

TECHNICAL BRIEF

Guard Tower® Lightning Protection System



The Guard Tower is protected against damage due to atmospheric surges by a system that provides different levels of protection according to the level of the threat.

WIRES INTERNAL TO EACH GUARD TOWER:

Each Guard Tower is provided with wiring internal to the post that runs from end to end. These internal wires are provided with a level of protection designed for the length of the post. The level of protection limits the voltage on each wire relative to the Guard Tower's internal ground system.

CAT5 CABLE (POWER SUPPLY AND COMMUNICATIONS):

Each Guard Tower is connected to adjacent Guard Towers by a CAT5 cable (typically 40 feet in length) where each conductor within a cable is protected at each end of the cable and at a higher level of protection than the short wires internal to each post. The CAT5 cable's conductors are provided with a level of protection designed for the distance between Guard Towers and limit the voltage on each conductor relative to the Guard Tower's internal ground system.

COMMUNICATION SYSTEM DIELECTRIC WITHSTAND AND FENCE WIRE ISOLATION:

The Guard Tower communication system consisting of the CAT5 cable, each Guard Tower's internal circuit, and each Guard Tower's internal wiring from end to end within each tower are designed to float relative to Earth ground. The system is capable of withstanding a 25KV induced voltage surge due to atmospheric surges. The 25KV is based on the IEC 60335-2-76 atmospheric surge requirement for electric fence energizers. Each Guard Tower connection to the fence wire is also provided with the same 25KV isolation between each fence wire and the internal circuit of each Guard Tower.

HEAD END COMMUNICATION SYSTEM TO EARTH GROUND PROTECTION:

To protect the Guard Tower's communication system (CAT5 cable, each Guard Tower's internal circuit, and each Guard Tower's internal wiring from end to end within each tower) along with the Guard Tower's power supply and opto-isolator, the floating communication system is connected to Earth ground through a MOV. The IEC 60335-2-76 atmospheric surge requirement for electric fence energizers states the energizer must withstand a 125 Joule surge. The Guard Tower at the head end of the system is provided with a MOV rated at 250 Joules (double the IEC requirement).

FENCE WIRE CONNECTION TO EARTH GROUND PROTECTION:

The Guard Tower at the head end of the system is also provided with 250 Joule MOVs between Earth ground and all connections to the fence wires to protect the Guard Tower's internal circuit from atmospheric induced surges on the fence wires. Along with the MOVs, secondary suppression devices are also provided to further protect the circuit from atmospheric surges.

In addition to each of the surge protection devices described above for each location within the Guard Tower lightning protection system, small impedances are provided between the surge protection device and the circuit being protected to reduce the current the circuit is subjected to during a lightning strike.

OPTIONAL INCREASED PROTECTION:

For additional protection, the same Guard Tower used at the head end of the fence may also be installed at multiple locations along the fence to increase the current capability between the Guard Tower's communication system and Earth ground.

SPECIFICATIONS FOR EACH LEVEL OF PROTECTION ARE AS FOLLOWS:

- Protection for Wiring Internal to Each Guard Tower Post: 17V @ 23A
(Relative to Guard Tower's Internal Floating Ground)
- Protection for Each End of CAT5 Cable Conductors:
 - Power Supply: 48V @ 31A
 - Communication Lines: 17V @ 88A
(Relative to Guard Tower's Internal Floating Ground)
Note: The power supply values are for a single Guard Tower and cumulative for multiple Guard Towers. The communication line values are for protection at each end of the 40' CAT5 cable.
- Secondary Protection for Connection to Fence: 17V @ 88A
(Relative to Guard Tower's Internal Floating Ground)
Note: These values are for a single Guard Tower head end and cumulative if multiple Guard Tower head end posts are provided along the fence.
- Isolation for Guard Tower Communication System: 25KV
(Relative to Earth Ground)
- Isolation for Guard Tower Power Supply: 3KVACrms
(Relative to Earth Ground)
- Isolation for Guard Tower Opto-Isolator: 2.5KVACrms
(Relative to Earth Ground)
- Protection at Head End of Guard Tower Communication System: Bi-directional 6500A Peak / 250 Joules / 1650V @ 100A / 2.5KVAC max at 125 Joules (IEC)
(Relative Earth Ground)
Note: These values are for a single Guard Tower head end and cumulative if multiple Guard Tower head end posts are provided along the fence.
- Protection for Each Fence Wire Connected to the Guard Tower's Circuit:
Bi-directional 6500A Peak / 250 Joules / 1650V @ 100A / 2.5KVAC max at 125 Joules (IEC)
(Relative Earth Ground)
Note: These values are for a single Guard Tower head end and cumulative if multiple Guard Tower head end posts are provided along the fence.

NOTES:

All 5V Lines: SMJA10ALF

All CAT5 Communication Lines: SMJA10ALF

Supply: SMCJ30ALF

Secondary Fence Protection: SMCJ10ALF

Polarity diode required between supply connection and the input of the voltage regulator. Diode and capacitor (input to regulator) need to be higher than 48V devices.