

PREVENTIVE PROTECTION



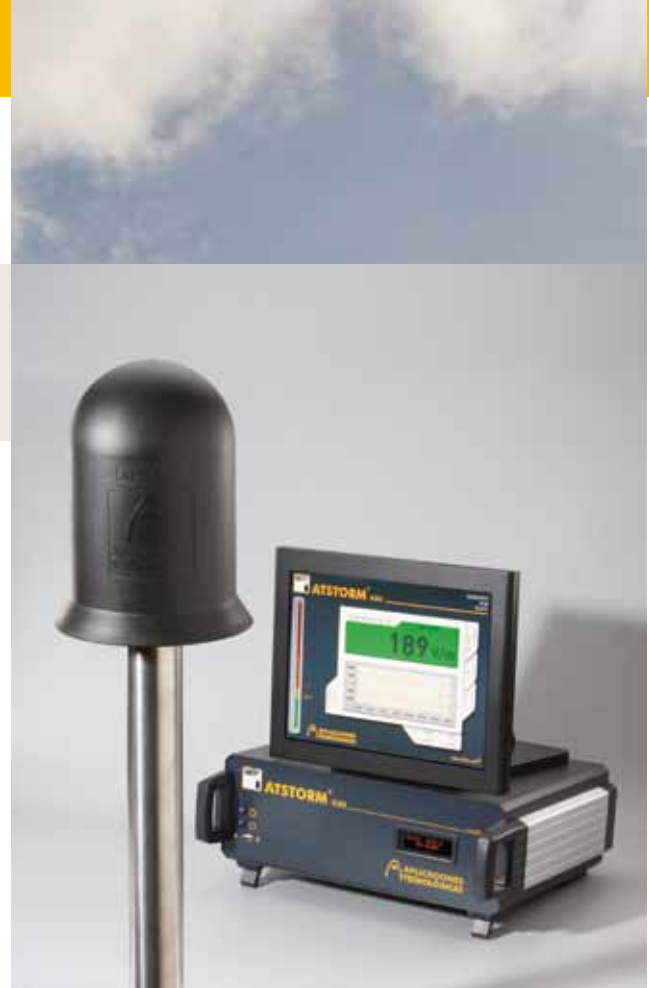
ATSTORM[®] v2



 APLICACIONES
TECNOLOGICAS

PREVENTIVE PROTECTION

ATSTORM®v2 is a storm detector that measures the environmental electric field. It is fully automatic, without mobile parts, robust and highly reliable.



Main advantages of ATSTORM®v2

- Local detection of every stage of the storm thus allowing several tens of minutes time for taking all the pre-established preventive actions.
- No mobile parts thus avoiding breakdowns and service interruptions.
- No special maintenance required.
- Configurable detection thresholds according to the user necessities.
- Universal outputs allowing connection to any alarm device, control devices, etc.
- With specific control software.
- Internet connectable.
- Integration of several detectors through an included licence ATSTORM® v2 WEB.
- Possibility of GSM modem allowing SMS messages to be sent to cell phones with data or alarms.
- Possibility to achieve an efficient sound warning when there is a risk of thunderstorm with amplifiers and repeaters.



ATSTORM[®] v2

ATSTORM STORM DETECTOR

An important concept "PREVENTIVE PROTECTION" against lightning storms

Preventive protection means having information in advance (from a storm detector) that allows the user to start temporary preventive measures before the storm begins. These measures will be deactivated after the storm.

Preventive protection will be complementary to an installed Lightning Protection System (LPS) in certain situations, while in others it will be sufficient to act alone.

Who is it for?

Having information about lightning storms is especially convenient for taking decisions in some of the following situations involving people in open areas, sensitive goods, losses in industrial procedures, guarantee of basic services, infrastructures, civil defence organization, environmental protection, accidents in workplaces, open areas structures...

All storm stages
detection /No mobile
parts



The most advanced technological solution

STORM DETECTOR ATSTORM[®] v2

The most efficient method of detecting storms locally is to measure the evolution of the electric field. Traditionally, the so-called "field mills" have been employed. However, these detectors have got several disadvantages, mainly due to their mobile parts, which cause obstruction and wear and tear overtime. In order to solve these problems, Aplicaciones Tecnológicas, S.A. has developed and world patented the highly innovative purely electronic detector, called **ATSTORM[®]v2**, that measures the electric field in a similar manner to conventional mills but using no motor or mechanical parts.

Other type of detectors such as electromagnetic ones, need lightning discharges to occur in order to detect the storm. Therefore they may raise the alarm too late in cases where the storm is forming over the place to be protected. **ATSTORM[®]v2** does not need these discharges as it detects every stage of a storm, from its outset, thus giving a far earlier warning.

PREVENTIVE PROTECTION

A proper preventive protection system can avoid important economic losses and damage to living beings.

There are around 50 cloud-to-ground discharges per second in the whole world, that is, 2 million discharges every year. This causes important losses of human and animal life, economic damage and production time due to lightning or its consequences such as fire. All this can be avoided by taking a proper **protection and prevention measures**.

Preventive protection relies upon having **information** that allows the user to take temporary measures in advance. The steps required for correct preventive protection are:

1º- Early detection of lightning hazard in the area to be protected.

2º- Lowering the risk of damage by starting preventive actions before the beginning of the storm. These measures are not permanent: when lightning risk finishes then the preventive action stops as well.

It is important to emphasize that preventive protection does not replace external nor internal lightning protection (both are permanent), but it is complementary to them. However, when external or internal lightning protection cannot be achieved (as for example with persons or moving elements) then preventive protection can be used alone.

Standards and methods for external and internal lightning protection exist, but they do not cover some hazardous situations related to lightning storms that can be dynamically prevented or lowered by temporary measures based on the alarm given by a detection system.



STORM DETECTION: WHO IS INVOLVED?

Having information about lightning storms is essential for workplaces or sensitive locations. Storm detectors are particularly useful for the people who are responsible for taking decisions (national or local governments, private or public companies) involving some of the following situations:



People in open areas: workplaces, sports or open air activities, competitions, multitudinous events, farming, ranching or fishing activities.



Sensitive goods protection: computers, electric or electronic controls, emergency, alarm or security systems.



Prevention of losses in industrial processes and operations.



Prevention of serious accidents involving hazardous products (flammable, radioactive, toxic, explosive).



Operations where **basic service continuity** has to be assured: telecommunications, power supply, energy transport and distribution, health and emergency services.



Infrastructures: harbours, airports, trains, roads, highways, cable railway.



Protection to the people and the environment.



Prevention of workplace risk: according to national codes and standards.



Buildings, transport or facilities with their external areas open to the public.

ATSTORM® v2 STORM DETECTOR. Characteristics.

The storm detector ATSTORM®v2 basic configuration is the following:

SENSOR WITH FCES TECHNOLOGY

The sensor measurement system is based on the FCES technology (Field-Controlled Electrometric Sensor), developed and patented by Aplicaciones Tecnológicas, S.A.

The sensor allows **local detection**, within a radius of 10 kilometers around, of every stage of the storm* thus allowing **several tens of minutes time for executing the necessary preventive actions (that should have been defined previously)**.

This technology improves upon traditional storm detection systems** **as all the sensor components are electronic**; there are no mechanical or mobile elements, for example a motor that could be blocked (by dust, insects, ice, etc.) causing the system to fall out of service at critical moments. This also avoids the need for continuous maintenance.



The sensor with FCES technology is connected to the interface with a communication cable.

It is designed to ensure the sensor is working correctly even in difficult weather conditions and must be installed in the open air.

The sensor does not require calibration related to its height prior to installation.

* See Annex I: Lightning storms

** See Annex II: Storm detection technologies

INTERFACE

The operational interface has to be installed inside a building and is formed by two elements:



- Touchscreen for easy use.
- Interface between the sensor and the screen.

The interface has to be connected to the sensor in order to:

- Ensure a continuous power supply to the sensor.
- Record the data.

It is equipped with membrane switches and a display for easy use.

Interface main characteristics

The interface main characteristics are:

Alarm levels can be adapted since the ATSTORM®v2 series values can be modified to the user's needs.

All stages of a storm's evolution can be viewed.

The alert type can be customized for each level of alarm.

The interface is configured with the following alarm levels (recommended levels, suitable for every installation) that may be changed according to the placement or to the user's necessities:

Alarm Level	Electric field value	Description
LEVEL 0	< 3 kV/m	No alert
LEVEL 1	3 a 4 kV/m	Alert
LEVEL 2	4 a 7 kV/m	Emergency
STORM	> 7 kV/m	Maximum risk

ATSTORM®v2 Technical Specifications

Operating	
Detection range	10 km around the sensor
Resolution	1V/m
Response time	1 second
Sensor measuring range	-100 to +100 KV/m
Interface display	Touchscreen
Alarm levels	4 configurable alarm levels
Interface alarm sound level	80 dB
Electrical	
Sensor DC Voltage	15Vdc
Interface power supply	230Vac (+/-15%)
Frequency	50Hz
Power	15 W
Relay outputs	4 configurable outputs (for instance 3 storm alarms and one communication failure) 250Vac, 2A (block connector)
Protections	The interface is protected against overcurrents and overvoltages
Mechanical	
SENSOR	
Weight	1 Kg
Dimensions Ø166 x 226 mm	Cable 25m
Maximum separation distance	100m (with optional wire)
Framework material	Polypropylene
IP Code	IP54
Fixing	Fixed to 1 ½" tube
Interface	
Weight	4,6 Kg
Touchscreen weight	3,5 Kg
Dimensions	350 x 260 x 120 mm
Touchscreen dimension	12,1"
Environmental	
Sensor working temperature	-40 a 85°C
Interface working temperature	-10 a 85°C
Communications	
Interface	Configurable serial, Ethernet
Outputs	Audio signal
Mounting	
Mast*	1½", 2m galvanised steel mast included
Anchoring*	U-shaped anchorage consisting of 2 galvanised steel, 30cm long supports with screws for wall fixing (all included)
Corrugated tube	Protection tube for communication cable included

* Variable according to installation.

ATSTORM®v2 STORM DETECTOR. MAIN ADVANTAGES

ATSTORM®v2 storm detector is the perfect tool for preventive protection against the effects of storms and atmospheric discharges as it allows a time in advance of several tens of minutes for taking specific measures when the risk of a lightning storm is imminent, thus keeping people and equipment safe from its destructive effects.

The sensor is equipped with the new patented **FCES** technology (Field-Controlled Electrometric Sensor) where all the components are electronic.

The main advantages of ATSTORM®v2 are the following:

Local detection by electric field measurement.

Detection of all the storm formation stages.

Entirely electronic. No mobile parts. This makes the sensor very robust, free from special maintenance due to obstruction by dust, insects, ice...

No need for height calibration previous to every placement.

The lightning storm is foreseen several tens of minutes before happening.

Reliable operation in adverse weather conditions.

Alarm levels are configurable so it is easily adapted to the user's necessities. The typical levels, recommended by Aplicaciones Tecnológicas, S.A., are also implemented as predetermined values in the equipment.

When the risk of lightning strike is high or when a given alarm level is reached, ATSTORM®v2 can be programmed to execute different automatic actions that will reduce potential damage, for example:

**Send an SMS.
Activate a sonorous and/or visual alarm.
Connect UPS and generators.
Disconnect sensitive equipment.**

ATSTORM® v2 is provided with software that, when installed in a PC connected to the interface, stores the data from the electric field every second, for example, or according to the requirements of its uses, depending on electric field threshold levels, etc., producing a record that can be analyzed later.

ATSTORM®v2 can save electric field data (4 Gbytes) each second or when an event happens, for historic analysis. It is possible to access these data through an external USB memory stick or in a shared folder if the equipment is connected to a network.

Electronic module with 4 contact-free outputs

An electronic module with 4 contact-free outputs (2A, 250V) is included. These outputs can be employed at the user's convenience: for connection to a sonorous alarm or to UPS equipment or for warning about possible interruptions in the communication between the interface and the sensor.



Many other parameters can also be established by the user, such as the alert corresponding to each relay, the reaction delay after the alert or the time that the alarm remains active, as in the following figure:

Software

ATSTORM[®]v2 is provided with its own software that should be installed in a computer that will be connected to the interface through Ethernet, having the same advantages as with the touchscreen:

a) Data saving:

- Data frequency storage depending on the alarm levels.
- Alerts about communication failures between the sensor and the interface or the interface and the PC.

b) **Long term analysis** of the electric field evolution and the frequency and effects of lightning storms within the area.

c) **Verification of alarm activation** when the electric field is maintained for a predefined length of time.

ATSTORM[®]v2 is connectable to a network, therefore 2 different licences are available:

ATSTORM[®]v2 WEB

This option is included with the equipment, allowing a connection between the ATSTORM[®]v2 and the server of Aplicaciones Tecnológicas, S.A. with the following advantages:

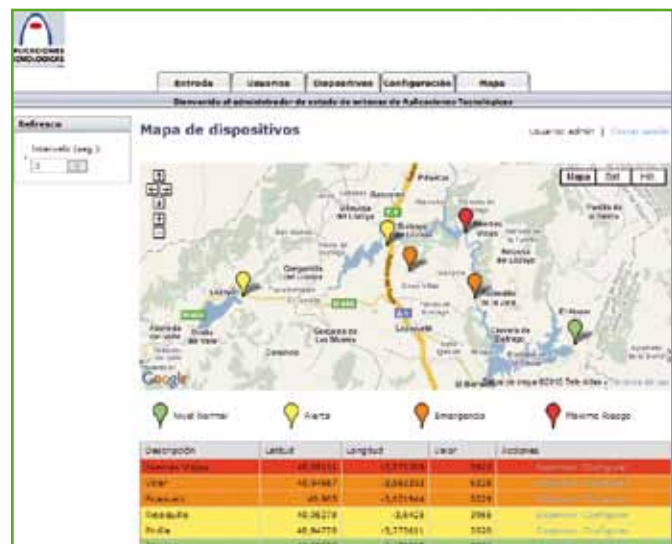
- Remote access to every data from any terminal with Internet connection.
- Historical display.

This server allows a safe way to store the data using double storage with our mirror hard disk. The customer only has to connect.

ATSTORM[®]v2 NET

Several ATSTORM[®]v2 can be connected several to a network and integrated into the customer's server. This configuration requires a specific design depending on the existing network.

Example of Web page view:



ATSTORM®v2 SPECIAL ACCESSORIES

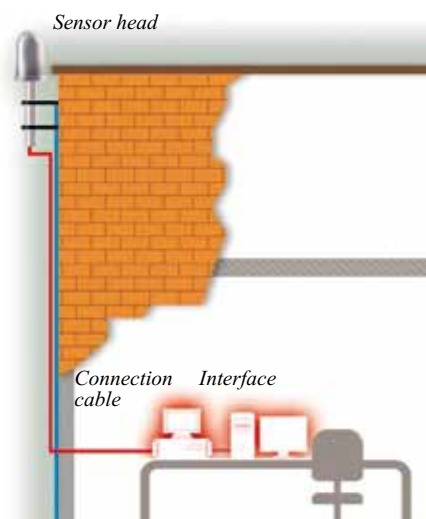
- Amplifier with audio alarm and 3 horn speakers.
Ref.: AT-516
- Amplifier with pre-recorded voice and 3 horn speakers.
Ref.: AT-517
- Amplifier and repeater with audio alarm and 3 horn speakers.
Ref.: AT-518
- Amplifier and repeater with pre-recorded voice and 3 horn speakers.
Ref.: AT-519
- 3G modem to send alerts when the computer is not connected to the network.
Ref.: AT-511



- ATSTORM®v2 NET
Ref.: AT-521



INSTALLATION AND MAINTENANCE



ATSTORM®v2 is easy to install and no special maintenance is needed.

The sensor works with FCES (Field-Controlled Electrometric Sensor) technology thus measuring the electrostatic field without employing mechanical elements.

The detector has to be installed in places situated far away from any elements that deform the electric field such as trees, metallic structures or power supplies.

Measurements are independent of the height where it is placed. There is thus no need for calibration according to height and no problems with the installation.

Mast, anchorages and corrugated tube for protecting the communication cable, are included with the storm detector.

ATSTORM®v2 employs no mobile parts and therefore needs **no special maintenance**.

ANNEX I: LIGHTNING STORMS



In normal conditions, there is a balance between positive and negative charges in the atmosphere, where the earth is more negatively charged than the atmosphere and the elements situated on the ground.

**However,
the formation of storm clouds
creates a charge polarisation:**

The lower part of the cloud is charged negatively producing a positive charge on the ground and any elements on it. This can form an electrical charge in the atmosphere in excess of tens of kilovolts.

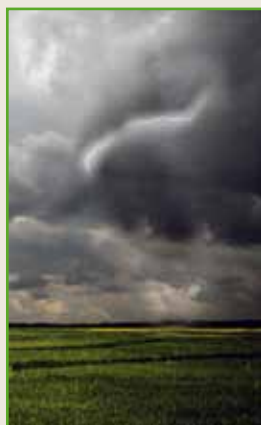
When the electrical field becomes intense enough, the cloud begins to discharge the energy towards the ground. The path formed by this discharge is called the “downward leader” and produces a fast variation in the electrical field. This is the process of lightning formation.

**The stages and phenomena that
characterize a lightning storm
can be summarized as follows:**



PHASE 1:

The charge separation can be detected at ground level before the first lightning discharge using **electric field measuring** devices.



PHASE 2:

After the first electrification, the first discharges occur. In most cases the first discharges are **intra-cloud** type.



PHASE 3:

Intra-cloud discharges are often followed by the **cloud-to-ground** discharges, that are associated to a more mature phase of the storm.



PHASE 4:

When the storm is over, then the electric field decreases.

ANNEX II: STORM DETECTION TECHNOLOGIES

Storm detectors can generally be classified into two groups: lightning strike detectors and electric field measuring detectors.

LIGHTNING STRIKE DETECTORS: these provide information about already-occurred lightning strikes thus warning about distant storms that are approaching.

Detection by radiofrequency or electromagnetic field record

Characteristics: Detectors by radiofrequency recognize the electromagnetic variations caused by lightning when crossing the atmosphere from the cloud to the ground. They are efficient for detecting distant storms.

Disadvantages: they are not able to detect storms that are forming just over the detector since they can only detect the storm when electric discharges already exist, not in the initial phases. Therefore, there is no time for taking early preventive actions if the first lightning strikes are in or close to the area to be protected.

ELECTRIC FIELD MEASURING DETECTORS: they give information about the local electric field, from which the possibility of lightning strikes can be deduced. Therefore, no first lightning strike is required for getting an alert.

Field mills

Characteristics: They are detectors containing not electronic but mechanical sensors. They measure the electrostatic field continuously thus detecting small (quitar) field variations coming both from the storm approaching or from its formation over the detector.

Disadvantages: The main inconvenience of this type of detectors is having a mechanical sensor. The measurement employs a rotatory motor that must work 24 hours a day. If the motor stops due to malfunctioning, damage, obstruction, etc then the sensor becomes out of service, not giving the necessary information for preventive purposes. They are high electricity consumers due to the continuously operating motor. As well as this, periodical maintenance and cleaning of certain elements is required, especially in salty environments, in order to minimize measurement errors.

Field-Controlled Electrometric Sensor (technology used by ATSTORM®v2)

Aplicaciones Tecnológicas, S.A. has developed and patented the Field-Controlled Electrometric Sensor (FCES) in order to overcome the problems of the traditional field mills. ATSTORM®v2, based on the FCES technology, is a totally electronic field measuring detector, without mobile parts, robust and with maximum reliability.

DISADVANTAGES OF OTHER SYSTEMS



FIELD MILLS

Due mainly to their mobile parts they are exposed to many problems (obstructions, wear and tear, out of service time due to maintenance, etc.).



ELECTROMAGNETIC DETECTORS

The main problem is that they need lightning discharges to occur in order to detect a storm, so their alert may arrive too late in the case where the storm is forming just over the place to be protected.

ADVANTAGES OF ATSTORM®v2



Fully electronic, no mobile parts that could be affected by wear and tear or external factors. ATSTORM®v2 always responds and needs no special maintenance.



No previous discharges are required to have occurred. Even the earliest stages of the storm are detected thus providing information in advance and allowing the preventive measures to be adopted.

ATSTORM®v2

The best existing tool for preventive protection against the effects of lightning.

The sensor detects all the stages of the lightning storm formation.

Offers an essential time period for adopting specific preventive measures.

Based on the new patented FCES technology (Field-Controlled Electrometric Sensor) where all components are electronic.

No need for special maintenance.

Fully operational in bad weather conditions.

Programmable alarm levels.