

# ITW Linx - INNOVATION BY DESIGN

ITW Linx is a leader in the design and development of surge protection devices since the division was created in 1982. Linx is a division of Illinois Tool Works, Inc. (ITW), a Fortune 200 Company, with over 600 operating units in 44 countries. Our products are the result of innovative engineering and careful consideration of application requirements.

Linx has always designed products which exceed industry and safety standards. Our products are UL/CSA Listed for their applications to ensure performance and safety. UL Listing of surge protection products ensures that the products we manufacture meet the safety standards set by Underwriter's Laboratories which differs from UL Recognition which certifies products to standards / specifications developed outside of UL.

In order to develop and certify product performance, Linx has one of the few laboratories in North America which can perform all of the necessary UL / CSA / FCC / TIA / EIA performance tests for surge protection devices. In many cases, such as Category 5e protection, performance of the device is more than surge protection. Data throughput and bit-corruption are critical to network performance. Transparent protection is the ultimate goal for high bandwidth data devices. The only way to ensure network performance is to measure it and certify compliance to published standards for a particular application.

## PROTECTION FOR PREVENTION

Surge Protection devices are used to prevent human injury, structure fires, and equipment damage. Protection devices prevent costly losses in business due to down time, equipment repair / replacement, and building damage. All surge devices are not suited for all applications. The performance requirements for surge protectors are specified by Underwriters Laboratories within the following Listing standards:

- **UL 497 - Primary Protection:** The Primary Protector is used at Building Entrances and is capable of withstanding the highest level of over-voltage surges - lightning. These devices are required by NEC Article 800 to protect buildings and humans.
- **UL 497A - Secondary Protection:** The Secondary Protector is located between the building entrance / primary protector and the equipment intended to be protected. The Linx Secondary devices add an additional layer of protection over Primary Protectors by including an over-current device to protect from power cross conditions such as touching an AC Power Cable to the telecommunications cable. These protectors are intended to protect buildings, humans and sensitive electronic equipment.
- **UL 497B - Isolated Loop Protection:** Isolated Loop Protectors are designed to handle over-voltage events which are introduced within a building. The protected "loop" must not be exposed to the outside world. These protectors are not designed to protect against lightning type surges.

Using the proper UL Listed Protection Device for your application will ensure your investment in protection will perform and protect the larger investment made in telecommunications equipment. All UL Listed protection devices must carry the UL Mark. Look for the UL Listing Mark to know you have the proper device for the application - your personnel, business, building and equipment depend on it.

### Are Voltage and Current Surges a New Problems?

Transients (surges) in general are not a new phenomena. Surges from lightning, induction, and electrostatic discharge are based in the laws of physics and have been around since the dawn of time. If the surges are not new, why is protection a more recent development and necessity? To answer this question, we must look at the changes in technology causing surges and the devices affected by surges.

As a cause, recent problems with power generation have caused increases in the numbers of power outages, brown outs and voltage fluctuations. Newer materials, cabling, and industrial equipment create paths for transients to reach equipment. Newer electronic devices operate at low voltages. When a surge of even a few volts hits these low voltage devices, the device may be exposed to two or more times its normal operating voltage. Thus, the device fails. Phone systems since the 1980's have migrated from electro-mechanical systems to electronic - increasing system sensitivity to surges at every level. Electro-mechanical switching devices can withstand larger changes in voltage without damaging the device. Electronics, however, can be stressed or damaged by very minor changes in voltage. ITW Linx has developed protection devices to specifically protect these newer systems from surge damage.

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ITW Linx 100% Solid-State Surge Protectors provide all of the voltage and current limiting features that are necessary to prevent damage to sensitive electronic communications equipment. All ITW Linx products are UL / CSA Listed to ensure safe performance during use. Using the right protection device can make the difference between system damage and system operation.

The Solid-State over-voltage devices respond to transient voltages in 2-5 nanoseconds. Electricity travels at approximately 1 foot per nanosecond. Thus, surges are stopped within 2-5 feet past the surge protection device and the equipment is safe from harm. By comparison, Solid-State devices react one thousand times faster than Gas Tube Protection Devices typically found at the telephone company demarcation point (building entrance). The Gas Tube device, while very robust, will not clamp the surge to ground before 4,000 to 5,000 nanoseconds. At this reaction speed, the surge passes the protector and travels up to one mile down the cable before the protector clamps to ground. The equipment that is intended to be protected is most likely damaged before the Gas Tube device even reacts.

## The Nature of the Surge Threat

Communications equipment can be subjected to over-voltage surges, over-current surges or even both surge events at once. Over-voltages can destroy sensitive semi-conductors in microprocessors within PBX / KSU systems as well as CPU's in PC's or workstations. Over-current events can generate enough heat to cause a building wiring fire. The types of surges seen by these communications devices are listed below:

- **Lightning** - This over-voltage surge is the most common cause of surge damage. Lightning strikes near the building or as far away as a few miles can generate a surge which travels through aerial or buried cable to the equipment. Solid-State devices are used to stop these powerful surges fast.
- **Power Line Cross** - This over-current surge is caused by the accidental crossing of power lines with telecommunications lines. Fuse devices or PTC's are used to prevent this damage from occurring within the building.
- **Conductive Spikes** - Voltage surges caused by the momentary contact between a power and telecommunications line.
- **Inductive Spikes** - Induced voltage / current surges caused by electromagnetic fields of high energy switching equipment or surges in cables near the communications cables.
- **Electrostatic Discharge** - This is an over-voltage surge that can damage equipment as easily as lightning and is typically overlooked.

Device	Device Response Time	Distance Surge Travels Before the Device Reacts	Typical Applications/ Installation Locations
Fuse	300,000 Nanoseconds	300,000 Feet	Secondary Protection for Power Crosses (over-current events)
Carbon Block	5,000-10,000 Nanoseconds	5,000-10,000 Feet or 1-2 Miles	Primary Protection / Residential Entrance Protection (over-voltage events)
Gas Tube	4,000-5,000 Nanoseconds	4,000-5,000 Feet or 1 Mile	Primary Protection / Building Entrances (over-voltage events)
Solid-State	2-5 Nanoseconds	2-5 Feet	Primary / Secondary Protection Bldg Entrance and at Equipment Locations (over-voltage events)