



►► 7. LIGHTNING PREVENTION

PREVISTORM[®]
THUNDERSTORM WARNING SYSTEM

Lightning, Heavy Storm In Bihar Kill 11, Including Two 10-Year-Old Girls
Bihar Chief Minister Nitish Kumar, asked his officials to offer compensation to the families of those who died in the lightning a
All India | Edited by Shylaja Varma (with
April 30, 2018 09:14 am IST

Storm Ciara: Cornwall lightning strikes damage houses

10 February 2020

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Home > Kolkata > Twelve people killed in lightning in West Bengal
Twelve people killed in lightning in West Bengal
Kolkata | Press Trust of India | Updated: May 28, 2012 07:44 am IST

Lightning damage rail signals on Cambridge to Newmarket line

24 July 2019

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Special Notices

WEDNESDAY 24TH JULY 2019
Due to lightning damaging
signaling equipment at
Newmarket, all services between
Ipswich and Cambridge are

Lightning damaged a railway signalling system overnight, causing disruption to Greater Anglia services.

▶▶ INTRODUCTION

INTRODUCTION:

The atmospheric discharge known as lightning, is the violent equalization of charges of an electric field that has been created between a cloud and the earth or, between clouds.

Every year we receive news from lightning strikes, showing the damages done for those events.

There are many areas in the world continually affected and a concern is generated in many sectors due to large amount of damage and loss produced by a lightning.

►► INTRODUCTION



Loss of human life / animal life



Environmental losses



Loss of economic value / service to the public



Loss of cultural heritage / structures

►► INGESCO Lightning Solutions

External Lightning Protection



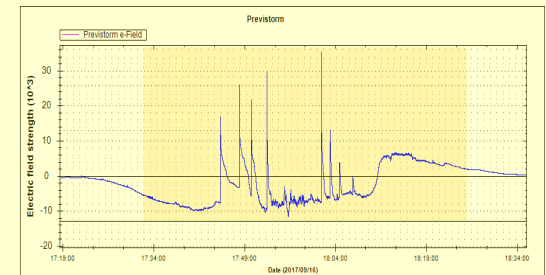
Internal Lightning Protection

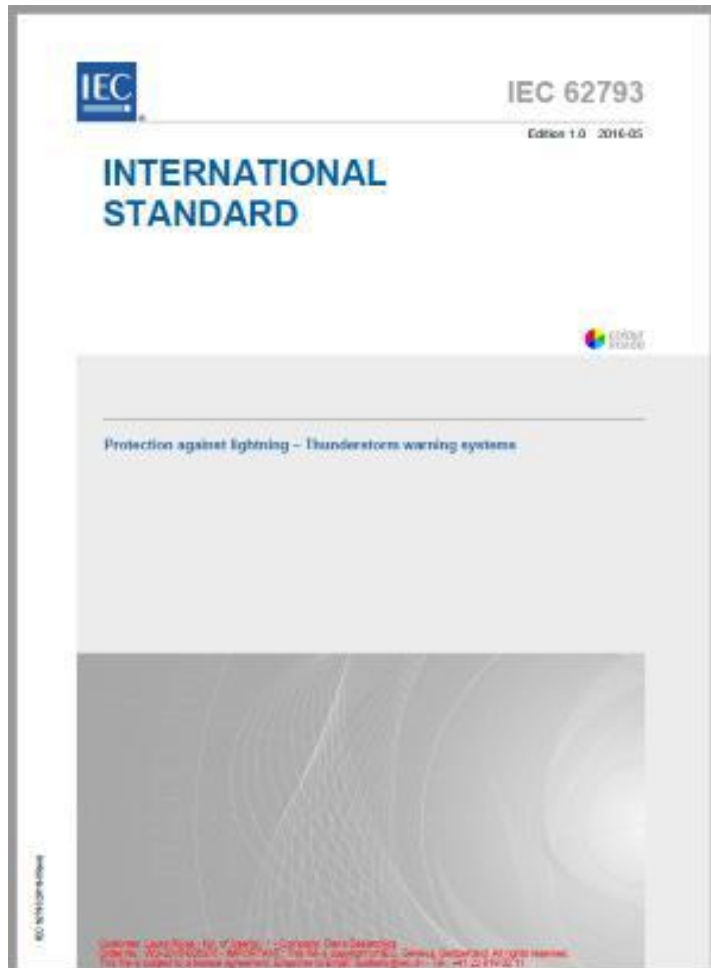


Control Systems



Preventive Protection: Storm Detectors





INTRODUCTION:

Natural atmospheric electric activity and, in particular, cloud-to-ground lightning poses a serious threat to living beings and property.

Real-time monitoring systems can provide high quality and valuable information in real-time of the thunderstorm occurrence, making it possible to achieve information which can be extremely valuable if coordinated with a detailed plan of action.

PURPOSE:

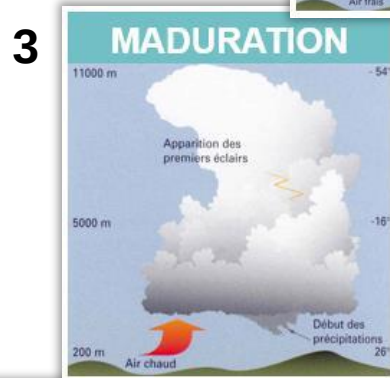
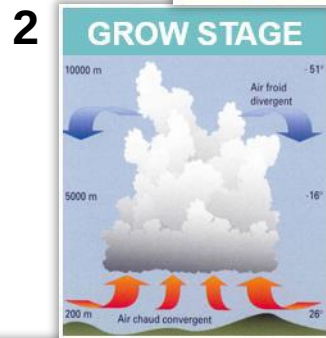
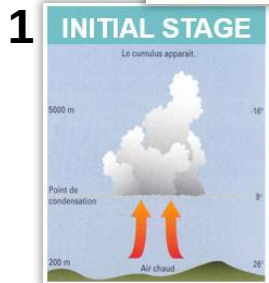
IEC 62793:2016 describes the characteristics of thunderstorm warning systems in order to implement lightning hazard preventive measures.

Classification of thunderstorm warning systems.

☐ **Local detector (Electric field sensor)**
Detect a thunderstorm over its entire lifecycle (phases 1 through 4).

☐ **Lightning location system (electromagnetic pulse detector)**
Detect Intra-cloud (IC) and Cloud-to-ground (CG) flashes (phases 2 through 4).

☐ **Network of detectors (both)**



The IEC 62793:2016 describes the connection between the frequency range in which a detector may operate and phases, classes and typical ranges of operation for those detectors.

Table 1 – Lightning detector properties

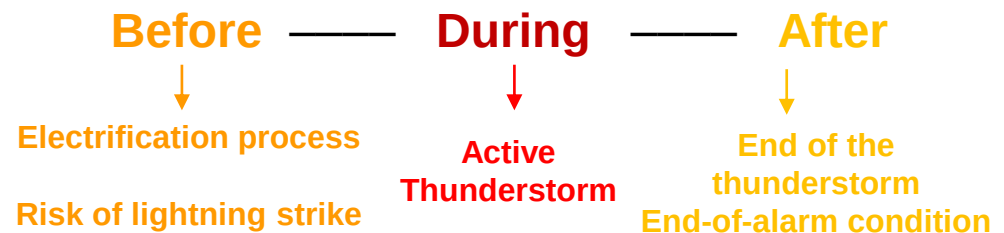
Technique	Physical detectable phenomenon	Frequency	Phase(s)	Main class	Secondary class	Typical sensor range km	Application
FSM	Electrification process	DC	1, 2, 3, 4	A		20	Short range early warning systems
MDF	Electric charges motion	VLF	2, 3	C	B	No limit	Low detection efficiency and location accuracy – very long range detection
MDF, TOA	Electromagnetic radiation (lightning current)	LF	2, 3	C	B	600 to 900	Long range – high location accuracy for CG detection. A fraction of IC processes are also detected
TOA	Breakdown and leader processes (IC/CG)	VHF	2, 3	B	C	200	Medium range – high location accuracy for both CG and IC
RFI	Breakdown and leader processes (IC/CG)	VHF	2, 3	B	C	300	Medium range – high location accuracy for both CG and IC
RF	Electromagnetic radiation (lightning current)	LF	3	D		100	Meteorological interest

NOTE The main class is the class for which the detector is designed. The secondary class is the class or the classes for which the sensor is also appropriate.

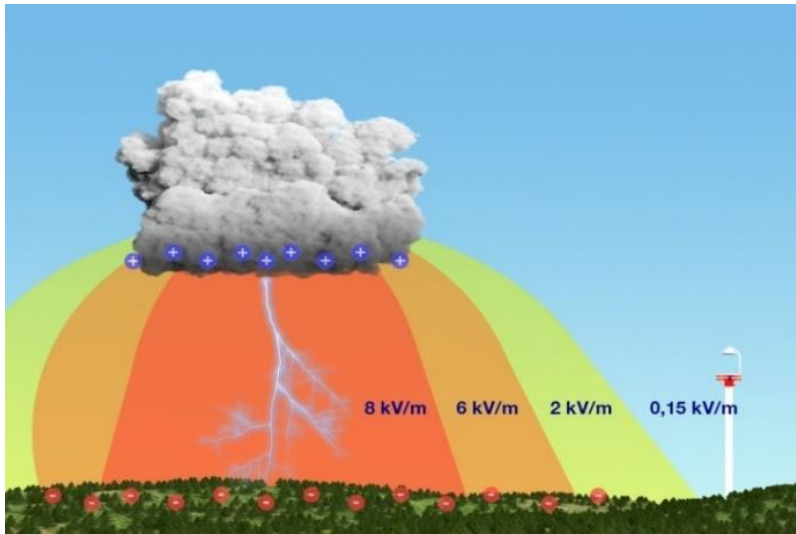
PREVISTORM Thunderstorm Warning System (TWS)

PREVISTORM TWS is an electrostatic field strength sensor, based on the principle of the field mill, measures the vertical component of the electric field and analyzes its evolution over time.

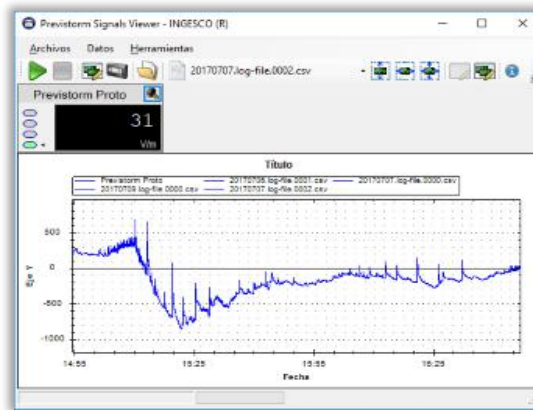
It is a key piece in the prevention of risks caused by lightning in the entire cycle of the thunderstorm.



►► INGESCO Lightning Prevention



Alarm configuration depending on Electric field measurement



Previstorm TWS Software

Preventive Actions



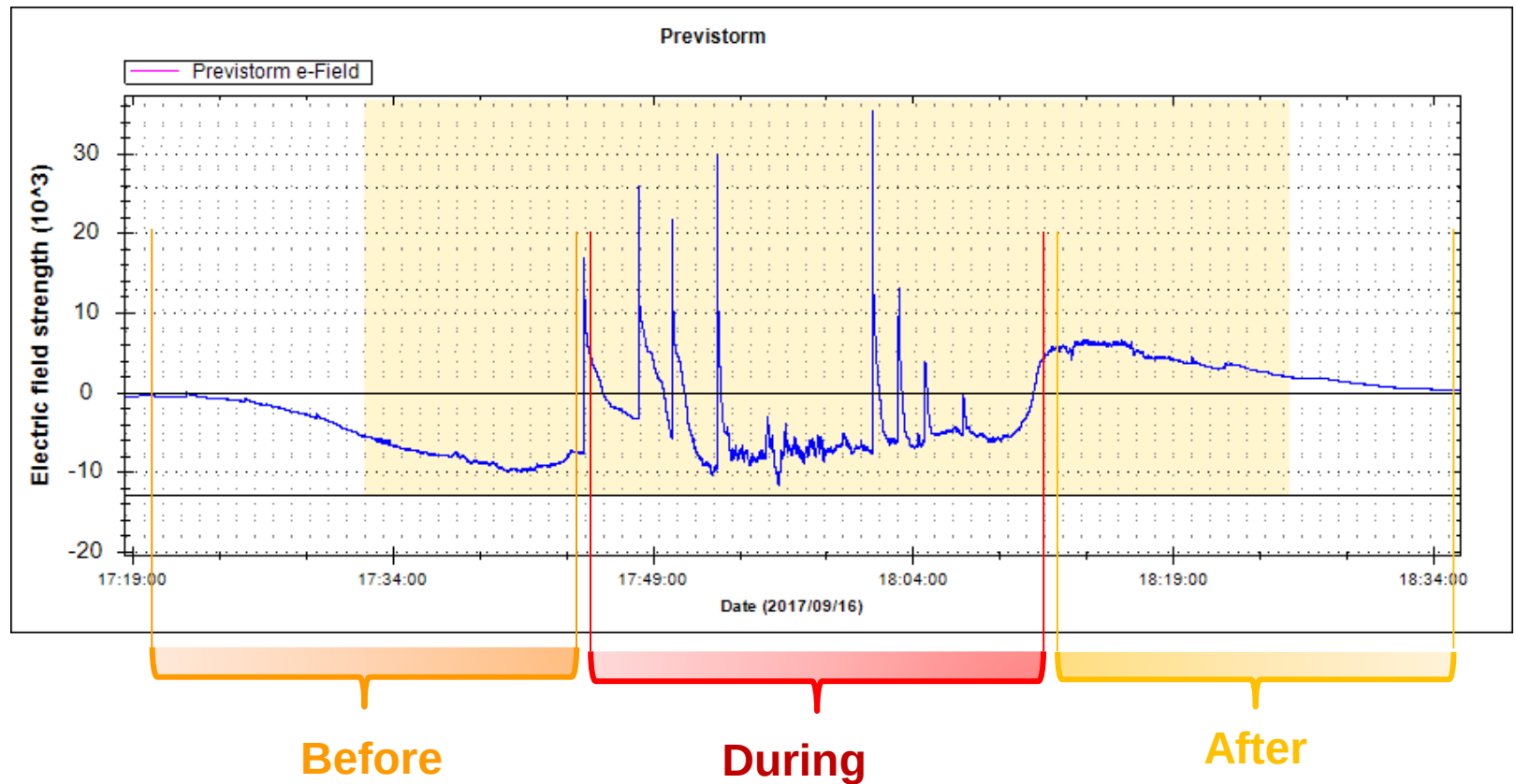
Alerts to external devices



Automatic and management systems

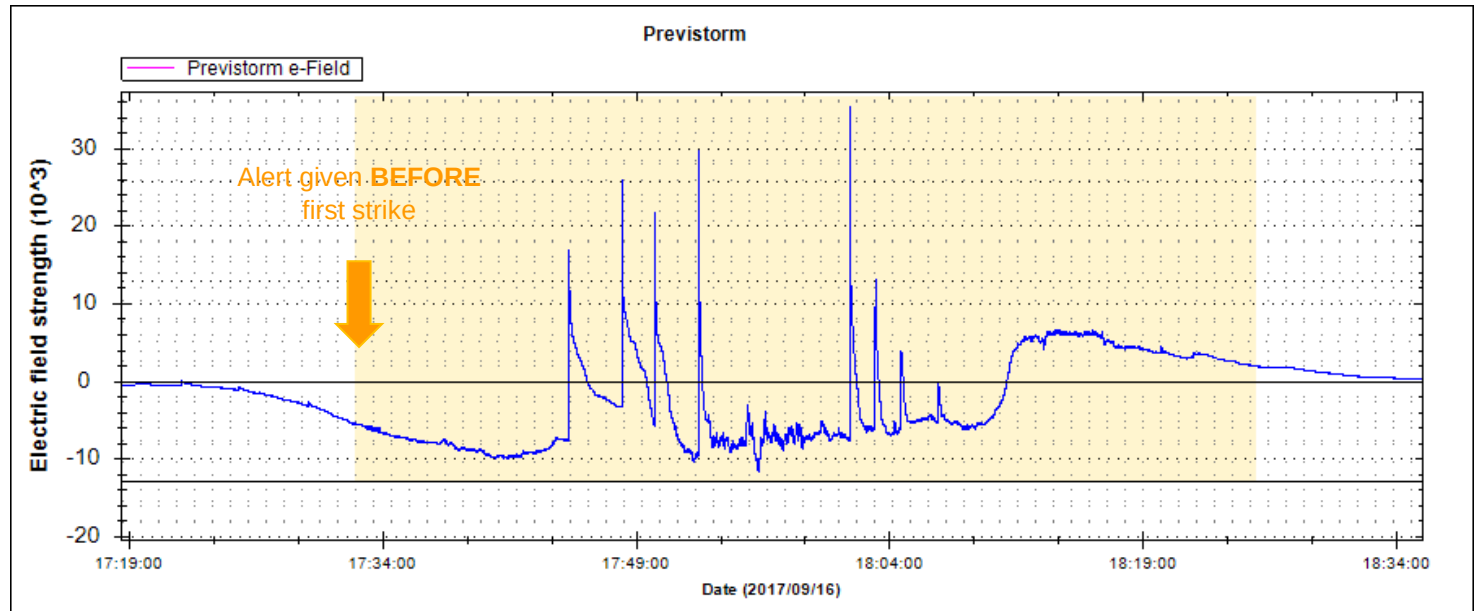


Example of thunderstorm episode where you can see the electric field evolution (kV/m) and some lightning strikes



Prevention:

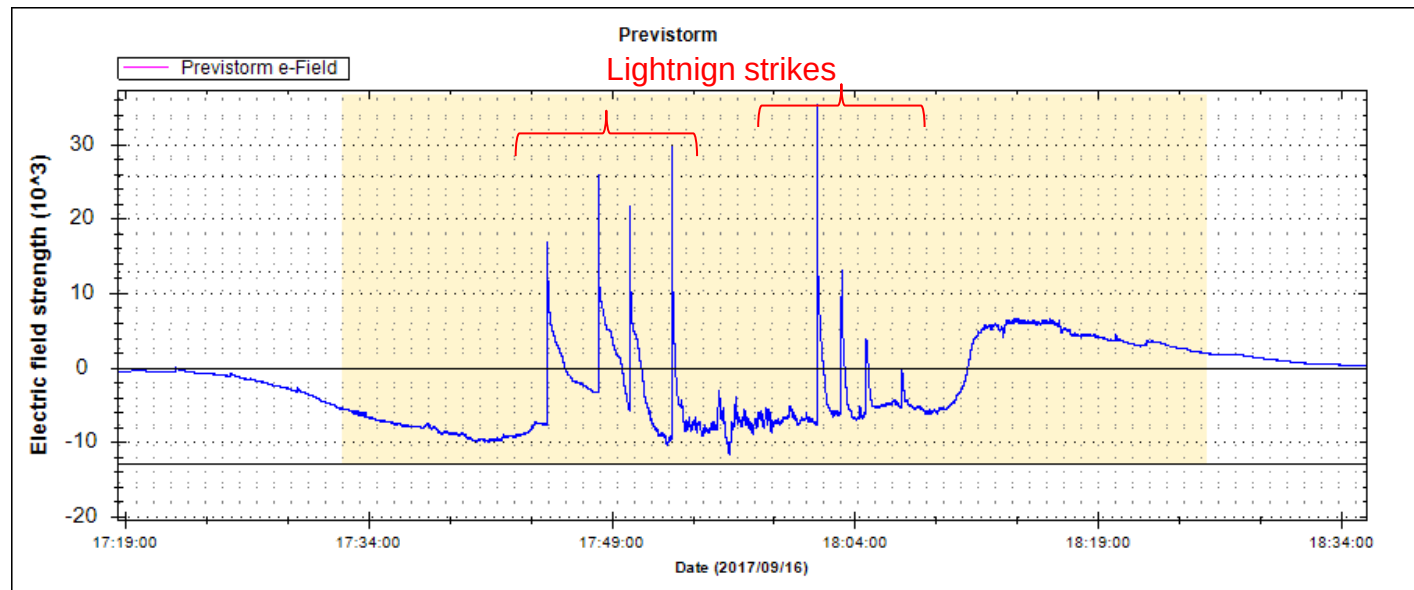
Before – During – After



September 27th of 2017, Das, Catalan Pyrenees

Prevention:

Before – **During** – After

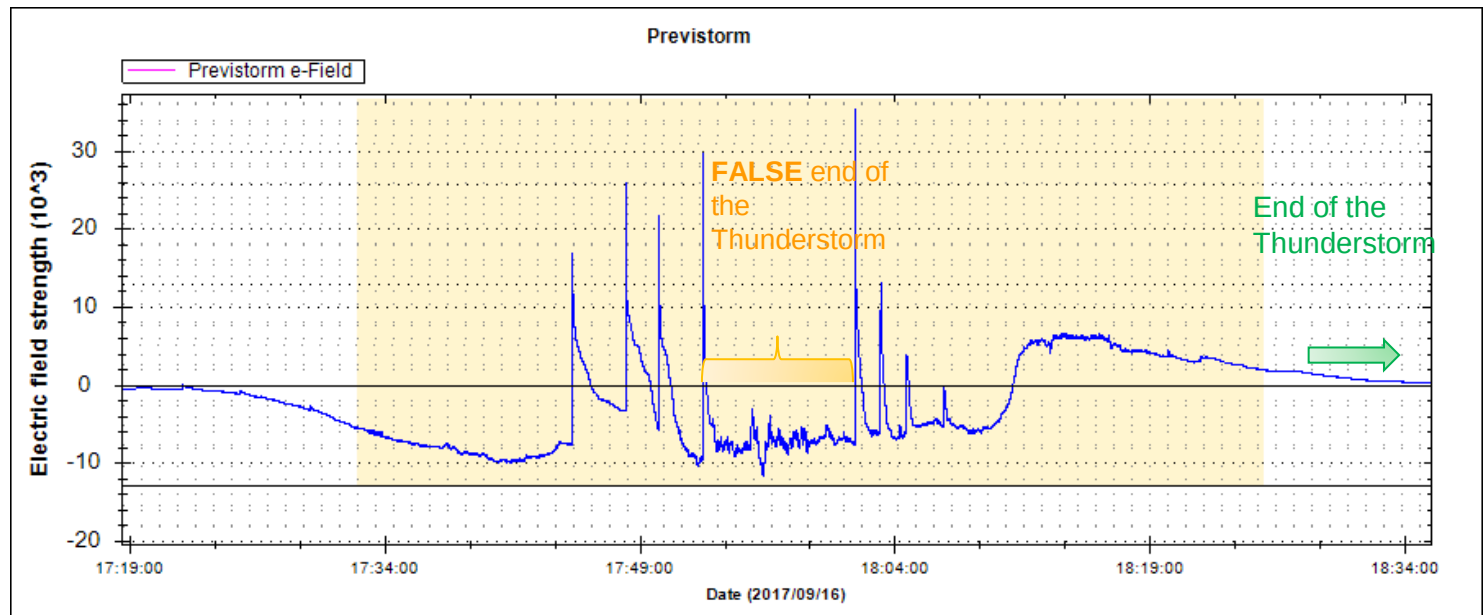


September 27th of 2017, Das, Catalan Pyrenees

Prevention:

The Previstorm TWW alarms generation system helps in deciding when the thunderstorm really ends.

Before – During – **After**



September 27th of 2017, Das, Catalan Pyrenees

Components

❑ PREVISTORM® E-Field Sensor

Electric field strength sensor. Must be installed at the exterior

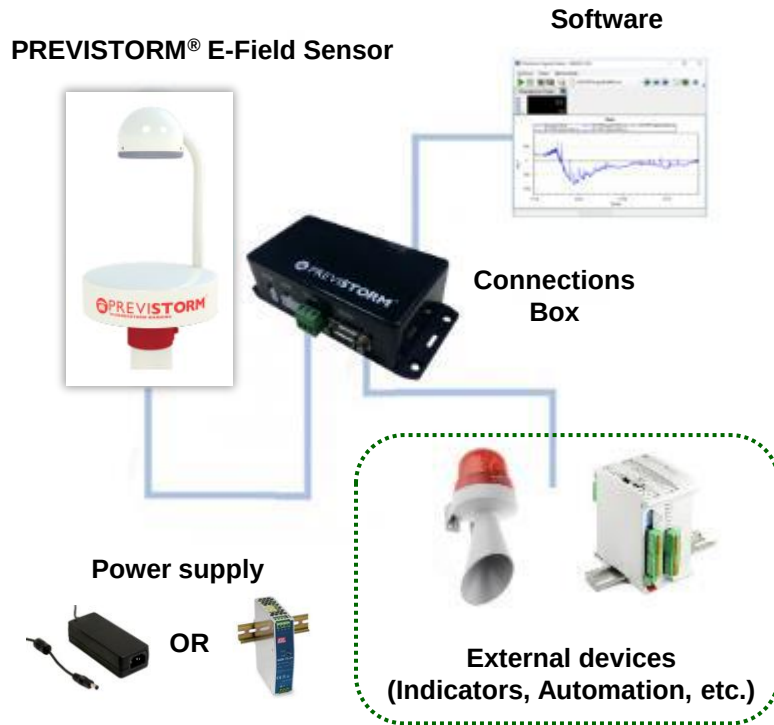
❑ Indoor Connections Box

Signals interfacing and routing box. Provides fast and easy connections between the sensor and the rest of the system.

❑ PREVISTORM® 2 Software

Software for datalogging, integration with other systems and visualization (PREVISTORM® Viewer for Windows™)

This is the recommended configuration for most applications.



The external devices shown here are not part of the Previstorm® TWS

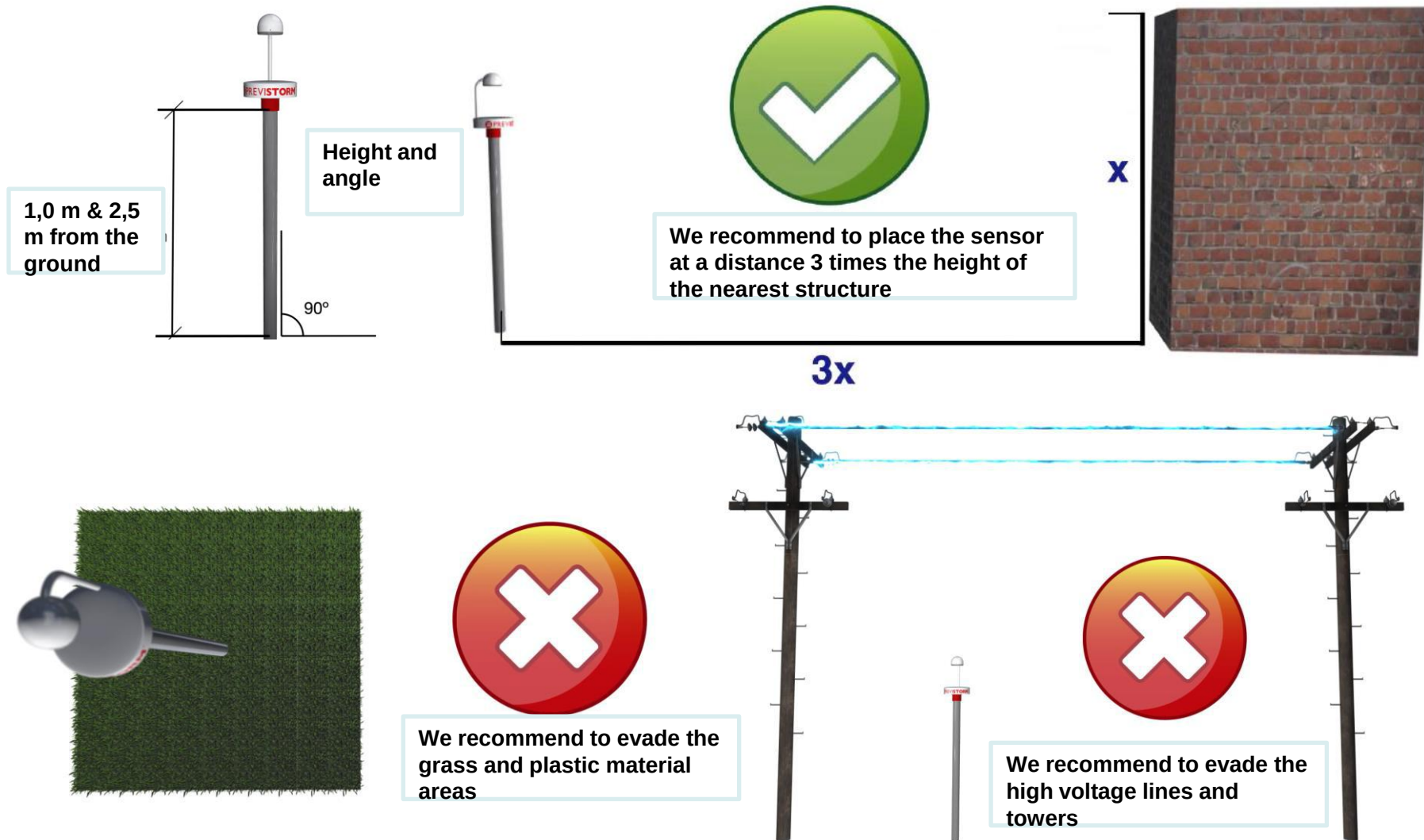
PREVISTORM® E-Field Sensor



PREVISTORM® E-Field Sensor *close-up*

- ❑ Easy installation, it doesn't require a ground preparation
- ❑ Can be adapted to many installation and usage scenarios.
- ❑ Generates alarm notifications for three alarm levels, plus normal conditions.
- ❑ Support for serial communications using several link formats: RS232, RS485, 1mm POF.
- ❑ Two models available:
 - PREVISTORM-MCE24V, ref.700023.
Low power consumption
 - **PREVISTORM-MCE48V, ref.700024.**
Includes support for de-icing.

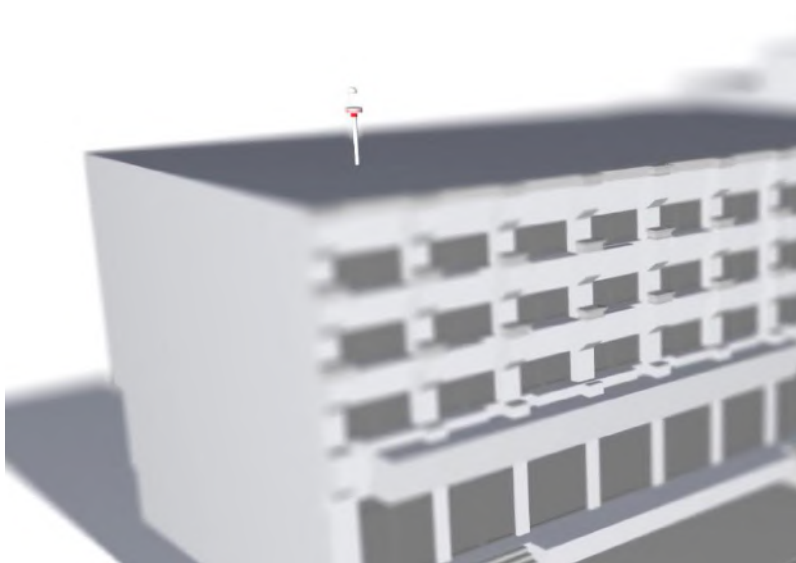
►► Installation Criteria



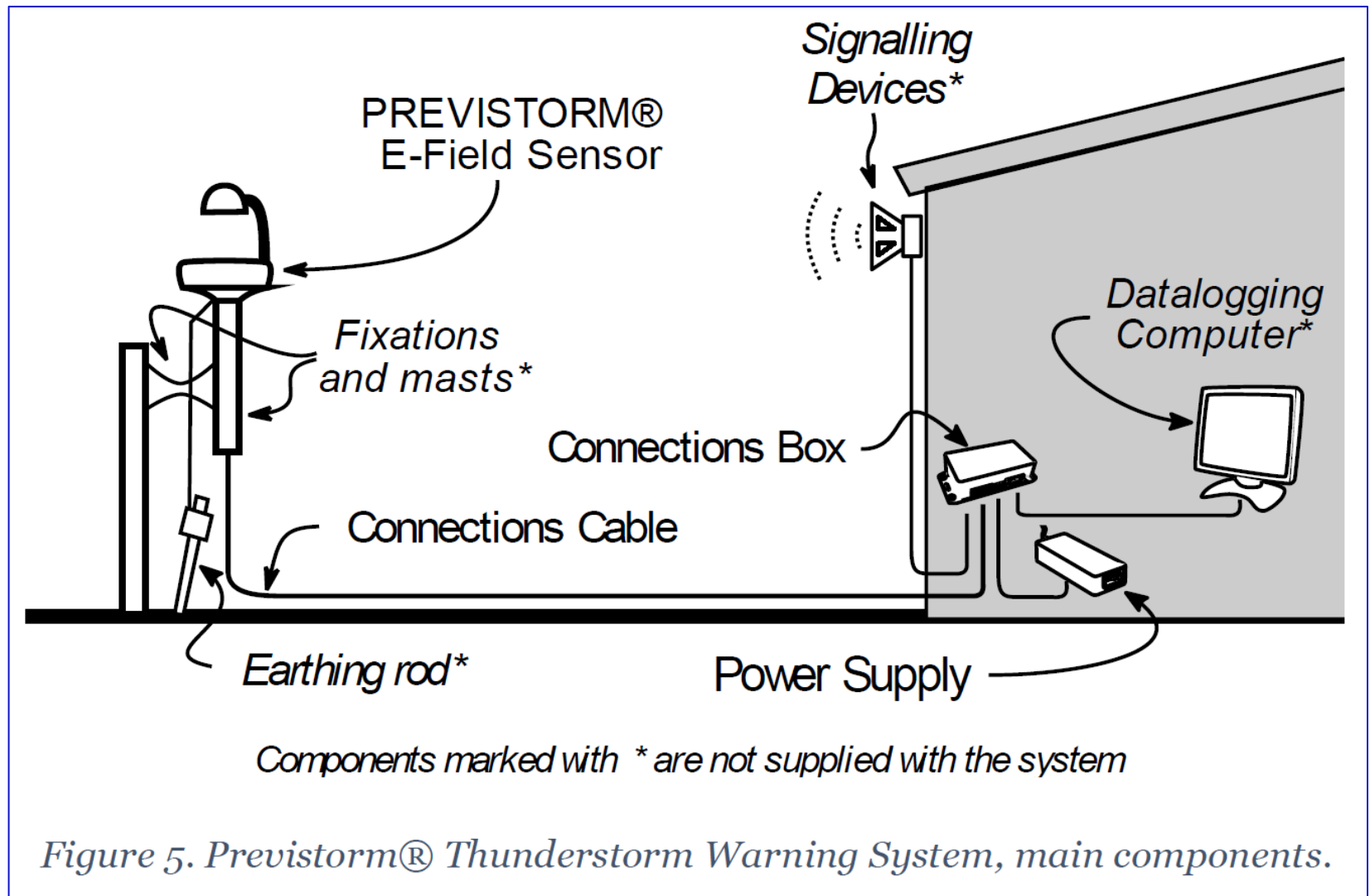
►► Installation Criteria

On installations on the roof of buildings should be avoided:

- ☐ Corners
- ☐ Exterior elements of the lightning protection system
- ☐ Masts
- ☐ AC distribution wiring
- ☐ Air conditioning equipment
- ☐ Antennas
- ☐ Higher close structures, always keep the distance 3 times the height

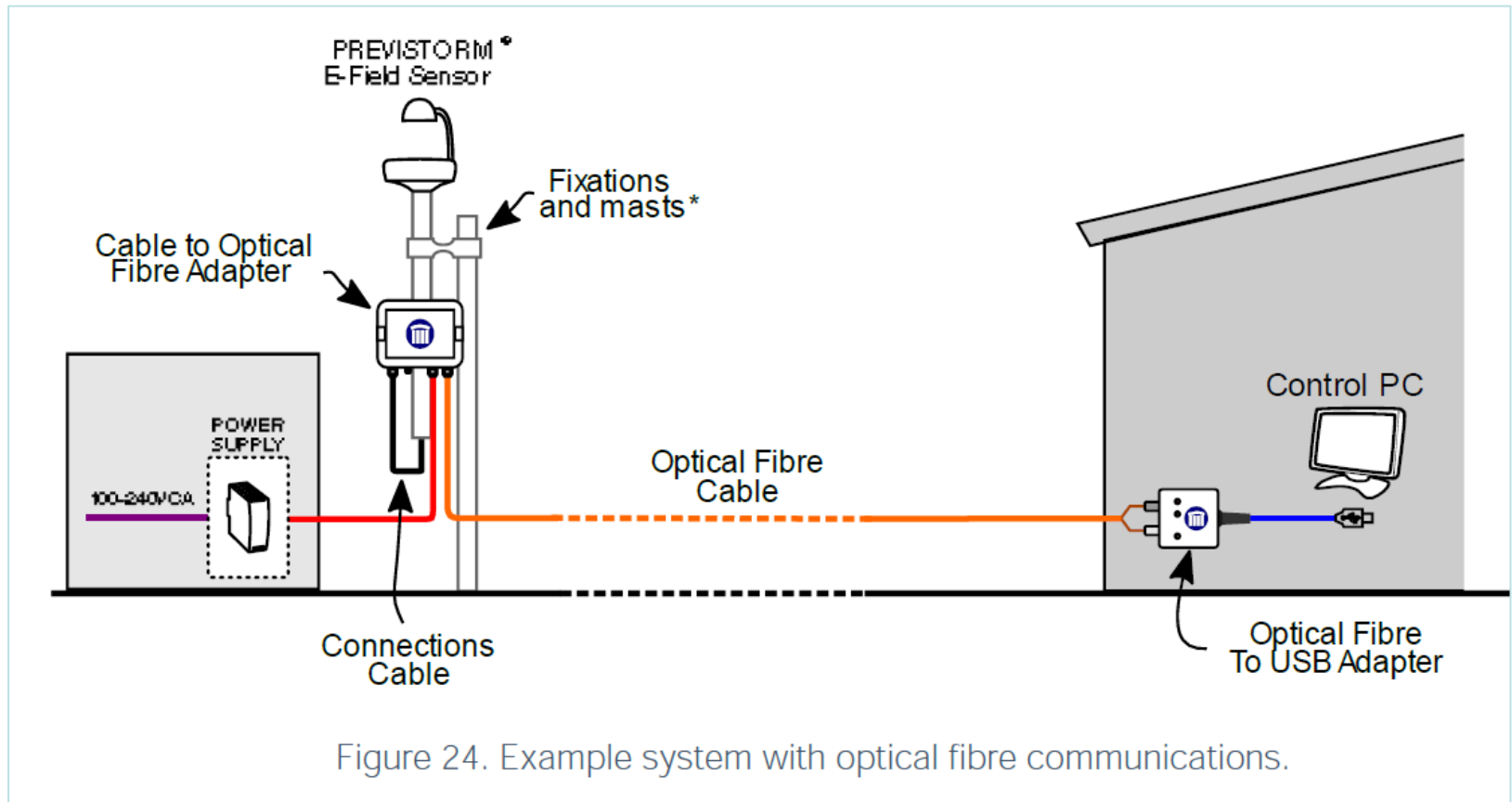


INSTALLATION

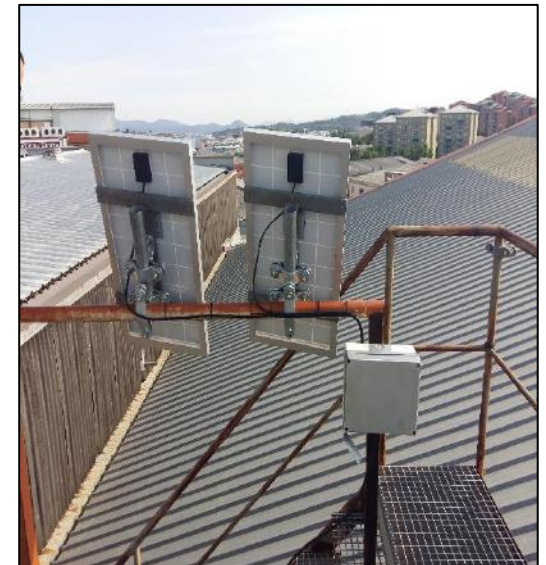
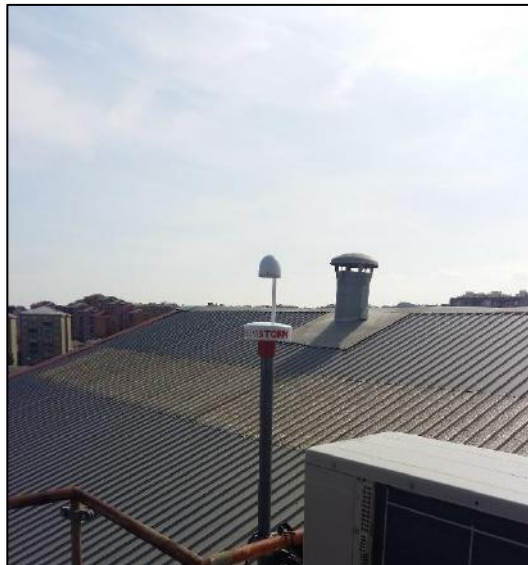


Installation Schemme

- ❑ Connection through optical fiber



INSTALLATION

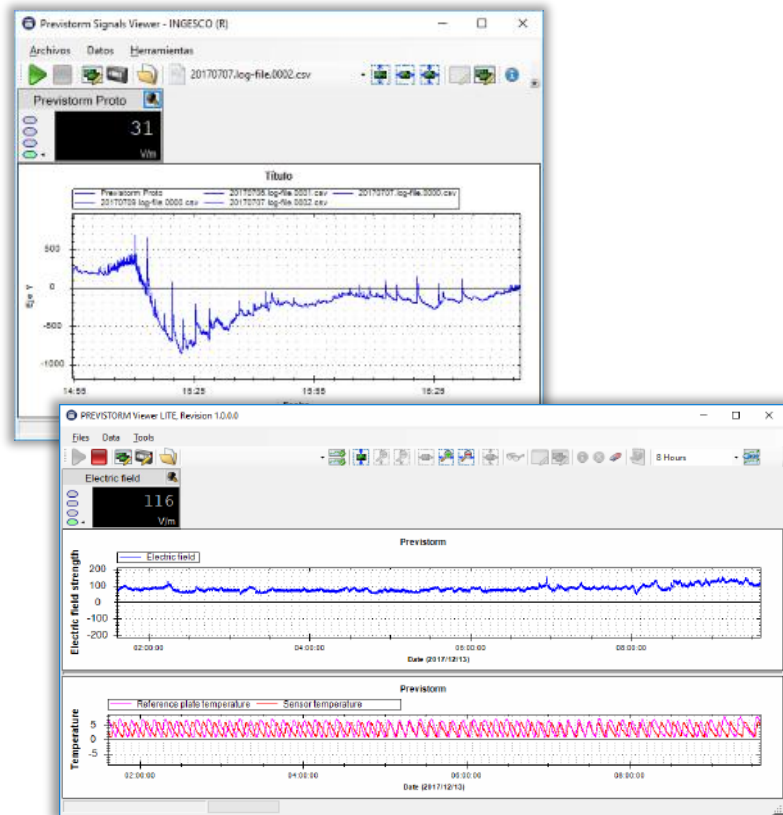


INSTALLATION



INSTALLATION

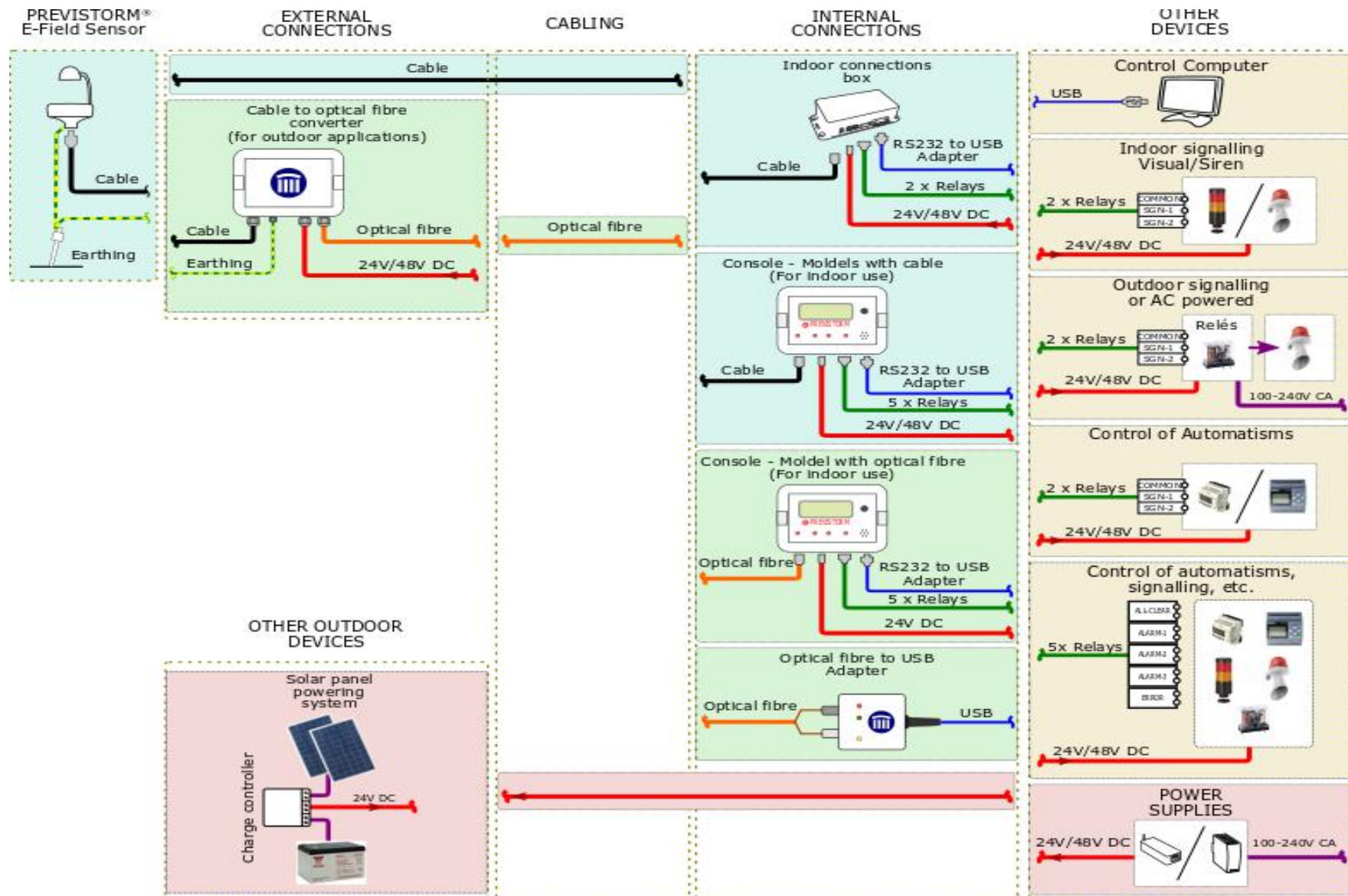




PREVISTORM® Viewer for Windows™

- ❑ Supports datalogging of data coming from an arbitrary number of PREVISTORM® sensors
- ❑ It incorporates the possibility to add lightning impacts detection with preconfigured parameters.
- ❑ Supports in-site modification of the Form Factor parameter for site installation calibration.
- ❑ It supports function to adapt the alarm and time levels.
- ❑ Provides the required tools for programming the signalling output control engine.

PREVISTORM TWS



Thank you for your attention



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