L-N modes, 3 L-L modes, 3 L-G modes and 1 N-G mode).

#### Input Power

50-60 Hz (60 Hz nominal)

#### **Temperature Rating**

Up to 80°C

#### Insertion Loss Data (L-N)

Frequency	10 kHz	100 kHz	1 MHz	Max Attenuation & Freq.
Attenuation	20 dB	47 dB	26 dB	65 dB @ 135 kHz

#### Standard Enclosure

NEMA 1 Rated Standard Enclosure (Other enclosure options available)

## Nominal Discharge Current (I\_) Rating

(ST-CSLA) 10 kA, (ST-CSLB) 20 kA

Green LED's, one per phase, normally on. A wide range of optional diagnostics is available.

#### Circuit Interrupt

Internal component-level, thermal fusing and patented circuit board mounted, over-current fusing. No external over-current protection required.

#### **Short Circuit Current Rating**

200 kAIC

## **Product Qualifications**

Listed to ANSI/UL 1449-2006 3rd Edition by UL (E340498), CSA (MC#241804);

UL1283\* and CE Compliant

ISO 9001-2008 Certified Manufacturing Facility

2004/2006 TVSS Customer Value Enhancement Award from Frost & Sullivan

#### OPTIONS

AC = Internal Audible Alarm w/ test button, mute switch and red LED

**C** = Form C dry relay contacts

**D1** = Integral, non-fused disconnect switch (TVSS unit mounts inside)

D3 = Same as D1, except no external handle

**E1** = Hub on side of enclosure

K = Gasket Kit

LP = Remote LED indicators in individual NEMA 4X housings

M = NEMA 12 Steel Enclosure

N = Removes neutral to ground Sinewave Tracking Circuit

**P** = Flush Mount Plate

**R2** = Remote lights on separate circuit board in separate enclosure

**S** = Surge counter w/ reset button

**W** = NEMA 4 Steel Enclosure

**X** = NEMA 4X Composite Enclosure (Box-in-box)

**X1** = NEMA 4X Composite Enclosure with Clear Lid (Box-in-box)

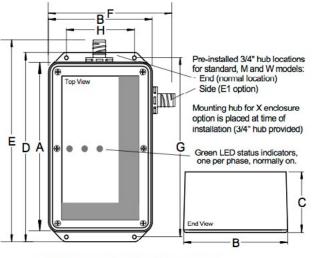
**X2** = NEMA 1, 2, 3, 3S, 4, 4X and 12 composite enclosure

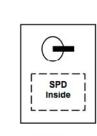
XS = NEMA 4X Stainless Steel Enclosure

## External Accessories: EACS = Externally mounted diagnostic module, combines AC, C, and S options (Also available: EAC, EC, ECS, and ES) Other options may be available upon request.

## MECHANICAL (Model Number Ex: ST-CSLA3Y2D3 / Base Model: ST-CSL / SPD type & Nominal Discharge Current (I<sub>D</sub>) Rating: A, B, C, D / Voltage Code: 3Y2 / Options Code: D3)

<b>Enclosure Dimensions</b>							
Inches	Standard	Enclosure Options					
(mm)	Model	М	w	X,X1			
Α	8.25	10.00	10.00	12.00			
	(210)	(254)	(254)	(305)			
В	5.00	8.00	8.00	10.50			
	(127)	(204)	(204)	(267)			
С	3.00	4.00	4.00	6.00			
	(77)	(102)	(102)	(153)			
D	9.37	11.50	11.50	12.50			
	(238)	(293)	(293)	(337)			
E	9.48	12.00	12.00	13.23			
	(242)	(305)	(305)	(337)			
F	6.23	9.00	9.00	11.73			
	(159)	(229)	(229)	(299)			
G	8.87	10.75	10.75	12.00			
	(226)	(274)	(274)	(305)			
Н	3.37	6.00	6.00	8.00			
	(86)	(153)	(153)	(204)			
Туре	NEMA 1	NEMA	NEMA 4	NEMA 4X			
	ABS	12 Steel	Steel	Composite			
lbs. (kg)	5	14	14	11			
	(2.27)	(6.36)	(6.36)	(4.99)			
Flush mount	trim plate availa	ble for standar	d and "M" op	tion models.			





Integral Disconnect D1, D3 option configuration (Enclosure 12x10x6) (CSA)

Circuit Connection: #10 AWG wire (pre-installed)

Voltage	ANSI/UL 1449-2006 (Third Edition) Voltage Protection Rating (VPR)								
Code	L-N	HL-N	L-G	HL-G	N-G	L-L	HL-L		
1S1	500	-	500	-	500	1000	-		
3Y1	500	-	500	-	500	1000	-		
3D1	500	1000	500	1000	500	1000	1000		
3Y2	1000	-	1000	-	1200	1800	-		
3N2	-	-	1000	-	-	1000	-		
3N4	-	-	1800	-	-	1800	-		

Voltage Code	Circuit Type	Peak Surge	MCOV	ANSI/IEEE C62.41.1™-2002, C62.41.2™-2002, C62.45™-2002, and C62.62™-2010 Measured Limiting Voltages (tested with 6 inches of lead length external to the enclosure per Clauses 6.1.1 of C62.62™-2010 and 37.4.4 of ANSI/UL 1449-2006)			
Code		Current		Test Mode	Cat A 30 Ω 100 kHz Ring Wave 2 kV / 67 A @ 270° Phase Angle	Category C (High) 10 kA 8/20 Current Driven Test <sup>†</sup>	
		30 kA L-N	150 V	L-N	30 V	1011 V	
1S1	120/240V 1Ø (Split)	30 kA L-L	300 V	L-L	54 V	1291 V	
151	(3 wire + ground)	30 kA L-G 30 kA N-G	150 V	L-G	45 V	991 V	
		180 kA Total	150 V	N-G	45 V	1431 V	
		30 kA L-N	150 V	L-N	27 V	1068 V	
3Y1	120/208 V 3Ø Wye	30 kA L-L	300 V	L-L	54 V	1381 V	
311	(4 wire + ground)	30 kA L-G 30 kA N-G	150 V	L-G	46 V	1048 V	
		300 kA Total	150 V	N-G	45 V	1431 V	
		30 kA L-N	150 V	L-N	24 V	1091 V	
	120/240 V 3Ø	30 kA L-L	320 V	HL-N	53 V	1411 V	
3D1	High- Leg Delta	30 kA HL-N 30 kA L-G	300 V	L-L	54 V	1381 V	
301	(4 wire + ground)	30 kA HL-G	150 V	L-G	47 V	1076 V	
	(4 wire + ground)	30 kA N-G	320 V	HL-G	75 V	1371 V	
		300 kA Total	150 V	N-G	45 V	1431 V	
		30 kA L-N	320 V	L-N	57 V	1334 V	
3Y2	277/480V 3Ø Wye	30 kA L-L 30 kA L-G	550 V	L-L	58 V	1981 V	
312	(4 wire + ground)	30 kA L-G 30 kA N-G	320 V	L-G	76 V	1304 V	
		300 kA Total	320 V	N-G	57 V	1721 V	
	240 V 3Ø Delta (NN)	30 kA L-L	320 V	L-L	76 V	1381 V	
3N2	(3 wire + ground)	30 kA L-G 180 kA Total	320 V	L-G		1304 V	
01.14	480V 3Ø Delta (NN)	30 kA L-L	550 V	L-L	76 V	1981 V	
3N4	(3 wire + ground)	30 kA L-G 180 kA Total	550 V	L-G		2144 V	

from the insertion point on the sine wave to the peak of the surge for powered tests. Each phase is the average of the modes within that mode of protection. In order to duplicate the results, the specified mode of protection must be tested in all modes (except N-G) and averaged together, (Individual mode or shot results may vary by more than 10%, Scope Settings; Time Base = 10 microseconds per division, Sampling Rate = 2.5 Gigasamples/sec, Bandwidth = 400 MHz (200 MHz for Cat C), Probes: Tektronix P5100/P6015A. These settings help to assure MLV results are accurate). All tests performed with 6" lead length (external to the enclosure), simulating actual installed performance. The MLVs reported above are certified by Third-Party, Independent Testing. Individual test reports are available upon request †Category C High, 10 kA is equivalent to the MLV recorded during the Nominal Discharge Current (L) Test from C62.62TM-2010 and ANSI/UL 1449-2006.

\*Other voltage configurations may be available. Contact your sales representative for additional assistance



# ST-CKLx 120kA Per Phase with Sinewave Tracking



<sup>\*</sup> Based on 3 Phase Wye, 4 Wire and Ground

## **KEY FEATURES**

Discrete "All Mode" Circuitry: Directly Connected Protection Elements in "All Modes" (10 modes for 3 phase, 4 wire Wye circuits) as recommend by NEMA LS-1 and IEEE Std. 1100-1999

Industry Leading Measured Limiting Voltage (let-through) Performance

Multi-stage Hybrid Optimal Sinewave Tracking® Circuit

Local & Remote Diagnostics

Independent Verification of Performance and Safety

No moving parts or springs - No mechanical or electro-mechanical thermal/ over-current protection

Rated as Type 2 SPD

Component-Level, Thermal Fusing

Patent Pending, Internal, Circuit Board Mounted, Over-Current Fusing

#### **GENERAL**

#### Application

The ST-CKLx series is one of the most versatile and effective devices in our product line. This durable, high performance device is intended for sensitive and critical load applications at main distribution panels, branch panels, motor control centers, and individual equipment disconnects. It is equally effective against high energy impulses and internally generated switching events.

#### 25 Years Unlimited Free Replacement

IEEE -C62.41.1 & C62.41.2-2002 environments

Suitable for Categories: A, B & C (Most Severe Electrical Environments)

Suitable for use in IEC 61643-11 environments

Parallel configured combination Optimal Sinewave Tracking® and Optimal Response Circuitry™ circuit design incorporating component-level, thermal fusing and Patent Pending internal, circuit board mounted, over-current fusing; and discrete "All Mode" protection (10 modes for 3 phase Wye units). All protection circuits are encapsulated in our high dielectric compound to promote long component life and protection from the weather and vibration.

#### **Protection Modes**

Industry-best practice of true all mode dedicated protection components for all operational modes of the electrical system. Discrete L-N, L-L (Normal Mode) and L-G, N-G (Common Mode) Example: Directly Connected Protection Elements in All 10 modes for a 3 phase, 4 wire, Wye system, (i.e. 3 L-N modes, 3 L-L modes, 3 L-G modes and 1 N-G mode).

#### Input Power

50-60 Hz (60 Hz nominal)

#### Temperature Rating

Up to 80°C

#### Insertion Loss Data (L-N)

Frequency	10 kHz	100 kHz	1 MHz	Max Attenuation & Freq.
Attenuation	20 dB	47 dB	26 dB	65 dB @ 135 kHz

#### Standard Enclosure

NEMA 4 Rated with optional free gasket kit (K option) (Other enclosure options available)

#### **SPD Type**

Type 2 SPD (CKLB, CKLA)

#### Nominal Discharge Current (I<sub>2</sub>) Rating

20 kA (CKLB) 10kA (CKLA)

#### **Diagnostics**

Green LED's, one per phase, normally on. A wide range of optional diagnostics is available.

## Circuit Interrupt

Internal component-level, thermal fusing and patent pending, circuit board mounted, over-current fusing.

#### **UL Short Circuit Current Rating**

200 kAIC

#### **Product Qualifications**

Listed to ANSI/UL 1449-2006 (3rd Edition) by CSA (CSA MC#241804); UL1283 and CE Compliant ISO 9001 Certified Manufacturing Facility

2004/2006 TVSS Customer Value Enhancement Award from Frost & Sullivan

#### OPTIONS

AC = Internal Audible Alarm w/ test button, mute switch and red LED

**C** = Form C dry relay contacts

**D1** = Integral, non-fused disconnect switch (TVSS unit mounts inside)

**D2** = External non-fused disconnect switch (TVSS mounts to outside)

D3 = Same as D1, except no external handle

**E1** = Hub on side of enclosure

**LP** = Remote LED indicators in individual NEMA 4X housings

**K** = Gasket Kit (installed)

M = NEMA 12 Steel Enclosure

**N** = Removes neutral to ground Sinewave Tracking Circuit

**P** = Flush Mount Plate

R1 = Remote lights on separate circuit board (board only - no enclosure)

**R2** = Remote lights on separate circuit board in separate enclosure

S = Surge counter w/ reset button

W = NEMA 4 Steel Enclosure

**X** = NEMA 4X Composite Fiberglass Enclosure

XS = NEMA 4X Stainless Steel Enclosure

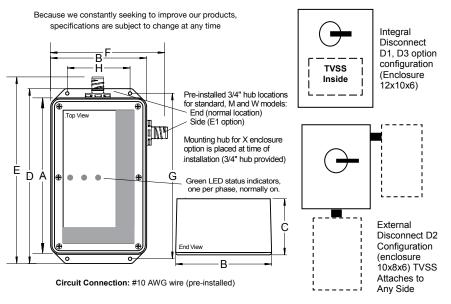
External Accessories: EACS = Externally mounted diagnostic module, combines AC, C, and S options (Also available: EAC, EC, ECS, and ES)

#### MECHANICAL (MODEL NUMBER EX: ST-CKLA3Y2D3 / BASE MODEL: ST-CKL / SPD TYPE: A. B)

Circuit Connection: #10 AWG wire (pre-installed)

<b>Enclosure Dimensions</b>								
Inches	Standard	<b>Enclosure Options</b>						
(mm)	Model	М	w	Х				
Α	8.25	10.00	10.00	12.00				
	(210)	(254)	(254)	(305)				
В	5.00	8.00	8.00	10.50				
	(127)	(204)	(204)	(267)				
С	3.00	4.00	4.00	6.00				
	(77)	(102)	(102)	(153)				
D	9.37	11.50	11.50	12.50				
	(238)	(293)	(293)	(318)				
Е	9.48	12.00	12.00	13.23				
	(242)	(305)	(305)	(337)				
F	6.23	9.00	9.00	11.73				
	(159)	(229)	(229)	(299)				
G	8.87	10.75	10.75	12.00				
	(226)	(274)	(274)	(305)				
Н	3.37	6.00	6.00	8.00				
	(86)	(153)	(153)	(204)				
Туре	NEMA 4X*	NEMA	NEMA 4	NEMA 4X				
	ABS	12 Steel	Steel	Composite				
lbs. (kg)	5	14	14	11				
	(2.27)	(6.36)	(6.36)	(4.99)				

<sup>\*</sup> With optional gasket kit installed Flush mount trim plate available for standard and "M" option models.



Voltage	ANSI/UL 1449-2006 (Third Edition) Voltage Protection Rating (VPR)								
Code	L-N	HL-N	L-G	HL-G	N-G	L-L	HL-L		
181	500	-	500	-	500	1000	-		
3Y1	500	-	500	-	500	1000	-		
3D1	500	1000	500	1000	500	1000	1000		
3Y2	1000	-	1000	-	1200	1800	-		
3N2	-	-	1000	-	-	1000	-		
3N4	-	-	1800	-	-	1800	-		

#### MEASURED LIMITING VOLTAGE PERFORMANCE AND ELECTRICAL SPECIFICATIONS ANSI/IEEE C62.41.1 & .2-2002 and C62.45-2002 Let-through Voltage Test Results Peak (tested w/6" lead length external to the enclosure per UL 1449) Voltage Surge Circuit Type MCOV Cat A 30 Ω 100 kHz Ring Wave 6 kV 200 A @ 90° Phase Angle / 10 kA @ 90° Phase Angle Current Mode 40 kA L-N 150 V 35 V 914 V L-N 40 kA L-L 120/240V 1Ø (Split) 300 V L-L 38 V 1119 V 40 kA L-G (3 wire + ground) 150 V L-G 56 V 1025 V 40 kA N-G 150 V N-G 55 V 1176 V 240 kA Total 40 kA L-N 150 V L-N 35 V 914 V 40 kA L-L 120/208 V 3Ø Wye 300 V L-L 38 V 1119 V 3Y1 40 kA L-G (4 wire + ground) 150 V L-G 56 V 1025 V 40 kA N-G 150 V N-G 55 V 1176 V 400 kA Total 35 V 914 V 150 V 40 kA L-N I -N 40 kA L-L 320 V 35 V 1050 V HL-N 120/240 V 3Ø 40 kA HL-N 300 V 38 V 1119 V L-L High-Leg Delta 40 kA I -G 150 V 56 V 1025 V I-G 40 kA HL-G (4 wire + ground) 320 V HL-G 56 V 1262 V 40 kA N-G 400 kA Total 150 V N-G 55 V 1176 V 40 kA L-N 320 V L-N 51 V 1050 V 40 kA L-L 277/480V 3Ø Wye 550 V L-L 126 V 1344 V 3Y2 40 kA L-G 320 V L-G 75 V 1262 V (4 wire + ground) 40 kA N-G 320 V N-G 52 V 1575 V 400 kA Total 40 kA I -I 51 V 1262 V 320 V 1 -1 240 V 3Ø Delta (NN) 3N2 40 kA L-G (3 wire + around) 320 V L-G 1262 V 240 kA Total 40 kA L-L 480V 3Ø Delta (NN) 550 V L-L 51 V 1344 V 3N4 40 kA L-G (3 wire + ground) 550 V L-G 1344 V 240 kA Total

\*Measured Limiting Voltage (Let-Through) Test Environment: Positive Polarity, Net voltages are peak (±10%). All tests are static except 150 V MCOV modes. Let-through voltages on static tests calculated by subtracting sinewave peak from let-through measured from zero. 150 V MCOV mode let-through voltages measured from the insertion point on the sinewaye. Each phase is the average of the 3 modes. In order to duplicate the results, the specified mode must be tested for all three phases (except N-G) and averaged together. (Individual mode or shot results may vary by more than 10%. (Scope Settings: Time Base = 10 Microseconds, Sampling Rate = 500 Megasamples/sec. These settings assure Letthrough voltages test results are accurate). All tests performed with 6" lead length (external to the enclosure), simulating actual installed performance.



## ST-CDLx 180kA Per Phase with Sinewave Tracking



<sup>\*</sup> Based on 3 Phase Wye, 4 Wire and Ground

## **KEY FEATURES**

Discrete "All Mode" Circuitry: Directly Connected Protection Elements in "All Modes" (10 modes for 3 phase, 4 wire Wye circuits) as recommend by NEMA LS-1 and IEEE Std. 1100-1999

Industry Leading Measured Limiting Voltage (let-through) Performance

Multi-stage Hybrid Optimal Sinewave Tracking® Circuit

Local & Remote Diagnostics

Independent Verification of Performance and Safety

No moving parts or springs - No mechanical or electro-mechanical thermal/ over-current protection

Rated as Type 2 SPD

Component-Level, Thermal Fusing

Patent Pending, Internal, Circuit Board Mounted, Over-Current Fusing

#### **GENERAL**

#### Application

The ST-CDLx series is one of the most versatile and effective devices in our product line. This durable, high performance device is intended for sensitive and critical load applications at main distribution panels, branch panels, motor control centers, and individual equipment disconnects. It is equally effective against externally generated high energy impulses and internally generated switching events

#### Warranty

#### 25 Years Unlimited Free Replacement

#### IEEE -C62.41.1 & C62.41.2-2002 environments

Suitable for Categories: A, B & C (Most Severe Electrical Environments)

#### **IEC Environments**

Suitable for use in IEC 61643-11 environments

#### **Circuit Topology**

Parallel configured combination Frequency Attenuation Network® and Optimal Response Circuitry™ circuit design incorporating component-level, thermal fusing and Patent Pending internal, circuit board mounted, over-current fusing; and discrete "All Mode" protection (10 modes for 3 phase Wye units). All protection circuits are encapsulated in our high dielectric compound to promote long component life and protection from the weather and vibration.

#### Protection Modes

Industry-best practice of true all mode dedicated protection components for all operational modes of the electrical system. Discrete L-N, L-L (Normal Mode) and L-G, N-G (Common Mode) Example: Directly Connected Protection Elements in All 10 modes for a 3 phase, 4 wire, Wye system, (i.e. 3 L-N modes, 3 L-L modes, 3 L-G modes and 1 N-G mode).

50-60 Hz (60 Hz nominal)

#### **Temperature Rating**

Up to 80°C

#### Insertion Loss Data (L-N)

Frequency	10 kHz	100 kHz	1 MHz	Max Attenuation & Freq.
Attenuation	20 dB	47 dB	26 dB	65 dB @ 135 kHz

#### Standard Enclosure

NEMA 4 Rated with optional free gasket kit (K option) (Other enclosure options available)

#### **SPD** Type

Type 2 SPD (CDLA, CDLB)

## Nominal Discharge Current (I<sub>2</sub>) Rating

20 kA (CDLB) 10kA (CDLA)

## Diagnostics

Green LED's, one per phase, normally on. A wide range of optional diagnostics is available.

#### Circuit Interrupt

Internal component-level, thermal fusing and patent pending, circuit board mounted, over-current

#### **UL Short Circuit Current Rating**

200 kAIC

#### **Product Qualifications**

Listed to ANSI/UL 1449-2006 (3rd Edition) by CSA (CSA MC#241804); UL1283 and CE Compliant ISO 9001 Certified Manufacturing Facility

## **OPTIONS**

AC = Internal Audible Alarm w/ test button, mute switch and red LED

**C** = Form C dry relay contacts

**D1** = Integral, non-fused disconnect switch (TVSS unit mounts inside)

**D2** = External non-fused disconnect switch (TVSS mounts to outside)

D3 = Same as D1, except no external handle

**E1** = Hub on side of enclosure

**LP** = Remote LED indicators in individual NEMA 4X housings

**K** = Gasket Kit (installed)

M = NEMA 12 Steel Enclosure

**N** = Removes neutral to ground Sinewave Tracking Circuit

**P** = Flush Mount Plate

R1 = Remote lights on separate circuit board (board only - no enclosure)

**R2** = Remote lights on separate circuit board in separate enclosure

S = Surge counter w/ reset button

W = NEMA 4 Steel Enclosure

**X** = NEMA 4X Composite Fiberglass Enclosure

XS = NEMA 4X Stainless Steel Enclosure

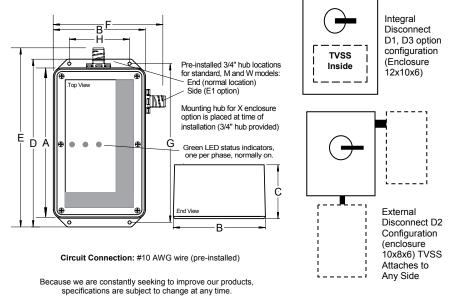
External Accessories: EACS = Externally mounted diagnostic module, combines AC, C, and S options (Also available: EAC, EC, ECS, and ES)

#### MECHANICAL (MODEL NUMBER EX: ST-CDLA3Y2D3 / BASE MODEL: ST-CDL / SPD TYPE: A. B)

	Enclosure Dimensions								
Inches	Standard	Enclosure Options							
(mm)	Model	М	w	х					
Α	8.25	10.00	10.00	12.00					
	(210)	(254)	(254)	(305)					
В	5.00	8.00	8.00	10.50					
	(127)	(204)	(204)	(267)					
С	3.00	4.00	4.00	6.00					
	(77)	(102)	(102)	(153)					
D	9.37	11.50	11.50	12.50					
	(238)	(293)	(293)	(318)					
E	9.48	12.00	12.00	13.23					
	(242)	(305)	(305)	(337)					
F	6.23	9.00	9.00	11.73					
	(159)	(229)	(229)	(299)					
G	8.87	10.75	10.75	12.00					
	(226)	(274)	(274)	(305)					
Н	3.37	6.00	6.00	8.00					
	(86)	(153)	(153)	(204)					
Туре	NEMA 4X*	NEMA	NEMA 4	NEMA 4X					
	ABS	12 Steel	Steel	Composite					
lbs. (kg)	5	14	14	11					
	(2.27)	(6.36)	(6.36)	(4.99)					

\* With optional gasket kit instal

NEMA	NEMA 4	NEMA 4X		Code	L-N
12 Steel	Steel	Composite		1S1	500
				3Y1	500
14	14	11		3D1	500
(6.36)	(6.36)	(4.99)		3Y2	1000
UI				3N2	-
lled ble for stands	ard and "M" o	ption models.		3N4	-
Die ioi stande	ard and ivi o	ption models.			



Voltage	ANSI	ANSI/UL 1449-2006 (Third Edition) Voltage Protection Rating (VPR)								
Code	L-N	HL-N	L-G	HL-G	N-G	L-L	HL-L			
1S1	500	-	500	-	500	1000	-			
3Y1	500	-	500	-	500	1000	-			
3D1	500	1000	500	1000	500	1000	1000			
3Y2	1000	-	1000	-	1200	1800	-			
3N2	-	-	1000	-	-	1000	-			
3N4	-	-	1800	-	-	1800	-			

Voltage	Oine vit Tons	MOOV	Peak	ANSI/IE	EE C62.41.1 & .2-2002 and C62.45-2 (tested w/6" lead length external t	2002 Let-through Voltage Test Results o the enclosure per UL 1449)
Code Circuit Type	Circuit Type	MCOV	Surge Current	Mode	Cat A 30 Ω 100 kHz Ring Wave 6 kV 200 A @ 90° Phase Angle	Cat C, 2 Ω Combination Wave 20 k\ / 10 kA @ 90° Phase Angle
		60 kA L-N	150 V	L-N	35 V	914 V
1S1	120/240V 1Ø (Split)	60 kA L-L 60 kA L-G	300 V	L-L	38 V	1119 V
131	(3 wire + ground)	60 kA N-G	150 V	L-G	56 V	1025 V
		360 kA Total	150 V	N-G	55 V	1176 V
		60 kA L-N	150 V	L-N	35 V	914 V
0)/4	120/208 V 3Ø Wye	60 kA L-L	300 V	L-L	38 V	1119 V
3Y1	(4 wire + ground)	60 kA L-G 60 kA N-G	150 V	L-G	56 V	1025 V
		600 kA Total	150 V	N-G	55 V	1176 V
		60 kA L-N	150 V	L-N	35 V	914 V
	400/040 \ / 00	60 kA L-L	320 V	HL-N	35 V	1050 V
001	120/240 V 3Ø	60 kA HL-N	300 V	L-L	38 V	1119 V
3D1	High- Leg Delta	60 kA L-G 60 kA HL-G	150 V	L-G	56 V	1025 V
	(4 wire + ground)	60 kA N-G	320 V	HL-G	56 V	1262 V
		600 kA Total	150 V	N-G	55 V	1176 V
		60 kA L-N	320 V	L-N	51 V	1050 V
0)/0	277/480V 3Ø Wye	60 kA L-L	550 V	L-L	126 V	1344 V
3Y2	(4 wire + ground)	60 kA L-G 60 kA N-G	320 V	L-G	75 V	1262 V
		600 kA Total	320 V	N-G	52 V	1575 V
	240 V 3Ø Delta (NN)	60 kA L-L	320 V	L-L	51 V	1262 V
3N2	(3 wire + ground)	60 kA L-G 360 kA Total	320 V	L-G	01 0	1262 V
	480V 3Ø Delta (NN)	60 kA L-L	550 V	L-L	51 V	1344 V
3N4	(3 wire + ground)	60 kA L-G 360 kA Total	550 V	L-G	<b>5</b>	1344 V

\*Measured Limiting Voltage (Let-Through) Test Environment: Positive Polarity, Net voltages are peak (±10%). All tests are static except 150 V MCOV modes. Let-through voltages on static tests calculated by subtracting sinewave peak from let-through measured from zero. 150 V MCOV mode let-through voltages measured from the insertion point on the sinewave. Each phase is the average of the 3 modes. In order to duplicate the results, the specified mode must be tested for all three phases (except N-G) and averaged together. (Individual mode or shot results may vary by more than 10%. (Scope Settings: Time Base = 10 Microseconds, Sampling Rate = 500 Megasamples/sec. These settings assure Letthrough voltages test results are accurate). All tests performed with 6" lead length (external to the enclosure), simulating actual installed performance.



# ST-CSEx

240kA Per Phase with Sinewave Tracking ANSI/UL 1449-2006 3rd Edition

A=Type 2 SPD,  $I_n = 10kA$ B=Type 2 SPD,  $I_n = 20kA$ 



\* Based on 3 Phase Wye, 4 Wire and Ground I<sub>n</sub> = Nominal Discharge Current per ANSI/UL 1449-2006

#### **KEY FEATURES**

Discrete "All Mode" Circuitry: Directly Connected Protection Elements in "All Modes" (10 modes for 3 phase Wye circuits) as recommended by IEEE Std. 1100-2005

Industry Leading Measured Limiting Voltage (let-through) Performance

Multi-stage Hybrid Frequency Attenuation Network

Local & Remote Diagnostics

Independent Verification of Performance and Safety

No moving parts or springs - No mechanical or electro-mechanical thermal/ over-current protection

Component-Level, Thermal Fusing

Patent Pending, Internal, Circuit Board Mounted, Over-Current Fusing

#### GENERAL

#### Application

The ST-CSEx series is the workhorse of our product line. This durable, high performance single port device is intended for sensitive and critical load applications at service entrance locations, main distribution panels, motor control centers, and individual equipment.

#### Warranty

#### 25 Years Unlimited Free Replacement

IEEE -C62.41.1 & C62.41.2-2002 environments

Suitable for Categories: A, B & C (Most Severe Electrical Environments)

#### **IEC Environments**

Suitable for use in IEC 61643-11 environments

#### **Circuit Topology**

Parallel configured combination Frequency Attenuation Network and Voltage Responsive Circuitry circuit design incorporating component-level, thermal fusing and circuit board mounted, Patented internal over- current fusing methodology with discrete "All Mode" protection (10 modes for 3 phase Wye units). All protection circuits are encapsulated in our high-dielectric compound to promote long component life and protection from the weather and vibration.

#### **Protection Modes**

Industry-best practice of dedicated protection components for all operational modes of the electrical system. Discrete L-N, L-L (Normal Mode) and L-G, N-G (Common Mode) Example: Directly Connected Protection Elements in All 10 modes for a 3 phase, 4 wire, Wye systems, (i.e. 3 L-N modes, 3 L-L modes, 3 L- G modes and 1 N-G mode).

50-60 Hz (60 Hz nominal)

**Temperature Rating** 

Up to 80°C

#### Insertion Loss Data (L-N)

Frequency	10 kHz	100 kHz	1 MHz	Max Attenuation & Freq.
Attenuation	20 dB	47 dB	26 dB	65 dB @ 135 kHz

#### Standard Enclosure

NEMA 1 Rated Standard Enclosure (Other enclosure options available)

## Nominal Discharge Current (I\_) Rating

(ST-CSEA) 10 kA, (ST-CSEB) 20 kA

#### Diagnostics

Green LED's, one per phase, normally on. A wide range of optional diagnostics is available.

Internal component-level, thermal fusing and patented circuit board mounted, over-current fusing. No external over-current protection required.

#### **Short Circuit Current Rating**

200 kAIC

## **Product Qualifications**

Listed to ANSI/UL 1449-2006 3rd Edition by UL (E340498), CSA (MC#241804);

UL1283\* and CE Compliant

ISO 9001-2008 Certified Manufacturing Facility

2004/2006 TVSS Customer Value Enhancement Award from Frost & Sullivan

## OPTIONS

AC = Internal Audible Alarm w/ test button, mute switch and red LED

**C** = Form C dry relay contacts

**D1** = Integral, non-fused disconnect switch (TVSS unit mounts inside)

D3 = Same as D1, except no external handle

**E1** = Hub on side of enclosure

K = Gasket Kit

LP = Remote LED indicators in individual NEMA 4X housings

M = NEMA 12 Steel Enclosure

N = Removes neutral to ground Sinewave Tracking Circuit

**P** = Flush Mount Plate

**R2** = Remote lights on separate circuit board in separate enclosure

**S** = Surge counter w/ reset button

**W** = NEMA 4 Steel Enclosure

**X** = NEMA 4X Composite Enclosure (Box-in-box)

**X1** = NEMA 4X Composite Enclosure with Clear Lid (Box-in-box)

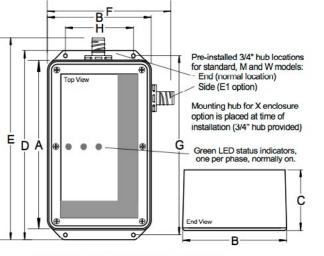
**X2** = NEMA 1, 2, 3, 3S, 4, 4X and 12 composite enclosure

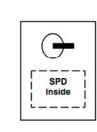
XS = NEMA 4X Stainless Steel Enclosure

External Accessories: EACS = Externally mounted diagnostic module, combines AC, C, and S options (Also available: EAC, EC, ECS, and ES) Other options may be available upon request.

## MECHANICAL (Model Number Ex: ST-CSEA3Y2D3 / Base Model: ST-CSE / SPD type & Nominal Discharge Current (I<sub>D</sub>) Rating: A, B, C, D / Voltage Code: 3Y2 / Options Code: D3)

<b>Enclosure Dimensions</b>								
Inches	Standard	Enclosure Options						
(mm)	Model	М	w	X,X1				
Α	8.25	10.00	10.00	12.00				
	(210)	(254)	(254)	(305)				
В	5.00	8.00	8.00	10.50				
	(127)	(204)	(204)	(267)				
С	3.00	4.00	4.00	6.00				
	(77)	(102)	(102)	(153)				
D	9.37	11.50	11.50	12.50				
	(238)	(293)	(293)	(318)				
E	9.48	12.00	12.00	13.23				
	(242)	(305)	(305)	(337)				
F	6.23	9.00	9.00	11.73				
	(159)	(229)	(229)	(299)				
G	8.87	10.75	10.75	12.00				
	(226)	(274)	(274)	(305)				
Н	3.37	6.00	6.00	8.00				
	(86)	(153)	(153)	(204)				
Туре	NEMA 1	NEMA	NEMA 4	NEMA 4X				
	ABS	12 Steel	Steel	Composite				
lbs. (kg)	5	14	14	10				
	(2.27)	(6.36)	(6.36)	(4.54)				
Flush mount trim plate available for standard and "M" option models.								





Integral Disconnect D1, D3 option configuration (Enclosure 12x10x6) (CSA)

Circuit Connection: #10 AWG wire (pre-installed)

Voltage	ANSI/UL 1449-2006 (Third Edition) Voltage Protection Rating (VPR)							
Code	L-N	HL-N	L-G	HL-G	N-G	L-L	HL-L	
1S1	500	-	500	-	500	1000	-	
3Y1	500	-	500	-	500	1000	-	
3D1	500	1000	500	1000	500	1000	1000	
3Y2	1000	-	1000	-	1200	1800	-	
3N2	-	-	1000	-	-	1000	-	
3N4	-	-	1800	-	-	1800	-	

Voltage Code	Circuit Type	Peak Surge Current	MCOV	ANSI/IEEE C62.41.1™-2002, C62.41.2™-2002, C62.45™-2002, and C62.62™-2010 Measured Limiting Voltages (tested with 6 inches of lead length external to the enclosure per Clauses 6.1.1 of C62.62™-2010 and 37.4.4 of ANSI/UL 1449-2006			
Code		Current		Test Mode	Cat A 30 Ω 100 kHz Ring Wave 2 kV / 67 A @ 270° Phase Angle	Category C (High) 10 kA 8/20 Current Driven Test <sup>†</sup>	
1S1	120/240V 1Ø (Split) (3 wire + ground)	80 kA L-N 80 kA L-L 80 kA L-G 80 kA N-G 480 kA Total	150 V 300 V 150 V 150 V	L-N L-L L-G N-G	30 V 54 V 45 V 45 V	1011 V 1291 V 991 V 1431 V	
3Y1	120/208 V 3Ø Wye (4 wire + ground)	80 kA L-N 80 kA L-L 80 kA L-G 80 kA N-G 800 kA Total	150 V 300 V 150 V 150 V	L-N L-L L-G N-G	27 V 54 V 46 V 45 V	1068 V 1381 V 1048 V 1431 V	
3D1	120/240 V 3Ø High- Leg Delta (4 wire + ground)	80 kA L-N 80 kA L-L 80 kA HL-N 80 kA L-G 80 kA HL-G 80 kA N-G 800 kA Total	150 V 320 V 300 V 150 V 320 V 150 V	L-N HL-N L-L L-G HL-G N-G	24 V 53 V 54 V 47 V 75 V 45 V	1091 V 1411 V 1381 V 1076 V 1371 V 1431 V	
3Y2	277/480V 3Ø Wye (4 wire + ground)	80 kA L-N 80 kA L-L 80 kA L-G 80 kA N-G 800 kA Total	320 V 550 V 320 V 320 V	L-N L-L L-G N-G	57 V 58 V 76 V 57 V	1334 V 1981 V 1304 V 1721 V	
3N2	240 V 3Ø Delta (NN) (3 wire + ground)	80 kA L-L 80 kA L-G 480 kA Total	320 V 320 V	L-L L-G	76 V	1381 V 1304 V	
3N4	480V 3Ø Delta (NN) (3 wire + ground)	80 kA L-L 80 kA L-G 480 kA Total	550 V 550 V	L-L L-G	76 V	1981 V 2144 V	

from the insertion point on the sine wave to the peak of the surge for powered tests. Each phase is the average of the modes within that mode of protection. In order to duplicate the results, the specified mode of protection must be tested in all modes (except N-G) and averaged together, (Individual mode or shot results may vary by more than 10%, Scope Settings; Time Base = 10 microseconds per division, Sampling Rate = 2.5 Gigasamples/sec, Bandwidth = 400 MHz (200 MHz for Cat C), Probes: Tektronix P5100/P6015A. These settings help to assure MLV results are accurate). All tests performed with 6" lead length (external to the enclosure), simulating actual installed performance. The MLVs reported above are certified by Third-Party, Independent Testing. Individual test reports are available upon request †Category C High, 10 kA is equivalent to the MLV recorded during the Nominal Discharge Current (L) Test from C62.62<sup>TM</sup>-2010 and ANSI/UL 1449-2006.

\*Other voltage configurations may be available. Contact your sales representative for additional assistance



## ST-CMLx 300kA Per Phase with Sinewave Tracking



<sup>\*</sup> Based on 3 Phase Wye, 4 Wire and Ground

## **KEY FEATURES**

Discrete "All Mode" Circuitry: Directly Connected Protection Elements in "All Modes" (10 modes for 3 phase, 4 wire Wye circuits) as recommend by NEMA LS-1 and IEEE Std. 1100-1999

Industry Leading Measured Limiting Voltage (let-through) Performance

Multi-stage Hybrid Optimal Sinewave Tracking® Circuit

Local & Remote Diagnostics

Independent Verification of Performance and Safety

No moving parts or springs - No mechanical or electro-mechanical thermal/ over-current protection

Rated as Type 2 SPD

Component-Level, Thermal Fusing

Patent Pending, Internal, Circuit Board Mounted, Over-Current Fusing

#### GENERAL

#### **Application**

The ST-CMLx series was developed to answer a broad variety of demands from our customers. This device is robust enough to handle the punishment of service entrance applications while providing protection from transients that are generated inside the facility. The constant bombardment of these combination transients damages valuable equipment and wastes budget dollars.

#### 25 Years Unlimited Free Replacement

IEEE -C62.41.1 & C62.41.2-2002 environments

Suitable for Categories: A, B & C (Most Severe Electrical Environments)

#### IEC Environments

Suitable for use in IEC 61643-11 environments

Parallel configured combination Optimal Sinewave Tracking® and Optimal Response Circuitry™ circuit design incorporating component-level, thermal fusing and Patent Pending internal, circuit board mounted, over-current fusing; and discrete "All Mode" protection (10 modes for 3 phase Wye units). All protection circuits are encapsulated in our high dielectric compound to promote long component life and protection from the weather and vibration.

Industry-best practice of true all mode dedicated protection components for all operational modes of the electrical system. Discrete L-N, L-L (Normal Mode) and L-G, N-G (Common Mode) Example: Directly Connected Protection Elements in All 10 modes for a 3 phase, 4 wire, Wye system, (i.e. 3 L-N modes, 3 L-L modes, 3 L-G modes and 1 N-G mode).

#### **Input Power**

50-60 Hz (60 Hz nominal)

#### **Temperature Rating**

Up to 80°C

#### Insertion Loss Data (L-N)

Frequency	10 kHz	100 kHz	1 MHz	Max Attenuation & Freq.
Attenuation	20 dB	47 dB	26 dB	65 dB @ 135 kHz

#### Standard Enclosure

NEMA 4 Rated with optional free gasket kit (K option) (Other enclosure options available)

#### **SPD Type**

Type 2 SPD (CMLB, CMLA)

#### Nominal Discharge Current (I<sub>2</sub>) Rating

20 kA (CMLB) 10kA (CMLA)

#### **Diagnostics**

Green LED's, one per phase, normally on. A wide range of optional diagnostics is available.

#### Circuit Interrupt

Internal component-level, thermal fusing and patent pending, circuit board mounted, over-current fusing.

#### **UL Short Circuit Current Rating**

200 kAIC

#### **Product Qualifications**

Listed to ANSI/UL 1449-2006 (3rd Edition) by CSA (CSA MC#241804); UL1283 and CE Compliant ISO 9001 Certified Manufacturing Facility

2004/2006 TVSS Customer Value Enhancement Award from Frost & Sullivan

#### OPTIONS

AC = Internal Audible Alarm w/ test button, mute switch and red LED

**C** = Form C dry relay contacts

**D1** = Integral, non-fused disconnect switch (TVSS unit mounts inside)

**D2** = External non-fused disconnect switch (TVSS mounts to outside)

D3 = Same as D1, except no external handle

**E1** = Hub on side of enclosure

**LP** = Remote LED indicators in individual NEMA 4X housings

M = NEMA 12 Steel Enclosure

**K** = Gasket Kit (installed)

**N** = Removes neutral to ground Sinewave Tracking Circuit

**P** = Flush Mount Plate

R1 = Remote lights on separate circuit board (board only - no enclosure)

**R2** = Remote lights on separate circuit board in separate enclosure

S = Surge counter w/ reset button

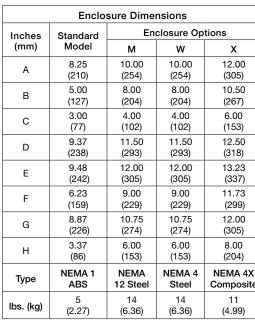
W = NEMA 4 Steel Enclosure

**X** = NEMA 4X Composite Fiberglass Enclosure

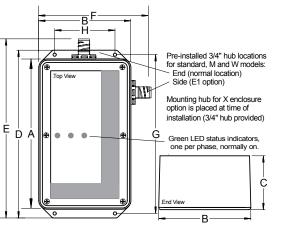
XS = NEMA 4X Stainless Steel Enclosure

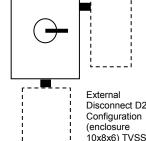
External Accessories: EACS = Externally mounted diagnostic module, combines AC, C, and S options (Also available: EAC, EC, ECS, and ES)

#### MECHANICAL (MODEL NUMBER EX: ST-CMLA3Y2D3 / BASE MODEL: ST-CML / SPD TYPE: A. B)



NEMA 4X Composite Flush mount trim plate available for standard and "M" option models





**TVSS** 

Inside

Integral

Disconnect

D1. D3 option

configuration

(Enclosure

12x10x6)

Attaches to

Any Side

Circuit Connection: #10 AWG wire (pre-installed)

Because we are constantly seeking to improve our products, specifications are subject to change at any time

Voltage	ANSI/UL 1449-2006 (Third Edition) Voltage Protection Rating (VPR)										
Code	L-N	HL-N	L-G	HL-G	N-G	L-L	HL-L				
1S1	500	-	500	-	500	1000	-				
3Y1	500	-	500	-	500	1000	-				
3D1	500	1000	500	1000	500	1000	1000				
3Y2	1000	-	1000	-	1000	1800	-				
3N2	-	-	1000	-	-	1000	-				
3N4	-	-	1800	-	-	1800	-				

Voltage	Cinquit Tuna	ANSI/IEEE C62.41.1 & .2-2002 and C62.45- Peak (tested w/6" lead length external				
Code	Circuit Type	MCOV	Surge Current	Mode	Cat A 30 Ω 100 kHz Ring Wave 6 kV 200 A @ 90° Phase Angle	Cat C, 2 Ω Combination Wave 20 kV / 10 kA @ 90° Phase Angle
		100 kA L-N	150 V	L-N	34 V	914 V
1S1	120/240V 1Ø (Split)	100 kA L-L 100 kA L-G	300 V	L-L	38 V	1119 V
131	(3 wire + ground)	100 kA L-G	150 V	L-G	56 V	1025 V
		600 kA Total	150 V	N-G	58 V	1176 V
		100 kA L-N	150 V	L-N	34 V	914 V
0) (4	120/208 V 3Ø Wye	100 kA L-L	300 V	L-L	38 V	1119 V
3Y1	(4 wire + ground)	100 kA L-G 4100 kA N-G	150 V	L-G	56 V	1025 V
	, , ,	1000 kA Total	150 V	N-G	58 V	1176 V
		100 kA L-N	150 V	L-N	34 V	914 V
	400/0401408	100 kA L-L	320 V	HL-N	34 V	1050 V
004	120/240 V 3Ø	100 kA HL-N	300 V	L-L	38 V	1119 V
3D1	High- Leg Delta	100 kA L-G 100 kA HL-G	150 V	L-G	56 V	1025 V
	(4 wire + ground)	100 kA N-G	320 V	HL-G	56 V	1262 V
		1000 kA Total	150 V	N-G	58 V	1176 V
		100 kA L-N	320 V	L-N	51 V	1050 V
0)/0	277/480V 3Ø Wye	100 kA L-L	550 V	L-L	111 V	1344 V
3Y2	(4 wire + ground)	100 kA L-G 100 kA N-G	320 V	L-G	74 V	1262 V
	, , ,	1000 kA Total	320 V	N-G	54 V	1575 V
	240 V 3Ø Delta (NN)	100 kA L-L	320 V	L-L	50 V	1262 V
3N2	(3 wire + ground)	100 kA L-G 600 kA Total	320 V	L-G	55 (	1262 V
		100 kA L-L	===\			
3N4	480V 3Ø Delta (NN)	100 KA L-E	550 V	L-L	50 V	1344 V
3114	(3 wire + ground)	600 kA Total	550 V	L-G		1344 V

\*Measured Limiting Voltage (Let-Through) Test Environment: Positive Polarity, Net voltages are peak (±10%). All tests are static except 150 V MCOV modes. Let-through voltages on static tests calculated by subtracting sinewave peak from let-through measured from zero. 150 V MCOV mode let-through voltages measured from the insertion point on the sinewave. Each phase is the average of the 3 modes. In order to duplicate the results, the specified mode must be tested for all three phases (except N-G) and averaged together. (Individual mode or shot results may vary by more than 10%. (Scope Settings: Time Base = 10 Microseconds, Sampling Rate = 500 Megasamples/sec. These settings assure Letthrough voltages test results are accurate). All tests performed with 6" lead length (external to the enclosure), simulating actual installed performance.



# ST-CILxM 360kA Per Phase with Sinewave Tracking



<sup>\*</sup> Based on 3 Phase Wye, 4 Wire and Ground

#### **KEY FEATURES**

Discrete "All Mode" Circuitry: Directly Connected Protection Elements in "All Modes" (10 modes for 3 phase, 4 wire Wye circuits) as recommend by NEMA LS-1 and IEEE Std. 1100-1999

Industry Leading Measured Limiting Voltage (let-through) Performance

Multi-stage Hybrid Optimal Sinewave Tracking® Circuit

Local & Remote Diagnostics

Independent Verification of Performance and Safety

No moving parts or springs - No mechanical or electro-mechanical thermal/ over-current protection

Rated as Type 2 SPD

Component-Level, Thermal Fusing

Patent Pending, Internal, Circuit Board Mounted, Over-Current Fusing

#### **GENERAL**

#### Application

The ST-CILxM series was developed to answer a broad variety of demands from our customers. This device is robust enough to handle the punishment of service entrance applications while providing protection from transients that are generated inside their facility. The constant bombardment of these combination transients can damage valuable equipment and waste budget dollars.

#### 25 Years Unlimited Free Replacement

IEEE -C62.41.1 & C62.41.2-2002 environments

Suitable for Categories: A, B & C (Most Severe Electrical Environments)

Suitable for use in IEC 61643-11 environments

Parallel configured combination Optimal Sinewave Tracking® and Optimal Response Circuitry™ circuit design incorporating component-level, thermal fusing and Patent Pending internal, circuit board mounted, over-current fusing; and discrete "All Mode" protection (10 modes for 3 phase Wye units). All protection circuits are encapsulated in our high dielectric compound to promote long component life and protection from the weather and vibration.

#### **Protection Modes**

Industry-best practice of true all mode dedicated protection components for all operational modes of the electrical system. Discrete L-N, L-L (Normal Mode) and L-G, N-G (Common Mode) Example: Directly Connected Protection Elements in All 10 modes for a 3 phase, 4 wire, Wye system, (i.e. 3 L-N modes, 3 L-L modes, 3 L-G modes and 1 N-G mode).

#### Input Power

50-60 Hz (60 Hz nominal)

#### Temperature Rating

Up to 80°C

#### Insertion Loss Data (L-N)

Frequency	10 kHz	100 kHz	1 MHz	Max Attenuation & Freq.
Attenuation	20 dB	47 dB	26 dB	65 dB @ 135 kHz

#### Standard Enclosure

NEMA 12 rated, painted steel enclosure (Other enclosure options available)

#### **SPD Type**

Type 2 SPD (CILBM, CILAM)

#### Nominal Discharge Current (I<sub>2</sub>) Rating

20 kA (CILBM) 10kA (CILAM)

#### **Diagnostics**

Green LED's, one per phase, normally on. A wide range of optional diagnostics is available.

## Circuit Interrupt

Internal component-level, thermal fusing and patent pending, circuit board mounted, over-current fusing.

#### **UL Short Circuit Current Rating**

200 kAIC

#### **Product Qualifications**

Listed to ANSI/UL 1449-2006 (3rd Edition) by CSA (CSA MC#241804); UL1283 and CE Compliant ISO 9001 Certified Manufacturing Facility

2004/2006 TVSS Customer Value Enhancement Award from Frost & Sullivan

## **OPTIONS**

AC = Internal Audible Alarm w/ test button, mute switch and red LED

- **C** = Form C dry relay contacts
- **D2** = External non-fused disconnect switch (TVSS mounts to outside)
- **D5** = Integral, non-fused disconnect switch (TVSS unit mounts inside)
- **D6** = Same as D5, except no external handle
- **E1** = Hub on side of enclosure
- **LP** = Remote LED indicators in individual NEMA 4X housings
- **N** = Removes neutral to ground Sinewave Tracking Circuit

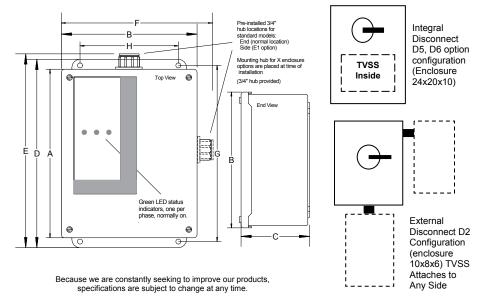
- **P** = Flush Mount Plate
- R1 = Remote lights on separate circuit board (board only no enclosure)
- R2 = Remote lights on separate circuit board in separate enclosure
- **S** = Surge counter w/ reset button
- W = NEMA 4 Steel Enclosure
- **X** = NEMA 4X Composite Fiberglass Enclosure
- XS = NEMA 4X Stainless Steel Enclosure

External Accessories: EACS = Externally mounted diagnostic module, combines AC, C, and S options (Also available: EAC, EC, ECS, and ES)

#### MECHANICAL (MODEL NUMBER EX: ST-CILA3Y2D3 / BASE MODEL: ST-CIL / SPD TYPE: A. B)

	Enclosure Dimensions									
Inches	Standard	Enclosure Dimensions								
(mm)	Model	W	Х							
Α	10.00	10.00	16.00							
	(254)	(254)	(407)							
В	8.00	8.00	14.00							
	(204)	(204)	(356)							
С	4.00	4.00	8.00							
	(102)	(102)	(204)							
D	11.50	11.50	12.00							
	(293)	(293)	(305)							
E	11.98	11.98	17.98							
	(305)	(305)	(457)							
F	9.98	9.98	15.98							
	(254)	(254)	(406)							
G	10.75	10.75	16.94							
	(274)	(274)	(431)							
Н	6.00	6.00	12.00							
	(153)	(153)	(305)							
Туре	NEMA 12	NEMA 4	NEMA 4X							
	Steel	Steel	Composite							
lbs. (kg)	14	14	32							
	(6.36)	(6.36)	(14.52)							

Circuit Connection: #10 AWG wire (pre-installed) Mounting: 3/4" hub (provided) and integrat feet



Voltage	ANSI/UL 1449-2006 (Third Edition) Voltage Protection Rating (VPR)						
Code	L-N	HL-N	L-G	HL-G	N-G	L-L	HL-L
1S1	500	-	500	-	500	1000	-
3Y1	500	-	500	-	500	1000	-
3D1	500	1000	500	1000	500	1000	1000
3Y2	1000	-	1000	-	1200	1800	-
3N2	-	-	1000	-	-	1000	-
3N4	-	-	1800	-	-	1800	-
			•	•			

#### MEASURED LIMITING VOLTAGE PERFORMANCE AND ELECTRICAL SPECIFICATIONS ANSI/IEEE C62.41.1 & .2-2002 and C62.45-2002 Let-through Voltage Test Results Peak (tested w/6" lead length external to the enclosure per UL 1449) Voltage Surge Circuit Type MCOV Cat A 30 Ω 100 kHz Ring Wave 6 kV 200 A @ 90° Phase Angle / 10 kA @ 90° Phase Angle Current Mode 120 kA L-N 150 V L-N 33 V 902 V 120 kA L-L 120/240V 1Ø (Split) 300 V L-L 43 V 1103 V 120 kA L-G 47 V (3 wire + ground) 150 V L-G 985 V 120 kA N-G 150 V N-G 49 V 1086 V 720 kA Total 120 kA L-N 150 V L-N 33 V 902 V 120 kA L-L 120/208 V 3Ø Wye 300 V L-L 43 V 1103 V 3Y1 120 kA L-G (4 wire + ground) 150 V L-G 47 V 985 V 120 kA N-G 150 V N-G 49 V 1086 V 1200 kA Total 33 V 902 V 150 V 120 kA L-N L-N 120 kA L-L 320 V 33 V 1066 \ HL-N 120/240 V 3Ø 120 kA HL-N 300 V 43 V 1103 V L-L High-Leg Delta 120 kA I -G 47 V 150 V 985 V I-G 120 kA HL-G (4 wire + ground) 320 V HL-G 47 V 1158 V 120 kA N-G 1200 kA Total 150 V N-G 49 V 1086 V 120 kA L-N 320 V L-N 51 V 1066 V 120 kA L-L 277/480V 3Ø Wye 550 V L-L 108 V 1456 V 3Y2 120 kA L-G 320 V L-G 79 V 1158 V (4 wire + ground) 120 kA N-G 320 V N-G 52 V 1481 V 1200 kA Total 120 kA I -I 51 V 1158 V 320 V 1 -1 240 V 3Ø Delta (NN) 3N2 120 kA L-G (3 wire + around) 320 V L-G 1158 V 720 kA Total 120 kA L-L 480V 3Ø Delta (NN) 550 V L-L 51 V 1456 V 3N4 120 kA L-G (3 wire + ground) 550 V L-G 1456 V 720 kA Total

\*Measured Limiting Voltage (Let-Through) Test Environment: Positive Polarity, Net voltages are peak (±10%). All tests are static except 150 V MCOV modes. Let-through voltages on static tests calculated by subtracting sinewave peak from let-through measured from zero. 150 V MCOV mode let-through voltages measured from the insertion point on the sinewave. Each phase is the average of the 3 modes. In order to duplicate the results, the specified mode must be tested for all three phases (except N-G) and averaged together. (Individual mode or shot results may vary by more than 10%. (Scope Settings: Time Base = 10 Microseconds, Sampling Rate = 500 Megasamples/sec. These settings assure Letthrough voltages test results are accurate). All tests performed with 6" lead length (external to the enclosure), simulating actual installed performance.



Energy Control Systems is proud to offer the industry's most complete and capable line of high quality Surge Protective Devices (SPD's) for Industrail, Commercial and Department of Defense applications. Our high quality, ISO 9001 manufactured devices cover the full range of applications for AC/DC power, data, current loop, and telecommunications applications from 5V DC to 7200V AC.

Our twenty five years of hands on, real world field experience can be seen in the simplicity, functionality and user friendly design of all our products. Simply stated, these are the finest, highest quality, best performing surge suppression products available anywhere in the world today. We not only set the standard, we are the standard.

ECS Service 817.483.8497



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