



Protective Measures for Outdoor Installation


Protective Measures for Outdoor Installation

If the device is installed outdoors, necessary protective measures should be taken to ensure safety.

- Signal cables should be at least 50 meters away from high-voltage power supplies and cables.
- Route cables under eaves whenever possible.
- In open fields, use sealed steel pipes to route cables underground and ground both ends of the steel pipes. Overhead cable wiring is prohibited.
- Surge protection devices (SPDs) and lightning rods must be installed in thunderstorm-prone areas and high induced voltage areas, such as high-voltage substations.

The device should be installed within the protective radius of the lightning protection air terminal. For actual installation, the protective radius is approximate to the area within 45 degree protective angle of the air terminal. The air terminal and the downlead should keep a distance from the device—at least 1 meter when parallel to device cables and at least 0.3 meters when perpendicular to device cables.

SPDs should be installed near the protected device. The SPD on the power cord should be installed with decoupling components to coordinate the action time of SPD and the protection components in the device. The decoupling inductance should be higher than 5 μH (approximately 1 μH for 1 meter of cord).

- The lightning protection and grounding design of outdoor installation and wiring should be in compliance with the lightning protection requirements of the buildings and local laws and regulations.
- The lightning protection system should apply equipotential grounding. The grounding device should be able to reduce interference and guarantee electrical safety. It must not be connected to the neutral line on power grid or use the same wire of the neutral line. When the system is grounded separately, the resistance should be no more than 4 Ω and the cross-sectional area of the ground wire should be no less than 25 mm^2 . The grounding point of the device is usually the yellow-green cable (labeled as YELLOW/GREEN ) or other substitution (refer to the Quick Start Guide). Drive the ground rod 1.5 meters into the ground and measure whether the resistance reaches the standard. If not, bury the ground rod deeper or change a ground rod.

Protective Measures for Outdoor Installation

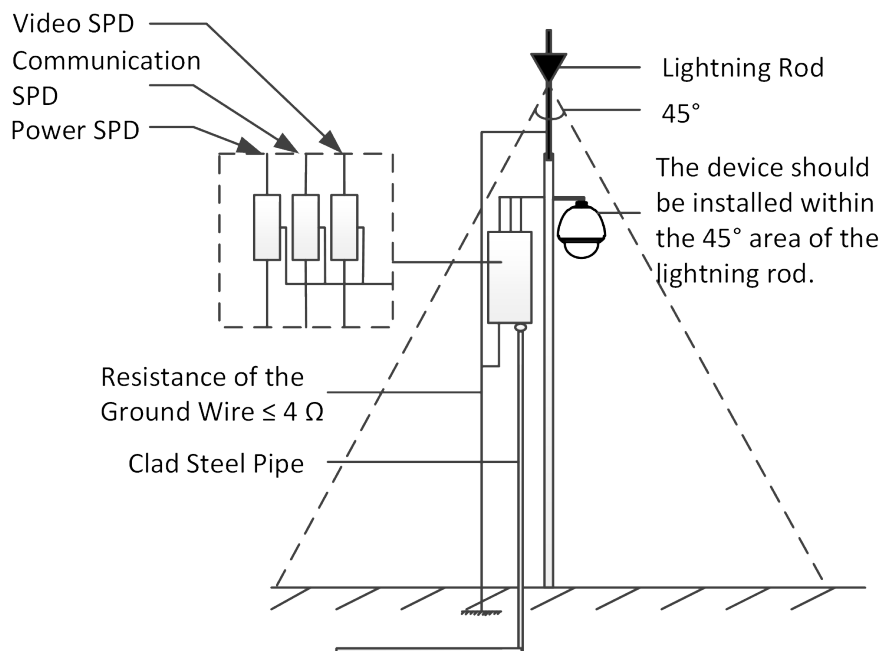


Figure 1 Protection for Outdoor Installation



Caution

If the device does not apply equipotential grounding, following risks may occur.

- Static electricity may cause damage to electronic components, or interference to the image or the control line.
- The device may be damaged if the device is not grounded on site to release the high energy of a lightning strike in lightning-prone areas.
- The power supply of the device may be damaged if the device is not grounded to release the high surge energy in areas with unstable voltage.

Lightning Protection Measures

Lightning protection measures should be applied to devices installed outdoors or in severe environments.

Severe Environment

Installation in a severe environment usually has following characteristics.

- The device is installed in an open field without any shelters.
- The device is installed on a high position with no higher objects nearby, for example, at the top of a building, pole, or mountain.
- The cables are routed over a long distance.

Protective Measures for Outdoor Installation

In severe environments, the device has a higher risk to be damaged by lightning strikes. Different types of lightning hazards and solutions are as follows.

Table 1 Lightning Hazards and Solutions in Severe Environments

Type	Description	Solution
Direct Strike	The device is not sheltered and at the risk of being struck directly by lightning.	Install lightning protection system and keep the device within its protective radius.
Ground Potential Rise	When a nearby object is hit directly by lightning and the resistance on its releasing path is too high, if the device and the object have the common ground, the transient current and high voltage will go into the device through the ground wire and cause damage.	Ground the device separately. Avoid common ground with the lightning protection system.
Lightning Electromagnetic Pulse	In an open field, the electromagnetic pulse caused by electric discharge from cloud to cloud or from cloud to ground couples into the wires of the device through space and causes damage.	It is usually required to enclose device cables with shielded metal pipes and ground the metal pipes. Long-distance cables are required to be buried underground. Overhead wiring is not allowed. Every line into the device should be installed with SPD.
Surge Energy	When the cable runs over a long distance, the surge energy from the far end also poses high risk.	

Protective Measures for Outdoor Installation

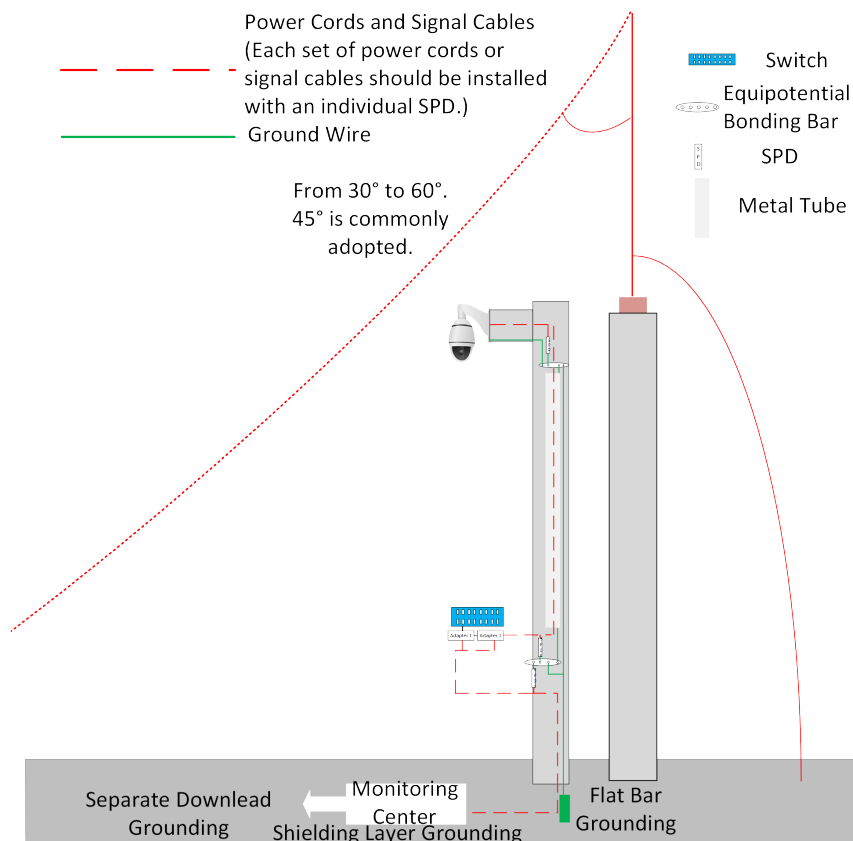


Figure 2 Lightning Protection Measures in Severe Environments

Outdoor Environment

Outdoor installation usually has the following characteristics.

- The device is installed outdoors with a lightning protection system or a higher building nearby.
- The cables are routed over a long distance.

When the device is installed outdoors and within the protective radius of a lightning protection system or a higher building nearby, it is not likely to be struck directly but has a higher risk to be struck indirectly. Different types of lightning hazards in outdoor environments and solutions are as follows.

Table 2 Lightning Hazards and Solutions in Outdoor Environments

Type	Description	Solution
Ground Potential Rise	When a nearby object is hit directly by lightning and the resistance on its releasing path is too high, if the device and	Ground the device separately. Avoid common ground with the lightning protection system.

Protective Measures for Outdoor Installation

Type	Description	Solution
	the object have the common ground, the transient current and high voltage will go into the device through the ground wire and cause damage.	
Lightning Electromagnetic Pulse	In an open field, the electromagnetic pulse caused by electric discharge from cloud to cloud or from cloud to ground couples into the wires of the device through space and causes damage.	It is usually required to enclose device cables with shielded metal pipes and ground the metal pipes. Long-distance cables are required to be buried underground. Overhead wiring is not allowed. Every line into the device should be installed with SPD.
Surge Energy	When the cable runs over a long distance, the surge energy from the far end also poses high risk.	

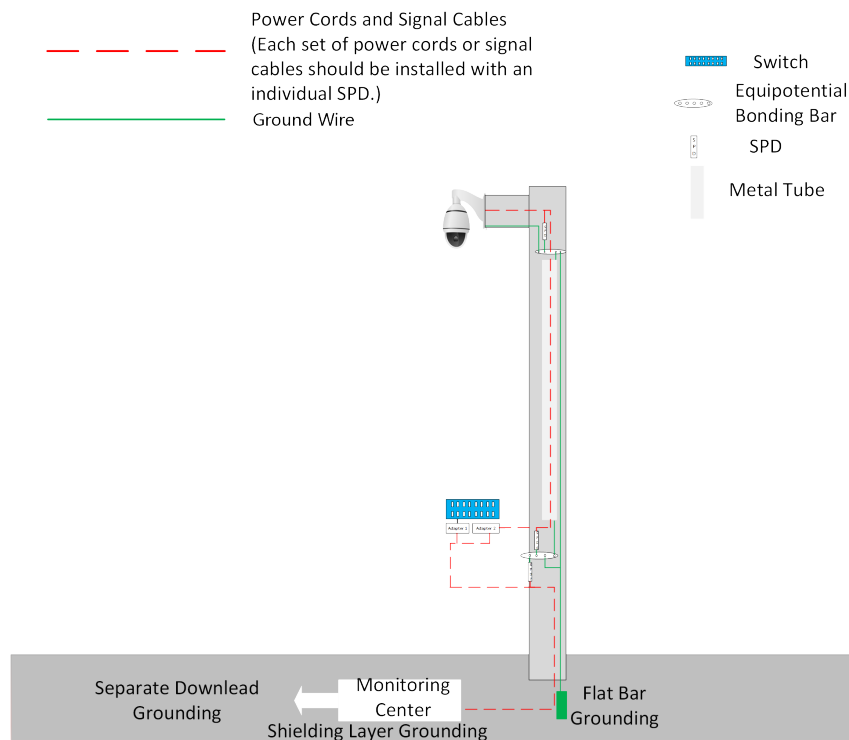
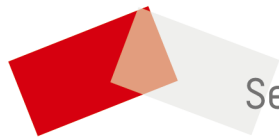


Figure 3 Lightning Protection Measures in Outdoor Environments



See Far, Go Further