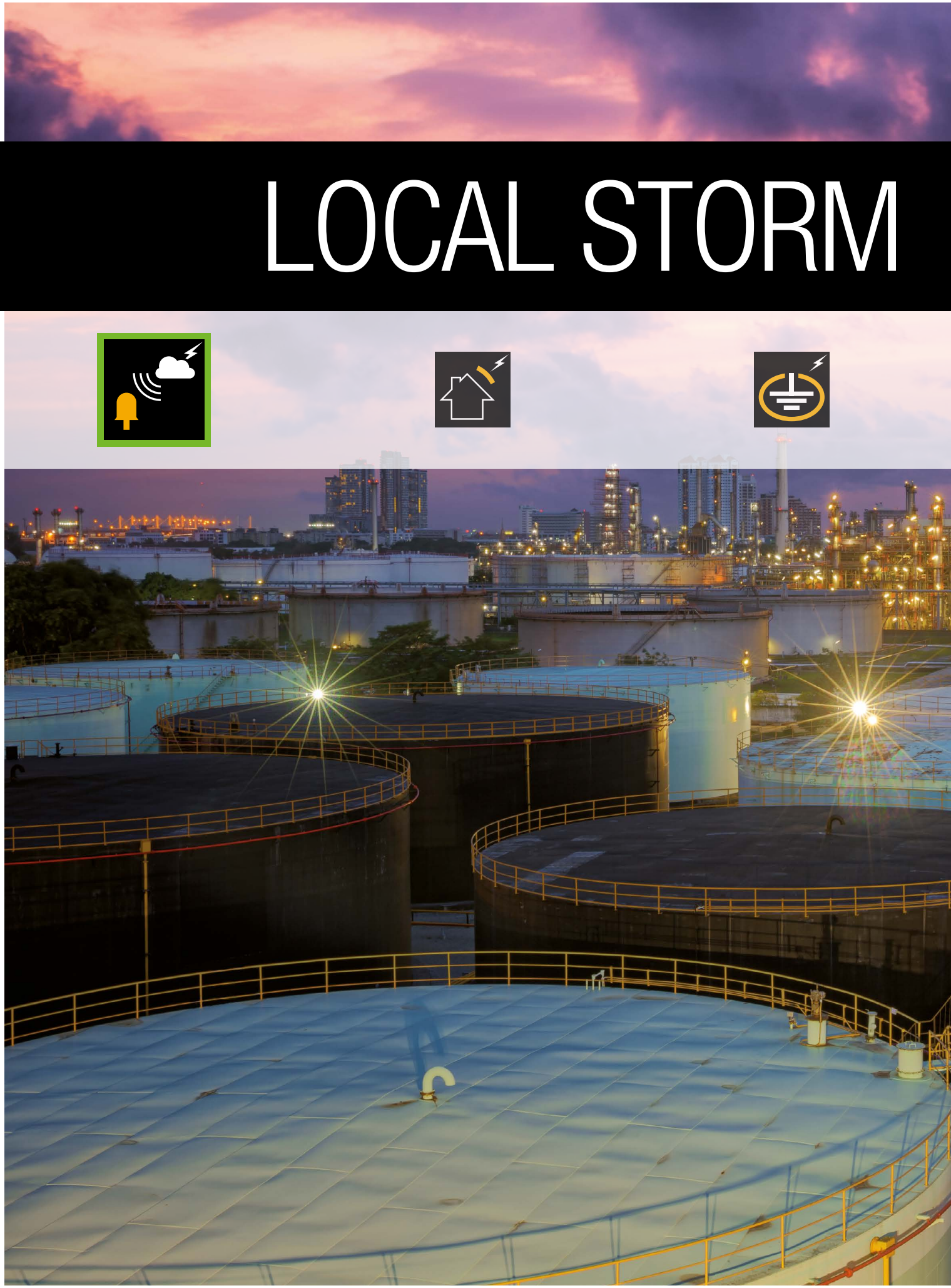
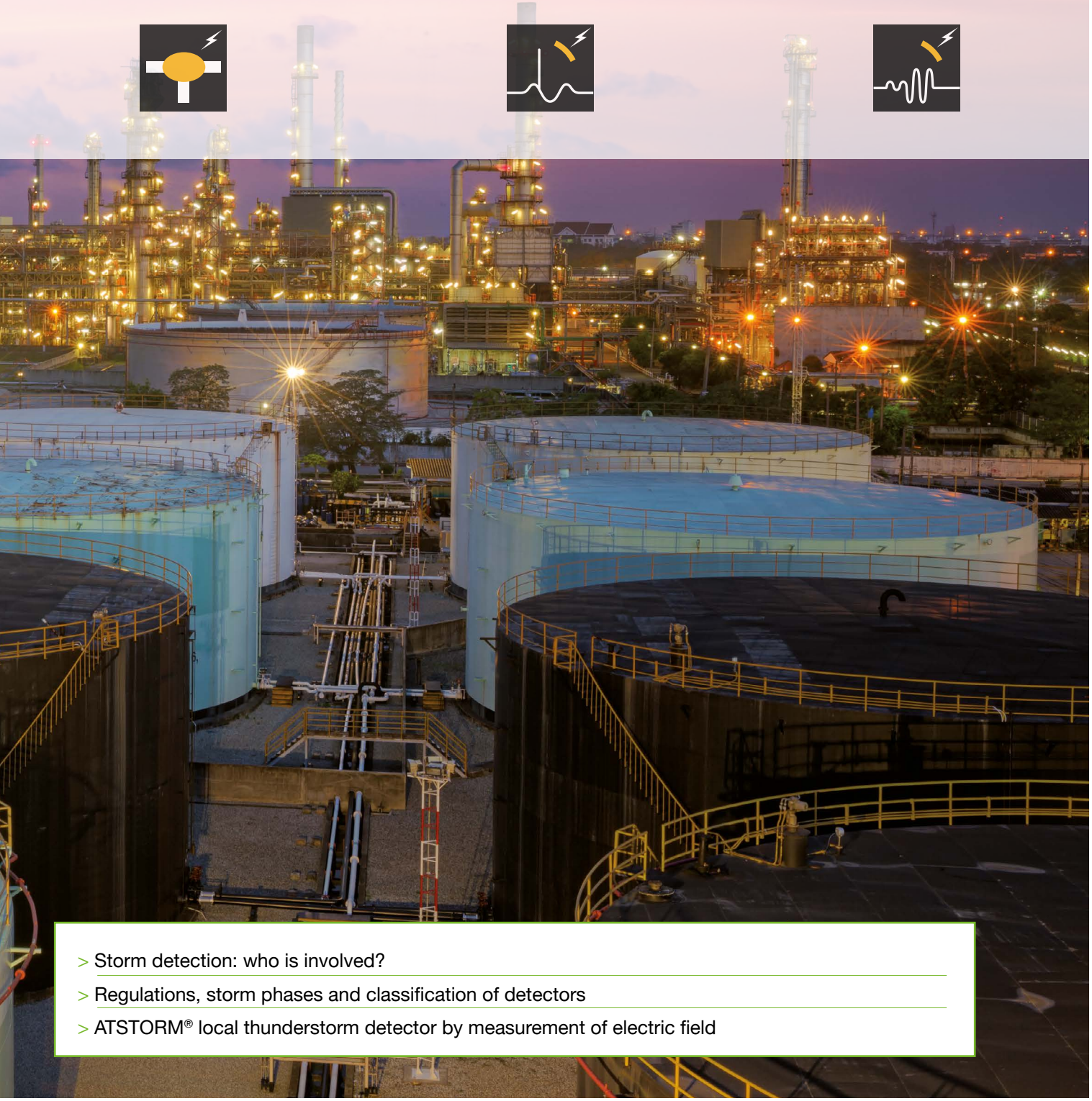
LOCAL STORM



Aplicaciones Tecnológicas S.A. - Parque Tecnológico de Valencia - Nicolás Copérnico, 4 - 46980 Paterna (Valencia), Spain T +34 961 318 250 - F +34 961 318 206 - atsa@at3w.com - www.at3w.com

DETECTION



> Storm detection: who is involved?

> Regulations, storm phases and classification of detectors

> ATSTORM® local thunderstorm detector by measurement of electric field

Aplicaciones Tecnológicas S.A. - Parque Tecnológico de Valencia - Nicolás Copérnico, 4 - 46980 Paterna (Valencia), Spain T +34 961 318 250 - F +34 961 318 206 - atsa@at3w.com - www.at3w.com

> STORM DETECTION: WHO IS INVOLVED?

STRUCTURES WITH PUBLIC OPEN-AIR AREAS

PREVENTION OF LOSSES IN INDUSTRIAL PROCESSES AND OPERATIONS

PREVENTION OF SERIOUS ACCIDENTS

Sites with hazardous products (flammable, radioactive, toxic and explosive).

CONTINUITY OF BASIC SERVICES

Telecommunications.
Energy production, distribution and supply.
Health and emergency services.

SAFEGUARDING SENSITIVE MATERIAL

Computer systems.
Electric or electronic controls.
Emergency, alarm and security systems.

Thunderstorm detectors are particularly useful for those responsible for decision making (state or local government, public or private companies) who need to protect human lives and equipment from the destructive effects of lightning.

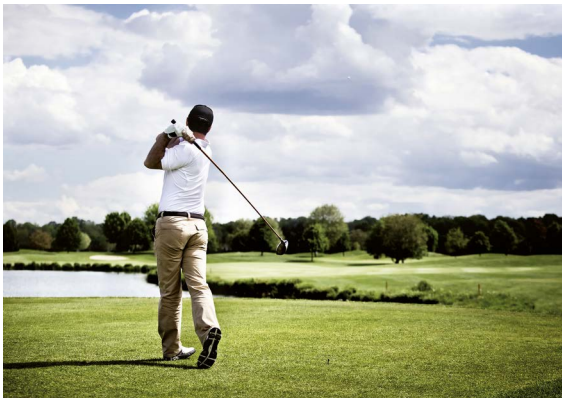
> STORM DETECTION: WHO IS INVOLVED?

INFRASTRUCTURES

Ports and airports.
Roads and highways.
Railways and cable cars.

PREVENTION OF OCCUPATIONAL RISKS

CIVIL AND ENVIRONMENTAL PROTECTION



PEOPLE IN OPEN AREAS

Open-air works, sports or activities.
Competitions and mass events.
Agriculture, livestock and fisheries.

Warning information from a storm detector enables us to **initiate preventive measures** before the beginning of thunderstorm activity and deactivates itself when the storm ends. Local storm detection enables normal activity to cease for however long is necessary when the risk is present, thereby saving costs incurred due to alarm duration and activity cessation.

The steps towards appropriate prevention are:

1. ASSESSMENT of the need of having information from a storm detector (according to EN 50536).
2. DETECTION in advance of the risk of lightning within the area to be protected.
3. LOWERING the risk by means of preventive actions before thunderstorm activity begins.

Preventive protection does not replace external lightning protection or internal protection against overvoltages, rather it complements both. However, when external and internal protection cannot be implemented, preventive protection may be used alone.

> REGULATIONS, STORM PHASES AND CLASSIFICATION OF DETECTORS

Standard EN 50536 on “Protection against lightning: thunderstorm warning systems” describes the basic requirements for sensors and sensor networks collecting data of thunderstorm evolution in real time. The standard also provides a method for determining the need for the data from a thunderstorm detector regarding preventive measures.

The standard distinguishes four phases in the evolution of a thunderstorm and classifies detectors based on the phases of the storm and the types of discharges that they can measure.

> Phase 1: The electric field rises.
> Phase 2: Intra-cloud and cloud-to-cloud lightning.
> Phase 3: Cloud-to-cloud and cloud-to-ground lightning.
> Phase 4: Number of lightning bolts decreases.

> Class I detectors: detect thunderstorm during its whole life cycle (phases 1 to 4).
> Class II detectors: detect cloud-to-cloud and cloud-to-ground lightning (phases 2 to 4).
> Class III detectors: detect only cloud-to-ground lightning (phases 3 and 4).
> Class IV detectors: detect cloud-to-ground lightning (phase 3) but with limited performance.

0 GOOD WEATHER

1 INITIAL PHASE

2 GROWTH PHASE

● CLASS I DETECTORS (ATSTORM®)

CLASS II DETECTORS

> DETECTORS MEASURING THE ELECTRIC FIELD

They provide information on the characteristics of the local atmospheric electric field, by means of which the possibility of lightning discharge can be deduced. They provide a warning before the first lightning bolt.

Traditionally **field mills** have been employed for this measure. They have a mechanical sensor which uses a rotary engine for measurement, operating 24 hours a day. If the engine stops due to a breakdown or obstruction, the detector stops working and becomes useless for any preventive purpose. Besides, field mills require periodical maintenance and cleaning of certain elements in order to minimize measurement errors.

How to avoid these inconveniences and guarantee safety?

Aplicaciones Tecnológicas, S.A. has developed and patented the Field-Controlled Electrometric Sensor (FCES) to overcome the disadvantages of field mills. ATSTORM®, based on FCES technology, is a thunderstorm detector that measures the surrounding electrostatic field, **fully electronic**, **without mobile parts**, robust and extremely reliable.

fces® FIELD-CONTROLLED ELECTROMETRIC SENSOR

VS

> REGULATIONS, STORM PHASES AND CLASSIFICATION OF DETECTORS

	DETECTORS MEASURING THE ELECTRIC FIELD	RADIOFREQUENCY DETECTORS
Storm formation above target	✓	✗
Prediction of the first lightning strike on the target to be protected	✓	✗
Thunderstorm approach	✓	✓
Warning without previous lightning	✓	✗

3 MATURE PHASE

4 DISSIPATION PHASE

0 GOOD WEATHER

CLASS III DETECTORS

CLASS IV DETECTORS

> RADIOFREQUENCY DETECTORS

They provide information about lightning strikes **during a thunderstorm,** warning about active thunderstorms approaching and detecting the electromagnetic pulses caused by intra-cloud, cloud-to-cloud or cloud-to-ground lightning.

What is the limitation of this technology?

Although they can detect thunderstorms at great distances, they are not able to sense those being formed just above the detector itself. Besides, as they can only give warning of lightning strikes when they have already occurred, they **do not leave enough time** to implement preventive actions.

OPTIMAL DECISION MAKING

Detecting a thunderstorm in the initial phase is essential in order to have enough time to implement preventive actions. Only Class I detectors can monitor a thunderstorm during its whole cycle, from its early formation phase to its full dissipation.

⚠ RISK OF LIGHTNING STRIKE

Phases of the storm when there is a risk of cloud-to-cloud and cloud-to-ground lightning.

DETECTION WITHOUT ANTICIPATION

When the detector does not sense the electrostatic field, lightning strikes are needed to activate the alarms. The notice period given to take preventive actions may sometimes be very short.

ALARM EXCESS

Inadequate detection may unnecessarily prolong a state of alarm, thus stopping activity beyond the time required which would, in turn, affect the use of human resources and machinery.

> ATSTORM® LOCAL THUNDERSTORM DETECTOR BY MEASUREMENT OF ELECTRIC FIELD

> ATSTORM®

Local thunderstorm detector by measurement of electric field

ATSTORM® is a storm detector by means of an electric field that allows a time gap of over twenty minutes or more to take pre-established preventive actions. It is a class I detector regarding standard EN 50536, comprising a sensor and a console with the following characteristics:

> SENSOR WITH fces® TECHNOLOGY

Waterproof design for assuring good performance in the most adverse weather conditions.

It detects:

> The first signs of a possible local formation of a thunderstorm, just above the detector itself.

> Active thunderstorms within a radius of 20 km.

This detection allows enough time to set the safety protocols in motion, thus safeguarding people, equipment and data.

> CONSOLE WITH TOUCH SCREEN

User-friendly and intuitive for an easy configuration of the alarm levels and other parameters. In addition, the user can also customize the alarm warnings and connection to other devices.

It enables:

> Historical data storage.

> Serial communication and TCP for remote control.

> Sending SMS.

- Maximum reliability in adverse weather conditions
- Local thunderstorm detection before the first lightning strike
- Fully electronic, no mobile parts or special maintenance required
- Warnings given with several tens of minutes' notice

> ATSTORM® LOCAL THUNDERSTORM DETECTOR BY MEASUREMENT OF ELECTRIC FIELD

The storm detector **ATSTORM®** is the ideal tool for preventive protection against the effects of storms and lightning since it enables us to obtain specific measurements with at least twenty or more minutes' notice before the imminent risk of a thunderstorm, thereby safeguarding people and equipment from its destructive effects.

Some preventive actions that can be programmed in the **ATSTORM®:**

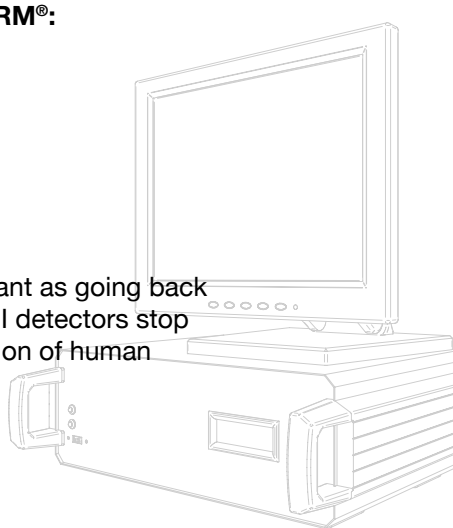
> Send an SMS.

> Activate an audible and/or visual alarm.

> Connect UPS and generators.

> Disconnect sensitive equipment.

Implementing preventive actions with enough notice is as important as going back to work in normal conditions once the danger has passed. Class I detectors stop the alarm when it is not necessary thus enabling better exploitation of human resources and machinery.



> ATSTORM® LOCAL THUNDERSTORM DETECTOR BY MEASUREMENT OF ELECTRIC FIELD

> TECHNICAL DETAILS

Reference	**AT-520**
Operating	
Type of detector according to EN 50536	Class I
Detection range	20 km around the sensor
Resolution	1 V/m
Response time	1 second
Sensor measuring range	From -32 to +32 kV/m
Console display	Touch-screen
Alarm levels	4 configurable alarm levels
Console alarm sound level	80 dB
Electrical	
Console power supply	110/250 V_{AC} (+/-15%)
Frequency	50/60 Hz
Electrical consumption	15 W
Relay outputs	4 configurable outputs (for instance 3 storm alarms and one communication failure)
Mechanical	
Sensor	
Weight	1 kg
Dimensions	Ø166 x 226 mm
Cable	25 m
Other options for cable length	50 or 100 m
Framework material	Polypropylene
IP Code	IP65
Fixing	1½" tube attachment fixing
Console	
Weight	4.6 kg
Touch screen weight	3.5 kg
Dimensions	350 x 260 x 120 mm
Touch screen dimensions	12.1"
Environmental	
Working sensor temperature	-40 ºC to +85 ºC
Working console temperature	+5 ºC to +50 ºC
Communications	
Interface	Configurable series, Ethernet
Outputs	Audio signal, relay outputs
Mounting	
Mast*	1½", 2 m galvanised steel mast included
Anchoring*	U-shaped anchorage consisting of 2 galvanised steel, 30 cm long supports to attach to the wall using screws
Other ATSTORM® references	
AT-523	Same characteristics as AT-520 (mast and anchorages not included)
AT-513	For facilities with uninterruptible power supply

* Variable according to installation

> SOFTWARE

ATSTORM® has its own software that can be installed on a computer connected to the network, which can:

- Save data from the sensor.
- Analyze the evolution of the electric field and the incidence of storms in the prevention area.
- Verify the activation of the alarm when the electric field level remains high for enough time.
- Remotely configure the console to change alarm levels and other settings.

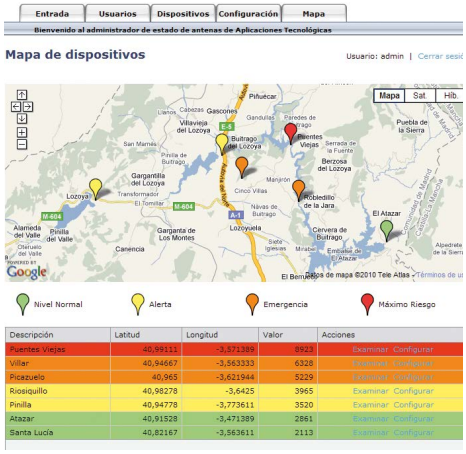
> ATSTORM® WEB

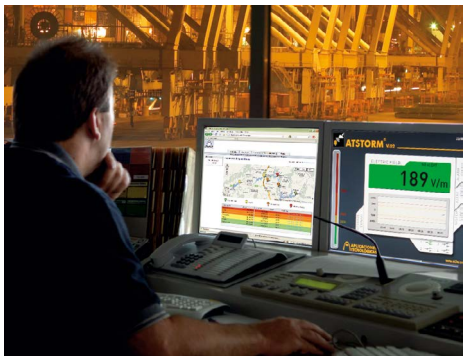
Using this service it is possible to monitor real-time information from multiple **ATSTORM®** detectors from any location. This only requires a PC with an internet connection and detectors that are also connected to the network.

> ATSTORM® NET

It is the same service as **ATSTORM® WEB**, but in this case the tools needed are installed in the customer's local network, in such a way that the entire information flow is managed by the customer.

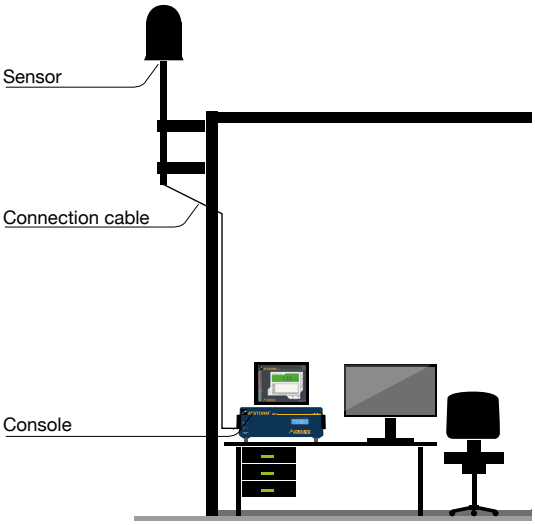
> ATSTORM® LOCAL THUNDERSTORM DETECTOR BY MEASUREMENT OF ELECTRIC FIELD





> EASY TO INSTALL

The **ATSTORM®** storm detection sensors should be installed outside the building, away from elements that could modify the electric field such as trees, metallic structures or power sources.



AT-520 includes anchorage and mast fixing for the sensor.