

Application Note: FT742-DM Lightning Guidance

1. Introduction

The FT742-DM has a range of accessories designed to improve and adapt the sensor to various environments and installations. This guide will detail the available lightning protection schemes, along with best-practice installation guidance.

Wind sensors are typically installed in challenging external environments, often on tall metallic structures. These environments can result in exposure to significant transient surges from lightning with the potential to damage the sensor and connected equipment.

There are several methods of protecting the equipment:

- **Primary Protection:** The use of a grounded lightning mast to divert lightning surges away from the sensor. Including metallic shielding conduit for the protection of cables with 360° grounded termination at both ends
- **Secondary:** Surge protection devices (SPD) to protect the device

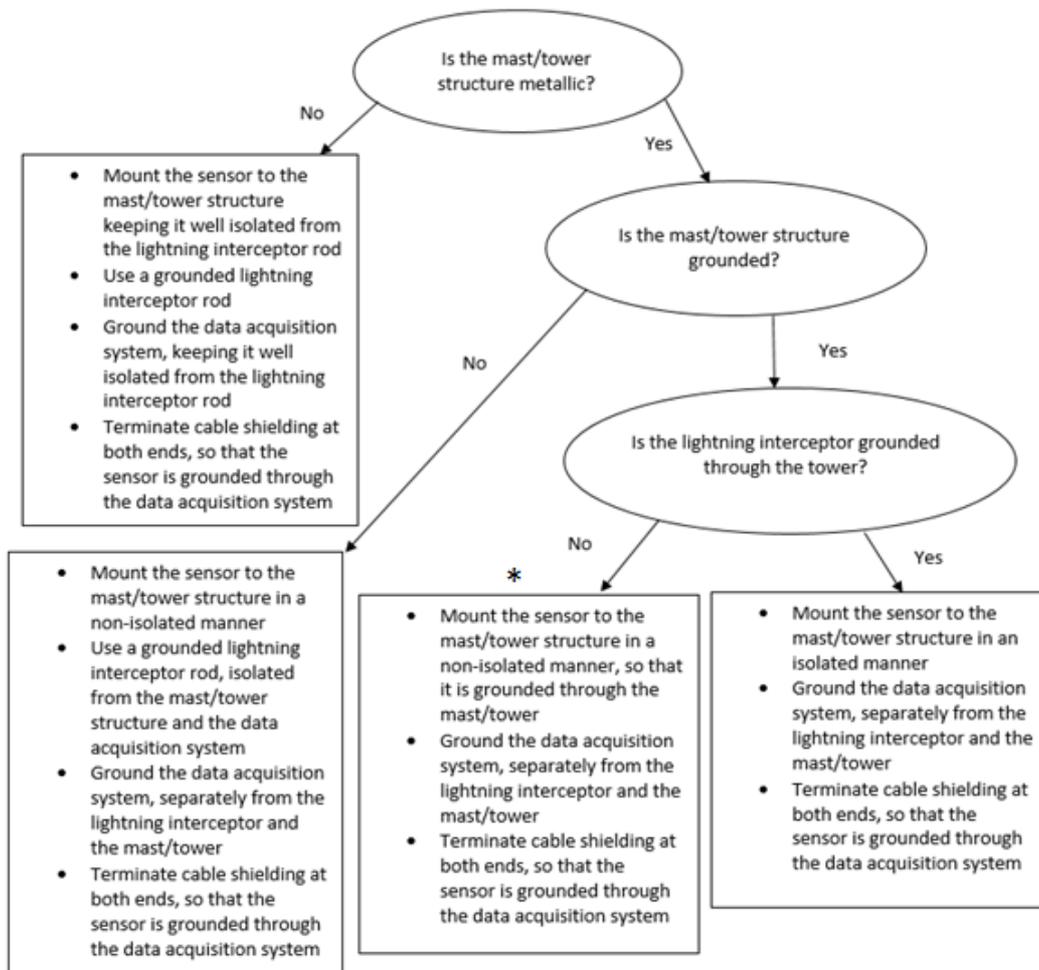
We strongly recommend consulting a professional lightning protection expert to provide specific recommendations for each different application.

For further details, please refer to the generic FT Lightning Protection Checklist (document A4223-1-EN).

The FT742-DM is specifically designed for meteorological use. When installing the sensor, it is essential to do so in a way that protects the sensor in the event of a lightning strike (if the site is deemed to be at risk). Since peak current levels during a lightning strike can be in the order of 200kA, applying the correct grounding technique is critical to ensuring current is diverted to ground in a controlled manner.

The sensor can survive a properly diverted lightning strike, so lightning interceptors and secondary protection should be used. The sensor should be positioned beneath the lightning interceptor rod, within a 45° protection zone. The recommended clearance between sensor and interceptor is a minimum of 30x diameter of the interceptor material.

The best grounding method to apply will depend on how the rest of the equipment has been installed. The following flow chart can help determine which grounding method should be applied for a given application:



* The recommended FT solution

Ideally the data acquisition system should be enclosed within a grounded metal enclosure and the data acquisition system’s ground connected to the enclosure chassis. Where termination of cable shielding at the data acquisition end has been recommended above, it should be done so using 360° termination via EMC cable glands within the wall of the enclosure-before the signal wires are allowed to enter. This helps to protect the sensor and data acquisition system against surge currents and voltages, and helps to prevent interference from being induced onto the signal lines.

The use of surge protection devices (SPD) is recommended. These devices should be located as close as possible to where the signals enter the enclosure (within the metal enclosure) and their ground connections connected to the enclosure chassis. All connections from the sensor to the data acquisition system and to power should pass through the SPD’s. This will suppress any unwanted overvoltage transients present on the signal or power lines. The SPD’s should be UL 1449 listed and have a minimum surge current rating of 20kA (8/20µs waveform).

All structural grounding connections should have a minimum cross-sectional area of 50mm², while mating surfaces should be uncoated and free of corrosion. All cabling should have a minimum bend radius of 57mm to prevent flashover and interference.

Installing the sensor as described in this section can help achieve a lightning protection zone level of LPZ 0B (in accordance with IEC 62305-4).



For non-meteorological applications with a higher risk of lightning exposure, where the sensor is mounted within close proximity of the strike point, we would recommend the Pipe-Mount (PM) range of sensors. In such applications, a different grounding method should be employed and the Pipe Mount variant is a more suitable solution. Please contact FT Technologies for further information.

2. Isolated & Non-Isolated Protection Schemes

2.1. Surge Protection for Isolated Sensors

Isolated surge protection involves no direct grounding path from the sensor's metallic body to ground of the mast structure. This can protect the sensor in situations where grounding of the lightning interceptor is achieved through the met mast tower. Lightning current will pass through the interceptor and the mast structure to ground but never reaches the sensor, since there is no direct connection. For isolated protection, there must be no connection between the sensor body and mast. The Tapered Pipe Insert (FT033) installed in the mast before fitting the sensor, provides an insulative barrier between the top of the mast and the sensor. However, due to lightning flashover additional insulative barriers are necessary, therefore a non-conductive sensor mounting is recommended.

For this type of installation, the data acquisition system should be grounded separately from the met mast. It is important to terminate the sensor's cable shielding at both ends so that the sensor achieves its grounding through the data acquisition system. Use of the FT742-DM Grounding Accessory (FT035) is not recommended for this protection scheme.

2.2. Surge Protection for Non-Isolated Sensors

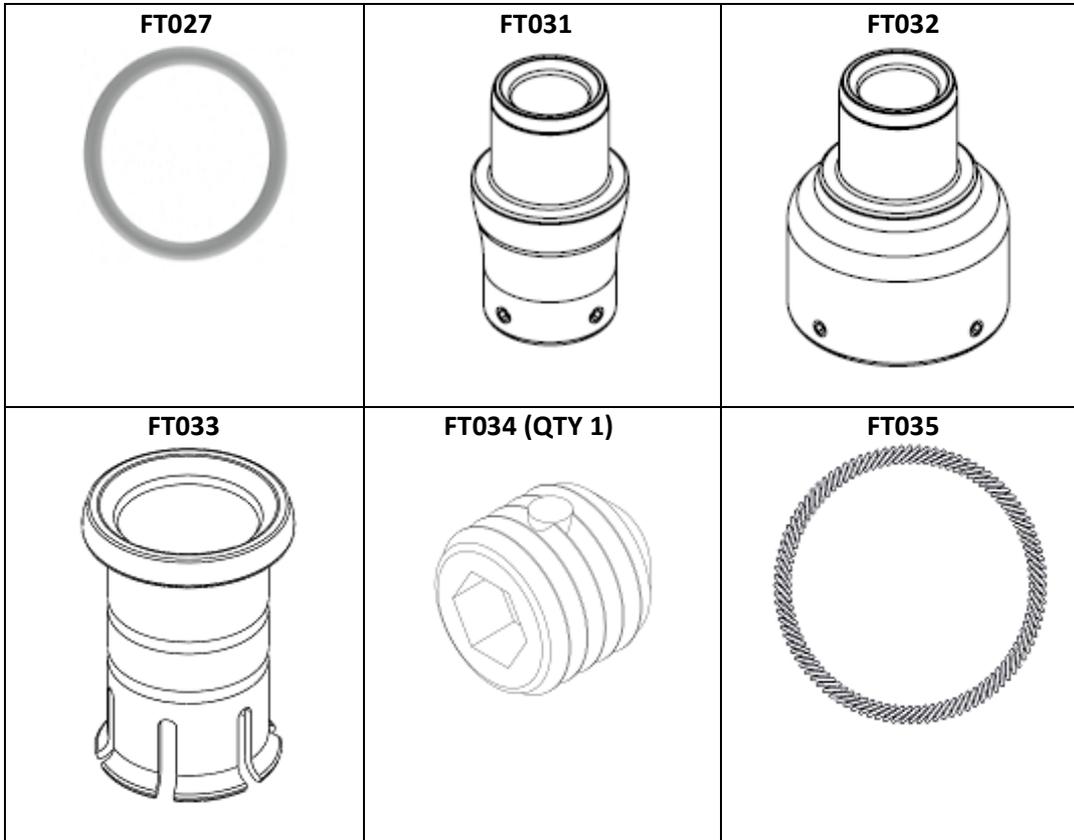
Non-isolated surge protection involves connecting the sensor body to the mast structure, such that they are electrically connected. This can protect the sensor in situations where the lightning interceptor is grounded separately from the mast structure. Lightning current will flow through the interceptor to ground and any resultant currents, due to induced charge onto the mast or sensor, will be directed to ground through the mast structure.

The FT742-DM Grounding Accessory (FT035) will encourage this by providing a low resistance path between the sensor and the outer mast surface. For this type of installation, the data acquisition system should be grounded separately from the met mast and lightning interceptor. It is important to terminate the sensor's cable shielding at both ends.

Use of FT031 and FT032 Size Adaptors are not recommended for installations where non-isolated protection is required, since a durable conductive path cannot be guaranteed.

3. Appendix

Below is an outline of the various FT742-DM Accessories:



Part	Description
FT027	O-ring for FT742-DM (3.53 CS x 32.92 ID)
FT031	Size Adaptor 25mm (1") for FT742-DM (includes an FT033 tapered pipe insert & 4x FT034 self-locking fasteners)
FT032	Size Adaptor 50mm (2") for FT742-DM (includes an FT033 tapered pipe insert & 4x FT034 self-locking fasteners)
FT033	Tapered Pipe Insert for FT742-DM (33.7mm OD)
FT034	1x Self-locking Fastener for FT742-DM
FT035	Grounding Spring for FT742-DM

Refer to FT document A4166-1 for further details about the FT742-DM accessories and their correct operation.