



Background

A tier one telecommunications provider in San Marcos, Texas reported that two locations suffered multiple rectifier failures attributed to lightning storm activity after remote electronics cabinets were installed and placed into service.

A provider remote location DLC (digital loop carrier) suffered significant damage to the rectifiers and remote electronics on multiple occasions. Site grounding system and SPDs were confirmed to be in good working order.

ITW Linx Guard Installation

Since February 19, 2019, when ITW Linx Guard, Part number TSP-L 240/120-60, adaptive surge protection with lightning detection, was installed at two San Marcos, Texas locations, neither reported damage to the rectifiers or remote electronics.

Lightning Activity Tracked

Lightning activity in the San Marcos area was tracked between February 19 and December 10, 2019. During this period of time, there were 19 storms that included lightning activity, 4 of which had high to severe lightning activity.

Field trial data shows that AC isolation during electrical storm activity greatly reduces and may eliminate remote electronics and rectified damage from both direct and proximity lightning strikes.

Field trial data correlates directly to data acquired in New Mexico at 80+ sites deployed with AC isolation systems.

AC Power Input Side AC Isolation System with Type 2 SPD on Supply Side of AC Breakers

4:26:08 PM	1 H-N Impulse	-160 Vp 90°		
4:26:08 PM	1 H-N Impulse	-370 Vp 52°		
4:24:40 PM	H-N Sag 101 Vrms		1.0 cycles	
4:24:40 PM	2 H-N Impulses	-370 Vp 132°		
4:24:40 PM	H-N Sag 98 Vrms		1.0 cycles	
4:24:40 PM	1 H-N Impulse	-350 Vp 137°		
4:16:32 PM	1 H-N Impulse	+270 Vp		194°
4:15:28 PM	1 H-N Impulse	+420 Vp		214°
4:09:12 PM	1 H-N Impulse	+270 Vp		102°
3:58:24 PM	1 H-N Impulse	+340		26°
3:57:12 PM	1 H-N Impulse	-260 Vp 88°		
3:55:44 PM	H-N Sag 92 Vrms		11.0 cycles	
3:55:36 PM	H-N Sag 35 Vrms		3.5 cycles	
3:55:36 PM	4 H-N Impulses	+760 Vp		252°
3:52:32 PM	1 H-N Impulse	+440 Vp		313°
3:52:32 PM	3 H-N Impulses	+490 Vp		228°
3:50:40 PM	1 H-N Impulse	+280 Vp		300°
3:49:28 PM	1 H-N Impulse	+370 Vp		214°
3:48:48 PM	H-N Sag 76 Vrms		16.0 cycles	
3:48:48 PM	H-N Sag 41 Vrms		8.0 cycles	
3:48:40 PM	H-N Sag 21 Vrms		9.0 cycles	
3:48:40 PM	5 H-N Impulses	-1130 Vp		54°
3:48:40 PM	5 H-N Impulses	-1330 Vp		57°

Load Side AC Isolation System

3:39:52 PM Outage 0 Vrms 04:30:40 Output from AC Isolation System

NOTE: AC Isolation System active from 3:39:52 until 04:30:40 due to lightning activity in area.

Intelligent Surge Protection for Power, Networks, and Connected Equipment – TSP-L Series

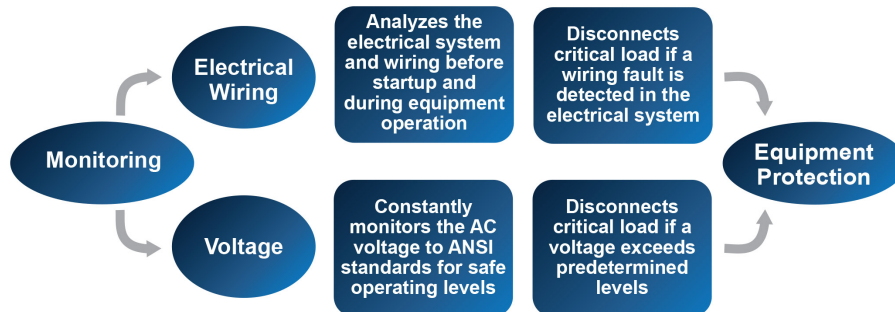
Adaptive AC Surge Protection Technology monitors electrical power integrity and adapts its performance and operating mode to the conditions required to protect the electrical systems and equipment connected to it.

Pre-emptive Lightning Detection works in tandem with Adaptive AC Surge Protection by detecting the proximity and severity of lightning and adjusting its performance and operating mode to enable pre-emptive protection measures.

Surge Protection Type 2 Listed to UL 1449 SPD monitors and protects connected equipment from AC power Surges and Transients.

TSP-L Series Intelligent Surge Protection

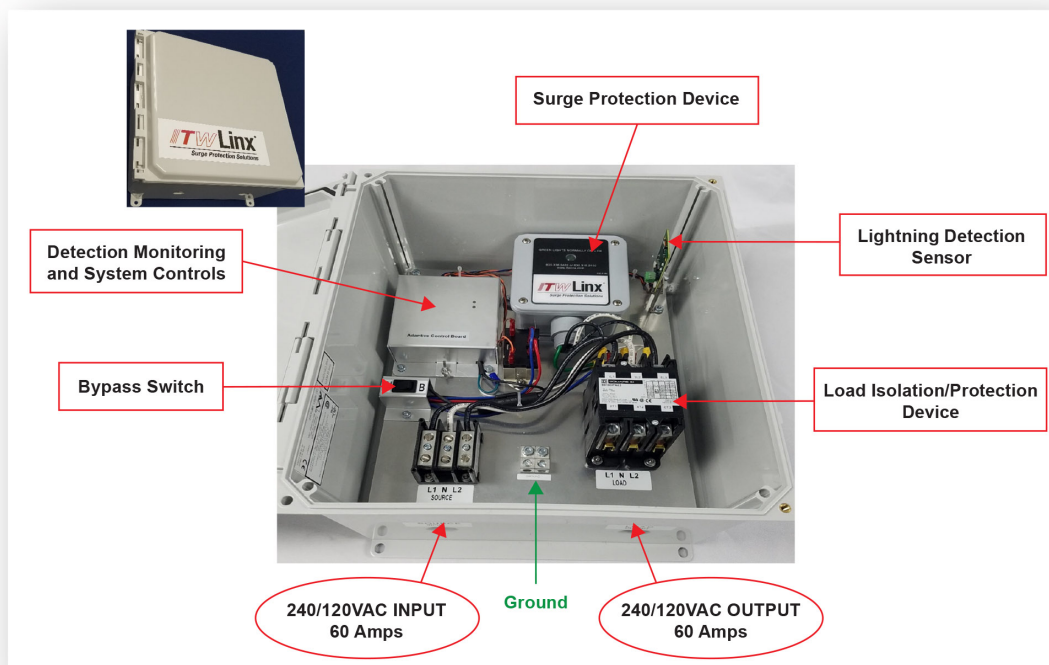
For Power, Networks, and Connected Equipment



Detect + Disconnect = Always Protect

Proven Success Increases Reliability

- Detects impending lightning before the strike occurs
- Isolates and protects sensitive equipment from destructive AC transients and ground current
- Protects communications installations per 1692-2011 – IEEE Guide for the Protection of Communication Installations from Lightning Effects
- Selectable voltage thresholds prevent unstable re-connection of AC power
- Analyzes and monitors electrical infrastructure for proper wiring
- Remote communications capability
- AC power quality and voltage monitoring enhance powering stability and increase equipment reliability



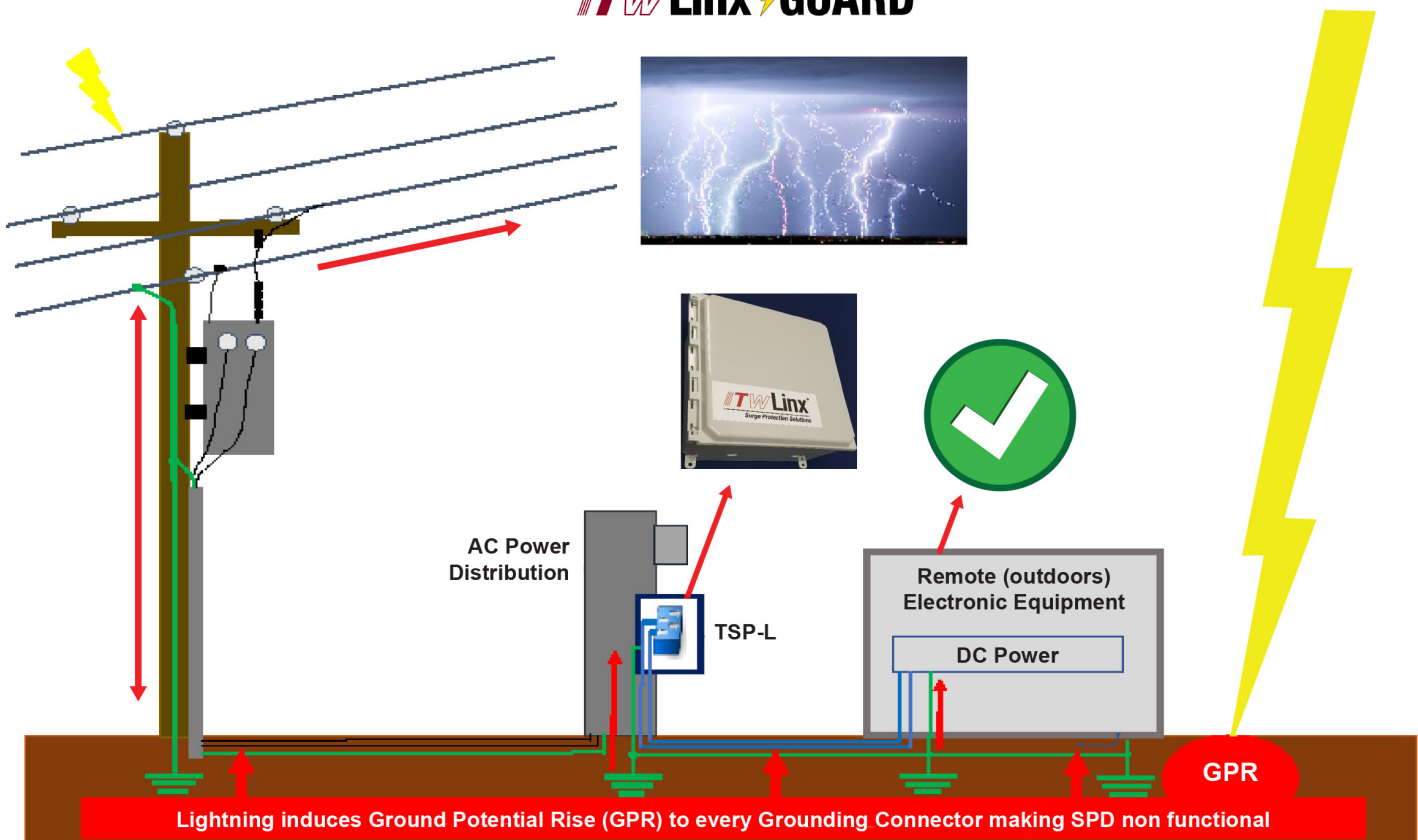
Pre-emptive Lightning Detection

Pre-emptive lightning detection monitors for atmospheric conditions capable of producing lightning strikes within 5 miles of protected equipment. It pre-emptively signals and disconnects power to connected equipment, eliminating lightning surge damages, blown out equipment and power feed brownout conditions. Normal operation of equipment continues if connected to batteries, UPS system or generator when set during the power disconnect or isolation mode.

Intelligent Lightning Detection System

Intelligent lightning detection system detects pending (overhead) lightning ONLY by calculating approaching and departing storm activity and ignores noise and disturbances. The system utilizes algorithmic calculations and microprocessor technology and narrowband receiving techniques with indoor or outdoor settings. The intelligent lightning detection system has the capability to detect lightning strikes as a function of distance and noise threshold levels resulting in the avoidance of false triggering by man-made or environmental events.

Protected with TSP-L ITW Linx® GUARD

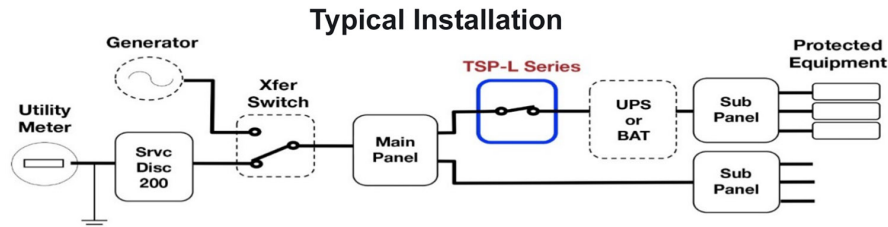


✓ TSP-L senses pending lightning and pre-emptively isolates the AC supply from the electronic equipment thus eliminating any damages.

Summary

Today's Ineffective Surge Protection Devices (SPD) are Being Replaced by the TSP-L Series Surge Protection Systems

The TSP-L next generation system incorporates lightning detection, load isolation, electrical wiring fault detection and AC voltage monitoring.



How Do You Know If Your Application Can Benefit from ITW Linx Guard – TSP-L 240/120-60?

- Critical equipment and infrastructure
- Outside plant and remote equipment
- Security systems
- Business automation systems
- Networks and wireless systems
- Oil and gas infrastructure
- Rail systems and infrastructure
- Where traditional Surge Protection Devices (SPDs) fail to protect



Lightning detection and AC power disconnection is the only effective way to protect remote outdoor equipment from the damaging effects of lightning induced surges. According to *IEEE Std 1692™-2011, Guide for the Protection of Communication Installations from Lightning Effects*© • 5.2.2 AC service isolation, **the best protection is to disconnect the AC service conductors from the load during lightning events.**



Traditional Surge Protection Devices (SPDs) are designed to divert lightning surges to ground assuming that the ground is effective and not saturated with Ground Potential Rise (GPR) produced by the nearby lightning strikes.

Traditional Surge Protection Devices (SPDs) are not an effective protection method.

Reliable ITW Linx Surge Protection Solutions

Model	TSP-L 240/120-60°
Dimensions (W X H X D)	12" X 14" X 10"
Net Weight	12 lbs.
Voltage	120/240 VAC
Frequency	50/60 Hz
Load Disconnect Capacity	60A
Conductors Disconnected	L1/L2/N
Power Consumption	<20W
National Discharge Current 8/20 (In)	20KA
Max. Discharge Current 8/20 (Imax)	80KA
Typical Lightning Sensor Range	<5 miles
Load Isolation	>12KV
Cooling	Convectional
Storage temperature	-40° C to 85° C
Operating Temperature	-40° C to 50° C
Indoors & Outdoors Installation	Yes
Outdoors NEMA Rating 4X	Yes
Standards and Compliance	UL 1449 4 th Edition SPD Type 2
*Add R for Optional remote Lightning Detection Antenna	Yes