APLICACIONES TECNOLÓGICAS

TECHNOLOGIES FOR LIGHTNING PROTECTION

LOCAL STORM DETECTION

AIR TERMINALS AND ACCESSORIES

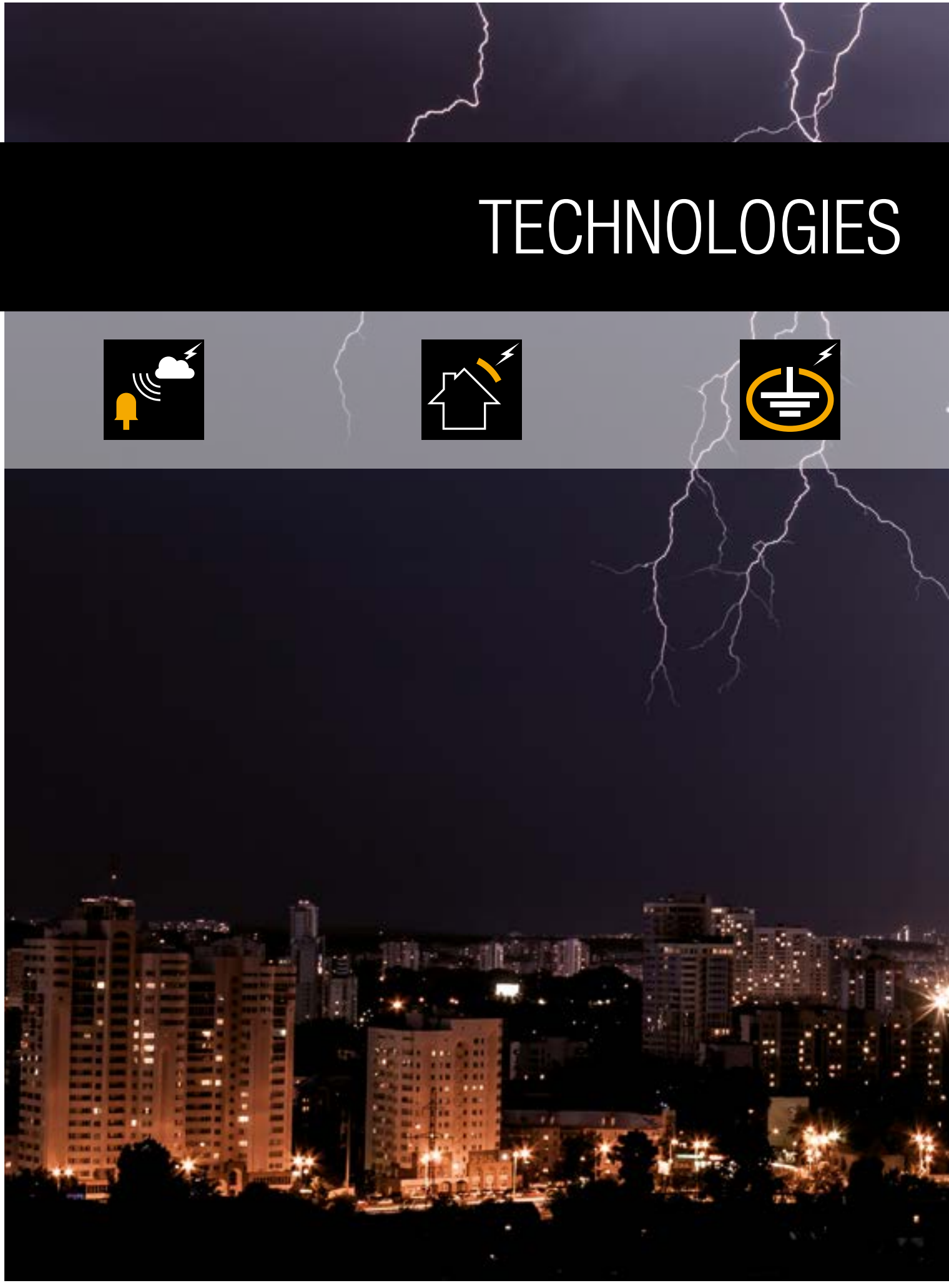
EARTHING

EXOTHERMIC WELDING

TRANSIENT OVERVOLTAGES

PERMANENT OVERVOLTAGES

TECHNOLOGIES



FOR LIGHTNING PROTECTION

> OUR COMPANY

We offer technologically advanced solutions in the area of lightning protection.

We provide the most complete range of products and solutions, given that we are a technological leader in this field.

We operate through our network of highly qualified local distributors, adapting to the needs and requirements of the area.

> HISTORY

With 30 years in the market APLICACIONES TECNOLÓGICAS S.A. has an abundance of achievements, awards and innovations.

1986:
Foundation of APLICACIONES TECNOLÓGICAS

1993:
R+D award granted by the Generalitat Valenciana

1994:
Start of export

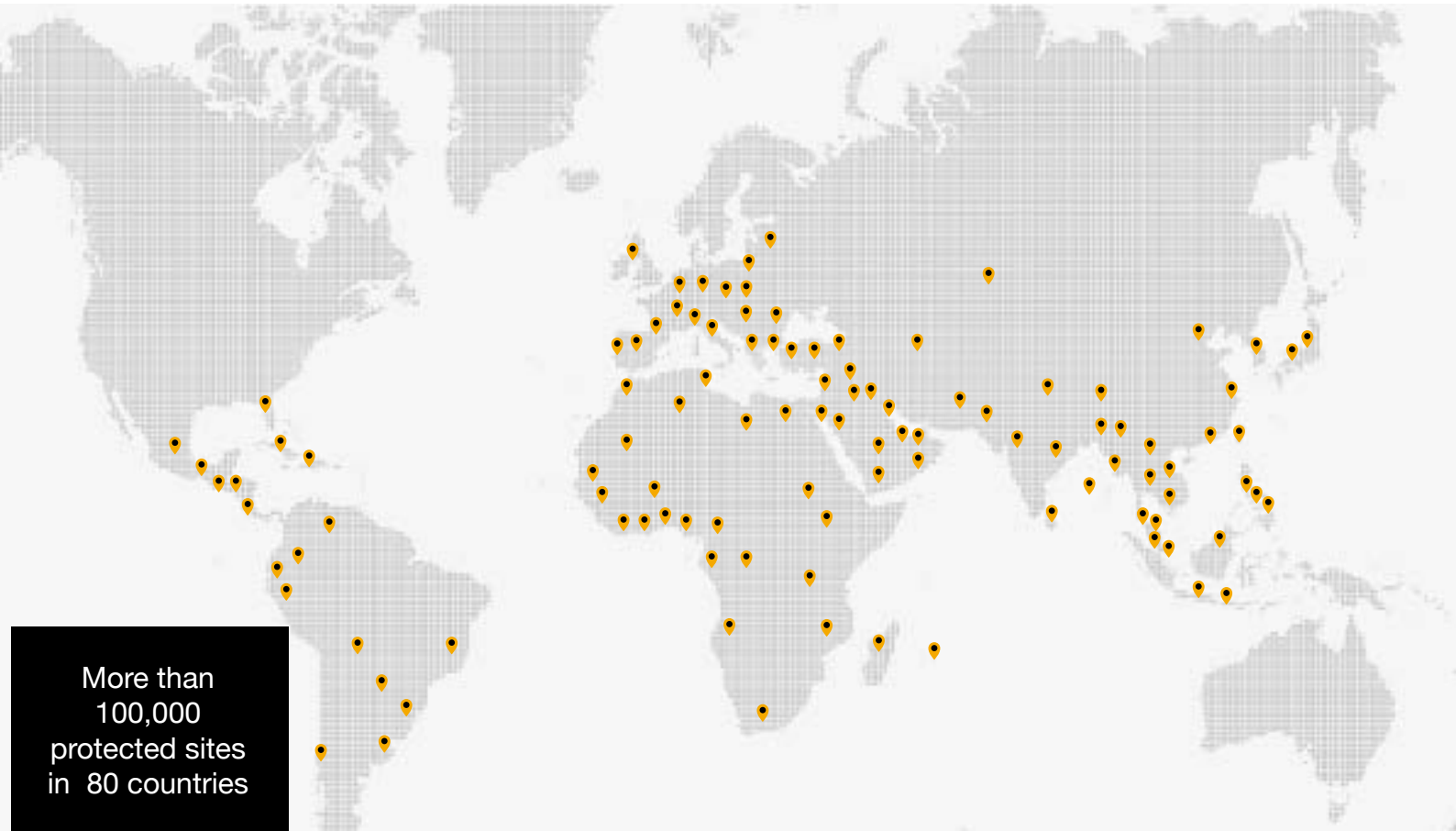
1995:
Start of transient overvoltages line

1996:
Transfer to Valencia Technology Park

1998:
First ISO 9001 certification

2000:
Clients in more than 25 countries

2001:
Start of exothermic welding line



More than 100,000 protected sites in 80 countries

Aplicaciones Tecnológicas Head Office, Paterna (Valencia), Spain

2004: Distributors in more than 50 countries

2005: Start of thunderstorm detectors line

2008: ISO 14001 Certification

2009: Start of permanent overvoltages line

Offices in the Caribbeans and China

2010: Offices in Portugal

2011: 25th anniversary

2012: Distributors in more than 75 countries

2013: Launch of Apliweld Secure+

2016: 30th anniversary

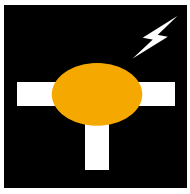
> WE ARE MANUFACTURERS

Our 6 specialization lines in this division include the investigation and development, production, commercialisation, installation and revision of:

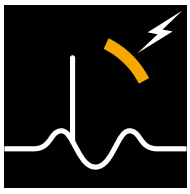
LOCAL STORM DETECTION

AIR TERMINALS AND ACCESSORIES

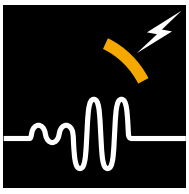
EARTHING



EXOTHERMIC WELDING



TRANSIENT OVERVOLTAGES



PERMANENT OVERVOLTAGES

> OUR VALUES

CUSTOMER SATISFACTION

We care about understanding our customers' needs and providing a solution to their problems, taking into account respect, kindness, quality, opportunity and excellence.

R+D+i: EFFORT & INVESTMENT

We have invested heavily in this area. Our R+D+i department is composed of a multidisciplinary team of engineers, physicists and chemists.

ENVIRONMENT: COMMITMENT AND RESPONSIBILITY

Company registered by AENOR (Spanish Association of Regulation and Certification). Environmental Management System certification according to standard UNE-EN ISO 14001: 2004 for all of our products and services.

QUALITY: SOLUTIONS AND PRODUCTS BEYOND THE REGULATORY REQUIREMENTS

Company registered by AENOR (Spanish Association of Regulation and Certification). Quality assurance system in accordance with standard UNE-EN ISO 9001: 2008 for all of our products and services.

STANDARDIZATION: PARTICIPATION AND DEDICATION

We promote the evolution of the standard regulations in our field. We actively participate in both national and international standardization committees.

AENOR CENELEC IEC ILPA AFME AFBEL

> OUR 6 PRODUCT LINES FOR FULL PROTECTION

1 **Local storm detection**

Enables preventive action to be taken

+

2 **Lightning rods and accessories**

Protection against the direct effects of lightning

+

3 **Earthing**

Components that safely disperse lightning current in the soil

+

> OUR 6 PRODUCT LINES FOR FULL PROTECTION

4 Exothermic welding

Conductors connected on a molecular level, permanent connections

+

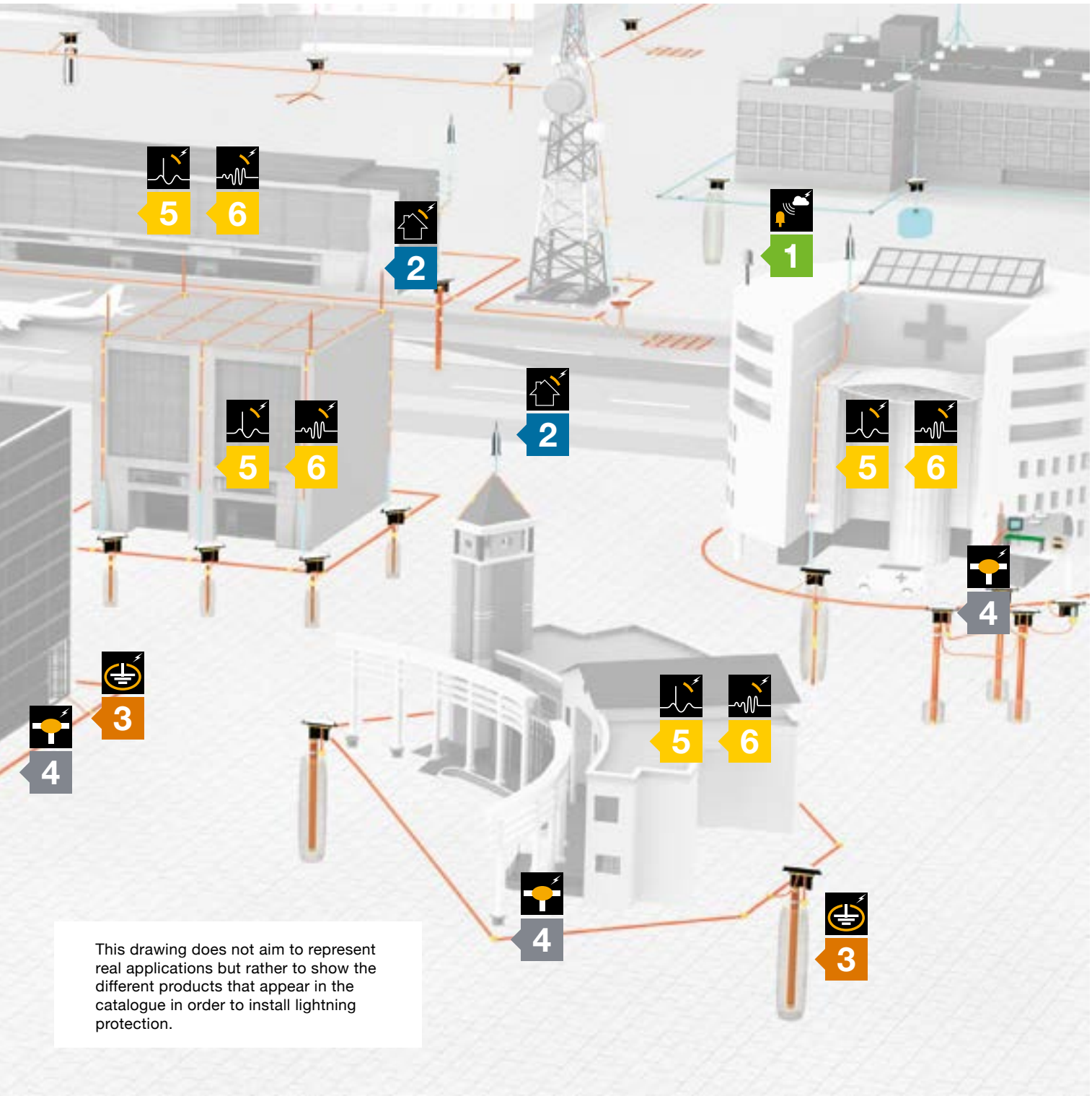
5 Transient overvoltages

Protection against the indirect effects of lightning

+

6 Permanent overvoltages

Protection against decompensation of phases due to disconnection of the neutral conductor



This drawing does not aim to represent real applications but rather to show the different products that appear in the catalogue in order to install lightning protection.

> AREAS OF APPLICATION

Lightning is a very complex natural phenomenon with unpredictable consequences. It is therefore essential to protect people, the environment and infrastructures against its effects, as well as ensuring service continuity and preserving material goods and cultural heritage.

Thanks to our experience, technical expertise and normative knowledge, together with the most complete range of products, we can provide the optimum lightning protection solution for any area of activity, meeting the needs of each sector and dealing with the specific problems that lightning may cause in each of them.

> AREAS OF APPLICATION

> RAW MATERIALS INDUSTRY

- IRON WORKS
- METALLURGY
- OIL PLATFORMS
- OIL REFINERIES
- AGRO-LIVESTOCK
- CEMENT PLANTS
- CHEMICALS

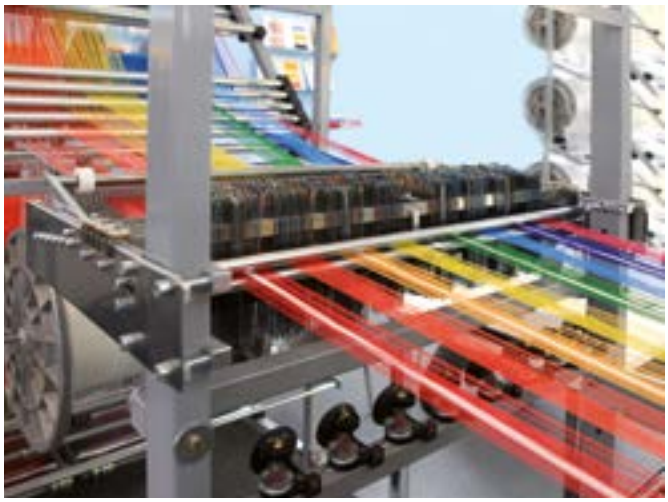
Industry is more and more dependent on computer and other electronic systems that are highly sensitive to overvoltages caused by the atmosphere. If this equipment fails, it can interrupt entire production lines.

In order for the workplace of factory employees to remain safe, care should be taken to ensure any lightning effects do not reach the machinery they are operating.

Some industries, such as chemical and oil refineries, can also cause important environmental damages.

> AREAS OF APPLICATION

> MANUFACTURING INDUSTRY



- SILOS
- ARMS INDUSTRY
- ROBOTICS
- TEXTILE INDUSTRY
- AUTOMOTIVE INDUSTRY
- FOOD INDUSTRY
- PHARMACEUTICAL INDUSTRY

> AREAS OF APPLICATION

> MANUFACTURING INDUSTRY

Lightning protection of the structure and lines can reduce personal and economical losses, avoiding unnecessary halts in production lines, deterioration of machinery and data losses or corruption, as well as more serious damage such as fires or electric shocks.

> AREAS OF APPLICATION

> TELECOMMUNICATIONS

CELL PHONE ANTENNAS
RADIO ANTENNAS
RADARS
TV ANTENNAS

> AREAS OF APPLICATION

> TELECOMMUNICATIONS

Telecommunication towers and aerials are often placed at isolated locations where they stand out due to their height, which is why they are the preferred points for lightning to strike.

They should provide an uninterrupted and efficient service.

In the case of facilities without a staff presence, the cost and time needed for repairs may significantly increase.

Protection against the direct impact of lightning and overvoltages prevents equipment damage and service interruptions, thus reducing maintenance costs.

> AREAS OF APPLICATION

> ENERGY

NUCLEAR POWER PLANTS
HYDROELECTRIC PLANTS
THERMAL POWER STATIONS
OPEN PIT MINES

> AREAS OF APPLICATION

> ENERGY

SOLAR THERMAL POWER PLANTS
PHOTOVOLTAIC POWER PLANTS
WIND TURBINES
BIOMASS-FUELLED POWER PLANTS

The production and supply of energy is needed for the economic development and welfare of people.

Energy infrastructures should reduce risk, not only to ensure adequate production and profitability, but above all to protect people and prevent environmental accidents.

Production and energy supply facilities are often very large. A detailed risk assessment on each zone is essential for installing the necessary external and internal protection against fires and damage to the equipment controlling the critical processes.

> AREAS OF APPLICATION

> TRANSPORT

AIRPORTS
PORTS
MARINAS
RAILWAYS
HIGHWAYS
LOGISTICS PLATFORMS

> AREAS OF APPLICATION

> TRANSPORT

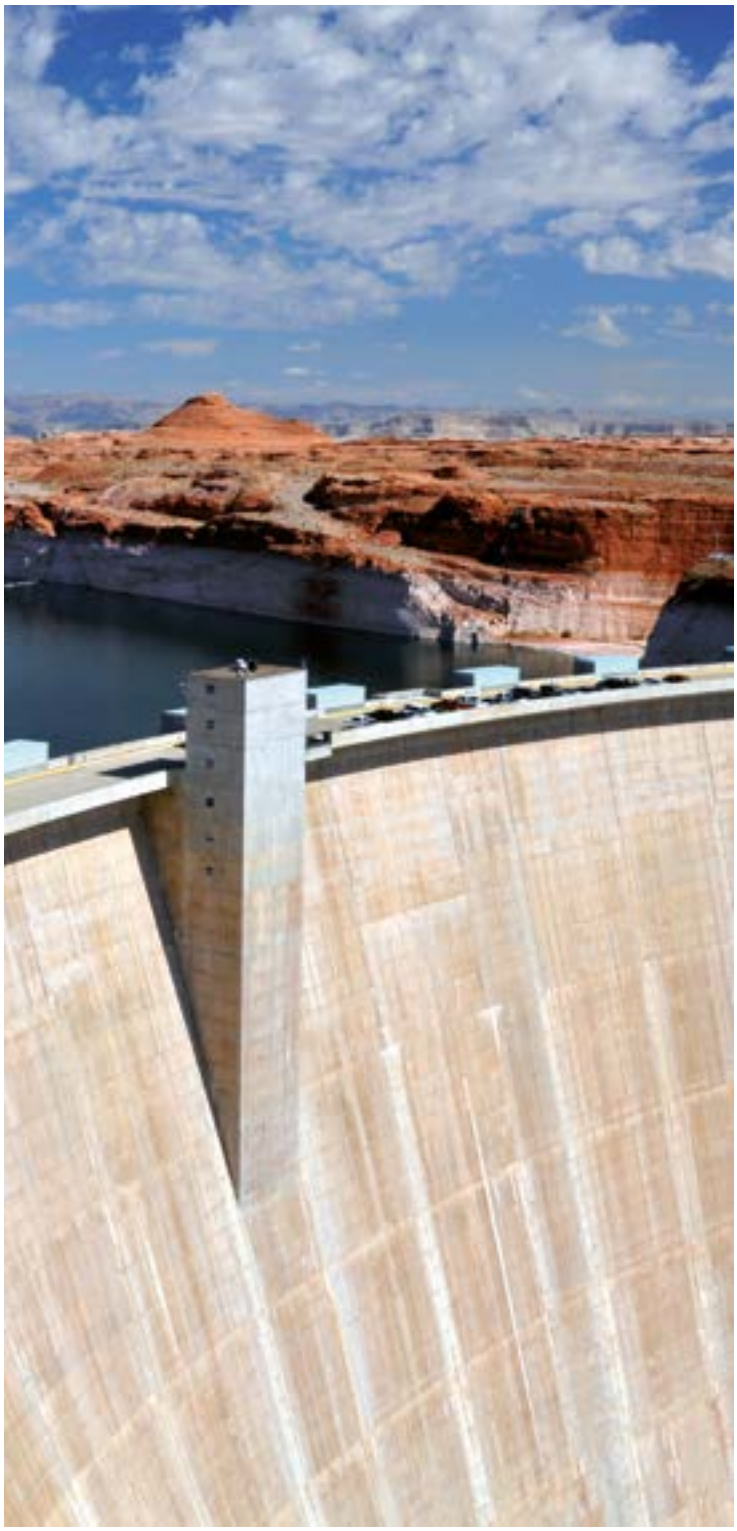
Transport is a strategic sector due to its crucial importance in the overall economy of a country.

Any safety failure could cause serious accidents and severe economic losses.

Even though it is impossible to cover all transport networks, protecting key centres against lightning can prevent a significant amount of accidents, service interruptions and damage to costly and sensitive equipment. Early storm detection can also contribute to increased safety.

> AREAS OF APPLICATION

> WATER



> AREAS OF APPLICATION

> WATER

- WATER PURIFICATION PLANTS
- WASTEWATER TREATMENT PLANTS
- SEWAGE SYSTEMS
- IRRIGATION SYSTEMS
- PUMPING STATIONS
- DAMS & RESERVOIRS

Water is the world's most important common good. Its management requires procedures that prevent it going to waste and which meet the environmental requirements of the natural cycle. Expensive technologies are used for this, which are sometimes of the latest generation.

Wastewater treatment plants, pumping stations and other facilities related to water treatment are often located in isolated places where such structures are the highest point and, therefore, the preferred point for lightning to strike.

Due to the dimensions of facilities related to water treatment and distribution, a detailed risk assessment is essential in order to protect them against direct and indirect lightning strikes without an excessive cost.

> AREAS OF APPLICATION

> DEFENCE AND CIVIL PROTECTION

- MILITARY SITES
- SHIPS
- FIRE STATIONS
- EMERGENCY SYSTEMS

> AREAS OF APPLICATION

> DEFENCE AND CIVIL PROTECTION

Military sites often contain explosive material.

Electronic equipment for Defence can be very expensive and should always be in good condition.

Buildings and open areas with concentrations of people should also be protected.

Structures storing material that could explode in the event of fire, or even with a spark, must be protected. It is also important to protect people and strategic equipment.

Moreover, early storm detection can be a very useful tool for civil protection tasks in service and damage to expensive and sensitive equipment. Early storm detection can also contribute to increased safety.

> AREAS OF APPLICATION

> CULTURAL AND HISTORICAL HERITAGE

> AREAS OF APPLICATION

> CULTURAL AND HISTORICAL HERITAGE

- MUSEUMS
- THEATRES
- TEMPLES
- HISTORIC BUILDINGS
- CONVENTION CENTRES

Many great artworks have been lost throughout history due to fires and damage caused by lightning, mainly because these types of buildings were often the highest points in their surroundings.

Nowadays, buildings are usually made with a large amount of metal. However, historic buildings are normally made of stone or even of flammable materials.

Many buildings containing cultural heritage are provided with electronic devices such as security cameras, audiovisual aids, etc.

Many of them also receive a large number of visitors meaning that there are large concentrations of people regularly or at specific moments.

Lightning protection for this type of building should aim to minimize the visual impact as much as possible and look after the electrical installations and earthing.

> AREAS OF APPLICATION

> OPEN AREAS

- STADIUMS
- SPORTS CENTRES
- GOLF COURSES
- ZOOS
- BEACHES
- CAMP SITES

> AREAS OF APPLICATION

> OPEN AREAS

- SAFETY AT WORK
- NATURAL PARKS
- AMUSEMENT PARKS
- SKI STATIONS
- MULTITUDINOUS EVENTS
- LIVESTOCK

Thunderstorms are especially dangerous in open areas, where there may be people without shelter exposed to them.

If it is not possible to prevent direct lightning strikes in the whole area, protection can be achieved through preventive actions based on a thunderstorm warning system.

Some open areas can be protected using Early Streamer Emission air terminals, but even in those cases, remaining in open areas during thunderstorms may be dangerous. The best option is to install storm detectors and establish preventive measures, including evacuation, in the event of risk of lightning.

> AREAS OF APPLICATION

> RESIDENTIAL AND SERVICES

Homes are provided with an increasing amount of sensitive electronic equipment, which may be damaged when lightning strikes the structure or the power supply or telecommunication lines. Lightning protection in residential structures enables improvement of the energy efficiency of the electrical installation and, above all, prevents sparks, fires, electric shocks and damage to equipment, such as home automation, computers, security systems, electrical appliances, etc.

CONDOMINIUMS
SINGLE-FAMILY HOMES
MALLS

> AREAS OF APPLICATION

> RESIDENTIAL AND SERVICES

- LEISURE PLACES
- GAS STATIONS
- BANKS
- HOTELS

Lightning protection in the services sector can increase the safety of people and prevent damage to electronic equipment and security systems, ensuring continuity of service or business and, therefore, customer satisfaction.

> AREAS OF APPLICATION

> EDUCATION, RESEARCH AND HEALTH

- SCHOOLS
- UNIVERSITY CAMPUS
- ASTRONOMICAL OBSERVATORIES
- INSTITUTIONS
- HOSPITALS
- RESIDENCES FOR THE ELDERLY

Risk analysis usually indicates the need to protect these structures whether due to the concentration of people, the high cost of the equipment, or both.

Protection of service lines is essential in hospitals, where correct operation of the equipment is vital for certain patients.

Storm detection may be also useful for safety of individuals, especially where there are large open areas.

Lightning protection, together with storm detection systems, can protect people and ensure service continuity in these kinds of centres, as well as safe-guarding costly electronic equipment and computer systems.

> AREAS OF APPLICATION

> SIGNALLING

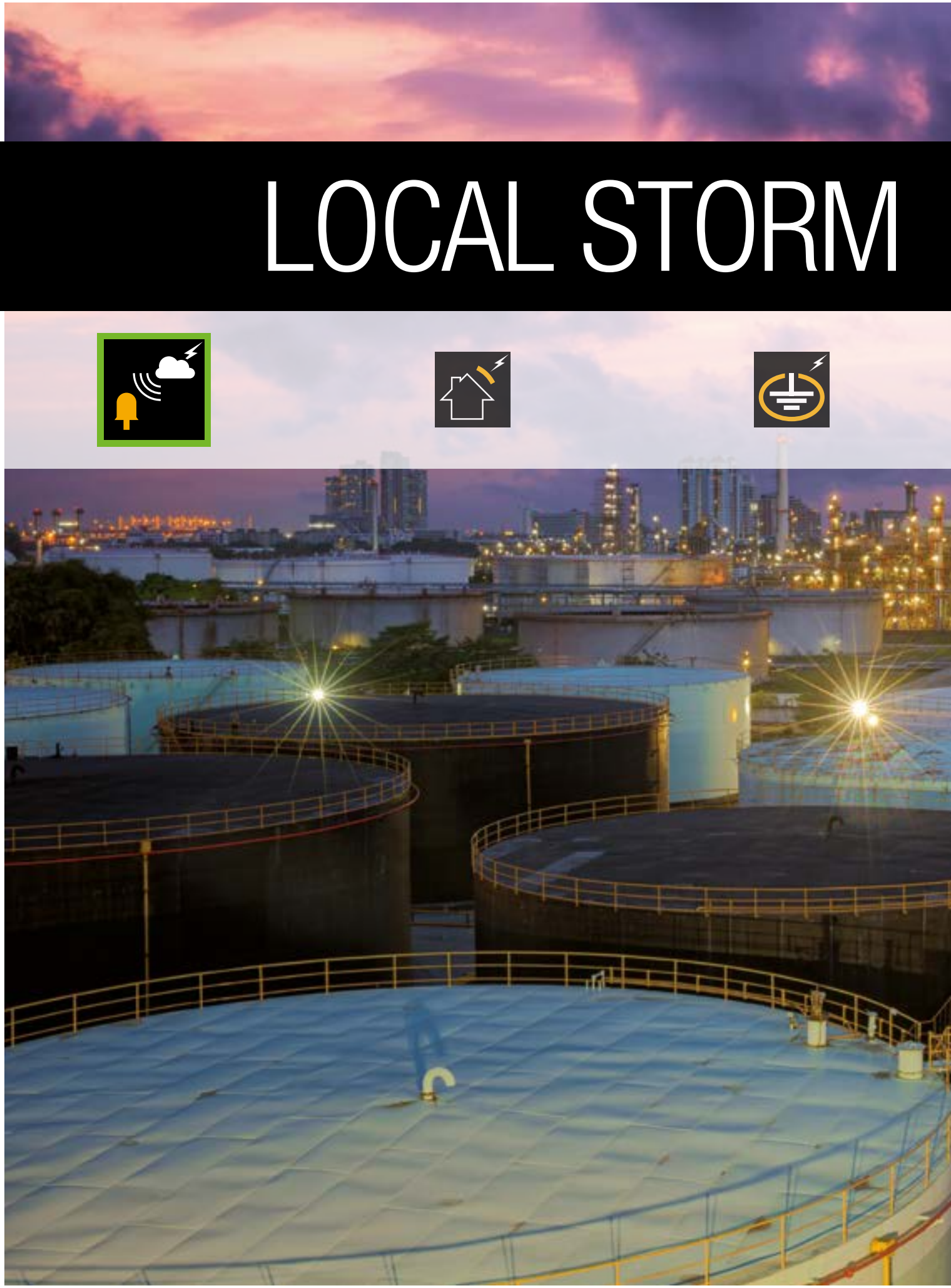
Electrical and electronic signals on the street are highly vulnerable to the direct and indirect effects of lightning.

Moreso during storms, it is very important for the safety of individuals that these services work properly.

Protection against lightning effects may prevent prolonged service disruptions, thereby ensuring comfort and public safety. Besides, it can also increase the useful life of lights and reduce maintenance costs for replacement of the equipment.

CCTV
TUNNELS
STREET LIGHTING
TRAFFIC LIGHTS
PUBLIC SIGNAGE

LOCAL STORM



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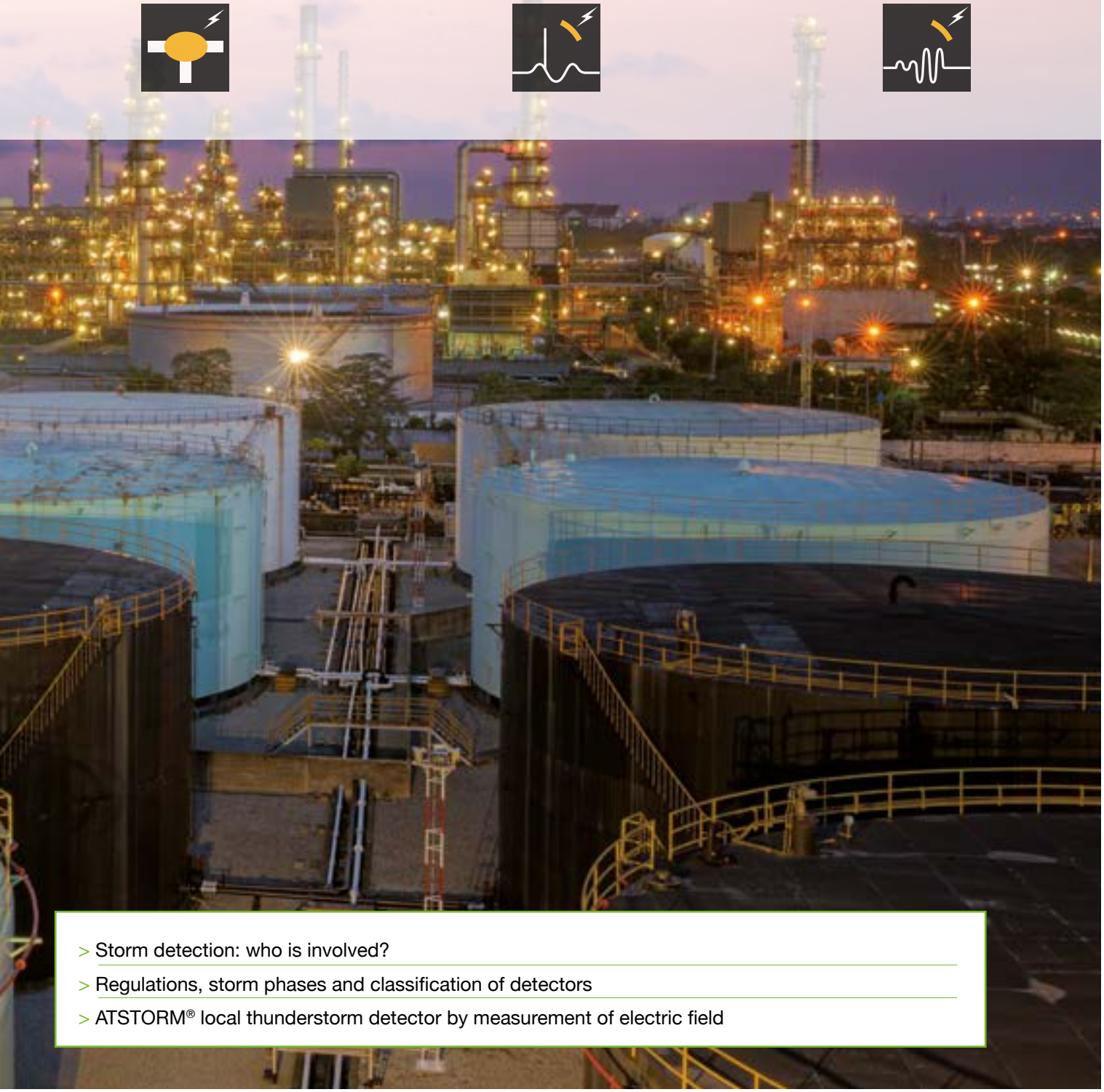
DETECTION



> Storm detection: who is involved?

> Regulations, storm phases and classification of detectors

> ATSTORM® local thunderstorm detector by measurement of electric field

> 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®:**

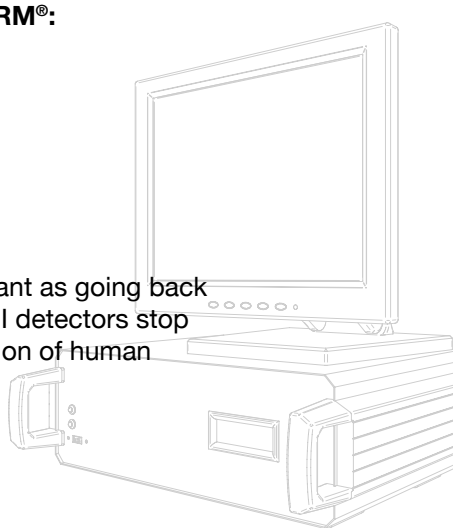
> Send an SMS.

> 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 °C to +85 °C
Working console temperature	+5 °C to +50 °C
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.

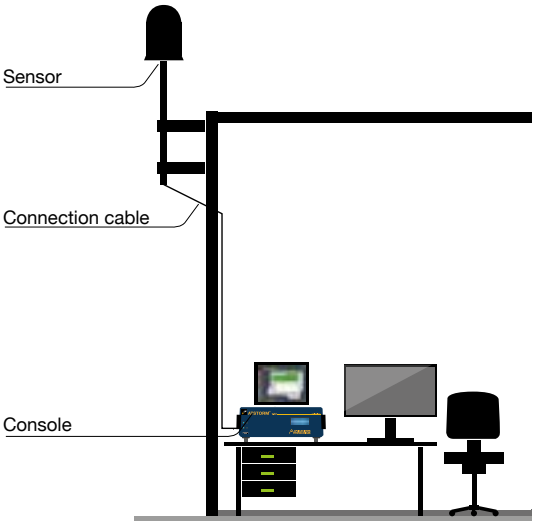
> ATSTORM® NET

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

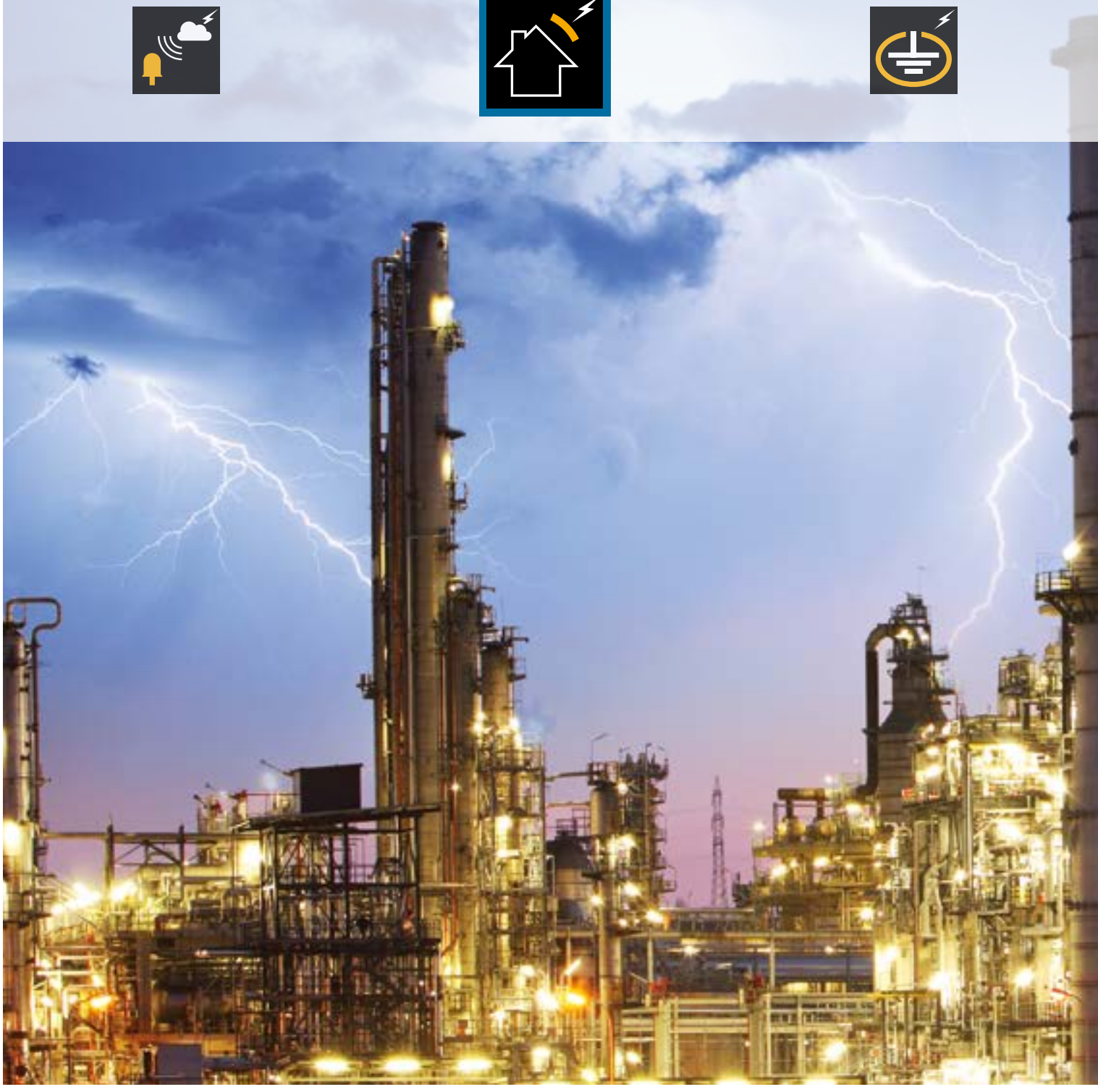
> EASY TO INSTALL

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.

AIR TERMINALS



2

AND ACCESSORIES



> NEED FOR PROTECTION

Train derailment due to lightning strike. Wenzhou (China).

> DESTRUCTIVE EFFECTS OF LIGHTNING

Electrical effects: equipment destruction.

Increases in ground voltage and surges can damage all the equipment connected to the electrical network.

Electrodynamic effects: damage to buildings.

Deformation and breakages may occur in the structure due to the force generated by the high magnetic field produced.

Thermal effects: fires.

Sparks and heat dissipation produced by the Joule effect can even cause fires.

Effects on people and animals: electrocution and burns.

Current of a certain intensity passing through the body for a short duration is enough to cause the risk of electrocution due to cardiac or respiratory arrest. The risk of burns can also be added to the list.

Inductive effects:

Within a variable electromagnetic field, induced currents appear in every conductor.

If these conductors reach computers or other electronic equipment, irreversible damage may be produced.

Lightning is one of the most destructive natural phenomena. There are many atmospheric discharges during lightning storms and some of them can even reach **hundreds of kiloamperes**.

These electrical discharges are a great hazard to people, animals, buildings and electronic equipment. The economic consequences of lightning are also very important; it can cause fire, stop production of a factory or interrupt critical processes. A direct lightning discharge to a person results in current flowing through the body. This current lasts a very short time but the intensity is enough to provoke electrocution resulting in heart failure and causing burns of different degrees.

At present, there is no device capable of preventing lightning formation. However, it is possible to create a path for the grounding of lightning which minimizes damage to the environment: the Lightning Protection System (LPS).

The need for lightning protection should be considered preferably during the first phases of structure design.

A Lightning Protection System has four basic objectives:

1) To capture the lightning.
2) To conduct lightning current safely to earth.
3) To dissipate the lightning current in the ground.
4) To provide protection against the secondary effects of lightning.

In a world where buildings and equipment are more complex every day, lightning is a constant hazard. One discharge can damage buildings and cause failures in electronic equipment. It can even provoke fire and lead to serious financial losses.

> NEED FOR PROTECTION

Refinery fire due to lightning discharge. Puerto Cabello (Venezuela).

Fire in a church tower due to lightning impact. Wald (Germany).

Lightning causes the death of livestock. Miracema de Tocantins (Brazil).

Lightning strikes a residential building. London (United Kingdom).

> LEGISLATION AND REGULATIONS

The capacity of an installation to provide sufficient protection against lightning protection is guaranteed by compliance with all the regulations in force.

> SPECIFIC STANDARDS FOR LIGHTNING PROTECTION

NF C 17-102. UNE 21186 and other National Standards "Lightning Protection with Early Streamer Emission Air Terminals".

IEC/EN 62305 Series "Lightning Protection using rods and meshed conductors".

EN 5016 Series (IEC 62561) "Lightning Protection Components".

> GUIDE DOCUMENTS

BIP 2118: Protection against lightning. A UK guide to practical application of BS EN 62305.

> OTHER STANDARDS

Typically, in every country there are codes that may be related to lightning protection, such as:

National Electric Code
National Construction Code

It is highly advisable to check carefully if there are lightning protection requirements within national obligatory standards.

Other laws and codes may also apply to lightning protection. Typical cases are:

Requirements for protection of flammable and explosive areas
Work health and safety codes
Particular requirements for other high risk structures and areas, such as hospitals, campsites, dangerous industries, etc.

BS EN 2591-214: Aerospace series. Elements of electrical and optical connection. Test methods. Lightning strike, current and voltage pulse. Under no circumstances is a force majeure extraneous to work considered as sunstroke, lightning and other phenomena of an analogous nature.

BS EN 3840-308: Aerospace series. Circuit breakers. Test methods. Lightning.

BS EN 50468: Resistibility to overvoltage and overcurrent caused by lightning for equipment with telecommunication ports.

BS EN 50289-4-14: Communication cables. Specifications for test methods. Environmental test methods. Lightning.

BS EN 60076-4: Power transformers. Guide to the lightning impulse and switching impulse testing. Power transformers and reactors.

BS EN 61400-24: Wind turbine generator systems. Lightning protection.

IEC/TR 60479-4: Effects of current on human beings and livestock. Effects of lightning on human beings and livestock.

HIGH RISK SITUATIONS DESCRIBED BY THE REGULATION

Area with high density of lightning strikes

People in open areas

Any installation or machinery used for work purposes

Buildings that need a lightning protection system with a certain level of protection, set by a risk assessment carried out according to regulations

Need for continuity of public or industrial services

Structures with outside areas open to the public

Buildings containing highly sensitive or valuable documents or equipment (such as telecommunications, computers, files, museums, historical monuments, cultural heritage)

Very high or isolated buildings

Buildings and warehouses handling or containing hazardous materials (explosive, flammable or toxic materials, etc.)

> HOW IS LIGHTNING FORMED

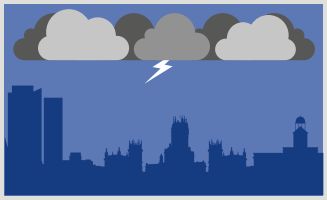
1

In normal atmospheric conditions, there is a balance between positive and negative charges, where the ground is more negatively charged than the air and other elements on the ground.

2

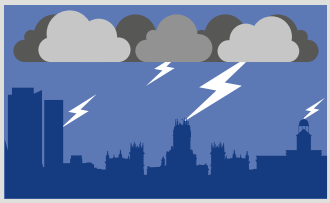
However, the formation of storm clouds creates a charge polarization: usually, the lower part of the cloud is negatively charged, thereby inducing a positive charge in the ground and other elements on it. The electric field formed in the atmosphere can then reach tens of kilovolts.
This positive charge is more evident in metal objects, pointed objects and well-earthed objects, including trees.

3



When the electric field is high enough, the cloud starts discharging towards the ground. The path formed by this discharge is called the downward leader and produces a very sharp variation in the electric field which affects the positive charges in the objects on the ground, causing the corona effect.

4

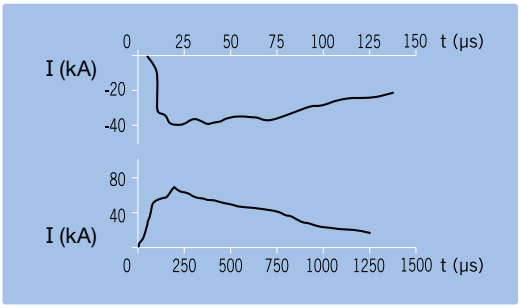


One of these objects will be the one forming the upward leader, which will move towards the downward leader thus forming the discharge path between the cloud and the ground. This object will receive the lightning strike. The cloud charge will find the most direct path to earth. If this path is not controlled, it could cause serious damage.

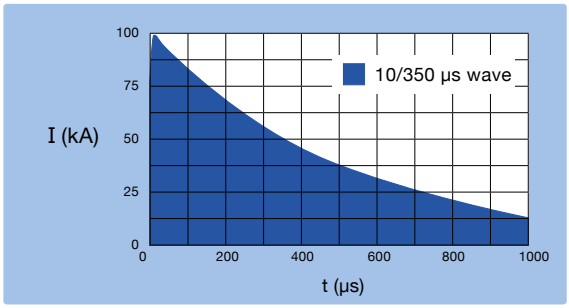
> LIGHTNING PARAMETERS

Lightning protection standards assume as a direct discharge wave, a double exponential which rise time is 10 µs (up to 90% of the peak value), peak value of 100 kA and tail time (up to 50% of the peak value) of 350 µs.

The values of the main lightning parameters have been obtained experimentally:



Wave shape and intensities of positive (ground to cloud) and negative (cloud to ground) discharges.



The measured values for intensity of lightning peak current range from hundreds of amperes to several hundred kiloamperes.

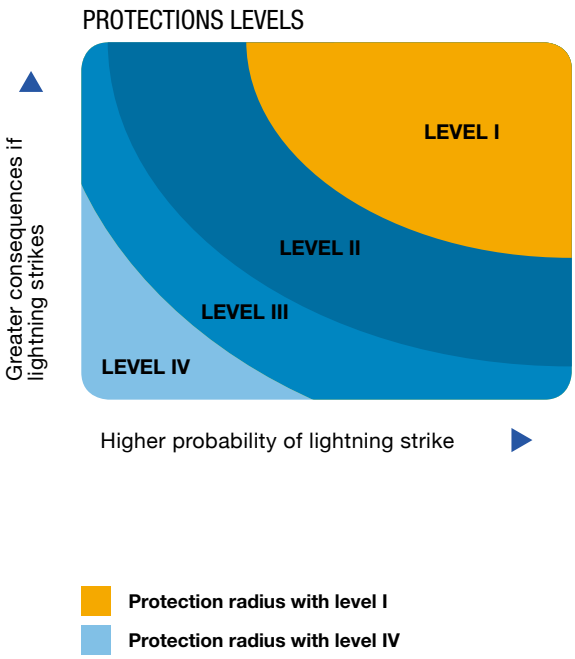
> RISK ASSESSMENT

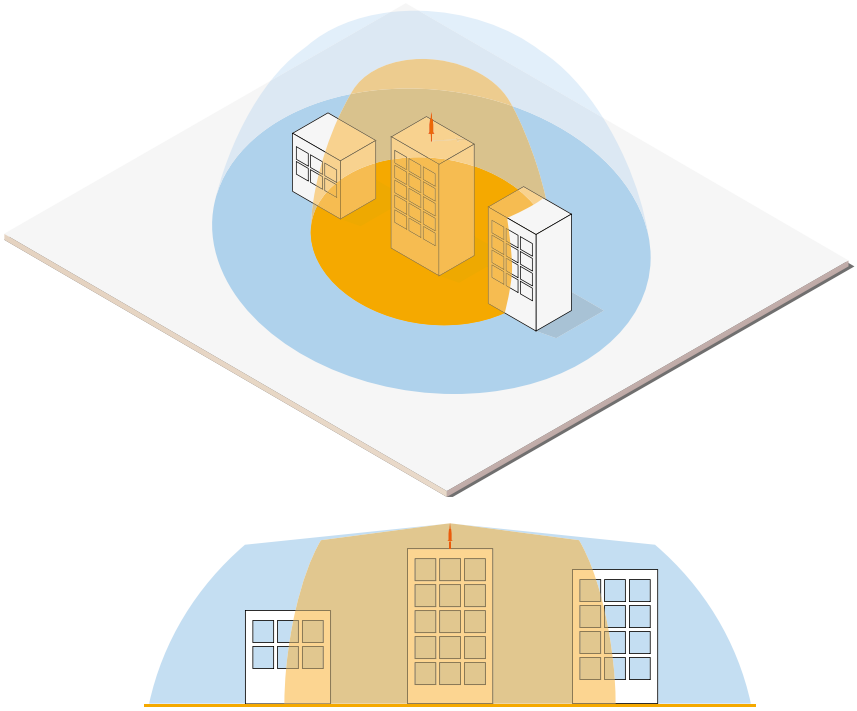
The procedure for calculating the risk index is described in lightning protection standards. The result determines the need for a lightning protection system and its degree of security (Protection Level). The risk assessment compares the expected lightning incidence with the assumed probability of lightning striking the structure. The relation between these two factors indicates whether a lightning protection system is needed or not and the corresponding degree of security.

This value depends on several tabulated factors, such as the type of structure and its contents, although sometimes other considerations could be taken into account to improve the protection level by increasing the effectiveness of the lightning protection system so that it is above the risk index calculated.

Protection level is thus related to the accepted probability of lightning striking a structure. A lower protection level (IV) will be able to intercept lightning with a high associated current, but may not capture a flash with a low current. Protection level I assumes more restrictive and safe conditions for the air terminals, hence the system would also intercept lower current lightning.

The need for protection and its level often depends on subjective criteria, since risk assessment consists of reaching a “tolerable risk” of strikes on the structure. Given that in many circumstances, this possibility is not acceptable, the decision may be taken to reduce the likelihood of lightning strike as far as possible by directly adopting level I, which is the safest and most effective.





> CD-RISK CALCULATION SOFTWARE

Risk assessment is a complex task. The Technical Department at Aplicaciones Tecnológicas, S.A. is at your disposal to calculate the risk of structures in accordance with the relevant regulations. We also recommend using calculation software **CD-RISK** in order to carry out the assessment and determine the protection level required for the structure.

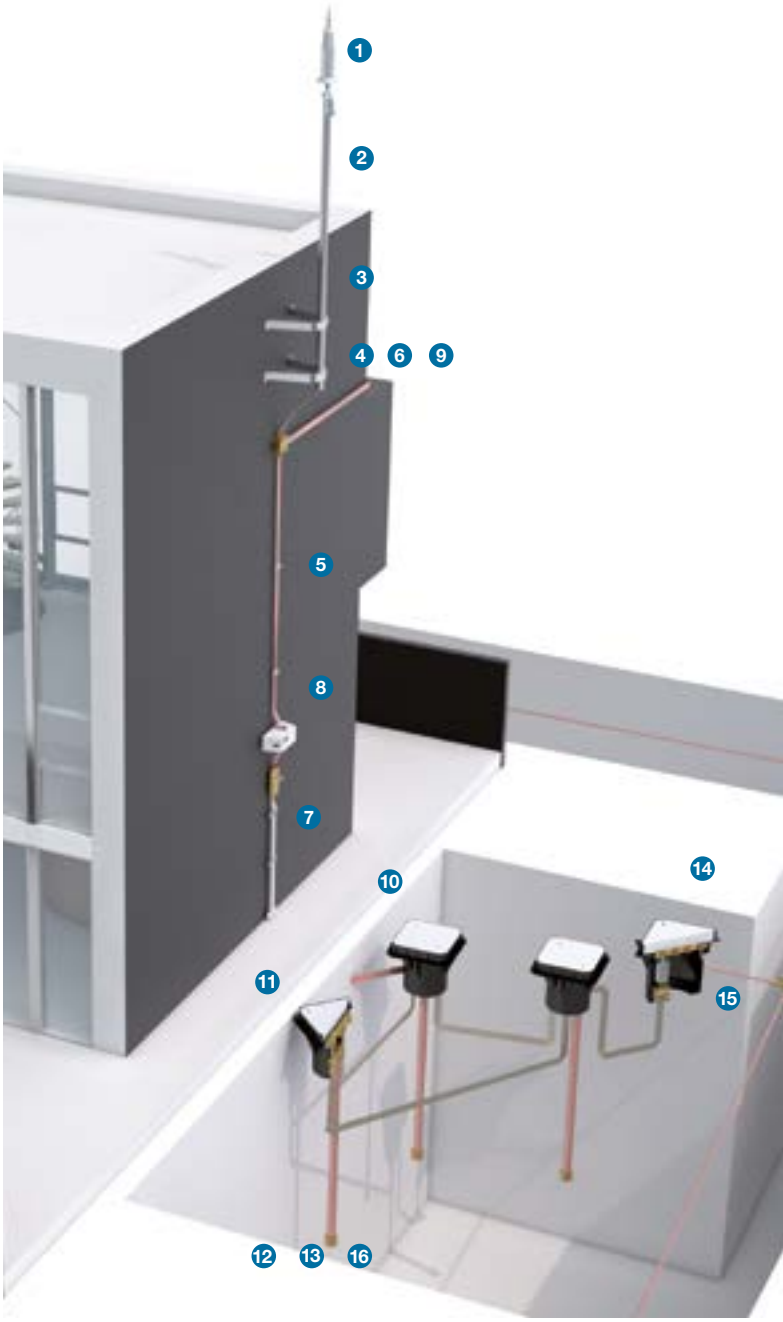
> GUIDE FOR THE DESIGN AND INSTALLATION OF EARLY STREAMER EMISSION AIR TERMINALS (ESE)

Operation of early streamer emission air terminals is based on the electric characteristics of lightning formation. Lightning begins with a down-conductor which spreads in any direction. Once it approaches the objects on the ground, any of them can be struck. The objective of an external lightning protection system is to control the lightning strike point and provide the lightning current with a path to earth avoiding damage to the structure.

The main feature of Early Streamer Emission (ESE) air terminals is the generation of the continuous upward leader before any other object within its protected area. The standards define this characteristic using a parameter **called advance time (ΔT)**: "Difference expressed in microseconds between the emission time of an early streamer emission air terminal and a simple rod air terminal measured in a laboratory under the conditions defined in the reference standard."

This advance time determines the protection radius of each air terminal. If the triggering occurs earlier, then the distance at which the downward leader is intercepted increases, thus avoiding a lightning strike in a wider area. The advance time must be measured in a high voltage laboratory, following the test procedure described in the ESE lightning protection regulations.

The components for a lightning protection system using ESE air terminals are as follows:



EXTERNAL LIGHTNING PROTECTION SYSTEM

- One or more air terminals.
- Two or more down-conductors.
- An earth termination system.

INTERNAL LIGHTNING PROTECTION SYSTEM

- A suitable surge protection installation.
- Other measures minimizing the destructive effects of lightning (equipotential bonding, screening etc.).

The **installation** of the LPS using ESE air terminals must follow the relevant standards (NF C 17-102, UNE 21186 or similar):

> PROTECTION RADIUS (R_p)

Calculated according to UNE 21186:2011, NF C 17-102:2011 and NP 4426:2013

		PROTECTION LEVEL I (D=20 m)				PROTECTION LEVEL II (D=30 m)				PROTECTION LEVEL III (D=45 m)				PROTECTION LEVEL IV (D=60 m)			
Ref. →		AT-1515 AT-2515	AT-1530 AT-2530	AT-1545 AT-2545	AT-1560 AT-2560	AT-1515 AT-2515	AT-1530 AT-2530	AT-1545 AT-2545	AT-1560 AT-2560	AT-1515 AT-2515	AT-1530 AT-2530	AT-1545 AT-2545	AT-1560 AT-2560	AT-1515 AT-2515	AT-1530 AT-2530	AT-1545 AT-2545	AT-1560 AT-2560
h (m)	2	13	19	25	31	15	22	28	35	18	25	32	39	20	28	36	43
	4	25	38	51	63	30	44	57	69	36	51	64	78	41	57	72	85
	6	32	48	63	79	38	55	71	87	46	64	81	97	52	72	90	107
	8	33	49	64	79	39	56	72	87	47	65	82	98	54	73	91	108
	10	34	49	64	79	40	57	72	88	49	66	83	99	56	75	92	109
	20	35	50	65	80	44	59	74	89	55	71	86	102	63	81	97	113
	60	35	50	65	80	45	60	75	90	60	75	90	105	75	90	105	120

h (m): Height of the air terminal over the element to be protected (in metres).
D (m): Rolling sphere radius (in metres).

> GUIDE FOR THE DESIGN AND INSTALLATION OF EARLY STREAMER EMISSION AIR TERMINALS (ESE)

> BASIC RECOMMENDED MATERIALS

INTERCEPTION

1. The radius of protection offered by an ESE lightning conductor depends on its height (h) in relation to the area to be protected, its triggering advance ΔT and the protection level.
2. The air terminal must be installed at least 2 metres higher than any other element within its radius of protection.

DENOMINATION	REF.	TABLE
ESE air terminals	AT-1560	1, 2
Adapting piece	AT-011A	15
Mast	AT-056A	30
Anchorage	AT-023B	31

DOWN-CONDUCTORS

3. Each air terminal must be earthed using two down-conductors located outside the structure. They will preferably be on different external walls of the building.
4. Each down-conductor should be installed such that its routing is as straight as possible and takes the shortest path to earth without sharp bends or upward sections.

   Care should also be taken to avoid crossing or running conductors in close proximity to electrical cables.

   When external routing is impracticable, the down-conductor may be internally routed. However, this is not recommended as it reduces the effectiveness of the lightning protection system, makes maintenance difficult and increases the risk of voltage surges.
5. The number of down-conductor fixings is determined by considering 3 clips per metre as a reference.
6. Down-conductors should have a cross-section of at least 50 mm^2. Since lightning current needs to be driven, flat conductors (tape) are preferable to round conductors as they have a larger exterior surface area for the same amount of material. Tin-plated copper is recommended due to its physical, mechanical and electrical characteristics (conductivity, malleability, corrosion resistance and so on).
7. Down-conductors should be protected by installing guard tubes up to a height of 2 m above ground level.
8. The installation of a lightning event counter over the guard tube is recommended in order to carry out verification and maintenance operations which are essential for any lightning protection system.
9. It is recommended that the down-conductor be kept at a distance of at least 5 metres from the external gas pipes.

DENOMINATION	REF.	TABLE
Clip	AT-240E	46
Clamp	AT-020F	90
Lightning event counter	AT-034G	106
Guard tube	AT-060G	107
Conductor	AT-052D	121

EARTHING

10. Each down-conductor must have an earth termination system. Earth termination systems should be located outside the building, except where this is absolutely impossible.
11. The resistance of the earth termination system measured by conventional means must be lower than 10 Ω, when separated from other conductive elements.

    Connection with the earth termination system must be made directly at the bottom of each down-conductor, using a device that allows the disconnection of the earth electrode and should be placed inside an inspection pit marked with the earth symbol.
12. The inductance of the earth termination system must be as low as possible. The recommended arrangement is vertical electrodes forming a triangle with a minimum total length of 6 m. The vertical electrodes must be bonded with a conductor buried 50 cm deep and separated at a greater distance than their length.
13. The use of a soil conductivity improver is recommended in high resistivity ground.
14. All earth termination systems should be bonded together and to the general earthing system of the building.
15. It is recommended to use a spark gap to connect the lightning earth termination system to the general earth system, as well as the lightning air terminal mast to any aerials.
16. All elements of the lightning rod earth termination system must always be at least 5 m from any buried metal or electrical pipes.

DENOMINATION	REF.	TABLE
Earth Electrode	AT-025H	133
Earth pit	AT-010H	144
Bonding bar	AT-020H	148
Spark gap for earth connections	AT-050K	157
Clamp	AT-020F	90
Conductor	AT-052D	121

> GUIDE FOR DESIGN AND INSTALLATION USING RODS AND MESHED CONDUCTORS

Lightning protection using rods and meshed conductors is intended to share and dissipate the lightning current through a network of down-conductors and earth terminations.

The elements of a lightning protection system using rods and meshed conductors are as follows:

> EXTERNAL LIGHTNING PROTECTION SYSTEM

- Simple rods and/or meshed conductors
- Down-conductors
- Earth Termination System

> INTERNAL LIGHTNING PROTECTION SYSTEM

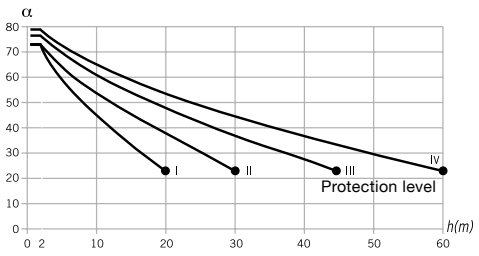
- A suitable surge protection installation.
- Other measures minimizing the destructive effects of lightning (equipotential bonding, screening etc.).

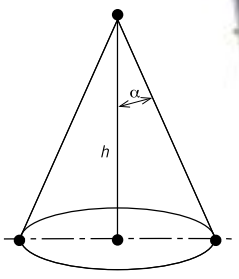
The installation of a lightning protection system using rods and meshed conductors must follow the standards IEC62305 on Lightning Protection:

The volume protected by the air terminals can be determined using 3 methods:

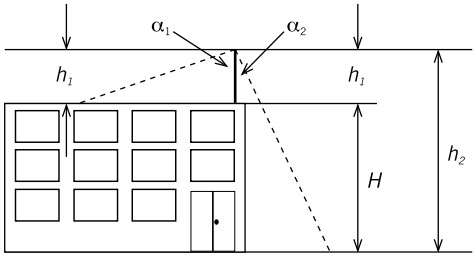
> ANGLE METHOD

According to this method, the protection volume is given by a line starting at the air terminal, the angle of which depends on the height and the protection level, according to the following graph:





Franklin rods should be placed on the higher and most vulnerable places (corners, overhangs, etc.), as shown in the figure:

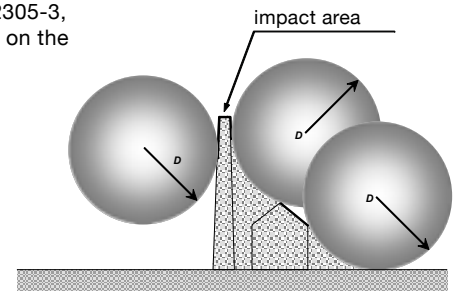


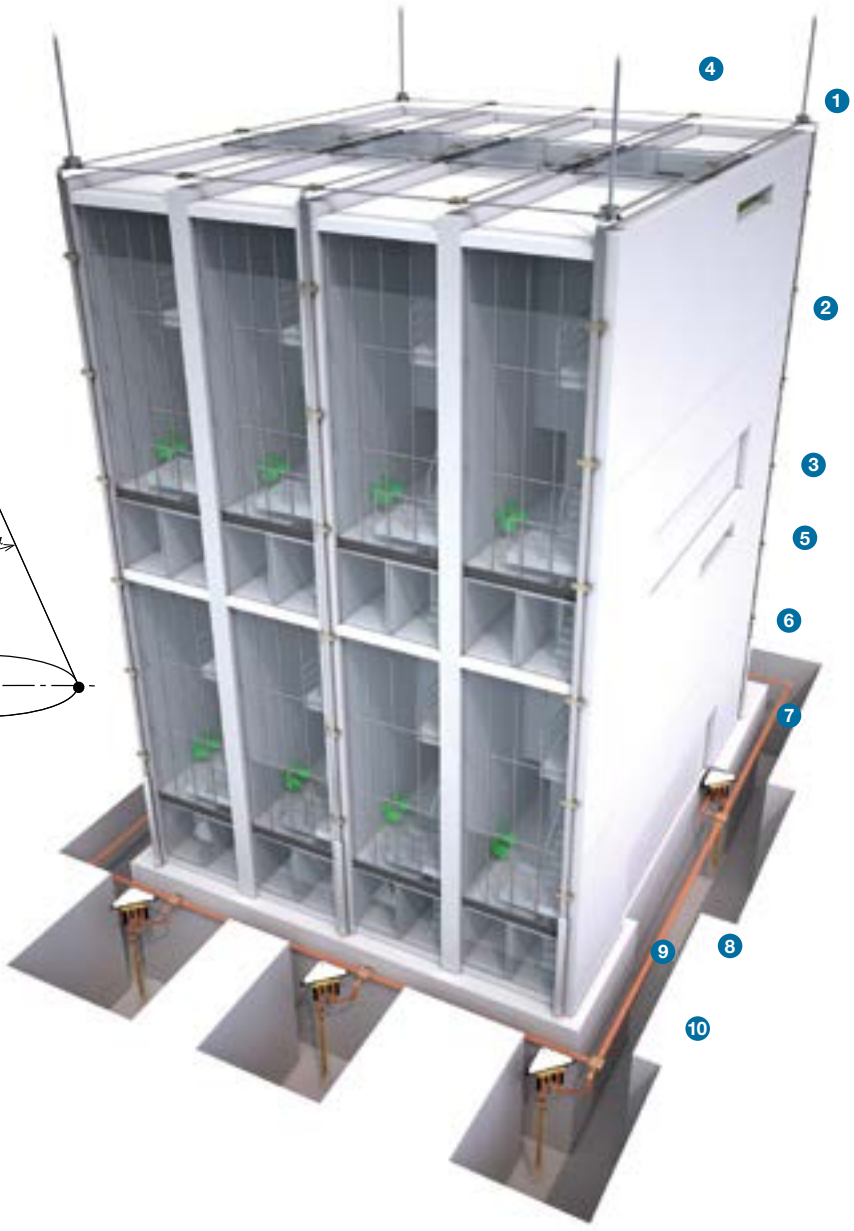
> ROLLING SPHERE METHOD

This method is based on an electrogeometric model that assumes that the last step of the downward leader can propagate in any direction. The model represents this with a sphere (of different radius depending on the required protection level) whose centre is the end of the lightning downward leader. This sphere is rolled along the external surface of the structure to be protected, so that the points in contact with the sphere are susceptible to get a lightning strike.

According to the Standard IEC 62305-3, the rolling sphere radius depends on the protection level:

- Protection level I: D = 20 m
- Protection level II D = 30 m
- Protection level III D = 45 m
- Protection level IV D = 60 m



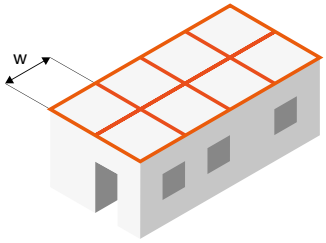


> GUIDE FOR DESIGN AND INSTALLATION USING RODS AND MESHED CONDUCTORS

> MESH METHOD

According to this method, conductors forming a mesh should be placed on the structure. The separation depends on the protection level:

Protection level	w	Distance between down-conductors
I	5 m	10 m
II	10 m	10 m
III	15 m	15 m
IV	20 m	20 m



> RECOMMENDED MATERIALS

DENOMINATION	REF.	TABLE
Franklin air rod	AT-008A	5
Franklin air rod base	AT-116B	17
Self-supporting Franklin air rod	AT-104A	10
Expansion unit	AT-012G	108
Roof conductor holder	AT-041E	66
Clamp	AT-039F	88
Conductor	AT-057D	123

INTERCEPTION

1. The mesh should be applied to the edges, overhangs and roof area perimeter, following the described methods.

For buildings higher than 60 m, a level IV mesh should also cover the upper 20% of the outer walls.

DOWN-CONDUCTORS

2. Down-conductors should provide several parallel paths to distribute the lightning current.

   The length of the current paths to the earthing system should be as short and direct as possible.

   To minimize the risk of dangerous sparks, down-conductors should be connected to the grounded metal parts of the structure if the distance between them is shorter than the safety separation distance as defined in the regulations.

3. The conductors should be fixed to the structure once every metre.

4. For longer conductors, it is recommended to install expansion joints every 20 m.

5. A guard tube should be installed for each down-conductor, covering at least 2 m from the floor, in order to avoid mechanical damages.

6. Each down-conductor must be connected to the earthing system. Equipotential bonding is recommended for all the down-conductors at ground level every 20 m.

DENOMINATION	REF.	TABLE
Clip	AT-240E	46
Rainwater pipe bond	AT-025J	87
Clamp	AT-039F	88
Bimetallic connector	AT-094F	103
Guard tube	AT-060G	107
Joint protection	AT-060G	107
Conductor	AT-057D	123

EARTHING

7. The recommended configuration for the earthing system is a ring bonding all down-conductors.

   A disconnecting sleeve should be installed in each down-conductor for measuring earth resistance separated from other conductive elements.

8. It is recommended that the earthing resistance is less than 10 Ω.

9. Earth conductors should be buried at a depth of at least 50 cm.

10. Aluminium conductors or fittings must not be used directly with the earth.

    Direct connections between copper and aluminium conductors or copper and galvanized steel conductors are not recommended in order to avoid corrosion. Bimetal or stainless steel clamps should be used for these connections.

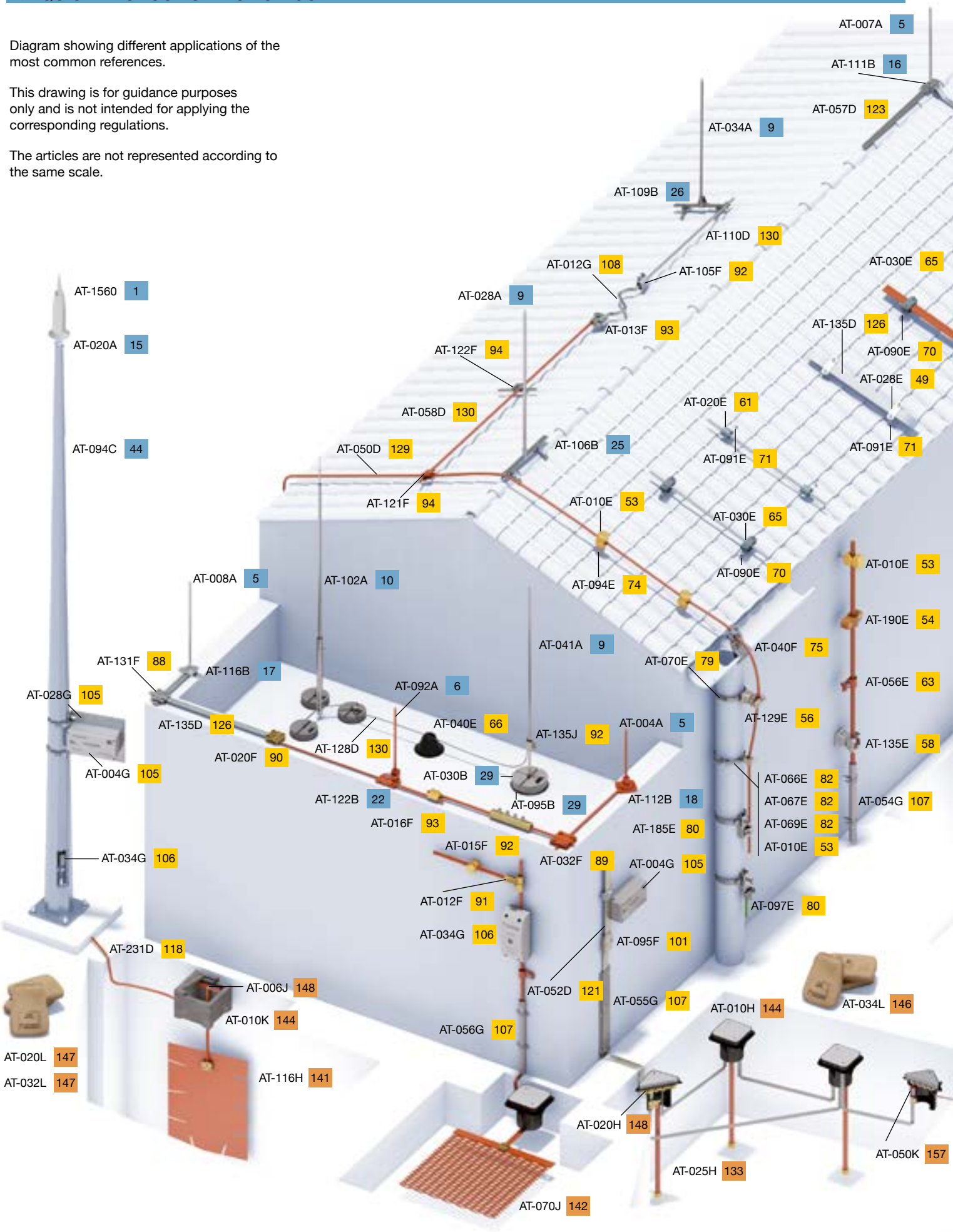
DENOMINATION	REF.	TABLE
Earth electrode	AT-041H	135
Clamp	AT-020F	90
Ground enhancing product	AT-010L	145
Earth pit	AT-010H	144
Bonding bar	AT-020H	148
Earth clamp	AT-090H	158
Conductor	AT-011D	120

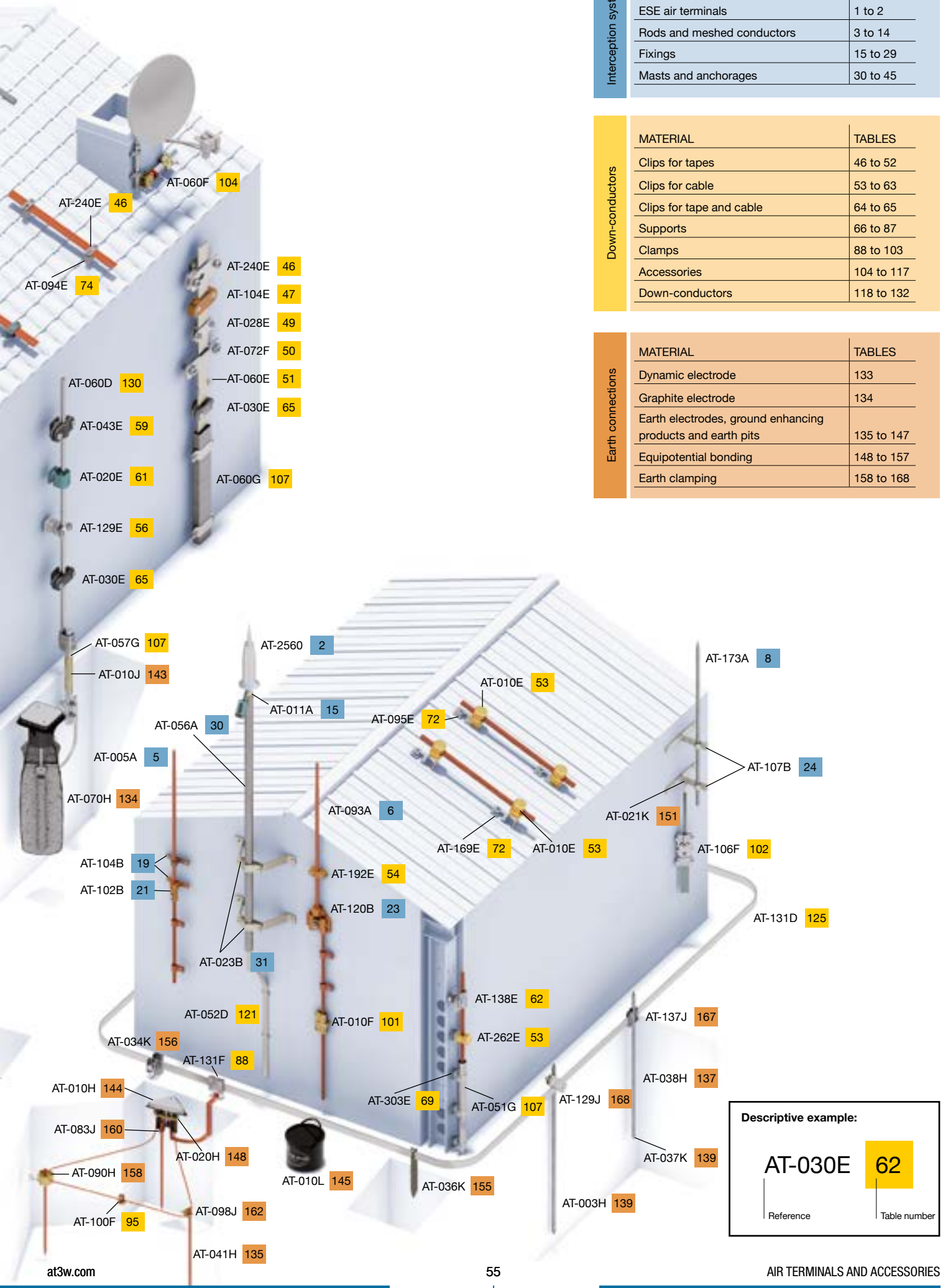
> QUICK PRODUCT SELECTION GUIDE

Diagram showing different applications of the most common references.

This drawing is for guidance purposes only and is not intended for applying the corresponding regulations.

The articles are not represented according to the same scale.





Descriptive example:

AT-030E **62**

Reference — Table number

>INTERCEPTION SYSTEMS AND ACCESSORIES

> ESE LIGHTNING AIR TERMINALS

1 > DAT CONTROLER® PLUS

> GENERAL DESCRIPTION

DAT CONTROLER® PLUS is an Early Streamer Emission (ESE) air terminal based on the electrical characteristics of lightning formation. The air terminal triggers the continuous upward leader before any other object within its radius of protection. This feature is referred to in the regulations as the **advance time of an ESE air terminal** (ΔT). The earlier the upward leader is triggered, the larger is the distance where the downward leader is intercepted, thus protecting a greater area against lightning (standards limit it to ΔT≤60 µs).

DAT CONTROLER® PLUS terminals offer the highest performance guarantees:

1 REGULATION REQUIREMENTS*

In accordance with the standard NF C 17-102:2011 "Early Streamer Emission air terminals"	Salt mist test ✓ Humid sulphurous atmosphere test ✓ Withstand current test: 100 kA (10/350 µs) ✓ Advance time ΔT test ✓

2 BEYOND THE STANDARDS: ADDITIONAL FEATURES

AENOR MARK (AENOR Producto Certificado 058-000005)	In accordance with the AENOR RP 058 specific regulation for ESE air terminals ✓ Monitoring samples taken by AENOR technicians ✓ Tests in official and independent laboratories ✓
Certified withstand current 100 kA, 20 impulses (10/350 µs)	Direct application of 20 impulses of current (10/350 µs) with a peak current higher than 100 kA and specific energy greater than 2.5 MJ/Ω ✓
Performance under rain (insulation above 95%) 	Test according to IEC-EN 60060-1:2012 ✓ The patented design of the **DAT CONTROLER® PLUS** prevents rain creating contact between the metal housing at atmospheric electric potential (in blue) and the grounded metal axis (in red) ✓ The source feeding the triggering device of an ESE air terminal is the high difference in the potential between its insulated metal frames during a thunderstorm. It is necessary to guarantee such a difference in potential in the event of rain.
Checking the state of the air terminal	In situ (DAT CONTROLER® PLUS) Remote checking (DAT CONTROLER® PLUS + AT-REMOTE TESTER) ✓

*The last edition of the standard UNE 21186, NF C 17-102 and NP 4426 requires, **consecutively and on the same sample,** the following tests:

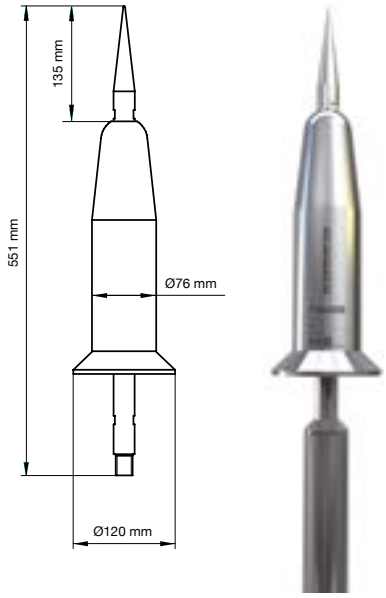
1. Environmental tests, in atmospheres with a high salt and sulphur concentration, in order to ensure the correct operation of the air terminal in highly corrosive atmospheres.
2. Current test, applying 3 impulses of 100 kA with a 10/350 µs wave to the air terminal in order to ensure it works after repeated lightning strikes.
3. Advance time test for calculating the ΔT factor which will determine its protection radius.

>INTERCEPTION SYSTEMS AND ACCESSORIES

> ESE LIGHTNING AIR TERMINALS

> TECHNICAL CHARACTERISTICS

Material:	AISI 316L stainless steel
Weight:	3.8 kg
IP Code:	IP67
Working temperature:	-25 ºC to +88 ºC
Type of air terminal:	Electropulsator (emits impulses)
Internal insulation:	Polyurethane resin
Fixing:	M20 male thread
Regulation: UNE 21186:2011; NF C 17-102:2011; NP 4426:2013	

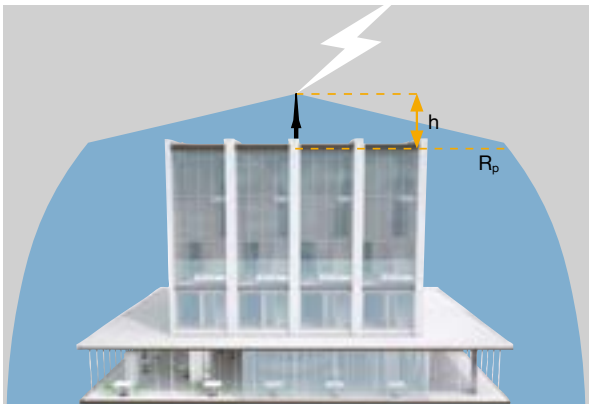


The installation of **DAT CONTROLER® PLUS** air terminals shall follow UNE 21186:2011, NF C 17-102:2011 and NP 4426:2013. “Lightning protection: ESE lightning air terminals”.

> DAT CONTROLER® PLUS ADVANCE TIMES (ΔT)

DAT CONTROLER® PLUS air terminals have passed all the tests according to the standards.
For safety and ease of calculation, the results have been rounded down thus certifying the following advance times (ΔT) in microseconds:

Ref.	Model	ΔT certified
AT-1515	DAT CONTROLER® PLUS 15	15 µs
AT-1530	DAT CONTROLER® PLUS 30	30 µs
AT-1545	DAT CONTROLER® PLUS 45	45 µs
AT-1560	DAT CONTROLER® PLUS 60	60 µs



> DAT CONTROLER® PLUS AND DAT CONTROLER® PLUS + AT-REMOTE TESTER PROTECTION RADIUS IN METRES (R_p)

		PROTECTION LEVEL I (D=20 m)				PROTECTION LEVEL II (D=30 m)				PROTECTION LEVEL III (D=45 m)				PROTECTION LEVEL IV (D=60 m)			
Ref. →		AT-1515	AT-1530	AT-1545	AT-1560	AT-1515	AT-1530	AT-1545	AT-1560	AT-1515	AT-1530	AT-1545	AT-1560	AT-1515	AT-1530	AT-1545	AT-1560
		AT-2515	AT-2530	AT-2545	AT-2560	AT-2515	AT-2530	AT-2545	AT-2560	AT-2515	AT-2530	AT-2545	AT-2560	AT-2515	AT-2530	AT-2545	AT-2560
h (m)	2	13	19	25	31	15	22	28	35	18	25	32	39	20	28	36	43
	4	25	38	51	63	30	44	57	69	36	51	64	78	41	57	72	85
	6	32	48	63	79	38	55	71	87	46	64	81	97	52	72	90	107
	8	33	49	64	79	39	56	72	87	47	65	82	98	54	73	91	108
	10	34	49	64	79	40	57	72	88	49	66	83	99	56	75	92	109
	20	35	50	65	80	44	59	74	89	55	71	86	102	63	81	97	113
	60	35	50	65	80	45	60	75	90	60	75	90	105	75	90	105	120

h (m): Height of the air terminal over the element to be protected (in metres).
D (m): Rolling sphere radius (in metres).

>INTERCEPTION SYSTEMS AND ACCESSORIES

> ESE LIGHTNING AIR TERMINALS

> DAT CONTROLER® PLUS CERTIFICATIONS

RADIUS PROTECTION CERTIFICATE AND REGULATION COMPLIANCE

Radius protection certificate for each model and level calculated according to standards UNE 21186:2011, NF C 17-102:2011 and NP 4426:2013.

AENOR PRODUCT CERTIFICATION NO. 058/000005

- Certified resistance to extreme environmental conditions (salt mist test and humid sulphurous atmosphere treatment).
- Certified withstand current: 100 kA (10/350 µs).
- Certified advance time ΔT (Annex C, NF C 17-102:2011).

WITHSTAND CURRENT CERTIFICATE FOR 20 IMPACTS OF 100 KA (10/350 µs)

Direct application of 20 current impulses (10/350 µs) with a peak current higher than 100 kA and specific energy greater than 2.5 MJ Ω (with positive and negative polarity), according to UNE-EN 60060-1 and IEC 61083-1.

CERTIFICATE OF PERFORMANCE UNDER RAIN

Insulation above 95%
These tests have been performed according to standard UNE-EN 60060-1:2012 in the Electrical Technology Institute (ITE).

- Comparative dry/rain tests with continuous voltage (simulating the electric field during a storm).
- Comparative dry/rain tests with switching impulses (simulating the approach of the downward leader).
- Comparative dry/rain tests with lightning impulses.

>INTERCEPTION SYSTEMS AND ACCESSORIES

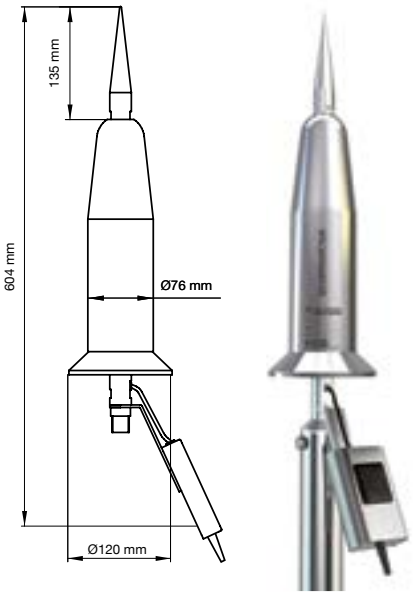
> ESE LIGHTNING AIR TERMINALS

2 > DAT CONTROLER® PLUS + AT-REMOTE TESTER

> GENERAL DESCRIPTION

DAT CONTROLER® PLUS may become a remote testable ESE air terminal at up to 100 m distance, when, at the customer's request, the air terminal comes with the AT-REMOTE TESTER device (reference AT-2510).

Ref.	Composition	Description
AT-2515	AT-1515 + AT-2510	DAT CONTROLER® PLUS 15 + AT-REMOTE TESTER
AT-2530	AT-1530 + AT-2510	DAT CONTROLER® PLUS 30 + AT-REMOTE TESTER
AT-2545	AT-1545 + AT-2510	DAT CONTROLER® PLUS 45 + AT-REMOTE TESTER
AT-2560	AT-1560 + AT-2510	DAT CONTROLER® PLUS 60 + AT-REMOTE TESTER

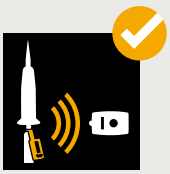


AT-REMOTE TESTER

- ✓ Range: 100 metres.
- ✓ Radiofrequency communication.
- ✓ Totally autonomous system thanks to its solar panels.
- ✓ Certified resistance to extreme environmental conditions (salt mist test and humid sulphurous atmosphere treatment).
- ✓ Certified withstand current: 20 x 100 kA (10/350 µs).
- ✓ Insulation above 95% according to IEC 60060-1

AT-REMOTE TESTER continuously checks the state of the air terminal and emits a signal with the result. This verification will be done by authorized personnel using a specific analysis device.

> AT-REMOTE TESTER CERTIFICATIONS



CERTIFICATE OF WITHSTAND CURRENT, 20 x 100 kA (10/350 µs), FOR THE REMOTE TESTER DEVICE OF DAT CONTROLER® PLUS AIR TERMINAL

Direct application of 20 current impulses (10/350 µs) a peak current higher than 100 kA and specific energy over 2.5 MJ Ω, according to EN 60060-1 and IEC 61083-1 to air terminals including the remote tester device (**DAT CONTROLER® PLUS + AT-REMOTE TESTER**).

>INTERCEPTION SYSTEMS AND ACCESSORIES

> RODS AND MESHED CONDUCTORS

3 > AIR TERMINATION ROD

Ø20 mm rods are assembled for example with accessories such as AT-022F or AT-003M (tables 27, 28), except AT-023A and AT-019A which are assembled, for example, with AT-010A (table 15). Ø16 mm rods are assembled with AT-161A (table 15) or AT-124B (table 18).

Reference	Dimensions (mm)	Thread	Material	Weight (kg)
AT-053L	Ø20 x 300	M10 female thread	Stainless steel	0.65
AT-055L	Ø20 x 500	M10 female thread	Stainless steel	1.14
AT-096A	Ø20 x 1000	M10 female thread	Stainless steel	2.35
AT-097A	Ø20 x 300	M10 female thread	Chrome-plated copper	0.70
AT-098A	Ø20 x 500	M10 female thread	Chrome-plated copper	1.25
AT-099A	Ø20 x 1000	M10 female thread	Chrome-plated copper	2.60
AT-023A	Ø20 x 400	M20	Stainless steel	0.90
AT-019A	Ø20 x 400	M20	Chrome-plated copper	1.00
AT-121A	Ø16 x 300	M16	Stainless steel	0.50
AT-122A	Ø16 x 600	M16	Stainless steel	1.00
Complies with IEC 62305, IEC 62561				

AT-023A (SS - stainless steel)
AT-019A (CC - chrome-plated copper)

AT-053L (SS - stainless steel)
AT-097A (CC - chrome-plated copper)

4 > AIR TERMINAL WITH MAST

For use in conjunction with reduced anchorages as AT-107B (table 24) or mast anchorages (tables 31 to 41). AT-024A and AT-017A include an adapting piece AT-011A (table 15) for fixing the conductor (tape, cable or round) inside the mast. The rest of the references require the conductor to be fixed on the outside of the mast (For example AT-033A, table 64). A conductor clip is included in reduced anchorage AT-107B.

Reference	Dimensions (mm)	Total height (m)	Material	Weight (kg)
AT-013A	Ø20 x 400 + Mast Ø1" x 1000	1.4	Stainless steel / Stainless steel (mast)	2.5
AT-014A	Ø20 x 400 + Mast Ø1" x 2000	2.4	Stainless steel / Stainless steel (mast)	4.5
AT-024A	Ø20 x 400 + Mast Ø1½" x 2000	2.4	Stainless steel / Galvanized steel (mast)	8.3
AT-015A	Ø20 x 400 + Mast Ø1" x 1000	1.4	Chrome-plated copper / Stainless steel (mast)	2.6
AT-016A	Ø20 x 400 + Mast Ø1" x 2000	2.4	Chrome-plated copper / Stainless steel (mast)	4.6
AT-017A	Ø20 x 400 + Mast Ø1½" x 2000	2.4	Chrome-plated copper / Galvanized steel (mast)	8.4
Complies with IEC 62305, IEC 62561				

AT-024A (SS - stainless steel)
AT-017A (CC - chrome-plated copper)

>INTERCEPTION SYSTEMS AND ACCESSORIES

> RODS AND MESHED CONDUCTORS

5 > TAPER POINTED AIR ROD

These air rods are available in copper or aluminium and fit into multi-points (table 11) and into flat and ridge saddles and air rod bases for example AT-104B or AT-110B (tables 16 to 21).

Reference	Dimensions (mm)	Total length (m)	Thread	Includes	Material	Weight (kg)
AT-004A	Ø16 x 350 + Ø15 x 150	0.5	M16	Tightening nut	Copper	0.73
AT-005A	Ø16 x 850 + Ø15 x 150	1	M16	Tightening nut	Copper	1.51
AT-006A	Ø16 x 1850 + Ø15 x 150	2	M16	Tightening nut	Copper	3.00
AT-007A	Ø16 x 350 + Ø15 x 150	0.5	M16	Tightening nut	Aluminium	0.29
AT-008A	Ø16 x 850 + Ø15 x 150	1	M16	Tightening nut	Aluminium	0.53
AT-009A	Ø16 x 1850 + Ø15 x 150	2	M16	Tightening nut	Aluminium	1.06
Complies with IEC 62305, IEC 62561						

AT-004A (Cu - copper)
AT-007A (Al - aluminium)

6 > Ø10 TAPER POINTED AIR ROD

These air rods are available in copper or aluminium and fit into the horizontal and vertical air terminal saddles, for example AT-122B. (tables 22 and 23). Only for applications where mechanical stress, such as wind loading, is not critical.

Reference	Dimensions (mm)	Thread	Includes	Material	Weight (kg)
AT-092A	Ø10 x 500	M10	Tightening nut	Copper	0.33
AT-093A	Ø10 x 1000	M10	Tightening nut	Copper	0.65
AT-094A	Ø10 x 500	M10	Tightening nut	Aluminium	0.11
AT-095A	Ø10 x 1000	M10	Tightening nut	Aluminium	0.22
Complies with IEC 62305, IEC 62561					

AT-092A (Cu - copper)
AT-094A (Al - aluminium)

7 > THREADED AIR ROD

Suitable for using with threaded concrete bases as AT-097B (table 29) or adapting piece as AT-161A (table 15).

Reference	Dimensions (mm)	Total height (m)	Thread	Material	Weight (kg)
AT-114A	Ø16 x 500 + Ø10 x 1000	1.5	M16	Aluminium	0.48
AT-115A	Ø16 x 1000 + Ø10 x 1000	2	M16	Aluminium	0.76
AT-116A	Ø16 x 1500 + Ø10 x 1000	2.5	M16	Aluminium	1.02
AT-117A	Ø16 x 2000 + Ø10 x 1000	3	M16	Aluminium	1.30
AT-118A	Ø16 x 2500 + Ø10 x 1000	3.5	M16	Aluminium	1.52
AT-119A	Ø16 x 3000 + Ø10 x 1000	4	M16	Aluminium	1.73
Complies with IEC 62305, IEC 62561					

AT-116A

>INTERCEPTION SYSTEMS AND ACCESSORIES

> RODS AND MESHED CONDUCTORS

8 > LIGHT AIR ROD

- AT-179A (GS - galvanized steel)
- AT-174A (SS - stainless steel)
- AT-163A (Cu - copper)
- AT-168A (Al - aluminium)

Hollow air terminal for reduced anchorage (AT-107B, table 24) and stackable wedged concrete base (AT-030B, table 29).

Reference	Dimensions (mm)	Total height (m)	Material	Weight (kg)
AT-163A	Ø18 x 1000	1	Copper	0.84
AT-164A	Ø18 x 1500	1.5	Copper	1.19
AT-165A	Ø18 x 2000	2	Copper	1.53
AT-166A	Ø18 x 2500	2.5	Copper	1.88
AT-167A	Ø18 x 3000	3	Copper	2.22
AT-168A	Ø18 x 1000	1	Aluminium	0.26
AT-169A	Ø18 x 1500	1.5	Aluminium	0.36
AT-171A	Ø18 x 2000	2	Aluminium	0.47
AT-172A	Ø18 x 2500	2.5	Aluminium	0.57
AT-173A	Ø18 x 3000	3	Aluminium	0.68
AT-174A	Ø18 x 1000	1	Stainless steel	0.76
AT-175A	Ø18 x 1500	1.5	Stainless steel	1.08
AT-176A	Ø18 x 2000	2	Stainless steel	1.40
AT-177A	Ø18 x 2500	2.5	Stainless steel	1.72
AT-178A	Ø18 x 3000	3	Stainless steel	2.04
AT-179A	Ø18 x 1000	1	Galvanized steel	0.77
AT-180A	Ø18 x 1500	1.5	Galvanized steel	1.10
AT-181A	Ø18 x 2000	2	Galvanized steel	1.42
AT-182A	Ø18 x 2500	2.5	Galvanized steel	1.75
AT-183A	Ø18 x 3000	3	Galvanized steel	2.07
Complies with IEC 62305, IEC 62561				

9 > LIGHTNING ROD FOR WEDGE

AT-045A

- AT-026A (GS - galvanized steel)
- AT-032A (SS - stainless steel)
- AT-036A (Cu - copper)
- AT-038A (Al - aluminium)

Non-threaded lightning rods suitable for use with stackable wedge concrete bases (for example AT-030B, table 29).

Reference	Dimensions (mm)	Total height (m)	Material	Weight (kg)
AT-025A	Ø16 x 750	0.75	Galvanized steel	1.22
AT-026A	Ø16 x 1000	1	Galvanized steel	1.60
AT-027A	Ø16 x 1250	1.25	Galvanized steel	2.00
AT-028A	Ø16 x 1500	1.50	Galvanized steel	2.40
AT-029A	Ø16 x 2000	2	Galvanized steel	3.20
AT-030A	Ø16 x 2500	2.50	Galvanized steel	4.20
AT-031A	Ø16 x 3000	3	Galvanized steel	4.80
AT-032A	Ø16 x 1000	1	Stainless steel	1.60
AT-034A	Ø16 x 1500	1.50	Stainless steel	2.38
AT-035A	Ø16 x 2000	2	Stainless steel	3.20
AT-036A	Ø16 x 1000	1	Copper	1.85
AT-037A	Ø16 x 1500	1.50	Copper	2.77
AT-038A	Ø16 x 1000	1	Aluminium	0.54
AT-039A	Ø16 x 1500	1.50	Aluminium	0.82
AT-040A	Ø16 x 2000	2	Aluminium	1.80
AT-041A	Ø16 x 2500	2.50	Aluminium	1.40
AT-042A	Ø16 x 3000	3	Aluminium	1.68
AT-043A	Ø10 x 1000	1	Aluminium	0.22
AT-044A	Ø16 x 500 + Ø10 x 1000	1.50	Aluminium	0.48
AT-045A	Ø16 x 1000 + Ø10 x 1000	2	Aluminium	0.76
AT-046A	Ø16 x 1500 + Ø10 x 1000	2.50	Aluminium	1.02
AT-047A	Ø16 x 2000 + Ø10 x 1000	3	Aluminium	1.30
Complies with IEC 62305, IEC 62561				

>INTERCEPTION SYSTEMS AND ACCESSORIES

> RODS AND MESHED CONDUCTORS

10 > SELF-SUPPORTING AIR-TERMINATION ROD

Tapered air-terminal rod with hinged tripod support for protection of roof structures that stick out, such air conditioning systems. The air terminal rods are designed for wind speed of up to 145 km/h. The stackable concrete bases, the flat washers and the clip for round conductor Ø6-10 mm. The rod is made of aluminium.

Reference	Base occupation (m)	Mast height (m)	No. of concrete bases	Load (kg/m²)	Material	Weight (kg)
AT-100A	0.80 x 0.73	3	3	110	Galvanized steel/Aluminium	64
AT-101A	0.80 x 0.73	3.5	3	110	Galvanized steel/Aluminium	64
AT-102A	0.82 x 0.82	4	4	110	Galvanized steel/Aluminium	78
AT-103A	0.82 x 0.82	4.5	4	110	Galvanized steel/Aluminium	78
AT-104A	1.10 x 1	5	6	105	Galvanized steel/Aluminium	116
AT-105A	1.10 x 1	5.5	6	105	Galvanized steel/Aluminium	116
AT-106A	1.25 x 1.25	6	8	100	Galvanized steel/Aluminium	160
AT-107A	1.25 x 1.25	6.5	8	100	Galvanized steel/Aluminium	160
AT-108A	1.25 x 1.25	7	8	100	Galvanized steel/Aluminium	160
AT-109A	1.25 x 1.25	7.5	8	100	Galvanized steel/Aluminium	160
AT-110A	1.25 x 1.25	8	8	100	Galvanized steel/Aluminium	160
AT-111A	1.50 x 1.40	8.5	12	115	Stainless steel / Aluminium	240
AT-081A	1.50 x 1.40	9	12	115	Stainless steel / Aluminium	245
AT-082A	1.50 x 1.40	9.5	12	115	Stainless steel / Aluminium	245
AT-083A	2.10 x 1.80	10	12	60	Stainless steel / Aluminium	250
AT-084A	2.10 x 1.80	11	12	60	Stainless steel / Aluminium	255
AT-086A	3.30 x 3	12	18	38	Stainless steel / Aluminium	380
AT-146A	3.30 x 3	13	24	49	Stainless steel / Aluminium	485
AT-147A	3.10 x 3.10	14	24	52	Stainless steel / Aluminium	503
AT-148A	3.10 x 3.10	15	24	53	Stainless steel / Aluminium	510
Complies with IEC 62305, IEC 62561						

APPLICATION AT-111A

11 > GUNMETAL MULTI-POINT

Multi-point only suitable for use with copper taper pointed air rods (for example AT-004A, table 5).

Reference	Rod dimensions (mm)	Material	Weight (g)
AT-000A	3 x (Ø9 x 90)	Gunmetal	325
Complies with IEC 62305, (IEC 62561), BS EN 1982			

AT-000A

APPLICATION AT-000A

12 > COPPER MULTI-POINT WITH MAST

Copper multi-point to be mounted at the top of metal structures. Total height: 1.5 m (including mast and anchorage). It includes 8 anchorage holes of Ø18 mm, at 80 mm from the centre.

Reference	Dimensions of the multi-point (mm)	Material	Weight (kg)
AT-001A	(Ø16 x 495) + 4 x (Ø16 x 315)	Copper (points) / Galvanized steel (mast)	9.5
Complies with IEC 62305, IEC 62561			

APPLICATION AT-001A

>INTERCEPTION SYSTEMS AND ACCESSORIES

> RODS AND MESHED CONDUCTORS

13 > MULTI-POINT

AT-003A (Cu - copper)
AT-002A (SS - stainless steel)

Multi-point with naval brass adapting piece. Suitable for use with mast 1½" (for example AT-056A, table 30).

Reference	Dimensions of the multi-point (mm)	Conductor range		Material	Weight (g)
		Ø (mm)	mm²		
AT-002A	(Ø16 x 185) + 4 x (Ø8 x 72)	8 - 10	50 - 70	Stainless steel (points)	885
AT-003A	(Ø16 x 185) + 4 x (Ø8 x 72)	8 - 10	50 - 70	Copper (points)	940
Complies with IEC 62305, IEC 62561					

14 > STRIKE PAD

AT-112A (Cu - copper)
AT-113A (Al - aluminium)

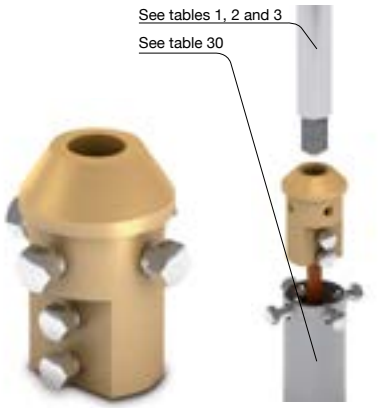
Equipped with a screw to fix the lightning conductors.

Reference	Dimensions (mm)	Material	Weight (g)
AT-112A	112 x 112 x 25	Copper	410
AT-113A	112 x 112 x 25	Aluminium	130
Complies with IEC 62305, IEC 62561			

> FIXINGS

15 > ADAPTING PIECE

APPLICATION AT-011A



AT-011A (NB - naval brass)
AT-021A (SS - stainless steel)

Suitable for fixing the lightning rod in the mast (table 26) with internal conductor (tape, cable or round) connection. Air termination rod as AT-121A (table 3) or AT-114A (table 7) can be fixed in AT-161A.

Reference	Mast Ø	Dimensions (mm)	Conductor range			Thread	Material	Weight (g)
			Ø (mm)	mm²	Tape (mm)			
AT-010A	1½"	Ø48 x 70	8 - 10	50 - 70	-	M20	Naval brass	675
AT-011A	1½"	Ø48 x 70	8 - 10	50 - 70	30 x 2 - 30 x 3.5	M20	Naval brass	655
AT-012A	1"	Ø34 x 97	8 - 10	50 - 70	-	M20	Naval brass	420
AT-020A	1½"	Ø48 x 70	8 - 10	50 - 70	-	M20	Stainless steel	615
AT-021A	1½"	Ø48 x 70	8 - 10	50 - 70	30 x 2 - 30 x 3.5	M20	Stainless steel	640
AT-022A	1"	Ø34 x 97	8 - 10	50 - 70	-	M20	Stainless steel	400
AT-151A	1½"	Ø48 x 70	8 - 10	50 - 70	30 x 2 - 30 x 3.5	M20	Aluminium	335
AT-161A	1½"	Ø48 x 70	8 - 10	50 - 70	30 x 2 - 30 x 3.5	M16	Stainless steel	625
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561								

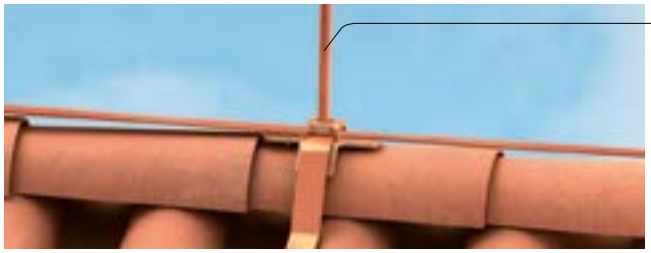
>INTERCEPTION SYSTEMS AND ACCESSORIES

> FIXINGS

16 > RIDGE SADDLE

Used for supporting lightning conductor air terminals on the ridge of the roof and connecting to the tape.

Reference	Dimensions (mm)	Conductor range (mm)	Thread	Material	Weight (g)
AT-110B	150 x 150 x 71	25 x 3 - 30 x 3	M16	Gunmetal	1070
AT-111B	150 x 150 x 71	25 x 3 - 30 x 3	M16	Aluminium	340
Complies with IEC 62305, IEC 62561, BS EN 1982					



APPLICATION AT-110B

AT-110B (Gu - gunmetal)
AT-111B (Al - aluminium)

17 > AIR ROD BASE

Used for supporting lightning conductor air terminals on the flat roof and connecting to the tape.

Reference	Dimensions (mm)	Conductor range (mm)	Thread	Material	Weight (g)
AT-115B	100 x 100 x 33	25 x 3	M16	Gunmetal	470
AT-116B	100 x 100 x 33	25 x 3	M16	Aluminium	150
Complies with IEC 62305, IEC 62561, BS EN 1982					

AT-115B (Gu - gunmetal)
AT-116B (Al - aluminium)

18 > FLAT SADDLE

Used for supporting lightning conductor air terminals on the flat roof and connecting to the cable or round.

Reference	Dimensions (mm)	Conductor range		Thread	Material	Weight (g)
		Ø (mm)	mm^2			
AT-112B	85 x 85 x 64	8	50	M16	Gunmetal	1030
AT-113B	85 x 85 x 64	10	70	M16	Gunmetal	950
AT-114B	85 x 85 x 64	13	95	M16	Gunmetal	950
AT-093B	79 x 79 x 20	8 - 13	50 - 95	M16	Aluminium	160
AT-124B	30 x 34 x 57	8 - 10	50 - 70	M16	Stainless steel	170
AT-125B	30 x 34 x 57	8 - 10	50 - 70	M20	Stainless steel	170
Complies with IEC 62305, IEC 62561, BS EN 1982						

AT-114B

>INTERCEPTION SYSTEMS AND ACCESSORIES

> FIXINGS

19 > ROD BRACKETS

These brackets are mainly used where it is not possible to fit a saddle on the roof. Used in conjunction with couplings (tables 20 or 21) and taper pointed air rods (table 5).

Reference	Dimensions (mm)	Rod Ø (mm)	Material	Weight (g)
AT-104B	120 x 24 x 60	16	Gunmetal	900
AT-105B	120 x 24 x 60	16	Aluminium	280
Complies with IEC 62305, IEC 62561, BS EN 1982, BS 2897				

- AT-104B (Gu - gunmetal)
- AT-105B (Al - aluminium)

See table 5

APPLICATION AT-100B, AT-104B (tables 19, 20 and 21)

20 > ROD TO TAPE COUPLING

This unit screws onto the air rod and connects to the tape by means of the screws provided. Used in conjunction with rod brackets (table 19) and taper pointed air rods (table 5).

Reference	Dimensions (mm)	Thread	Material	Weight (g)
AT-100B	39 x 39 x 80	M16	Gunmetal	200
AT-101B	39 x 39 x 80	M16	Aluminium	60
Complies with IEC 62305, IEC 62561, BS EN 1982, BS 2897				

- AT-100B (Gu - gunmetal)
- AT-101B (Al - aluminium)

21 > ROD TO CABLE COUPLING

This unit screws onto the air rod and connects to the cable by means of the screws provided. Used in conjunction with rod brackets (table 19) and taper pointed air rods (table 5).

Reference	Dimensions (mm)	Conductor range		Thread	Material	Weight (g)
		Ø (mm)	mm²			
AT-102B	39 x 39 x 80	8 - 10	50 - 70	M16	Gunmetal	220
AT-094B	39 x 39 x 80	8 - 10	50 - 70	M16	Aluminium	75
AT-103B	39 x 39 x 80	13	95	M16	Gunmetal	220
Complies with IEC 62305, IEC 62561, BS EN 1982, BS 2897						

- AT-102B (Gu - gunmetal)
- AT-094B (Al - aluminium)

>INTERCEPTION SYSTEMS AND ACCESSORIES

> FIXINGS

22 > HORIZONTAL AIR TERMINAL SADDLE

Used for supporting Ø10 mm taper pointed air rods (table 6) on the roof and connecting to the cable or round. They are not recommended for use in combination with the 1 m taper pointed air rods.

Reference	Dimensions (mm)	Conductor range		Thread	Material	Weight (g)
		Ø (mm)	mm²			
AT-122B	65 x 65 x 35	8	50	M10	Gunmetal	300
AT-123B	65 x 65 x 35	8	50	M10	Aluminium	110
Complies with IEC 62305, IEC 62561						

AT-122B (Gu - gunmetal)
AT-123B (Al - aluminium)

23 > VERTICAL AIR TERMINAL SADDLE

Used for supporting Ø10 mm taper pointed air rods (table 6) on the wall and connecting them to the cable or round. An additional fixing AT-192E or AT-193E (table 54) may be used for 1 m taper pointed air rods.

Reference	Dimensions (mm)	Conductor range		Thread	Material	Weight (g)
		Ø (mm)	mm²			
AT-120B	65 x 65 x 35	8	50	M10	Gunmetal	300
AT-121B	65 x 65 x 35	8	50	M10	Aluminium	110
Complies with IEC 62305, IEC 62561						

APPLICATION AT-120B

AT-120B (Gu - gunmetal)
AT-121B (Al - aluminium)

24 > REDUCED ANCHORAGE

Anchorage for 16 to 34 mm air rods (tables 4, 8 and 9) to be screwed into the wall. The anchorages need a minimum of 50 cm between each other and at least 20 cm from the top of the wall in order to ensure correct attachment. Clip included for Ø6-10 mm conductor. Single extra supports: ref. AT-108B and AT-118B, respectively.

Reference	Dimensions (mm)	Includes	Ø rod	Material	Weight (kg)
AT-107B	280 x 170 x 30	2 supports	16 mm - 34 mm (1")	Galvanized steel	1
AT-117B	280 x 170 x 30	2 supports	16 mm - 34 mm (1")	Stainless steel	1
Complies with IEC 62305, IEC 62561					

AT-107B (GS - galvanized steel)
AT-117B (SS - stainless steel)

>INTERCEPTION SYSTEMS AND ACCESSORIES

> FIXINGS

25 > RIDGE ANCHORAGE

APPLICATION AT-106B

Used for fixing Franklin air terminal rods (table 8 or 9) onto the ridge of the roof without becoming damaged. This anchorage adjusts to different sizes of tiles.

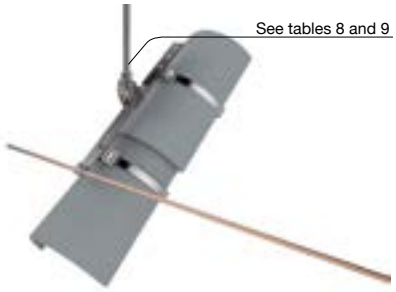
Reference	Dimensions (mm)	Conductor range		Maximum arch of tile	Ø rod (mm)	Material	Weight (kg)
		Ø (mm)	mm²				
AT-106B	460 x 100 x 500	8 - 10	50 - 70	500 mm	16 - 18	Stainless steel	1.1
Complies with IEC 62305, IEC 62561							

26 > ADJUSTABLE TILE ANCHORAGE

Used for supporting Franklin air termination rods (table 8 or 9) onto the roof tiles without them becoming damaged. This anchorage adjusts to different sizes and inclinations of tiles.

Reference	Dimensions (mm)	Conductor range		Max. inclination	Maximum arch of tile	Ø rod (mm)	Material	Weight (kg)
		Ø (mm)	mm²					
AT-109B	460 x 100 x 500	8 - 10	50 - 70	45°	500 mm	18	Stainless steel	1.4
Complies with IEC 62305, IEC 62561								

AT-109B



APPLICATION AT-109B

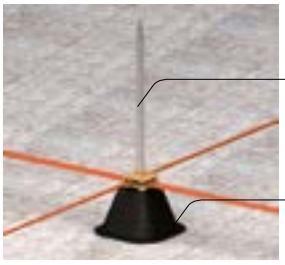
27 > NAVAL BRASS ROOF CLAMP

Used for supporting lightning conductor air terminals on the roof and connecting them via cable or tape.

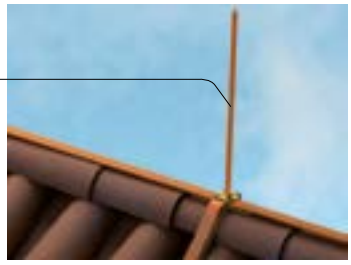
Reference	Model	Dimensions (mm)	Max. width of the conductor (mm)			Thread	Material	Weight (g)
			Ø (mm)	mm²	Tape (mm)			
AT-022F	For flat roofs	55 x 55 x 40	8 - 10	50 - 70	30 x 2 - 30 x 3.5	M10	Naval brass	360
AT-011M	For the ridge of the roof	270 x 160 x 140	8 - 10	50 - 70	30 x 2 - 30 x 3.5	M10	Naval brass	610
Complies with IEC 62305, IEC 62561								

AT-022F

AT-011M



APPLICATION AT-022F



APPLICATION AT-011M

>INTERCEPTION SYSTEMS AND ACCESSORIES

> FIXINGS

28 > SPECIAL ROD SUPPORTS

For fixing air rods with M10 male or female threads (for example AT-053L, AT-092A tables 3 and 6) to vertical surfaces or to the top of the aerial mast. The AT-030M is for masts from Ø6 - 50 mm.

Reference	Model	Dimensions (mm)	Includes	Material	Weight (g)
AT-003M	To vertical surface	40 x 40 x 40	M10	Stainless steel	130
AT-030M	To top of the aerial mast	Ø60 x 70	M10 female	Stainless steel	600
Complies with IEC 62305, IEC 62561					

See tables 3 and 6

APPLICATION AT-003M

See tables 3 and 6

APPLICATION AT-030M

29 > CONCRETE BASE

Used to fix air termination rods (tables 8 and 9) to flat roofs. These bases are not recommended for use with air rods over 3 m high due to wind load. AT-029B only allows Ø10 x 1000 mm and Ø16 x 1000 mm air termination rods (for example AT-043A or AT-026A, table 8).

Reference	Model	Dimensions (mm)	Rod Ø (mm)	Includes	Material	Weight (kg)
AT-030B	Stackable wedged concrete base	Ø325 x 90	16	Wedge	Concrete	17.00
AT-029B	Stackable wedged concrete base	Ø230 x 90	10 or 16	Wedge	Concrete	8.50
AT-095B	Support plate	Ø360 x 10	-	-	EVA	0.22
AT-096B	Support plate	Ø270 x 10	-	-	EVA	0.19
AT-097B	Threaded concrete base	Ø350 x 100	16	M16 Female	Concrete	12.00
AT-098B	Threaded concrete base	Ø350 x 120	16	M16 Female	Concrete	16.00
AT-099B	Threaded concrete base	Ø350 x 140	16	M16 Female	Concrete	25.00
Complies with IEC 62305, IEC 62561						

See tables 8 and 9

APPLICATION AT-030B

AT-030B

AT-029B

AT-095B

AT-097B

>INTERCEPTION SYSTEMS AND ACCESSORIES

> MASTS AND ANCHORAGES

30 > MASTS FOR ATTACHING TO WALL OR STRUCTURE

Elevation up to 8 m. For attachment using 2 anchorage supports, except those which are 8 m high, in which case 3 anchorage supports are needed. The distance between supports must be 60 cm. In atmospheres with a high level of corrosion, the use of stainless steel masts is recommended.

AT-066A (SS - stainless steel)
AT-056A (GS - galvanized steel)

Reference	Model	Dimensions	Includes	Material	Weight (kg)
AT-051A	1 m mast	Ø1½" x 1 m	1 section x 1 m	Galvanized steel	3.3
AT-052A	2 m mast	Ø1½" x 2 m	1 section x 2 m	Galvanized steel	6.6
AT-053A	3 m mast	Ø1½" x 3 m	1 section x 3 m	Galvanized steel	10.0
AT-050A	4 m mast	Ø1½" x 4 m	2 sections x 2 m	Galvanized steel	13.0
AT-056A	6 m mast (2 sections)	Ø1½" x 6 m	2 sections x 3 m	Galvanized steel	20.0
AT-057A	6 m mast (3 sections)	Ø1½" x 6 m	3 sections x 2 m	Galvanized steel	20.0
AT-058A	8 m mast	Ø2" - Ø1½" x 8 m	3 sections x 3 m	Galvanized steel	35.0
AT-060A	1 m mast	Ø1½" x 1 m	1 section x 1 m	Stainless steel	3.0
AT-062A	2 m mast	Ø1½" x 2 m	1 section x 2 m	Stainless steel	6.0
AT-063A	3 m mast	Ø1½" x 3 m	1 section x 3 m	Stainless steel	9.0
AT-085A	4 m mast	Ø1½" x 4 m	2 sections x 2 m	Stainless steel	12.0
AT-066A	6 m mast (2 sections)	Ø1½" x 6 m	2 sections x 3 m	Stainless steel	18.0
AT-067A	6 m mast (3 sections)	Ø1½" x 6 m	3 sections x 2 m	Stainless steel	18.0
AT-068A	8 m mast	Ø2" - Ø1½" x 8 m	3 sections x 3 m	Stainless steel	30.0
Complies with UNE 21186, NF C 17-102					

31 > U-SHAPED ANCHORAGE

1" - 1½" mast anchorage to be embedded or screwed into the wall. The 60 cm U-shaped anchorages are designed to avoid obstacles such as cornices of up to 50 cm. The anchorages need a minimum of 60 cm between each other and at least 30 cm from the top of the wall in order to ensure correct attachment. Single extra supports, ref: AT-012B, AT-015B, AT-009B, AT-021B and AT-025B, respectively.

AT-013B

Reference	Model	Dimensions (mm)	Includes	Material	Weight (kg)
AT-013B	30 cm U-shaped anchorage embedded into the wall	2 x (50 x 340 x 390)	2 supports	Galvanized steel	4.6
AT-014B	30 cm U-shaped anchorage embedded into the wall	3 x (50 x 340 x 390)	3 supports	Galvanized steel	6.9
AT-016B	60 cm U-shaped anchorage embedded into the wall	2 x (50 x 640 x 615)	2 supports	Galvanized steel	11.0
AT-017B	60 cm U-shaped anchorage embedded into the wall	3 x (50 x 640 x 615)	3 supports	Galvanized steel	16.0
AT-010B	15 cm U-shaped anchorage screwed into the wall	2 x (50 x 400 x 140)	2 supports	Galvanized steel	4.5
AT-011B	15 cm U-shaped anchorage screwed into the wall	3 x (50 x 400 x 140)	3 supports	Galvanized steel	6.8
AT-023B	30 cm U-shaped anchorage screwed into the wall	2 x (50 x 400 x 290)	2 supports	Galvanized steel	6.0
AT-024B	30 cm U-shaped anchorage screwed into the wall	3 x (50 x 400 x 290)	3 supports	Galvanized steel	9.0
AT-026B	60 cm U-shaped anchorage screwed into the wall	2 x (50 x 600 x 670)	2 supports	Galvanized steel	10.0
AT-027B	60 cm U-shaped anchorage screwed into the wall	3 x (50 x 600 x 670)	3 supports	Galvanized steel	15.0
Complies with UNE 21186, NF C 17-102					

AT-023B

APPLICATION AT-013B

APPLICATION AT-023B

> INTERCEPTION SYSTEMS AND ACCESSORIES

> MASTS AND ANCHORAGES

32 > ANGLE BAR ANCHORAGE

1” - 1½” mast anchorage to be welded to metal structures.
The anchorages require a minimum of 60 cm between each other in order to ensure they are correctly fixed. Single extra supports, ref: AT-034B, AT-044B, AT-037B and AT-047B, respectively.

Reference	Model	Dimensions (mm)	Includes	Material	Weight (kg)
AT-035B	30 cm angle bar anchorage	2 x (50 x 120 x 300)	2 supports	Galvanized steel	4.0
AT-036B	30 cm angle bar anchorage	3 x (50 x 120 x 300)	3 supports	Galvanized steel	5.5
AT-045B	30 cm angle bar anchorage	2 x (50 x 120 x 300)	2 supports	Stainless steel	3.0
AT-046B	30 cm angle bar anchorage	3 x (50 x 120 x 300)	3 supports	Stainless steel	4.5
AT-038B	60 cm angle bar anchorage	2 x (50 x 120 x 600)	2 supports	Galvanized steel	6.0
AT-039B	60 cm angle bar anchorage	3 x (50 x 120 x 600)	3 supports	Galvanized steel	9.0
AT-048B	60 cm angle bar anchorage	2 x (50 x 120 x 600)	2 supports	Stainless steel	4.5
AT-049B	60 cm angle bar anchorage	3 x (50 x 120 x 600)	3 supports	Stainless steel	7.0
Complies with UNE 21186, NF C 17-102					

AT-038B (GS - galvanized steel)
AT-048B (SS - stainless steel)

APPLICATION AT-038B

33 > MAST TO TRESTLE TOWER ANCHORAGE

1” - 1½” mast anchorage to be fixed to trestle towers.
Not recommended for masts higher than 6 m.
The anchorages require a minimum of 60 cm between each other in order to ensure they are correctly fixed.
Single supports: ref. AT-018B

Reference	Dimensions (mm)	Includes	Material	Weight (kg)
AT-019B	2 x (50 x 120 x 700)	2 supports	Galvanized steel	7.6
AT-020B	3 x (50 x 120 x 700)	3 supports	Galvanized steel	11.4
Complies with UNE 21186, NF C 17-102				

AT-019B

See table 30

APPLICATION AT-019B

> INTERCEPTION SYSTEMS AND ACCESSORIES

> MASTS AND ANCHORAGES

34 > LIGHT ANCHORAGE

1” - 1½” mast anchorage to be embedded or screwed into the wall.
The anchorages need a minimum of 60 cm between each other and at least 30 cm from the top of the wall in order to ensure correct attachment.
Single extra supports: ref. AT-031B and AT-041B, respectively.

AT-032B

AT-042B

Reference	Model	Dimensions (mm)	Includes	Material	Weight (kg)
AT-032B	30 cm light anchorage embedded into the wall	2 x (50 x 100 x 300)	2 supports	Galvanized steel	3.4
AT-033B	30 cm light anchorage embedded into the wall	3 x (50 x 100 x 300)	3 supports	Galvanized steel	5.1
AT-042B	30 cm light anchorage screwed into the wall	2 x (50 x 165 x 300)	2 supports	Galvanized steel	4.2
AT-043B	30 cm light anchorage screwed into the wall	3 x (50 x 165 x 300)	3 supports	Galvanized steel	6.3
Complies with UNE 21186, NF C 17-102					

APPLICATION AT-032B

APPLICATION AT-042B

35 > PARALLEL ANCHORAGE

Double bracket anchoring system for fixing 1” - 1½” mast in parallel to vertical sections of handrail or piping. The anchorages require a minimum of 60 cm between each other, and a robust structure, in order to ensure they are correctly fixed.
Single extra supports: ref. AT-051B and AT-061B, respectively.

AT-062B

Reference	Dimensions (mm)	Includes	Material	Weight (kg)
AT-052B	2 x (50 x 90 x 340)	2 supports	Galvanized steel	5.0
AT-053B	3 x (50 x 90 x 340)	3 supports	Galvanized steel	7.5
AT-062B	2 x (50 x 90 x 165)	2 supports	Galvanized steel	5.0
AT-063B	3 x (50 x 90 x 165)	3 supports	Galvanized steel	7.5
Complies with UNE 21186, NF C 17-102				

APPLICATION AT-052B

See table 30

APPLICATION AT-062B

See table 30

> INTERCEPTION SYSTEMS AND ACCESSORIES

> MASTS AND ANCHORAGES

36 > LAMP POST ANCHORAGE

1" - 1½" mast anchorage fixture adjustable for conic structures such as lamp posts.
The anchorages require a minimum of 60 cm between each other in order to ensure they are correctly fixed.
Single supports: ref. AT-067B

Reference	Dimensions (mm)	Includes	Material	Weight (kg)
AT-068B	2 x (50 x 90 x 190)	2 supports	Galvanized steel	6
AT-069B	3 x (50 x 90 x 190)	3 supports	Galvanized steel	9
Complies with UNE 21186, NF C 17-102				

See table 30

APPLICATION AT-068B

37 > CROSS-SHAPE ANCHORAGE

Cross-shape double bracket anchoring system, for fixing 1" - 1 ½"mast to horizontal sections of handrail or piping.
The anchorages require a minimum of 60 cm between each other, and a robust structure, in order to ensure they are correctly fixed.
Single supports: ref. AT-071B

Reference	Dimensions (mm)	Includes	Material	Weight (kg)
AT-072B	2 x (170 x 170 x 200)	2 supports	Galvanized steel	5.8
AT-073B	3 x (170 x 170 x 200)	3 supports	Galvanized steel	8.7
Complies with UNE 21186, NF C 17-102				

See table 30

APPLICATION AT-072B

38 > ADJUSTABLE ANCHORAGE

Due to the covers or cornices of the roofs, a substantial horizontal distance needs to be avoided. In these cases it is necessary to use the extendible tube (60 to 80 cm).
The anchorages require a minimum of 60 cm between each other in order to ensure they are correctly fixed.
Single supports: ref. AT-077B

Reference	Dimensions (mm)	Includes	Material	Weight (kg)
AT-078B	2 x (300 x 450 x 800)	2 supports	Galvanized steel	14
AT-079B	3 x (300 x 450 x 800)	3 supports	Galvanized steel	21
Complies with UNE 21186, NF C 17-102				

See table 30

APPLICATION AT-078B

39 > MAST TO POST ANCHORAGE

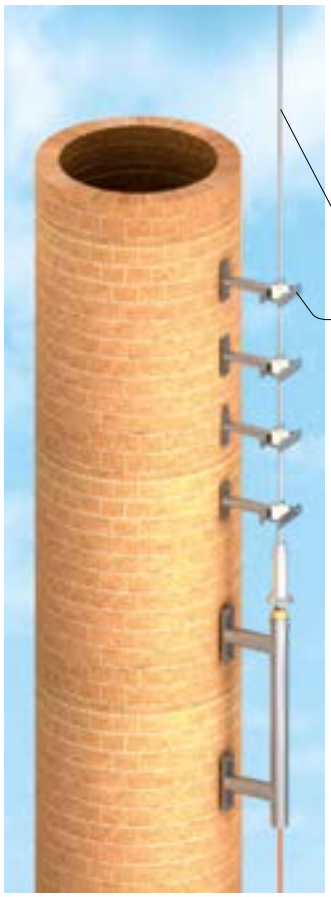
Suitable for fixing a 1" - 1½" mast to a 25 cm square or round post.
The anchorages require a minimum of 60 cm between each other in order to ensure they are correctly fixed.
Single supports: ref. AT-070B and AT-076B, respectively.

Reference	Model	Dimensions (mm)	Includes	Material	Weight (kg)
AT-074B	Mast to 25 cm square post	2 x (40 x 360 x 300)	2 supports	Galvanized steel	6
AT-075B	Mast to 25 cm square post	3 x (40 x 360 x 300)	3 supports	Galvanized steel	9
AT-083B	Mast to Ø25 cm round post	2 x (45 x 360 x 300)	2 supports	Galvanized steel	6
AT-086B	Mast to Ø25 cm round post	3 x (45 x 360 x 300)	3 supports	Galvanized steel	9
Complies with UNE 21186, NF C 17-102					

See table 30

APPLICATION AT-083B
APPLICATION AT-074B

40 > INSULATED CHIMNEY ANCHORAGE



Mast anchorage to attach to chimneys active**.** The insulation of the air rod anchorage is necessary in order to maintain the difference in potential between the parts of the **DAT CONTROLER® PLUS** for chimneys. The body of the **DAT CONTROLER® PLUS** has to be mounted moreless 3.5 m below the chimney hole to avoid the heat of the gases deforming the lightning rod structure and leading to early corrosion. AT-088B anchorage should be fixed as follows: the first in the threaded union between the **DAT CONTROLER® PLUS** for chimney and the rod (AT-085B); the second at 125 cm for the first; the third in the threaded union between the two parts of the rod (AT-085B) and the fourth 25 cm from the top of the wall in order to ensure they are correctly fixed. In order to comply with UNE 21186, the AT-085B rod should be mounted so that it is 2 m higher than the chimney.
Single extra support, ref: AT-081B.

AT-085B

AT-088B (x2)

Reference	Model	Dimensions (mm)	Material	Weight (kg)
AT-080B	DAT CONTROLER® PLUS for chimney anchorage	50 x 520 x 1000	Galvanized steel	7.5
AT-088B	DAT CONTROLER® PLUS for chimney insulated rod support (2 supports)	50 x 160 x 520	Galvanized steel + Teflon	7.0
AT-085B	DAT CONTROLER® PLUS for chimney 5 m rod	Ø18 x 5000	Stainless steel	10.0
Complies with UNE 21186, NF C 17-102				

Reference	Model	Dimensions (mm)	Material	Weight (kg)
AT-3515	DAT CONTROLER® PLUS 15 for chimney	120 x 120 x 610	Stainless steel	4
AT-3530	DAT CONTROLER® PLUS 30 for chimney	120 x 120 x 610	Stainless steel	4
AT-3545	DAT CONTROLER® PLUS 45 for chimney	120 x 120 x 610	Stainless steel	4
AT-3560	DAT CONTROLER® PLUS 60 for chimney	120 x 120 x 610	Stainless steel	4
Complies with UNE 21186, NF C 17-102				

APPLICATION AT-080B

>INTERCEPTION SYSTEMS AND ACCESSORIES

> MASTS AND ANCHORAGES

41 > MAST ANCHORAGE FOR FLAT ROOF

1 ½" mast support for flat roofs which can be drilled. If not, a concrete base will be required. 70 x 70 x 25 cm concrete base is recommended in order to avoid any damage to the roof.

Reference	Model	Dimensions (mm)	Material	Weight (kg)
AT-003B	For 1½" masts up to 3 m high	(300 x 300) x 500	Galvanized steel	8
AT-006B	For 1½" masts up to 6 m high	(500 x 500) x 800	Galvanized steel	21
Complies with UNE 21186, NF C 17-102				

See table 30

See table 66

APPLICATION AT-006B

42 > TRESTLE TOWERS

Towers that elevate up to 26.5 m with guy wires included. Ø1½" x 3 m mast is included. Each triangular section measures △ 180 mm x 3 m. If the flat roof cannot be perforated, a concrete base is needed for the trestle tower and the guy wire anchorages. 3 guy wire must be installed with 120º between them. The trestle towers can also be placed on walls using a trestle tower-wall anchorage (AT-037C, table 43). They must be assembled section by section and tightened using guy wires. The 3 guy wire anchorages must be joined to the down-conductor at fixation level.

Reference	Total height from ground (m)	Guy wire anchorage distance from tower (m)	Height/length of guy wires (m)					Material	Weight (kg)
			1	2	3	4	5		
AT-063C	5.5	2	2.6/3.8	-	-	-	-	Galvanized steel	25
AT-031C	8.5	2	4.6/5.6	-	-	-	-	Galvanized steel	35
AT-032C	11.5	3	4.4/5.9	7.6/8.8	-	-	-	Galvanized steel	50
AT-033C	14.5	4	5.4/7.3	10.6/11.9	-	-	-	Galvanized steel	60
AT-034C	17.5	5	4.4/7.3	9.1/11	13.6/15.1	-	-	Galvanized steel	75
AT-035C	20.5	6	4.9/8.6	10.9/13	16.9/18.2	-	-	Galvanized steel	85
AT-064C	23.5	9	5.3/11	10.9/14.7	14.9/18	19.6/22.2	-	Galvanized steel	100
AT-065C	26.5	10	4.4/11.2	9.4/14.3	13.9/17.7	18.4/21.6	22.6/25.3	Galvanized steel	120
Complies with UNE 21186, NF C 17-102									

APPLICATION AT-031C

>INTERCEPTION SYSTEMS AND ACCESSORIES

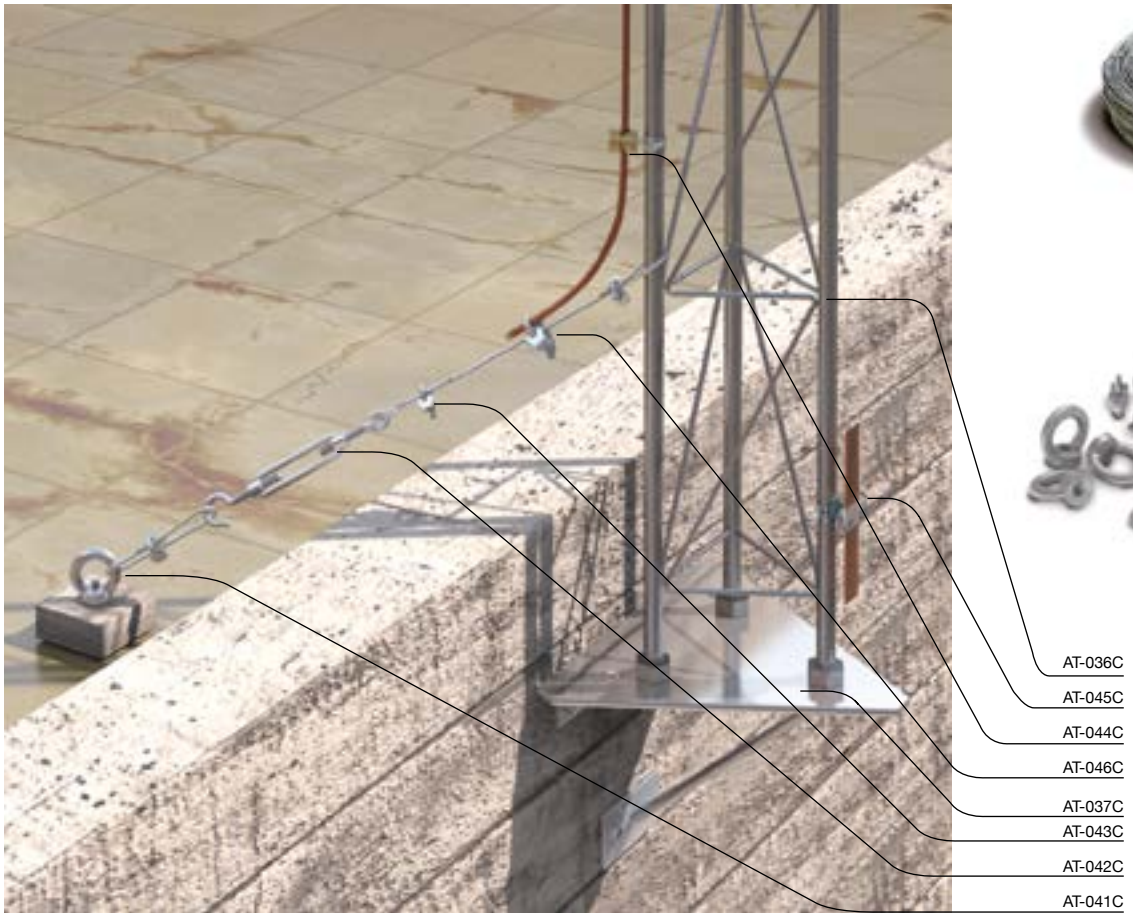
> MASTS AND ANCHORAGES

43 > TRESTLE TOWER ACCESSORIES

Different devices to complete a trestle tower installation.

Reference	Model	Dimensions (mm)	Includes	Material	Weight (g)
AT-036C	Trestle tower middle section	△ 180 mm x 3 m	-	Galvanized steel	11500
AT-037C	Trestle tower - wall anchorage	400 x 350 x 400	-	Galvanized steel	6000
AT-038C	Guy wire kit	-	1 AT-040C + 3 AT-041C + 3 AT-042C + 18 AT-043C	Galvanized steel	7500
AT-040C	Guy wire ring	Ø4 mm x 100 m	-	Galvanized steel	6000
AT-041C	Guy wire anchorage	55 x 30 x 55	-	Galvanized steel	155
AT-042C	Turnbuckle	25 x 15 x 200	-	Galvanized steel	160
AT-043C	Guy wire clamp	30 x 15 x 30	-	Galvanized steel	40
AT-044C	Cable to trestle tower clip	25 x 45 x 55	AT-010E	Naval brass - Stainless steel	85
AT-045C	Tape to trestle tower clip	40 x 45 x 50	AT-028E	Stainless steel	125
AT-046C	Cable to guy wire clamp	40 x 20 x 40	-	Galvanized steel	75
Complies with UNE 21186, NF C 17-102					

APPLICATION AT-037C, AT-036C, AT-044C, AT-045C, AT-041C, AT-042C, AT-043C and AT-046C



AT-040C

AT-038C

>INTERCEPTION SYSTEMS AND ACCESSORIES

> MASTS AND ANCHORAGES

44 > FREE STANDING MAST

Self supporting mast with polygonal section measured for wind velocity up to 250 km/h. Ø1½" at the top.

They are made of pyramidal trunk sections that slot into each other so the sections do not need to be joined by stud-bolts or welding and the hinge means they can be raised using a small crane.

Preliminary work is needed, which consists of inserting a flexible tube in order to let the down-conductor pass, as well as casting the steel support with the hinge in a concrete base (which varies in size depending on the mast height, as shown in the table).

It's necessary to wait until the concrete has hardened before placing the mast in its support. It is recommended to mount the air terminal with the conductor inside the mast before raising it. The conductor does not need to be fixed inside the mast, the down-conductor should simply be passed through the clip inside the mast at door level. It is possible to install a lightning strike counter AT-034G (table 106) inside the mast behind the inspection hatch in the base. ATLOGGER recorder of lightning activity may be installed outside the mast (AT-004G and AT-028G, table 105).

FOUNDATION AT-090C

APPLICATION AT-090C

Reference	Model	Sections	Mast dimensions (m)	Solid base dimensions (mm)	Dimensions of the foundations (m)	Material	Weight (kg)
AT-090C	6 m free standing mast	2	3.00 + 3.23	400 x 400	0.8 x 0.8 x 0.8	Galvanized steel	82.4
AT-091C	8 m free standing mast	3	2 x 3.00 + 2.5	400 x 400	0.8 x 0.8 x 0.8	Galvanized steel	114.5
AT-092C	10 m free standing mast	4	3 x 3.00 + 1.65	500 x 500	1 x 1 x 1	Galvanized steel	162.6
AT-093C	12 m free standing mast	5	4 x 3.00 + 0.95	500 x 500	1 x 1 x 1	Galvanized steel	203.3
AT-094C	15 m free standing mast	6	5 x 3.00 + 1.45	500 x 500	1.5 x 1.5 x 1.5	Galvanized steel	299.6
AT-095C	18 m free standing mast	7	6 x 3.00 + 1.8	600 x 600	1.6 x 1.6 x 2	Galvanized steel	504.0
AT-096C	20 m free standing mast	8	7 x 3.00 + 1.35	600 x 600	2 x 2 x 2	Galvanized steel	615.3
AT-097C	25 m free standing mast	10	9 x 3.00 + 2.85	Ø710	2 x 2 x 2.5	Galvanized steel	1050.0
AT-098C	30 m free standing mast	13	12 x 3.00 + 1.7	Ø870	2.5 x 2.5 x 2.5	Galvanized steel	1640.0
AT-099C	40 m free standing mast	19	18 x 3.00 + 1.00	Ø1130	3 x 3 x 3	Galvanized steel	3860.0
Complies with UNE 21186, NF C 17-102							

>INTERCEPTION SYSTEMS AND ACCESSORIES

> MASTS AND ANCHORAGES

45 > SELF-SUPPORTED TOWER

1½" elevation fixture up to 26 m. Particularly suitable where welding work is not allowed.
The total height from ground includes the tower + 6 m mast that is provided.

INSTALLATION
First of all, a hole for the foundation has to be made (the dimensions of the hole depend of the height of the tower).
The first section has to be embedded in the hole. Wait for the concrete to harden. The top of the concrete foundation needs a small slope to avoid water accumulating.

See tables 1 and 2

Reference	Height from ground (m)*	Dimensions	Dimensions of the foundations (m)	Material	Weight (kg)
AT-050C	14	0.73 x 0.73 x 8.5 m + 1½" x 5.5 m	0.9 x 0.9 x 1.85	Galvanized steel	300
AT-051C	16	0.8 x 0.8 x 10.5 m + 1½" x 5.5 m	0.95 x 0.95 x 1.95	Galvanized steel	390
AT-052C	18	0.87 x 0.87 x 12.5 m + 1½ " x 5.5 m	1.02 x 1.02 x 2	Galvanized steel	460
AT-053C	20	0.95 x 0.95 x 14.5 m + 1½" x 5.5 m	1.1 x 1.1 x 2	Galvanized steel	560
AT-054C	22	1 x 1 x 16.5 m + 1½" x 5.5 m	1.15 x 1.15 x 2.05	Galvanized steel	630
AT-055C	24	1.1 x 1.1 x 18.5 m + 1½" x 5.5 m	1.25 x 1.25 x 2.05	Galvanized steel	725
AT-056C	26	1.15 x 1.15 x 20.5 m + 1½" x 5.5 m	1.3 x 1.3 x 2.1	Galvanized steel	800

Complies with UNE 21186, NF C 17-102

Other dimensions, please contact us

See table 106

See tables 144 and 148

APPLICATION AT-050C

> DOWN-CONDUCTORS AND ACCESSORIES

> CLIPS FOR TAPES

46 > TAPE BUCKLE CLIP

Down-conductor holder suitable for fixing 30 x 2 or 30 x 3.5 mm tape to flat surface. The AT-006E and AT-061E include suitable screws and neoprene washers for metal sheets or sandwich panels. AT-012E and AT-019E include self-drill double screws and neoprene washers for metal structures. AT-216E and AT-217E are designed to overcome obstacles such as cornices.

Reference	Dimensions (mm)	Tape range (mm)	Conductor elevation (mm)	Includes	Material	Weight (g)
AT-240E	58 x 13 x 20	30 x 2 - 30 x 3.5	8	Plug and lag bolt M6 x 25 mm	Stainless steel	115
AT-006E	58 x 13 x 20	30 x 2 - 30 x 3.5	8	Self-drill screw + neoprene washer	Stainless steel	115
AT-012E	58 x 13 x 20	30 x 2 - 30 x 3.5	8	Self-drill double screw and neoprene washer	Stainless steel	120
AT-241E	58 x 13 x 20	30 x 2 - 30 x 3.5	8	Plug and lag bolt M6 x 25 mm	Galvanized steel	115
AT-061E	58 x 13 x 20	30 x 2 - 30 x 3.5	8	Self-drill screw + neoprene washer	Galvanized steel	115
AT-019E	58 x 13 x 20	30 x 2 - 30 x 3.5	8	Self-drill double screw and neoprene washer	Galvanized steel	120
AT-216E	58 x 63 x 20	30 x 2 - 30 x 3.5	58	Plug and lag bolt M8 x 40 mm	Stainless steel + Naval brass	290
AT-217E	58 x 113 x 20	30 x 2 - 30 x 3.5	108	Plug and lag bolt M8 x 40 mm	Stainless steel + Naval brass	485

Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561

APPLICATION AT-240E

APPLICATION AT-006E

AT-240E (SS - stainless steel)
AT-241E (GS - galvanized steel)

47 > DC TAPE CLIP

Reference	Dimensions (mm)	Tape (mm)	Type of tape	Material	Weight (g)
AT-100E	50 x 20 x 10	20 x 3	Bare copper	Gunmetal	60
AT-101E	50 x 20 x 10	25 x 3	Bare copper	Gunmetal	70
AT-102E	50 x 20 x 10	25 x 4	Bare copper	Gunmetal	70
AT-103E	50 x 20 x 13	25 x 6	Bare copper	Gunmetal	80
AT-104E	70 x 20 x 13	31 x 3	Bare copper	Gunmetal	90
AT-105E	70 x 20 x 13	31 x 6	Bare copper	Gunmetal	100
AT-106E	64 x 20 x 10	38 x 3	Bare copper	Gunmetal	120
AT-107E	63 x 20 x 10	38 x 5	Bare copper	Gunmetal	120
AT-108E	63 x 20 x 10	38 x 6	Bare copper	Gunmetal	140
AT-109E	65 x 20 x 10	40 x 4	Bare copper	Gunmetal	140
AT-110E	65 x 20 x 10	40 x 6	Bare copper	Gunmetal	150
AT-111E	80 x 20 x 10	50 x 3	Bare copper	Gunmetal	150
AT-112E	80 x 20 x 10	50 x 4	Bare copper	Gunmetal	150
AT-113E	80 x 20 x 16	50 x 6	Bare copper	Gunmetal	160
AT-114E	55 x 20 x 13	25 x 3	PVC coated copper	Gunmetal	100
AT-115E	55 x 20 x 16	25 x 6	PVC coated copper	Gunmetal	130
AT-116E	85 x 20 x 13	50 x 6	PVC coated copper	Gunmetal	260
AT-117E	50 x 20 x 10	20 x 3	Bare aluminium	Aluminium	20
AT-118E	50 x 20 x 10	25 x 3	Bare aluminium	Aluminium	30
AT-119E	50 x 20 x 13	25 x 6	Bare aluminium	Aluminium	40
AT-120E	80 x 20 x 16	50 x 6	Bare aluminium	Aluminium	50
AT-121E	55 x 20 x 23	25 x 3	PVC coated aluminium	Aluminium	40
AT-122E	85 x 20 x 20	50 x 6	PVC coated aluminium	Aluminium	60

Complies with IEC 62305, IEC 62561, BS EN 1982, BS 2897

Suitable for fixing the tape conductor to the building. Plug and screw included.

AT-101E (Gu - gunmetal)
AT-118E (Al - aluminium)

APPLICATION AT-101E

> DOWN-CONDUCTORS AND ACCESSORIES

> CLIPS FOR TAPES

48 > B BOND

This connection bonds the copper or aluminium tapes with the metal structures. The screw size is M10.

AT-022J (Gu - gunmetal)
AT-023J (Al - aluminium)

Reference	Dimensions (mm)	Tape (mm)	Material	Weight (g)
AT-022J	35 x 35 x 25	25 x 3	Gunmetal	100
AT-023J	35 x 35 x 25	25 x 3	Aluminium	60
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561				

APPLICATION AT-022J

49 > METAL TAPE CLIP

Down-conductor support clip for 30 x 2 or 30 x 3.5 mm tape to flat surfaces.

AT-028E (SS - Stainless steel)
AT-027E (Cu - copper)

Reference	Dimensions (mm)	Tape range (mm)	Conductor elevation (mm)*	Includes	Material	Weight (g)
AT-027E	60 x 20 x 20	30 x 2 - 30 x 3.5	14	Plug and screw M6 x 25 mm	Copper	47
AT-028E	60 x 20 x 20	30 x 2 - 30 x 3.5	14	Plug and screw M6 x 25 mm	Stainless steel	46
AT-026E	60 x 20 x 20	30 x 2 - 30 x 3.5	18	Plug and screw M6 x 25 mm and nylon support	Stainless steel	45
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561						

Other dimensions, please contact us

50 > TAPE CLIP

AT-124E (Cu - copper)
AT-127E (Al - aluminium)

Suitable for securing the tape conductors to a flat surface, using two screws. Plugs and screws included.

Reference	Dimensions (mm)	Tape		Material	Weight (g)
		Size (mm)	Type		
AT-123E	70 x 20 x 7	20 x 3	Bare copper	Copper	30
AT-124E	75 x 20 x 7	25 x 3	Bare copper	Copper	30
AT-125E	70 x 20 x 7	25 x 3	PVC coated copper	Copper	30
AT-126E	70 x 20 x 7	20 x 3	Bare aluminium	Aluminium	10
AT-127E	70 x 20 x 7	25 x 3	Bare aluminium	Aluminium	10
AT-072F	70 x 11 x 8	30 x 2	Bare copper	Tin-plated copper	6
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561					

> DOWN-CONDUCTORS AND ACCESSORIES

> CLIPS FOR TAPES

51 > PUSH-IN TAPE CLIP

Hold-fast clip to secure the tape conductor to a flat surface. Plug and screw included.

Reference	Dimensions (mm)	Tape (mm)	Material	Weight (g)
AT-059E	45 x 10 x 8	25 x 3	Stainless steel	6
AT-068E	45 x 10 x 8	28 x 2	Stainless steel	6
AT-060E	45 x 10 x 8	30 x 2	Stainless steel	6
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561				

APPLICATION AT-060E

AT-060E

52 > LIGHT BRACKET

Down-conductor clip for fixing 30 x 2 mm or 30 x 3.5 mm tape to flat surface.
Using AT-050E with bare copper tape may cause galvanic coupling. Plug and screw included.

Reference	Dimensions (mm)	Tape range (mm)	Material	Weight (g)
AT-050E	42 x 35 x 8	30 x 2 - 30 x 3.5	Galvanized steel	15
AT-051E	43 x 35 x 8	30 x 2 - 30 x 3.5	Stainless steel	15
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561				

APPLICATION AT-050E

AT-051E (SS - stainless steel)
AT-050E (GS - galvanized steel)

> DOWN-CONDUCTORS AND ACCESSORIES

> CLIPS FOR CABLE

53 > NAVAL BRASS CABLE CLIP

Down-conductor clip for fixing round conductor or cable to flat surface.
AT-011E suitable to use on corners. The AT-009E includes screws and washers suitable for metal sheets or sandwich panels. AT-262E includes self-drill double screw and neoprene washer for metal structures. AT-013E and AT-014E are designed to avoid obstacles such as cornices.

AT-010E

Reference	Dimensions (mm)	Conductor range Ø (mm)	Conductor range mm²	Conductor elevation (mm)	Includes	Material	Weight (g)
AT-010E	24 x 32 x 24	6 - 10	25 - 70	7	Plug and lag bolt M6 x 25 mm	Naval brass	70
AT-009E	24 x 32 x 24	6 - 10	25 - 70	7	Self-drill screw + neoprene washer	Naval brass	70
AT-262E	24 x 32 x 24	6 - 10	25 - 70	7	Self-drill double screw + neoprene washer	Naval brass	70
AT-011E	24 x 32 x 24	6 - 10	25 - 70	7	Plug and lag bolt M6 x 25 mm	Naval brass	65
AT-013E	24 x 82 x 24	6 - 10	25 - 70	57	Plug and lag bolt M8 x 40 mm	Naval brass	245
AT-014E	24 x 132 x 24	6 - 10	25 - 70	107	Plug and lag bolt M8 x 40 mm	Naval brass	435
AT-025E	30 x 30 x 40	13	95	10	Plug and lag bolt M8 x 40 mm	Naval brass	165

Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561

AT-011E

APPLICATION AT-009E

APPLICATION AT-010E

APPLICATION AT-013E

54 > HEAVY DUTY CAST CABLE SADDLE

Suitable for fixing cable or round conductor to the building, using two screws.
Plugs and screws included.

Reference	Dimensions (mm)	Conductor range Ø (mm)	Conductor range mm²	Material	Weight (g)
AT-190E	50 x 17 x 20	8	50	Gunmetal	60
AT-191E	50 x 17 x 20	8	50	Aluminium	30
AT-192E	50 x 17 x 20	10	70	Gunmetal	60
AT-193E	50 x 17 x 20	10	70	Aluminium	30

Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561

APPLICATION AT-192E (Gu - gunmetal)
AT-193E (Al - aluminium)

> DOWN-CONDUCTORS AND ACCESSORIES

> CLIPS FOR CABLE

55 > TOWER EARTH CLAMP

They bond copper cable or round conductor to metal structures.
M10 bolts are used for AT-026J and AT-027J. Other references have M12 screws.

Reference	Dimensions (mm)	Conductor range		Material	Weight (g)
		Ø (mm)	mm²		
AT-026J	30 x 45 x 60	6 - 8	25 - 50	Aluminium	50
AT-027J	30 x 45 x 60	6 - 10	25 - 70	Gunmetal	130
AT-028J	35 x 50 x 65	10 - 15	70 - 120	Gunmetal	220
AT-029J	40 x 55 x 65	15 - 18	120 - 185	Gunmetal	300
AT-030J	40 x 60 x 65	18 - 20	185 - 240	Gunmetal	400
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561					

AT-027J (Cu - copper)
AT-026J (Al - aluminium)

APPLICATION AT-027J

56 > METAL CABLE CLIP

Down-conductor clip for fixing round conductor or cable to flat surface.

Reference	Dimensions (mm)	Conductor range		Conductor elevation (mm)*	Includes	Material	Weight (g)
		Ø (mm)	mm²				
AT-128E	40 x 20 x 40	6 - 10	25 - 70	18	Plug, screw and nylon support	Stainless steel	21
AT-129E	40 x 25 x 40	6 - 10	25 - 70	18	Metal support	Stainless steel	25
AT-130E	40 x 25 x 40	6 - 10	25 - 70	18	Metal support	Copper	28
AT-131E	45 x 25 x 50	16	150	18	Plug, screw and nylon support	Stainless steel	36
AT-132E	45 x 25 x 50	16	150	18	Plug, screw and metal support	Stainless steel	40
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561							

Other dimensions, please contact us

APPLICATION AT-128E

APPLICATION AT-129E (SS - Stainless steel)
AT-130E (Cu - copper)

APPLICATION AT-131E

> DOWN-CONDUCTORS AND ACCESSORIES

> CLIPS FOR CABLE

57 > KS CABLE CLIP

For connecting round conductor or cable to flat profiles.

Reference	Dimensions (mm)	Conductor range		Conductor elevation (mm)	Material	Weight (g)
		Ø (mm)	mm²			
AT-004E	25 x 25 x 40	6 - 10	25 - 70	8	Copper	65
AT-002E	25 x 25 x 40	6 - 10	25 - 70	8	Galvanized steel	65
AT-000E	25 x 25 x 40	6 - 10	25 - 70	8	Stainless steel	65
AT-003E	25 x 55 x 40	6 - 10	25 - 70	8	Galvanized steel	120
AT-005E	25 x 55 x 40	6 - 10	25 - 70	8	Copper	154
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561						

- AT-004E (Cu - copper)
- AT-002E (GS - galvanized steel)
- AT-000E (SS - stainless steel)

- AT-003E (GS - galvanized steel)
- AT-005E (Cu - copper)

APPLICATION AT-004E

58 > PUSH-IN CABLE CLIP

Hold-fast clip to secure round conductor or cable.

Reference	Dimensions (mm)	Conductor range		Conductor elevation (mm)*	Includes	Material	Weight (g)
		Ø (mm)	mm²				
AT-133E	20 x 15 x 30	8	50	18	Plug, screw and nylon support	Stainless steel	10
AT-134E	20 x 15 x 30	10	70	18	Plug, screw and nylon support	Stainless steel	10
AT-135E	20 x 15 x 30	8	50	18	Plug, screw and metal support	Stainless steel	13
AT-136E	20 x 15 x 30	10	70	18	Plug, screw and metal support	Stainless steel	13
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561							

Other dimensions, please contact us

APPLICATION AT-135E

APPLICATION AT-133E

> DOWN-CONDUCTORS AND ACCESSORIES

> CLIPS FOR CABLE

59 > NYLON CABLE CLIP Ø6 - 10 mm

Nylon clip to secure round conductor or cable.

Reference	Dimensions (mm)	Conductor range Ø (mm)	Conductor range mm²	Conductor elevation (mm)*	Includes	Material	Weight (g)
AT-043E	50 x 23 x 25	6 - 10	25 - 70	18	Plug and lag bolt M6 x 25 mm	Nylon	17
AT-044E	50 x 23 x 80	6 - 10	25 - 70	18	Integrated plug and screw	Nylon	18

Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561

Other dimensions, please contact us

APPLICATION AT-043E

APPLICATION AT-044E

60 > NYLON CABLE CLIP Ø13 - 16 mm

Nylon clip to secure round conductor or cable.
Also suitable for securing air termination rods to the side of the building.

Reference	Dimensions (mm)	Conductor range Ø (mm)	Conductor range mm²	Conductor elevation (mm)*	Includes	Material	Weight (g)
AT-045E	50 x 23 x 30	13	95	20	Plug and lag bolt M6 x 25 mm	Nylon	24
AT-046E	50 x 23 x 30	16	150	20	Plug and lag bolt M6 x 25 mm	Nylon	24
AT-047E	50 x 23 x 52	13	95	42	Plug and lag bolt M6 x 25 mm	Nylon	29
AT-048E	50 x 23 x 54	16	150	42	Plug and lag bolt M6 x 25 mm	Nylon	29
AT-049E	50 x 23 x 85	16	150	20	Integrated plug and screw	Nylon	32

Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561

Other dimensions, please contact us

APPLICATION AT-047E

APPLICATION AT-045E

APPLICATION AT-049E

> DOWN-CONDUCTORS AND ACCESSORIES

> CLIPS FOR CABLE

61 > NYLON HOLD-FAST CABLE CLIP

Nylon clip to secure round conductor or cable.

Reference	Dimensions (mm)	Conductor range		Conductor elevation (mm)	Includes	Material	Weight (g)
		Ø (mm)	mm²				
AT-020E	25 x 25 x 35	8 - 10	50 -70	18	Plug and lag bolt M6 x 25 mm	Nylon	9
AT-034E	25 x 25 x 35	10	70	18	Plug and lag bolt M6 x 25 mm	Nylon	9
AT-035E	25 x 25 x 35	8	50	25	Plug and lag bolt M6 x 25 mm	Nylon	10
AT-036E	25 x 25 x 35	10	70	25	Plug and lag bolt M6 x 25 mm	Nylon	10
AT-037E	25 x 25 x 70	8	50	40	Plug and lag bolt M6 x 25 mm	Nylon	11
AT-038E	25 x 25 x 70	10	70	40	Plug and lag bolt M6 x 25 mm	Nylon	13
AT-021E	25 x 25 x 90	8	50	18	Integrated plug and screw	Nylon	10
AT-039E	25 x 25 x 90	10	70	18	Integrated plug and screw	Nylon	10
AT-022E	25 x 25 x 80	8	50	25	Anti-humidity plug and screw	Nylon	20

Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561

APPLICATION AT-021E

APPLICATION AT-035E

APPLICATION AT-020E

APPLICATION AT-022E

APPLICATION AT-037E

> DOWN-CONDUCTORS AND ACCESSORIES

> CLIPS FOR CABLE

62 > CLAMPING FRAME

Used for fixing down-conductors (round conductor or cable) to metal structures. Include M8 x 30 mm bolt.

Reference	Dimensions (mm)	Conductor range		Material	Weight (g)
		Ø (mm)	mm²		
AT-138E	33 x 33 x 35	6 - 10	25 - 70	Stainless steel	34
AT-139E	33 x 33 x 35	6 - 10	25 - 70	Copper	35
AT-140E	33 x 33 x 35	6 - 10	25 - 70	Aluminium	27
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561					

AT-138E (SS - stainless steel)
AT-139E (Cu - copper)
AT-140E (Al - aluminium)

APPLICATION AT-138E

63 > ONE-HOLE CABLE CLIP

Simple holder to secure cable or round conductor to the wall. Plug and screw included.

Reference	Dimensions (mm)	Conductor range			Material	Weight (g)
		Ø (mm)	mm²	Type		
AT-056E	15 x 10 x 25	8	50	Bare copper	Copper	9
AT-058E	20 x 15 x 30	10	70	Bare copper	Copper	10
AT-057E	25 x 20 x 35	13	95	Bare copper	Copper	11
AT-141E	20 x 15 x 30	8	50	PVC coated copper	Copper	10
AT-142E	15 x 10 x 25	8	50	Bare aluminium	Aluminium	4
AT-143E	20 x 15 x 30	10	70	Bare aluminium	Aluminium	5
AT-144E	20 x 15 x 30	8	50	PVC coated aluminium	Aluminium	5
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561						

APPLICATION AT-056E (Cu - copper)
AT-142E (Al - aluminium)

> DOWN-CONDUCTORS AND ACCESSORIES

> CLIPS FOR TAPE AND CABLE

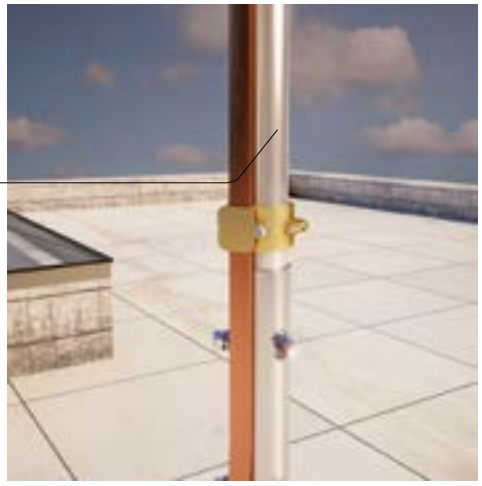
AT-048A

64 > CONDUCTOR-MAST SUPPORT CLIP

Down-conductor clip for fixing 1" - ½" pipe on the exterior of the mast.

Reference	Model	Dimensions (mm)	Conductor range			Material	Weight (g)
			Ø (mm)	mm²	Tape (mm)		
AT-033A	Ø1"	73 x 52 x 40	8 - 10	50 - 70	30 x 2 - 30 x 3.5	Naval brass	275
AT-048A	Ø1 ¼" - 1½"	60 x 72 x 40	8 - 10	50 - 70	30 x 2 - 30 x 3.5	Naval brass	310
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561							

See table 30



APPLICATION AT-048A

65 > NYLON CLIP

Nylon clips to secure round, cable or tape conductor.

Reference	Dimensions (mm)	Conductor range			Conductor elevation (mm)	Includes	Material	Weight (g)
		Ø (mm)	mm²	Tape (mm)				
AT-030E	20 x 50 x 25	6 - 10	25 - 70	30 x 2 - 30 x 3.5	17	Plug and lag bolt M6 x 25 mm	Nylon	21
AT-053E	20 x 50 x 30	6 - 10	25 - 70	30 x 2 - 30 x 3.5	23	Plug and lag bolt M6 x 25 mm	Nylon	23
AT-054E	20 x 50 x 70	6 - 10	25 - 70	30 x 2 - 30 x 3.5	40	Plug and lag bolt M6 x 25 mm	Nylon	25
AT-031E	20 x 50 x 60	6 - 10	25 - 70	30 x 2 - 30 x 3.5	17	Integrated plug and screw	Nylon	28
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561								

APPLICATION AT-030E

APPLICATION AT-053E

APPLICATION AT-031E

APPLICATION AT-054E

> DOWN-CONDUCTORS AND ACCESSORIES

> SUPPORTS

66 > CONICAL ROOF CONDUCTOR HOLDER

Conductor holder for flat roofs where it is not possible to drill in order to secure the conductor, such as bitumen roofs. Supplied empty to be then filled with concrete, or already filled with concrete. The lip at the bottom of the cone allows it to be embedded in concrete or bitumen. It can also be sealed with polymer.

Reference	Dimensions (mm)	Conductor range			Conductor elevation (mm)	Includes	Material	Weight (g)
		Ø (mm)	mm²	Tape (mm)				
AT-041E	140 x 140 x 90	8 - 10	50 - 70	30 x 2 - 30 x 3.5	65	Empty with base. Hold-fast clip	UV resistant polyethylene	80
AT-183E	140 x 140 x 90	8 - 10	50 - 70	30 x 2 - 30 x 3.5	65	Full of concrete. Hold-fast clip	UV resistant polyethylene + concrete	1000
AT-040E	140 x 140 x 90	8 - 10	50 - 70	-	65	Empty with base	UV resistant polyethylene	95
AT-184E	140 x 140 x 90	8 - 10	50 - 70	-	65	Full of concrete	UV resistant polyethylene + concrete	1000
AT-005M	140 x 140 x 95	-	-	-	-	Empty with base. M10	UV resistant polyethylene	105
AT-145E	140 x 140 x 120	8 - 10*	50 - 70*	30 x 2 - 30 x 3.5	90	Empty with base.	UV resistant polyethylene	400

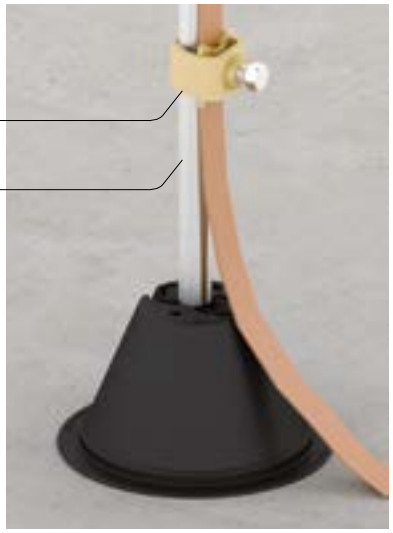
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561

AT-005M

APPLICATION AT-040E
APPLICATION AT-184E

APPLICATION AT-041E
APPLICATION AT-183E

APPLICATION AT-145E



APPLICATION AT-005M

67 > ROOF CONDUCTOR HOLDER

Double hold-fast concrete support for cable or round conductor.

Reference	Dimensions (mm)	Conductor range		Conductor elevation (mm)	Material	Weight (kg)
		Ø (mm)	mm²			
AT-042E	140 x 75 x 50	8 - 10	50 - 70	60	Polypropylene/ concrete	1

Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561

APPLICATION AT-042E

> DOWN-CONDUCTORS AND ACCESSORIES

> SUPPORTS

68 > METAL SUPPORT

AT-178E

AT-179E

These supports are fixed using screws or adhesive to flat surfaces or welded onto metal structures. Suitable for use with rods such as AT-053L (table 3).

Reference	Dimensions (mm)	Includes	Material	Weight (g)
AT-178E	100 x 100 x 20	M10	Galvanized steel	155
AT-179E	80 x 30 x 12	M10	Galvanized steel	55
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561				

69 > METAL FIXATION

AT-009G

AT-303E

Component for fixing cable or tape clips onto metal surfaces.

Reference	Dimensions (mm)	Description	Application	Includes	Material	Weight (g)
AT-009G	Ø18 x 25 mm	3.9 x 25 mm self-drill screw	Metal sheets and sandwich panels	Ø18 mm neoprene washer	Galvanized steel	3.6
AT-303E	Ø19 x 20	6.3 x 5 mm self-drill double screw with M6	Beams and metal structures	Ø19 mm neoprene washer	Galvanized steel	9.2
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561						

70 > CURVED TILE SUPPORT

AT-090E (SS - stainless steel)
AT-151E (Cu - copper)

APPLICATION AT-090E

For fixing the conductor clips to curved tiles. Suitable for use in conjunction with clips from tables 46, 49, 53, 56, 58, 59, 60, 61 or 65.

Reference	Model	Dimensions (mm)	Material	Weight (g)
AT-090E	170-240 mm curved tile support	180 x 25 x 140	Stainless steel	79
AT-150E	190-300 mm curved tile support	200 x 25 x 155	Stainless steel	113
AT-151E	170-240 mm curved tile support	180 x 25 x 140	Copper	85
AT-152E	190-300 mm curved tile support	200 x 25 x 155	Copper	120
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561				

71 > SPRING TILE SUPPORT

AT-091E

APPLICATION AT-091E

For fixing the conductor clips to tile. This support has a spring to adapt to tiles ranging from 180 to 280 mm. Suitable for use in conjunction with clips from tables 46, 49, 53, 56, 58, 59, 60, 61 or 65.

Reference	Dimensions (mm)	Material	Weight (g)
AT-091E	20 x 35 x 220	Stainless steel	55
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561			

> DOWN-CONDUCTORS AND ACCESSORIES

> SUPPORTS

72 > METAL SANDWICH ROOF SUPPORT

Corrugated or sandwich roof supports. The support employs existent metal sheet fixings. Suitable for use in conjunction with clips from tables 46, 49, 53, 56, 58, 59, 60, 61 or 65.

Reference	Dimensions (mm)	Material	Weight (g)
AT-095E	25 x 60 x 15	Stainless steel	15
AT-169E	25 x 60 x 25	Stainless steel	20
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561			

APPLICATION AT-169E

AT-095E

AT-169E

73 > CLIP SUPPORT FOR ROOFS

Different solutions for fixing the conductor clips to the roof.
Suitable for use in conjunction with clips from tables 46, 49, 53, 56, 58, 59, 60, 61 or 65.

Reference	Model	Dimensions (mm)	Material	Weight (g)
AT-159E	210 mm flat tile elevated support	40 x 25 x 210	Stainless steel	37
AT-160E	260 mm flat tile elevated support	40 x 25 x 260	Stainless steel	46
AT-161E	335 mm flat tile elevated support	40 x 25 x 335	Stainless steel	70
AT-162E	210 mm flat tile smooth support	15 x 25 x 210	Stainless steel	43
AT-163E	260 mm flat tile smooth support	15 x 25 x 260	Stainless steel	51
AT-168E	130 mm flat tile angled support	60 x 25 x 130	Stainless steel	45
AT-092E	180 mm flat tile angled support	60 x 25 x 180	Stainless steel	55
AT-093E	440 mm flat tile angled support	60 x 25 x 440	Stainless steel	100
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561				

APPLICATION AT-161E

AT-161E

AT-163E

AT-093E

> DOWN-CONDUCTORS AND ACCESSORIES

> SUPPORTS

74 > TILE SUPPORT

AT-094E

AT-158E

For fixing the clip to the tile without causing any damage in such a way that the conductor can be fixed afterwards. Suitable for use in conjunction with clips from tables 46, 49, 53, 56, 58, 59, 60, 61 or 65.

Reference	Model	Dimensions (mm)	Material	Weight (g)
AT-156E	15 – 20 mm tile support	50 x 20 x 35	Stainless steel	30
AT-157E	20 – 25 mm tile support	50 x 20 x 40	Stainless steel	31
AT-158E	25 – 30 mm tile support	50 x 20 x 45	Stainless steel	32
AT-094E	Universal support for tiles up to 20 mm	25 x 40 x 80	Galvanized steel	85
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561				

APPLICATION AT-094E

75 > GUTTER CLAMP

AT-040F (SS - stainless steel)
AT-153E (Cu - copper)

APPLICATION AT-040F

Clamp for Ø6-10 mm round conductor to be fixed at the edge of the gutter.

Reference	Dimensions (mm)	Material	Weight (g)
AT-040F	50 x 50 x 40	Stainless steel	65
AT-153E	50 x 50 x 40	Copper	72
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561			

76 > EXTENSION

AT-016E

APPLICATION AT-013E

Used when the installation requires the conductor to be fixed at a certain distance from the surface. For use in conjunction with AT-010E, for example (table 53). Plug and screw included. Suitable for use in conjunction with clips from tables 46, 49, 53, 56, 58, 59, 60, 61 or 65.

Reference	Dimensions (mm)	Material	Weight (g)
AT-016E	Ø24 x 50	Naval brass	175
AT-017E	Ø24 x 100	Naval brass	370
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561			

> DOWN-CONDUCTORS AND ACCESSORIES

> SUPPORTS

77 > BACK PLATE HOLDFAST

Used when the installation requires the conductor to be fixed at a certain distance from the surface. For use in conjunction with AT-101E, for example (table 47). Plug and screw included. Suitable for use in conjunction with clips (table 47 or 54).

Reference	Dimensions (mm)	Material	Weight (g)
AT-170E	Ø63 x 74	Gunmetal	300
AT-171E	Ø63 x 74	Aluminium	100
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561			

APPLICATION AT-170E

AT-170E (Gu - gunmetal)
AT-171E (Al - aluminium)

78 > GLAZING BAR HOLDFAST

Suitable for fixing any clip to narrow flanges such as metal profiles.
Suitable for use in conjunction with clips from tables 46, 47, 49, 53, 54, 56, 58, 59, 60, 61 or 65.

Reference	Dimensions (mm)	Maximum width (mm)	Material	Weight (g)
AT-172E	20 x 15 x 35	12	Gunmetal	110
AT-173E	20 x 15 x 35	12	Aluminium	50
AT-018E	38 x 19 x 40	18	Galvanized steel	85
AT-174E	58 x 24 x 60	26	Galvanized steel	220
Complies with IEC 62305, UNE 21186, NF C 17-102, IEC 62305, IEC 62561				

AT-172E (Gu - gunmetal)
AT-173E (Al - aluminium)

APPLICATION AT-172E

APPLICATION AT-018E

AT-018E

> DOWN-CONDUCTORS AND ACCESSORIES

> SUPPORTS

79 > SCREWDRIVER DOWNPIPE SUPPORT

Rainwater support, adjustable with a screwdriver. Suitable for use in conjunction with clips from tables 46, 49, 53, 56, 58, 59, 61, 61 or 65.

AT-076E

AT-070E

APPLICATION AT-070E

Reference	Model	Dimensions (mm)	Downpipe diameter (mm)	Material	Weight (g)
AT-070E	Spiral pipe support	25 x 12 x 100	50 - 70	Stainless steel	70
AT-071E	Spiral pipe support	25 x 12 x 120	70 - 90	Stainless steel	75
AT-072E	Spiral pipe support	25 x 12 x 130	80 - 100	Stainless steel	77
AT-073E	Spiral pipe support	25 x 12 x 150	100 - 120	Stainless steel	78
AT-182E	Spiral pipe support	25 x 12 x 170	120 - 140	Stainless steel	84
AT-194E	Spiral pipe support	25 x 12 x 190	140 - 160	Stainless steel	87
AT-195E	Spiral pipe support	25 x 12 x 210	160 - 180	Stainless steel	96
AT-076E	Tube clip support	40 x 35 x 25	25 - 27	Stainless steel	30
AT-077E	Tube clip support	47 x 35 x 25	31 - 34	Stainless steel	33
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561					

80 > EARTHING PIPE CLAMP

Rainwater support with clamp to connect to earthing system or to fix the down-conductor.

AT-097E

AT-185E

Reference	Model	Dimensions (mm)	Conductor Ø (mm)	Downpipe Ø (mm)	Material	Weight (g)
AT-097E	Earthing pipe clamp	60 x 25 x 35	2.5 - 6 (4 - 25 mm²)	27 - 60 (¾" - 2")	Stainless steel	71
AT-098E	Earthing pipe clamp	60 x 25 x 35	2.5 - 6 (4 - 25 mm²)	27 - 115 (¾" - 4")	Stainless steel	76
AT-099E	Earthing pipe clamp	60 x 25 x 35	2.5 - 6 (4 - 25 mm²)	27 - 165 (¾" - 6")	Stainless steel	94
AT-185E	Earthing pipe clamp	70 x 35 x 40	6 - 10	27 - 89 (¾" - 3")	Stainless steel	133
AT-186E	Earthing pipe clamp	70 x 35 x 40	6 - 10	27 - 165 (¾" - 6")	Stainless steel	137
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561						

> DOWN-CONDUCTORS AND ACCESSORIES

> SUPPORTS

81 > DOWNPIPE CLAMP

50 -120 mm rainwater pipe clamp, for Ø6 - 10 mm round conductor or 25 - 70 mm² cable.

Reference	Dimensions (mm)	Downpipe diameter (mm)	Material	Weight (g)
AT-082E	120 x 180 x 40	50 - 120	Copper	155
AT-083E	120 x 180 x 40	50 - 120	Stainless steel	130
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561				

APPLICATION AT-082E

82 > DOWNPIPE SUPPORT

Different pieces to customize your downpipe support.
Suitable for use in conjunction with clips from tables 46, 49, 53, 56, 58, 59, 60, 61 or 65.

Reference	Model	Dimensions (mm)	Downpipe diameter (mm)	Material	Weight (g)
AT-096E	Adjustable tensioning strap for downpipes up to Ø160 mm	160 x 180 x 20	Up to 160	Stainless steel	40
AT-069E	Continuous tensioning strap	14 x 0.3 (50 m)	-	Stainless steel	1800
AT-029E	Continuous tensioning strap	14 x 0.3 (100 m)	-	Stainless steel	4000
AT-067E	Separate strap holder	36 x 22 x 20	-	Stainless steel	10
AT-066E	Downpipe clip holder	25 x 30 x 65	-	Stainless steel	20
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561					

AT-096E

APPLICATION AT-069E, AT-067E AND AT-066E

AT-069E

AT-067E

AT-066E

> DOWN-CONDUCTORS AND ACCESSORIES

> SUPPORTS

83 > DOWNPIPE CABLE HOLDER

APPLICATION AT-084E

Adjustable rainwater pipe conductor holder, for Ø8 mm round conductor or 50 mm² cable.

Reference	Dimensions (mm)	Downpipe diameter (mm)	Material	Weight (g)
AT-084E	70 x 80 x 12	50 - 70	Stainless steel	27
AT-085E	90 x 100 x 12	70 - 90	Stainless steel	31
AT-086E	100 x 110 x 12	80 - 100	Stainless steel	33
AT-087E	120 x 130 x 12	100 - 120	Stainless steel	37
AT-088E	140 x 150 x 12	120 - 140	Stainless steel	41
AT-089E	160 x 170 x 12	140 - 160	Stainless steel	45
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561				

84 > ALUMINIUM DOWNPIPE CABLE HOLDER

AT-065E

Aluminium rainwater pipe conductor holder, for Ø8 mm or 50 mm² cable.

Reference	Dimensions (mm)	Downpipe diameter (mm)	Material	Weight (g)
AT-065E	120 x 120 x 18	80 - 120	Aluminium	10
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561				

85 > PIPE BOND

AT-175E (Gu - gunmetal)
AT-176E (Al - aluminium)

Used to fix an 8 mm diameter down-conductor to large diameter piping.

Reference	Dimensions (mm)	Downpipe diameter (mm)	Material	Weight (g)
AT-175E	60 x 35 x 40	50 - 200	Gunmetal	460
AT-176E	60 x 35 x 40	50 - 200	Aluminium	250
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561				

APPLICATION AT-175E

> DOWN-CONDUCTORS AND ACCESSORIES

> SUPPORTS

86 > WATERMAIN PIPE BOND

Used for bonding copper tape to water pipes.

Reference	Dimensions (mm)	Tape (mm)	Material	Weight (g)
AT-177E	45 x 35 x 40	25 x 3	Gunmetal	260
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561				

APPLICATION AT-177E

AT-177E

87 > RAINWATER PIPE (RWP) BOND

This bonds copper or aluminium tapes to metal circular surfaces such as rainwater pipes, handrails, etc. The bolt size is M10.

Reference	Dimensions (mm)	Tape range (mm)	Material	Weight (g)
AT-024J	32 x 32 x 40	25 x 3	Gunmetal	180
AT-025J	32 x 32 x 40	25 x 3	Aluminium	70
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561				

APPLICATION AT-024J

AT-024J (Gu - gunmetal)
AT-025J (Al - aluminium)

> CLAMPS

88 > SQUARE TAPE CLAMPS

Linear, T, L and cross-shape equipotential bonds for tape.

Reference	Dimensions (mm)	Tape range (mm)	Material	Weight (g)
AT-033F	55 x 55 x 15	25 x 3	Gunmetal	230
AT-034F	55 x 55 x 20	25 x 6	Gunmetal	420
AT-035F	85 x 85 x 25	50 x 6	Gunmetal	980
AT-039F	55 x 55 x 15	25 x 3	Aluminium	70
AT-026F	60 x 60 x 6	30 x 2 - 30 x 3.5	Galvanized steel	330
AT-029F	60 x 60 x 6	25 x 3 - 30 x 3.5	Copper	315
AT-131F	60 x 60 x 6	30 x 2 - 30 x 3.5	Stainless steel	300
Complies with IEC 62305, UNE 21186, NF C 17-102, IEC 62305, IEC 62561				

APPLICATION AT-026F

APPLICATION AT-033F (Gu - gunmetal)
AT-039F (Al - aluminium)

> DOWN-CONDUCTORS AND ACCESSORIES

> CLAMPS

89 > SQUARE CABLE CLAMPS

Linear, T, L and cross-shape equipotential bonds for round conductor and cable.

Reference	Dimensions (mm)	Conductor range		Rod Ø (mm)	Material	Weight (g)
		Ø (mm)	mm²			
AT-036F	60 x 60 x 40	8	50	-	Gunmetal	320
AT-037F	60 x 60 x 40	10	70	-	Gunmetal	290
AT-038F	60 x 60 x 40	13	95	-	Gunmetal	250
AT-032F	60 x 60 x 22	8 - 10	50 - 70	-	Copper	330
AT-023F	60 x 60 x 19	8 - 10	50 - 70	-	Galvanized steel	330
AT-028F	60 x 60 x 21	7 - 13	35 - 95	-	Stainless steel	330
AT-136J	60 x 60 x 22	8 - 10	50 - 70	16	Galvanized steel	330
AT-137J	60 x 60 x 22	8 - 10	50 - 70	16	Stainless steel	330
AT-138J	60 x 60 x 22	8 - 10	50 - 70	16	Copper	330
AT-089J-1	50 x 50 x 45	8 - 15	50 - 120	-	Naval brass	250

Complies with IEC 62305, UNE 21186, NF C 17-102, IEC 62305, IEC 62561

APPLICATION AT-023F (GS - galvanized steel)
AT-032F (Cu - copper)
AT-028F (SS - stainless steel)

APPLICATION AT-136J (GS - galvanized steel)
AT-138J (Cu - copper)
AT-137J (SS - stainless steel)

APPLICATION AT-089J-1

APPLICATION AT-036F

90 > SQUARE TAPE AND CABLE CLAMPS

Linear, T, L and cross-shape equipotential bonds for round, cable and tape.

Reference	Dimensions (mm)	Conductor range			Material	Weight (g)
		Ø (mm)	mm²	Tape (mm)		
AT-020F	57 x 57 x 25	7 - 13	35 - 95	30 x 2 - 30 x 3.5	Naval brass	330
AT-134F	57 x 57 x 25	7 - 13	35 - 95	30 x 2 - 30 x 3.5	Aluminium	120
AT-031F	60 x 60 x 14	8 - 10	50 - 70	30 x 2 - 30 x 3.5	Galvanized steel	330
AT-133F	60 x 60 x 14	8 - 10	50 - 70	30 x 2 - 30 x 3.5	Copper	450
AT-136F	60 x 60 x 14	8 - 10	50 - 70	30 x 2 - 30 x 3.5	Stainless steel	333
AT-015J	60 x 60 x 19	16	150	30 x 2 - 30 x 3.5	Galvanized steel	330
AT-016J	60 x 60 x 19	16	150	30 x 2 - 30 x 3.5	Stainless steel	330
AT-017J	60 x 60 x 19	16	150	30 x 2 - 30 x 3.5	Copper	330

Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561

AT-015J (GS - Galvanized steel) (application)
AT-016J (Cu - copper)
AT-017J (SS - stainless steel)

APPLICATION AT-031F (GS - galvanized steel)
AT-133F (Cu - copper)
AT-136F (SS - stainless steel)

APPLICATION AT-020F (NB - naval brass)
AT-134F (Al - aluminium)

APPLICATION AT-020F (NB - naval brass)
AT-134F (Al - aluminium)

APPLICATION AT-020F (NB - naval brass)
AT-134F (Al - aluminium)

> DOWN-CONDUCTORS AND ACCESSORIES

> CLAMPS

91 > T-CLAMP

T-shape equipotential bond for round conductor and cable.

Reference	Dimensions (mm)	Conductor range		Material	Weight (g)
		Ø (mm)	mm²		
AT-012F	50 x 40 x 20	8 - 10	50 - 70	Naval brass	120
AT-119F	49 x 27 x 21	8	50	Gunmetal	120
AT-120F	49 x 27 x 21	8	50	Galvanized steel	120
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561					

APPLICATION AT-012F

APPLICATION AT-119F (Gu - gunmetal)
AT-120F (GS - galvanized steel)

92 > STRAIGHT CLAMP

Linear joint for cable or round conductor.

Reference	Dimensions (mm)	Conductor range			Rod	Material	Weight (g)
		Ø (mm)	mm²	Tape (mm)			
AT-015F	Ø21 x 100	8 - 10	50 - 70	-	-	Naval brass	140
AT-116F	Ø15 x 75	6 - 8	25 - 50	-	-	Copper	140
AT-117F	Ø15 x 75	6 - 8	25 - 50	-	-	Stainless steel	140
AT-118F	60 x 27 x 20	8	50	-	-	Galvanized steel	140
AT-135F	60 x 27 x 20	8	50	-	-	Gunmetal	100
AT-105F	40 x 30 x 17	8 - 10	50 - 70	-	-	Aluminium	50
AT-135J	43 x 41 x 30	7 - 10	35 - 70	-	16	Galvanized steel	120
AT-090H	85 x 41 x 44	8 - 10	50 - 70	30 x 2 - 30 x 3.5	20	Naval brass	265
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561							

AT-015F (NB - naval brass)
AT-116F (Cu - copper)
AT-117F (SS - stainless steel)

AT-090H

APPLICATION AT-118F (GS - galvanized steel)
AT-135F (Gu - gunmetal)

APPLICATION AT-090H

APPLICATION AT-135J

APPLICATION AT-105F

> DOWN-CONDUCTORS AND ACCESSORIES

> CLAMPS

93 > PARALLEL CLAMP

Parallel bond for cable or round conductor. AT-013F is used for bonds between copper and aluminium conductors, preventing galvanic coupling.

AT-011F

Reference	Dimensions (mm)	Conductor range			Material	Weight (g)
		Ø (mm)	mm²	Tape (mm)		
AT-011F	45 x 45 x 14	8	50	30 x 2 - 30 x 3.5	Naval brass	120
AT-013F	42 x 42 x 25	4 - 13	16 - 95	-	Aluminium alloy	183
AT-016F	42 x 42 x 25	4 - 13	16 - 95	-	Naval brass	220
AT-009F	42 x 42 x 25	4 - 13	16 - 95	-	Aluminium	217
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561						

AT-016F (NB - naval brass)
AT-009F (Al - aluminium)

AT-013F

94 > UNIVERSAL CLAMP

Cross or parallel bond between copper cables or round conductors.

APPLICATION AT-113F (SS - stainless steel)
AT-112F (Cu - copper)

Reference	Dimensions (mm)	Conductor range		Rod Ø (mm)	Material	Weight (g)
		Ø (mm)	mm²			
AT-112F	33 x 33 x 35 (Miniature)	6 - 8	25 - 50	-	Copper	80
AT-113F	33 x 33 x 35 (Miniature)	6 - 8	25 - 50	-	Stainless steel	80
AT-115F	40 x 40 x 45	8 - 10	50 - 70	-	Aluminium	60
AT-121F	40 x 40 x 45	8 - 10	50 - 70	-	Copper	120
AT-122F	40 x 40 x 45	8 - 10	50 - 70	-	Stainless steel	120
AT-125F	40 x 40 x 45	8 - 10	50 - 70	-	Galvanized steel	120
AT-128F	40 x 40 x 45	8 - 10	50 - 70	-	Copper/Aluminium	120
AT-025F	48 x 44 x 45	8 - 10	50 - 70	16	Stainless steel	130
AT-127J	48 x 44 x 45	8 - 10	50 - 70	16	Copper	130
AT-128J	48 x 44 x 45	8 - 10	50 - 70	16	Galvanized steel	130
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561						

APPLICATION AT-121F
AT-115F (Al - aluminium)
AT-122F (SS - stainless steel)
AT-125F (GS - galvanized steel)
AT-128F (Cu/Al - copper/aluminium)

APPLICATION AT-025F (SS - stainless steel)
AT-127J (Cu - copper)
AT-128J (GS - galvanized steel)

> DOWN-CONDUCTORS AND ACCESSORIES

> CLAMPS

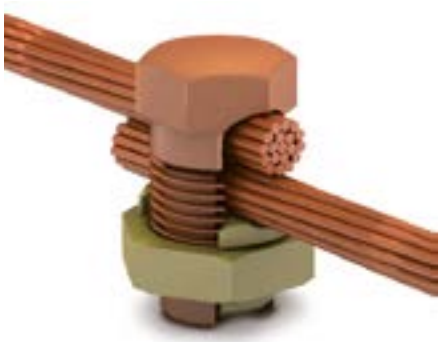
95 > TYPE H SPLIT BOLT CLAMP

Parallel bond between two stranded or solid round conductors.

Reference	Dimensions (mm)	Conductor range		Application	Material	Weight (g)
		Conductor A (mm^2)	Conductor B (mm^2)			
AT-096F	23 x 10 x 12	10	1.5 - 10	Cu/Cu	Electrolytic copper/gunmetal	20
AT-097F	25 x 11 x 12	16	2.5 - 16	Cu/Cu	Electrolytic copper/gunmetal	24
AT-098F	30 x 15 x 18	25	2.5 - 25	Cu/Cu	Electrolytic copper/gunmetal	37
AT-099F	31 x 15 x 19	35	2.5 - 35	Cu/Cu	Electrolytic copper/gunmetal	45
AT-100F	39 x 20 x 20	50	2.5 - 50	Cu/Cu	Electrolytic copper/gunmetal	70
AT-101F	43 x 20 x 22	70	2.5 - 70	Cu/Cu	Electrolytic copper/gunmetal	85
AT-102F	53 x 25 x 28	95	2.5 - 95	Cu/Cu	Electrolytic copper/gunmetal	145
AT-103F	53 x 27 x 28	120	10 - 120	Cu/Cu	Electrolytic copper/gunmetal	160
AT-082F	50 x 26 x 28	150	10 - 150	Cu/Cu	Electrolytic copper/gunmetal	160
AT-104F	60 x 30 x 31	185	50 - 185	Cu/Cu	Electrolytic copper/gunmetal	240
AT-114F	72 x 34 x 34	240	95 - 240	Cu/Cu	Electrolytic copper/gunmetal	345
AT-057F	27 x 10 x 12	10	2.5 - 10	Cu/Al or Al/Al	Electrolytic copper/gunmetal	23
AT-058F	27 x 11 x 12	16	2.5 - 16	Cu/Al or Al/Al	Electrolytic copper/gunmetal	26
AT-064F	32 x 15 x 18	25	4 - 25	Cu/Al or Al/Al	Electrolytic copper/gunmetal	43
AT-065F	37 x 15 x 19	35	4 - 35	Cu/Al or Al/Al	Electrolytic copper/gunmetal	50
AT-066F	44 x 20 x 20	50	4 - 50	Cu/Al or Al/Al	Electrolytic copper/gunmetal	80
AT-067F	44 x 20 x 22	70	10 - 70	Cu/Al or Al/Al	Electrolytic copper/gunmetal	95
AT-068F	54 x 25 x 28	95	10 - 95	Cu/Al or Al/Al	Electrolytic copper/gunmetal	160
AT-069F	57 x 27 x 28	120	10 - 120	Cu/Al or Al/Al	Electrolytic copper/gunmetal	182
AT-074F	55 x 26 x 28	150	16 - 150	Cu/Al or Al/Al	Electrolytic copper/gunmetal	200
AT-075F	65 x 30 x 31	185	25 - 185	Cu/Al or Al/Al	Electrolytic copper/gunmetal	275
AT-076F	75 x 34 x 34	240	95 - 240	Cu/Al or Al/Al	Electrolytic copper/gunmetal	400
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561						

AT-100F

APPLICATION
AT-100F



> DOWN-CONDUCTORS AND ACCESSORIES

> CLAMPS

96 > METAL SHEET CLAMP

Equipotential bond between round, cable or tape and metal sheet.

Reference	Dimensions (mm)	Conductor range			Tape (mm)	Material	Weight (g)
		Ø (mm)	mm²	Sheet (mm)			
AT-043K	56 x 45 x 60	7 - 10	35 - 70	-	5 - 18	Galvanized steel	210
AT-044K	56 x 45 x 50	6 - 10	25 - 70	-	1 - 12	Galvanized steel	190
AT-045K	27 x 47 x 50	7 - 10	35 - 70	-	1 - 12	Galvanized steel	155
AT-046K	35 x 40 x 40	6 - 10	25 - 70	-	1 - 8	Galvanized steel	110
AT-047K	30 x 40 x 50	6 - 10	25 - 70	-	1 - 8	Copper	100
AT-048K	30 x 40 x 50	6 - 10	25 - 70	-	1 - 8	Stainless steel	100
AT-049K	35 x 35 x 40	7 - 10	35 - 70	-	1 - 5	Zinc alloy	110
AT-052K	65 x 50 x 20	6 - 10	25 - 70	-	1 - 5	Galvanized steel	135
AT-053K	65 x 50 x 20	6 - 10	25 - 70	-	1 - 5	Copper	148
AT-054K	50 x 60 x 30	8 - 10	50 - 70	-	1 - 8	Galvanized steel	120
AT-055K	50 x 40 x 60	7 - 10	35 - 70	-	1 - 5	Galvanized steel	160
AT-056K	55 x 30 x 40	-	-	30 x 2 - 30 x 3.5	1 - 5	Copper	280
AT-057K	55 x 30 x 40	-	-	30 x 2 - 30 x 3.5	1 - 5	Galvanized steel	270

Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561

APPLICATION AT-047K (Cu - copper)
AT-048K (SS - stainless steel)

APPLICATION AT-046K

APPLICATION AT-045K

APPLICATION AT-049K

APPLICATION AT-043K

APPLICATION AT-056K (Cu - copper)
AT-057K (GS - galvanized steel)

APPLICATION AT-055K

APPLICATION AT-054K

APPLICATION AT-052K (GS - galvanized steel)
AT-053K (Cu - copper)

> DOWN-CONDUCTORS AND ACCESSORIES

> TEST CLAMPS

97 > TAPE TEST CLAMP

Specially used for disconnection and test purposes for tape conductors.

Reference	Model	Dimensions (mm)	Tape range (mm)	Material	Weight (g)
AT-081F	Oblong test clamp	60 x 35 x 30	25 x 3	Gunmetal	290
AT-083F	Oblong test clamp	60 x 35 x 30	25 x 3	Aluminium	120
AT-084F	Plate type test clamp	80 x 80 x 40	25 x 3	Gunmetal	620
AT-085F	Screw-down test clamp	60 x 60 x 60	25 X 3	Gunmetal	720
Complies with IEC 62305, UNE 21186, NF C 17-102, IEC 62305, IEC 62561					

APPLICATION AT-081F (Gu - gunmetal)
AT-082F (Al - aluminium)

APPLICATION AT-084F

APPLICATION AT-085F

98 > UNIVERSAL DISCONNECTING CLAMP FOR TAPE

Linear connection between tapes.

Reference	Dimensions (mm)	Tape range (mm)	Material	Weight (g)
AT-111F	58 x 30 x 20	30 x 2 - 30 x 3.5	Galvanized steel	180
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561				

AT-111F

> DOWN-CONDUCTORS AND ACCESSORIES

> TEST CLAMPS

99 > UNIVERSAL DISCONNECTING CLAMP FOR CABLE

Linear connection between cables.

Reference	Dimensions (mm)	Conductor range		Rod Ø (mm)	Material	Weight (g)
		Ø (mm)	mm²			
AT-110F	50 x 30 x 20	8 - 10	50 - 70	-	Galvanized steel	180
AT-108F	50 x 30 x 20	8	50	-	Copper/Galvanized steel	180
AT-124F	50 x 30 x 20	8 - 10	50 - 70	-	Stainless steel	200
AT-113J	58 x 30 x 20	8 - 10 (Copper)	50 - 70 (Copper)	16 (Galvanized steel)	Copper/Galvanized steel	150
AT-114J	58 x 30 x 20	8 - 10	50 - 70	16	Galvanized steel	150
AT-115J	58 x 30 x 20	8 - 10	50 - 70	16	Stainless steel	100

Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561

AT-108F (Cu/GS - copper/galvanized steel)
AT-110F (GS - galvanized steel)
AT-124F (SS - stainless steel)

APPLICATION AT-114J (GS - galvanized steel)
AT-113J (Cu/GS - copper /galvanized steel)
AT-115J (SS - stainless steel)

100 > UNIVERSAL DISCONNECTING CLAMP FOR CABLE AND TAPE

Linear connection between cable and tape.

Reference	Dimensions (mm)	Conductor range			Material	Weight (g)
		Ø (mm)	mm²	Tape (mm)		
AT-107F	58 x 30 x 20	8 - 10 (Copper)	50 - 70 (Copper)	30 x 2 - 30 x 3.5 (Galvanized steel)	Copper/Galvanized steel	180
AT-109F	58 x 30 x 20	8 - 10	50 - 70	30 x 2 - 30 x 3.5	Galvanized steel	180
AT-123F	58 x 30 x 20	8 - 10	50 - 70	30 x 2 - 30 x 3.5	Stainless steel	200

Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561

AT-109F (GS - galvanized steel)
AT-107F (Cu/GS - copper/galvanized steel)
AT-123F (SS - stainless steel)

> DOWN-CONDUCTORS AND ACCESSORIES

> TEST CLAMPS

101 > CABLE AND TAPE TEST CLAMP

Especially used for disconnection and testing purposes for cable, round or tape conductors.

Reference	Dimensions (mm)	Conductor range			Includes	Material	Weight (g)
		Ø (mm)	mm²	Tape (mm)			
AT-010F	55 x 30 x 75	8	50	30 x 2 - 30 x 3.5	Plug and screw M4 x 38	Naval brass	295
AT-086F	30 x 65 x 45	7	35	25 x 3	-	Gunmetal	400
AT-087F	30 x 65 x 45	8	50	25 x 3	-	Gunmetal	400
AT-088F	30 x 65 x 45	10	70	25 x 3	-	Gunmetal	400
AT-089F	30 x 65 x 45	13	95	25 x 3	-	Gunmetal	390
AT-090F	30 x 65 x 45	15	120	25 x 3	-	Gunmetal	390
AT-091F	30 x 65 x 45	8	50	25 x 3	-	Aluminium	90
AT-095F	55 x 75 x 20	8 - 10	50 - 70	30 x 3.5	Plug and screw M4 x 38	Nickel plated brass	500
Complies with IEC 62305, UNE 21186, NF C 17-102, IEC 62305, IEC 62561							

AT-010F

APPLICATION AT-010F

APPLICATION AT-095F

APPLICATION AT-086F (Gu - gunmetal)
AT-091F (Al - aluminium)

102 > TEST JOINT

Disconnecting sleeve between galvanized steel round and tape conductor.

Reference	Dimensions (mm)	Conductor range			Material	Weight (g)
		Ø (mm)	mm²	Tape (mm)		
AT-106F	136 x 70 x 30	8 - 10	50 - 70	30 x 2 - 30 x 3.5	Galvanized steel	330
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561						

APPLICATION AT-106F

103 > BIMETAL CONNECTOR

Used for bonding copper, aluminium or galvanized steel conductors, preventing galvanic coupling, particularly where an aluminium or galvanized steel lightning protection system has to be connected to a copper earthing system.

Reference	Dimensions (mm)	Conductor range			Material	Weight (g)
		Ø (mm)	mm²	Tape (mm)		
AT-013F	42 x 42 x 25	4 - 13	16 - 95	-	Aluminium alloy	183
AT-092F	100 x 30 x 30	8	50	-	Copper/Aluminium	250
AT-093F	100 x 30 x 30	8 (Aluminium)	50 (Aluminium)	25 x 3 (Copper)	Copper/Aluminium	225
AT-094F	100 x 30 x 25	-	-	25 x 3	Copper/Aluminium	200
AT-107F	58 x 30 x 20	8 - 10 (Copper)	50 - 70 (Copper)	30 x 2 - 30 x 3.5 (Galvanized steel)	Copper/Galvanized steel	180
AT-108F	50 x 30 x 20	8	50	-	Copper/Galvanized steel	180
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561						

AT-013F

APPLICATION AT-092F

APPLICATION AT-093F

APPLICATION AT-094F

AT-107F

AT-108F

> DOWN-CONDUCTORS AND ACCESSORIES

> ACCESSORIES

104 > SPARK GAP FOR AERIAL MAST

Aerials are particularly exposed to lightning strikes and their consequences. The lightning protection system must protect the aerial against direct impact, however part of the lightning current could side-strike it and follow an uncontrolled path to earth. Even if it is only part of the lightning current, the damage caused could be very significant.

The AT-060F protector is connected to the aerial mast in order to ensure an equipotential bond between metal elements, thereby preventing dangerous sparks between the lightning protection system and the aerial mast, which could result in fire and damage to the structure.

AT-060F

APPLICATION AT-060F

Reference	**AT-060F**
Dimensions:	50 x 50 x 230 mm
Weight:	900 g
Lightning impulse current (10/350 µs wave):	I_p (10/350) > 100 kA
Nominal discharge current:	I_n(8/20 µs) = 50 kA
Protection level (1.2/50 µs wave):	U_p < 4 kA
Working temperature:	-55 ºC to +85 ºC
Connections:	Mast: Holdfast for Ø30 - 50 mm aerial LPS: Clamp for Ø8-10 mm round conductor or 30 x 2 mm / 25 x 3 mm tape
Material:	Polyurethane resin
Tests certified according to:	EN 50164 (IEC 62561) IEC 61643
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561	

Aplicaciones Tecnológicas, S.A. supplies specific surge protection equipment for the aerial signal cable (ATFREQ series, page 364), which will protect the connected equipment.

INSTALLATION

AT-060F is to be installed connecting the aerial mast to the closest grounded element of the lightning protection system. Its connecting clamp is suitable for a wide range of conductors.

> DOWN-CONDUCTORS AND ACCESSORIES

> ACCESSORIES

105 > ATLOGGER

ATLOGGER is a recorder of electrical activity in the lightning rod's down-conductor which, in addition to counting the number of strikes, records the amplitude and polarity of the lightning, as well as the date and time the impact occurred.

Installation is very easy as it does not involve interrupting the down-conductor. Simply place it beside the down-conductor and fix it properly onto a flat surface.

The data is downloaded automatically using a USB device that enables data transfer from different ATLOGGER devices to the reading point.

AT-004G

CE Ex Authorised for use in explosive atmospheres

Reference	**AT-004G**
Dimensions:	160 x 80 x 55 mm
Includes:	M4 plug and screw x 49
Material:	Polycarbonate V0
Weight:	0.6 kg
Counter:	0… 999999
Power supply:	2 AA batteries 3.6 V
Temperature:	-25 ºC to +70 ºC
Registry:	Minimum 1 kA (8/20 µs) Maximum 100 kA (10/350 µs)
ATEX marking:	Ex ic nA IIC T3/T4 Gc
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561	

See table 107

APPLICATION AT-004G

DATA DOWNLOAD

Data downloading should coincide, at least, with the revision and periodic maintenance of the system or when the number of strikes on the installation exceeds 30 since the last download, since the internal memory can record up to 40 events.

Software is included for download management by means of transfer device with USB connection.

INSTALLATION

It must be installed so that the down-conductor of air terminal is on the side nearest the electromechanical counter.

When no drill is allowed, the fixing is made by a support plate providing a flat and sturdy surface for fixing the ATLOGGER: AT-005G with 2 bonding clamps for ¾" guard tube for cable or tape; AT-035G with 2 bonding clamps for a 1½" and AT-028G support is to be used to install the ATLOGGER in free-standing masts.

APPLICATION AT-005G

APPLICATION AT-028G

Reference	**AT-005G**	**AT-035G**	**AT-028G**
Dimensions:	250 x 250 mm	285 x 215 mm	175 x 150 mm
Material:	Galvanized steel	Galvanized steel	Galvanized steel
Weight:	2.3 kg	2.4 kg	0.9 kg

> DOWN-CONDUCTORS AND ACCESSORIES

> ACCESSORIES

106 > LIGHTNING EVENT COUNTER

AT-034G

The AT-034G lightning event counter is a device to be installed on the down-conductor, usually above the guard tube. It automatically counts the strikes received by the lightning protection system. It is very sturdy and totally autonomous, however it is advisable to check it periodically in order to see if there has been a strike and, therefore, whether or not the lightning protection system needs any special maintenance.
This counter is designed to be installed inside self-supporting masts and interrupting the down-conductor is not necessary for its installation.

Reference	**AT-034G**
Dimensions:	150 x 65 x 52 mm
Includes:	Support sheet and 4 M4 x 25 mm screws
Material:	Polycarbonate
Weight:	1 kg
Counter:	0… 999999
Registry:	Minimum 1 kA (8/20 µs)
Temperature:	-25 ºC to +70 ºC
Power supply:	No need, totally autonomous
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561	

See table 107

APPLICATION AT-034G and AT-056G

APPLICATION AT-034G

INSTALLATION

The counter installation is very simple, It merely needs to be fixed to the down-conductor by tightening the four screws included in the support sheet, so that the down-conductor is between both elements.

The lightning counter has been successfully tested in official and independent laboratories. The counter has proved its effective operation and strength by means of these tests, withstanding lightning currents (100 kA, 10/350 µs) without suffering any damage.

> DOWN-CONDUCTORS AND ACCESSORIES

> ACCESSORIES

107 > GUARD TUBE

Anti-vandal guard for cable or tape down-conductors. In order to avoid the cable breaking due to accidental impacts, it is necessary to install a guard tube, which is at least 2 metres high, wherever the cable is accessible. AT-056G is recommended to prevent touch voltages in public buildings with low resistivity soil.

Reference	Dimensions (mm)	Conductor range			Includes	Material	Weight (kg)
		Ø (mm)	mm²	Tape (mm)			
AT-051G	Ø27 x 2000	8 - 10	50 - 70	-	Bonding clamps	Galvanized steel	3
AT-050G	Ø27 x 3000	8 - 10	50 - 70	-	Bonding clamps	Galvanized steel	5
AT-054G	Ø27 x 2000	8 - 10	50 - 70	-	Bonding clamps	Stainless steel	2.3
AT-053G	Ø27 x 3000	8 - 10	50 - 70	-	Bonding clamps	Stainless steel	3.5
AT-056G	Ø26 x 2500	8 - 10	50 - 70	-	Bonding clamps	3 mm cross-linked polyethylene	0.7
AT-060G	40 x 14 x 2000	-	-	30 x 2 - 30 x 3.5	Bonding clamps	Galvanized steel	1
AT-063G	40 x 14 x 2000	-	-	30 x 2 - 30 x 3.5	Bonding clamps	Stainless steel	1
AT-055G	70 x 15 x 2000	8 - 10	50 - 70	30 x 2 - 30 x 3.5	Plug and screw	Galvanized steel	3
AT-057G	40 x 30 x 1500	7 - 10	35 - 70	-	Straight clamp and KS cable clip	Galvanized steel	2.6

Complies with UNE 21186, NF C 17-102

AT-055G

AT-053G (SS - stainless steel)
AT-051G (GS - galvanized steel)

AT-063G (SS - stainless steel)
AT-060G (GS)

AT-056G

APPLICATIONAT-057G

See table 56
See table 143

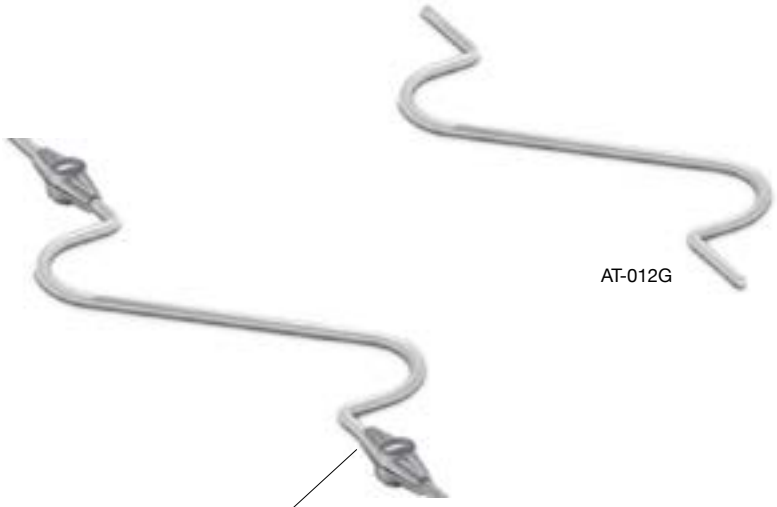
> DOWN-CONDUCTORS AND ACCESSORIES

> ACCESSORIES

108 > EXPANSION UNIT

For thermal expansion of longer conductors. Suitable to install it each 20 m. If the down-conductors are made of copper, use a bimetal clamp such as AT-128F (table 94).

Reference	Dimensions (mm)	Material	Weight (g)
AT-012G	400 x 100 x 8	Aluminium	80
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561			



AT-012G

APPLICATIONAT-012G

109 > FLEXIBLE BRAID BOND

This flexible braid allows an equipotential bond between diverse metal elements such as fences, doors and windows.
Fixed using Ø11 mm holes.

Reference	Dimensions (mm)	Equivalent section (mm^2)	Material	Weight (g)
AT-001F	25 x 3.5 x 200	35	Tin-plated copper	80
AT-032J	25 x 3.5 x 400	35	Copper	150
AT-033J	33 x 4 x 180	50	Aluminium	30
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561				

AT-001F

APPLICATION AT-001F

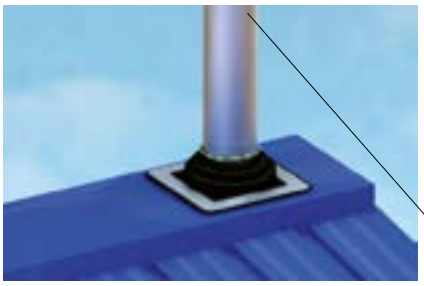
> DOWN-CONDUCTORS AND ACCESSORIES

> ACCESSORIES

110 > WATERTIGHT CONE

It prevents water penetrating flat roof surfaces. Used with Ø6 to 50 mm air rods and masts.

Reference	Dimensions (mm)	Material	Weight (g)
AT-090B	115 x 115 x 60	Rubber	76



APPLICATIONAT-090B

AT-090B

111 > SEALING WASHER

To be used in conjunction with any screw threaded attachments in order to protect it from water on vertical surfaces.

Reference	Dimensions (mm)	Material	Weight (g)
AT-014G	Ø35 x 5	Rubber	2

APPLICATION AT-014G

AT-014G

112 > ASPHALT STRIP

For fixing conductors to flat roof (secured using heat).

Reference	Dimensions (mm)	Material	Weight (g)
AT-071F	100 x 40 x 3	Asphalt	35
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561			

APPLICATION AT-071G

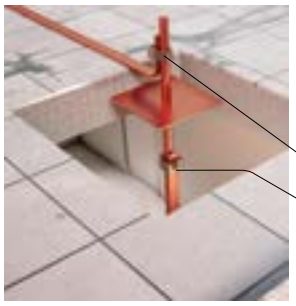
> DOWN-CONDUCTORS AND ACCESSORIES

> ACCESSORIES

113 > PUDDLE FLANGE

Enables the conductor to pass through the roof.

AT-015G (Cu - copper)
AT-016G (Al - aluminium)



APPLICATION AT-015G

Reference	Dimensions (mm)	Material	Weight (kg)
AT-015G	150 x 150 x 600	Copper	1.7
AT-016G	150 x 150 x 600	Aluminium	0.5
Complies with BS 6651, BS 1432 C101, BS 2897			

114 > HANGING GUY WIRE KIT

For installing guy wire to hold the cable or round conductor over flat traffic-bearing terraces. The cable is joined to the guy wire using AT-046C (See table 43).

Reference	Model	Includes	Weight (kg)
AT-080G	Hanging guy wire kit	15 m of guy wire + 2 AT-042C + 4 AT-043C + 28 AT-046C (see table 43) + AT-081G	1.00
AT-081G	Guy wire plate for Ø1½'' mast + anchorage	-	0.21
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561			

AT-081G

APPLICATION AT-080G

> DOWN-CONDUCTORS AND ACCESSORIES

> ACCESSORIES

115 > WIRE STRAIGHTENER

For straightening round conductors made of medium-hard materials.

Reference	Model	Dimensions (mm)	Material	Weight (kg)
AT-040G	5 straightening coils with handles	300 x 200 x 150	Galvanized steel	6.20
AT-041G	For bending and straightening round conductors	260 x 50 x 60	Galvanized steel	0.33

AT-040G

AT-041G

116 > ANTI-CORROSION SPRAY

This cold galvanizer spray protects all kind of metals from corrosion. Specially used to protect welding.

Reference	Dimensions (mm)	Weight (g)
AT-023G	60 x 60 x 200	435

AT-023G

117 > BIMETAL SHEET (CUPAL)

To prevent galvanic coupling between conductors and structures of a different kind.

Reference	Model	Dimensions (mm)	Material	Weight (g)
AT-030G	Copper inside/Aluminium outside	Ø8 x 60	Copper/Aluminium	4
AT-031G	Copper outside/Aluminium inside	Ø8 x 60	Aluminium/Copper	3
AT-070F	Strip	40 x 0.5 x 500	Copper/Aluminium	38

AT-070F

AT-030G

AT-031G

> DOWN-CONDUCTORS AND ACCESSORIES

> CONDUCTORS

118 > COPPER-STEEL BIMETAL CONDUCTOR

AT-231D

AT-234D

Copper-steel conductors (Cu 25%) maintain the electrical characteristics of the electrolytic copper, along with the best mechanical properties of steel.

Reference	Model	Dimensions (mm²)	Weight (kg/m)
AT-230D	7 x Ø2.6 mm stranded cable	35	0.30
AT-231D	7 x Ø3.3 mm stranded cable	50	0.47
AT-232D	7 x Ø3.7 mm stranded cable	70	0.60
AT-233D	7 x Ø4.6 mm stranded cable	95	0.95
AT-234D	Ø7 mm round conductor	35	0.34
AT-235D	Ø8 mm round conductor	50	0.43
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561			

119 > COPPER-CLAD ALUMINIUM BIMETAL CONDUCTOR

AT-236D

AT-241D

Copper-clad aluminium conductors (Cu 15%) maintain the electrical characteristics of copper conductors but with a lower cost. Installation with this material is easier than using copper-steel due to its high malleability.

Reference	Model	Dimensions (mm²)	Weight (kg/m)
AT-236D	7 x Ø2.6 mm stranded cable	35	0.17
AT-237D	7 x Ø3.3 mm stranded cable	50	0.21
AT-238D	7 x Ø3.7 mm stranded cable	70	0.27
AT-239D	7 x Ø4.6 mm stranded cable	95	0.43
AT-241D	Ø7 mm round conductor	35	0.15
AT-242D	Ø8 mm round conductor	50	0.19
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561			

> DOWN-CONDUCTORS AND ACCESSORIES

> CONDUCTORS

120 > BARE COPPER TAPE

Copper tape recommended as a down-conductor for lightning protection systems.

Reference	Dimensions (mm)	Weight per metre (kg/m)
AT-006D	12.5 x 1.5	0.20
AT-007D	12.5 x 3	0.30
AT-008D	20 x 1.5	0.25
AT-009D	20 x 3	0.32
AT-010D	25 x 1.5	0.35
AT-011D	25 x 3	0.70
AT-012D	25 x 4	0.90
AT-013D	25 x 6	1.35
AT-014D	30 x 2	0.50
AT-015D	30 x 3	0.80
AT-016D	30 x 4	1.10
AT-017D	30 x 5	1.40
AT-018D	38 x 3	1.00
AT-019D	38 x 5	1.70
AT-020D	38 x 6	1.80
AT-021D	40 x 3	1.10
AT-022D	40 x 4	1.40
AT-023D	40 x 5	1.80
AT-024D	40 x 6	2.20
AT-025D	50 x 3	1.40
AT-026D	50 x 4	1.80
AT-027D	50 x 5	2.20
AT-028D	50 x 6	2.75

Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561

Other dimensions, please contact us

AT-011D

121 > TIN-PLATED COPPER TAPE

Tin-plated copper tape is recommended for use as a down-conductor and earth conductor in lightning protection systems.

Reference	Dimensions (mm)	Weight per metre (kg/m)
AT-000D	12.5 x 1.5	0.2
AT-055D	25 x 3	0.7
AT-052D	30 x 2	0.5
AT-002D	25 x 6	1.3
AT-003D	31 x 3	0.8
AT-004D	38 x 5	1.7
AT-005D	50 x 6	2.7

Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561

Other dimensions, please contact us

AT-052D

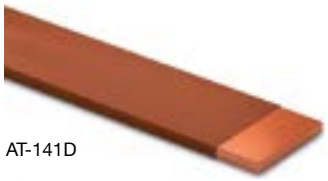
> DOWN-CONDUCTORS AND ACCESSORIES

> CONDUCTORS

122 > PVC COATED COPPER TAPE


AT-139D


AT-030D


AT-141D


AT-140D


AT-143D


AT-142D

Copper tape coated in PVC used to blend the down-conductor into the building.

Reference	Dimensions (mm)	PVC colour	Weight per metre (kg/m)
AT-029D	12.5 x 1.5	Black	0.2
AT-030D	25 x 3	Black	0.7
AT-139D	25 x 3	Grey	0.7
AT-140D	25 x 3	Green	0.7
AT-141D	25 x 3	Brown	0.7
AT-142D	25 x 3	Stone	0.7
AT-143D	25 x 3	White	0.7
AT-031D	25 x 6	Green	1.5
AT-032D	50 x 6	Green	3.0

Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561

Other dimensions, please contact us

123 > ALUMINIUM TAPE


AT-057D

Aluminium tape is easier to install than copper tape but has lower conductivity. Not suitable for direct contact with the soil.

Reference	Dimensions (mm)	Weight per metre (kg/m)
AT-033D	12.5 x 1.5	0.05
AT-034D	20 x 3	0.18
AT-057D	25 x 3	0.22
AT-056D	30 x 3	0.27
AT-037D	25 x 6	0.41
AT-038D	40 x 6	0.69
AT-039D	50 x 6	0.85

Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561

Other dimensions, please contact us

124 > PVC COATED ALUMINIUM TAPE


AT-144D


AT-042D


AT-146D


AT-145D

Aluminium tape coated in PVC used to blend the down-conductor into the building. Not suitable for direct contact with the soil.

Reference	Dimensions (mm)	PVC colour	Weight per metre (kg/m)
AT-040D	12.5 x 1.5	Black	0.10
AT-041D	20 x 3	Black	0.25
AT-042D	25 x 3	Black	0.32
AT-144D	25 x 3	Brown	0.32
AT-145D	25 x 3	Grey	0.32
AT-146D	25 x 3	Stone	0.32

Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561

Other dimensions, please contact us

> DOWN-CONDUCTORS AND ACCESSORIES

> CONDUCTORS

125 > GALVANIZED STEEL TAPE

Galvanized steel tape has an acceptable resistance to corrosion in air, concrete and non-chemically aggressive soil.

Reference	Dimensions (mm)	Weight per metre (kg/m)
AT-130D	20 x 2.5	0.4
AT-131D	30 x 3.5	0.8
AT-132D	30 x 4	1.0
AT-133D	40 x 4	1.3
AT-134D	40 x 5	1.6
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561		

Other dimensions, please contact us

AT-131D

126 > STAINLESS STEEL TAPE

Stainless steel tape is strongly recommended in highly corrosive environments.

Reference	Dimensions (mm)	Weight per metre (kg/m)
AT-135D	30 x 3.5	0.8
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561		

Other dimensions, please contact us

AT-135D

127 > FLEXIBLE COPPER BRAID

The copper braid is recommended when there is movement between the equipotentially connected objects.

Reference	Dimensions (mm)	Section (mm²)	Weight per metre (kg/m)
AT-043D	12 x 1	11	0.05
AT-044D	15 x 1.5	15	0.10
AT-045D	10 x 2 (tin-plated)	10	0.10
AT-046D	16 x 2 (tin-plated)	16	0.13
AT-047D	19 x 2.5	19	0.16
AT-048D	25 x 3.5	40	0.35
AT-049D	25 x 3.5 (tin-plated)	40	0.35
AT-053D	30 x 3.5 (tin-plated)	50	0.40
AT-051D	32 x 6	80	0.65
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561			

Other dimensions, please contact us

AT-053D

128 > HARD DRAWN COPPER BAR

Hard drawn copper bars are suitable for rigid connections.

Reference	Dimensions (mm)	Weight per metre (kg/m)
AT-080D	25 x 3 x 5 m	0.65
AT-081D	25 x 6 x 5 m	1.35
AT-082D	40 x 6 x 5 m	2.00
AT-083D	50 x 6 x 5 m	2.70
AT-084D	50 x 6 x 5 m (tin-plated)	2.70
AT-085D	50 x 10 x 5 m	4.50
AT-086D	75 x 6 x 5 m	4.00
AT-087D	100 x 6 x 5 m	5.40
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561		

AT-083D

> DOWN-CONDUCTORS AND ACCESSORIES

> CONDUCTORS

129 > STRANDED ELECTROLYTIC COPPER CABLE

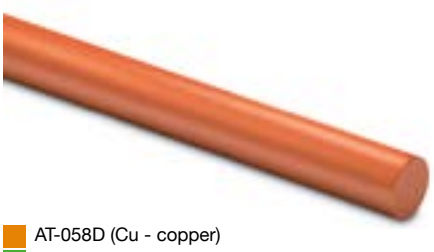
AT-050D

Stranded cable is easier to install than solid round conductor.

Reference	Dimensions (mm^2)	Stranded (mm)	Weight (kg/m)
AT-035D	35	7 x Ø2.5	0.40
AT-050D	50	19 x Ø1.8	0.47
AT-070D	70	19 x Ø2.2	0.65
AT-095D	95	19 x Ø2.5	0.85
AT-120D	120	37 x Ø2	1.10
AT-150D	150	37 x Ø2.3	1.34
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561			

Other dimensions, please contact us

130 > BARE SOLID ROUND CONDUCTOR



- AT-058D (Cu - copper)
- AT-138D (Al - aluminium)
- AT-060D (GS - galvanized steel)
- AT-128D (SS - stainless steel)

Solid round conductors are more suitable for corrosive environments.

Reference	Dimensions (mm^2)	Material	Weight (kg/m)
AT-058D	8	Copper	0.45
AT-110D	8	Semi-hard aluminium alloy (AlMgSi)	0.14
AT-138D	8	Soft aluminium alloy (AlMgSi)	0.14
AT-125D	10	Aluminium	0.15
AT-060D	8	Galvanized steel	0.40
AT-061D	10	Galvanized steel	0.62
AT-128D	8	Stainless steel	0.40
AT-129D	10	Stainless steel	0.60
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561			

Other dimensions, please contact us

> DOWN-CONDUCTORS AND ACCESSORIES

> CONDUCTORS

131 > PVC INSULATED STRANDED COPPER CABLE

AT-114D

Stranded copper cable coated in PVC is used as an internal earth conductor.

Reference	Dimensions (mm^2)	Stranded (mm)	Weight (kg/m)
AT-113D	35	7 x Ø2.5	0.40
AT-114D	50	19 x Ø1.8	0.55
AT-115D	70	19 x Ø2.2	0.75
AT-116D	95	19 x Ø2.5	1.00
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561			

Other dimensions, please contact us

132 > PVC COATED SOLID ROUND CONDUCTOR

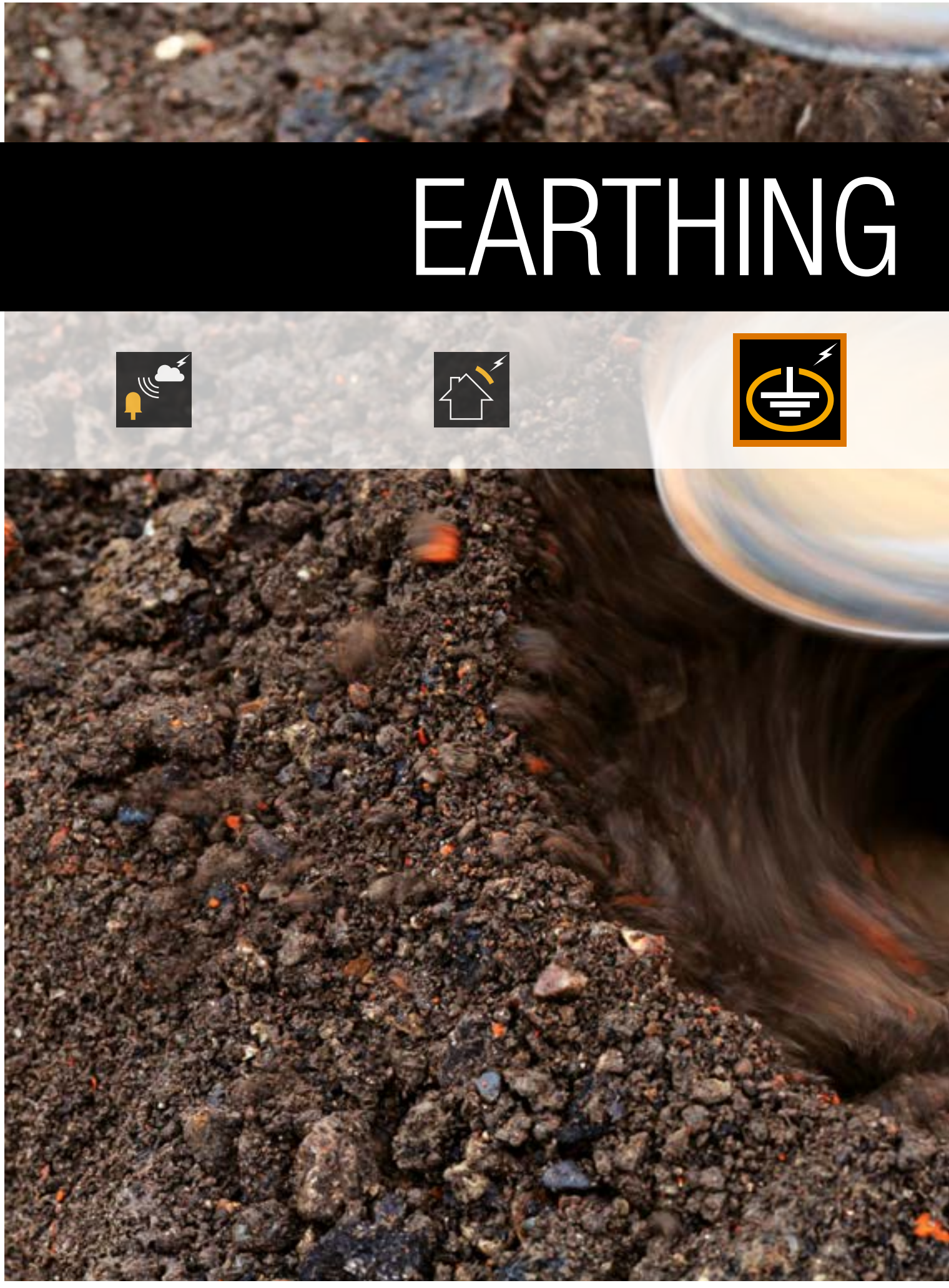
- AT-123D (Cu - copper)
- AT-124D (Al - aluminium)
- AT-126D (GS - galvanized steel)

Solid round conductors coated in PVC are used to blend the down-conductor into the building.

Reference	Dimensions (mm)	Material	Weight (kg/m)
AT-123D	8	Copper	0.50
AT-124D	8	Aluminium	0.15
AT-126D	8	Galvanized steel	0.45
AT-127D	10	Galvanized steel	0.65
Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561			

Other dimensions, please contact us

EARTHING



3



> IMPORTANCE OF A SUITABLE EARTHING

A well designed earthing system is basic for any electrical installation to avoid the danger associated with fault currents, as established in the main earthing standards:

Spain: RBT2002 “Low Voltage Electrotechnical Regulation”. ITC-18 “Earthing systems”.
Great Britain: BS 7430 “Code of practice for Earthing”.
France: NF C 15-100 “Low Voltage Electrical Installations”.
Germany: DIN VDE 0100 Part 540 “Earthing arrangements, protective conductors, equipotential bonding conductors”
USA: UL 467 “Grounding and bonding equipment”.

A LOW VOLTAGE EARTH TERMINATION SYSTEM IS AIMED AT:

> Provide security for persons by limiting the touch voltage.

> Protect installations and equipment by providing a low impedance path.

> Improve the quality of the signal by minimizing the electromagnetic noise.

> Fix a reference voltage for the system equipotentialization.

A low earth resistance is essential for obtaining an efficient earthing. Conductors with an accurate section should be used in order to carry the expected current. Besides, they must be durable against corrosion.

The electrical resistance of the earthing system should be measured isolated from any other conductive element. Therefore, it is necessary to use disconnectors to separate the earthing from the rest of the installation during the measuring process.

OTHER DETERMINING FACTORS WHEN DESIGNING AN EARTHING SYSTEM INCLUDE:

> The resistance should be measured regularly so it is necessary to place an inspection pit.

> The soil humidity will reduce the earthing resistance.

> Earthing enhancing compounds reduce the soil resistivity.

> Buried electricity and gas installations should be known in order to respect the security distances for each case.

> Buried pipes and water tanks should be known in order to bond them equipotentially with the earth termination.

To obtain a suitable earth resistance in earthing systems, special electrodes should be used for low-conductivity soils, enhanced electrodes, deep electrodes or ring conductors should be used in order to obtain a suitable earth resistance.

> SPECIFIC CONSIDERATIONS FOR LIGHTNING PROTECTION

Particularly, the earth termination system is essential for lightning protection, since the lightning current should disperse there. Each down-conductor must have an earthing system, formed by conductive elements in contact with the soil that are able to disperse the lightning current in it.

In order to accomplish with these requirements, standards set as a first specification that the resistance of the LPS earthing should be lower than 10 Ω. On the other hand, it should be noticed that lightning current is an impulse and therefore it is not advisable to use a single, very long element. The employ of deep electrodes is interesting if the resistivity is very high at surface but there are lower layers with much more humidity. Triangle or ‘goose foot’ configurations are suitable for a good lightning current dispersion.

These considerations for improving the impedance should be taken into account when the earthing is made, since normally the measurements are taken afterwards with a conventional earth meter which only measures the earthing resistance, that is, its performance if current were continuous. A high inductance would not be measured by these earth meters and, in any case, it would be a significant obstacle for the passing current if it was an impulse, such as in the case of lightning.

In general, it is advisable to bond the lightning protection earth system with those of the installation in order to avoid surges and dangerous step voltages.

> REGULATIONS

All the earthing materials manufactured by Aplicaciones Tecnológicas comply with the earthing and lightning protection standards. The minimum dimensions specified in these standards are the following:

> EARTHING

RBT ITC-18. Technical Guide for implementing Technical Instruction 18 (earthing systems) of the Spanish Low Voltage Electrotechnical Regulations.

Type of electrode	Material	Minimum dimensions
Earth rod (*)	Copperbond steel (250 µ)	Ø14.2 mm
Earth rod	Galvanized steel (78 µ)	Ø20 mm
Solid plate	Electrolytic copper	1000 x 500 x 2 mm
Solid plate	Galvanized steel (78 µ)	1000 x 500 x 3 mm
Cable	Electrolytic copper	35 mm^2

BS 7430. Code of practice for Earthing.

Type of electrode	Material	Minimum dimensions
Earth rod	Copperbond steel (250 µ)	Ø14 mm x 1.2 m
Earth rod	Electrolytic copper	Ø14 mm x 1.2 m
Earth rod	Stainless steel	Ø16 mm x 1,2 m
Earth rod	Galvanized steel	Ø14 mm x 1.2 m
Tape	Electrolytic copper	25 x 3 mm
Round	Electrolytic copper	Ø8 mm
Cable	Electrolytic copper	50 mm^2

NF C 15-100. Low voltage electrical installations.

Type of electrode	Material	Minimum dimensions
Earth rod	Copperbond steel	Ø15 mm x 2 m
Earth rod	Galvanized steel	Ø25 mm x 2 m
Cable	Electrolytic copper	25 mm^2
Cable	Galvanized steel	95 mm^2

UL 467. Grounding and bonding equipment.

Type of electrode	Material	Minimum dimensions
Earth rod	Copperbond steel (250 µ)	Ø12.7 mm x 2.4 m
Earth rod	Stainless steel	Ø12.7 mm x 2.4 m
Earth rod	Electrolytic copper	Ø12.7 mm x 2.4 m
Tubular earth rod	Electrolytic copper	$Ø_{ext}$ 54 mm x 2.4 m

(*) The minimum thickness of the copper coating the copperbond steel earth rods, as recommended by standard UNE 202006, is 100 µ. Nevertheless, the minimum measure of 250 µ given by the regulation of low voltage is of compulsory compliance.

> LIGHTNING PROTECTION EARTHING

IEC 62305 / EN 62305 / IEC 62561 (EN 50164 before). Protection against lightning.

Type of electrode	Material	Minimum dimensions
Earth rod	Copperbond steel (250 µ)	Ø14 mm
Earth rod	Stainless steel	Ø15 mm
Earth rod	Electrolytic copper	Ø15 mm
Earth rod	Galvanized steel	Ø14 mm
Cross profile earth rod	Galvanized steel	50 x 50 x 3 mm
Tubular earth rod	Electrolytic copper	$Ø_{ext}$ 20 mm
Solid plate	Electrolytic copper	500 x 500 x 1.5 mm
Solid plate	Galvanized steel	500 x 500 x 3 mm
Cable	Electrolytic copper	50 mm^2 (Ø1.7 mm each wire)
Tape	Electrolytic copper	50 mm^2 (min. thickness 2 mm)
Tape	Stainless steel	100 mm^2 (min. thickness 2 mm)
Tape	Galvanized steel	90 mm^2 (min. thickness 3 mm)
Round	Electrolytic copper	Ø8 mm
Round	Copperbond steel (250 µ)	Ø8 mm
Round	Stainless steel	Ø10 mm
Round	Galvanized steel	Ø10 mm

BS 6651. Code of practice for protecting structures against lightning.

Type of electrode	Material	Minimum dimensions
Earth rod	Copperbond steel (250 µ)	Ø14 mm
Earth rod	Stainless steel	Ø12 mm
Earth rod	Electrolytic copper	Ø12 mm
Earth rod	Galvanized steel	Ø14 mm
Tape	Electrolytic copper	20 x 2.5 mm
Tape	Galvanized steel	20 x 2.5 mm
Round	Electrolytic copper	Ø8 mm
Round	Galvanized steel	Ø8 mm

NFPA 780.
Standard for the installation of lightning protection systems.

Type of electrode	Material	Minimum dimensions
Earth rod	Copperbond steel	Ø12.7 mm x 2.4 m
Earth rod	Stainless steel	Ø12.7 mm x 2.4 m
Earth rod	Electrolytic copper	Ø12.7 mm x 2.4 m
Earth rod	Galvanized steel	Ø12.7 mm x 2.4 m
Solid plate	Electrolytic copper	600 x 300 x 0.8 mm
Solid plate	Galvanized steel	600 x 300 x 0.8 mm

> ENHANCED ELECTRODES FOR LOW-CONDUCTIVITY SOILS

133 > APLIROD® DYNAMIC ELECTRODE

A lack of free ions in the surrounding ground is detrimental to the correct performance of the earthing. Earthing systems using dynamic electrodes are based on the contribution of ions to the ground.

The system mainly consists of a copper electrode (**APLIROD®**) filled with a mixture of ionic compounds. The moisture condenser absorbs environmental moisture and dissipates it in the soil surrounding the electrode, adding free ions and gradually lowering the resistivity of the soil.

The effectiveness of this earth electrode is improved by placing a ground conductivity improver, such as **CONDUCTIVER PLUS** (AT-010L) around the electrode.

Soil resistivity and site characteristics are the main factors to be considered when determining the electrode model to use. Where the soil shows a lack of ion presence or the material that may be affected by lightning is extremely sensitive, longer electrodes, several earthing systems, or a combination of both, should be used.

The most appropriate configuration in most cases is a triangular arrangement. Vertical shapes are good to obtain low earth resistance values. L-shape models are better when you cannot make a deep excavation.

INSTALLATION

1. For vertical electrodes, bore a 25 x 25 cm hole x 25 cm in diameter (for the earth pit), and within this another Ø40 mm hole for the Ø28 mm electrodes or Ø75 mm for the Ø54 mm electrodes, with an approximate depth of 10 cm less than the length of the electrode. For the horizontal or L-shape electrodes, bore a trench suitable for the size of the electrode.
2. Remove the covers of the leach holes.
3. Place the electrode in the hole.
4. Fill the hole with the conductive compound **APLIFILL** supplied together with the electrode, mixing it with water outside the excavation and gradually fill it using 1 kilo of **APLIFILL** for every 4 litres of water.
5. Place the earth pit so that the cover remains at surface level. The electrode will hang out by approximately 10 cm over the bottom of the earth pit, leaving the breather holes uncovered.
6. Remove the covers of the upper breather holes.
7. Connect the grounding electrode to the test bonding bar.
8. More electrodes should be placed at regular intervals, interconnected with bare copper cable and buried at least 0.5 m deep. It is advisable to cover the conductor with **APLIFILL**.

APLIROD® APPLICATION

Reference	Dimensions (mm)	Shape	Includes	Material	Weight (kg)
AT-024H	Ø28 x 2000	Vertical	AT-020F + AT-031L	Copper + Salts	4.0
AT-025H	Ø28 x 2500	Vertical	AT-020F + AT-031L	Copper + Salts	4.5
AT-012H	Ø54 x (1000 + 2000)	Horizontal (L-shape)	AT-020F + 2 x AT-032L	Copper + Salts	62.5
AT-030H	Ø54 x (1000 + 3000)	Horizontal (L-shape)	AT-020F + 2 x AT-032L	Copper + Salts	67.0
AT-111H	Ø54 x 2500 (threaded)	Vertical	AT-020F + AT-032L	Copper + Salts	35.0
AT-102H	Ø28 x 2000	Vertical	50 mm² welded cable + AT-031L	Copper + Salts	4.0
AT-103H	Ø28 x 2500	Vertical	50 mm² welded cable + AT-031L	Copper + Salts	4.5
AT-108H	Ø54 x (1000 + 2000)	Horizontal (L-shape)	50 mm² welded cable + 2 x AT-032L	Copper + Salts	62.5
AT-104H	Ø54 x (1000 + 3000)	Horizontal (L-shape)	50 mm² welded cable + 2 x AT-032L	Copper + Salts	67.0
AT-112H	Ø54 x 2500 (threaded)	Vertical	50 mm² welded cable + AT-032L	Copper + Salts	35.0
AT-035H	Ø220 x 190	Load required for APLIROD®		Salts	5.5

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

> ENHANCED ELECTRODES FOR LOW-CONDUCTIVITY SOILS

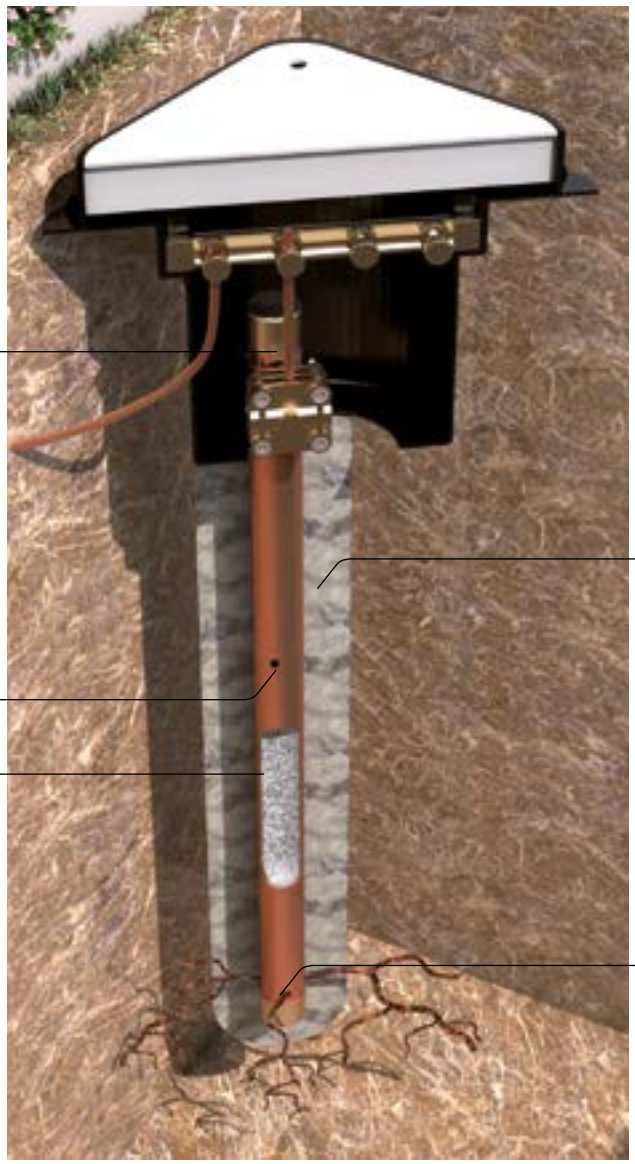
Breather holes

AT-025H

AT-103H

AT-035H

APLIROD® (application)



AT-030H

AT-104H

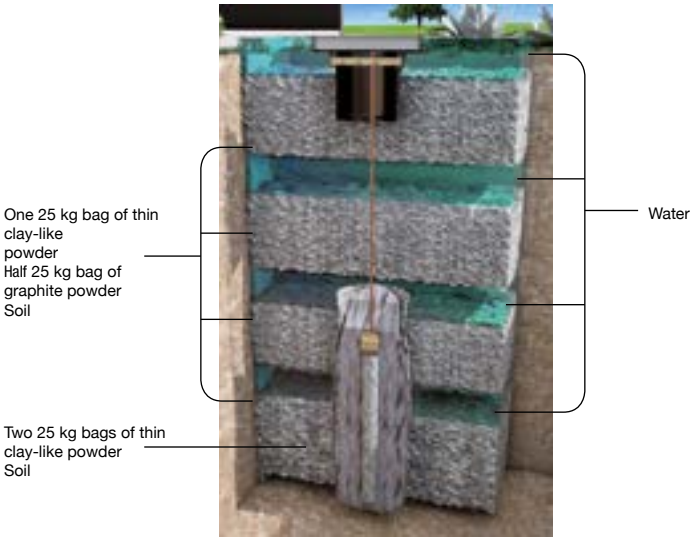
> ENHANCED ELECTRODES FOR LOW-CONDUCTIVITY SOILS

134 > GRAPHITE ELECTRODE

The fact that graphite exhibits high electrical and thermal conductivity and is unassailable and inert to chemical agents (apart from oxygen at a high temperature), makes it a very suitable element for building an earth electrode. The materials used as filling (graphite powder and thin clay-like powder) ensure contact between the electrode and the ground thanks to its capacity to penetrate even cracks in rocks.

Reference	Dimensions (mm)	Shape	Includes	Weight (kg)
AT-070H	Ø150 x 600	Rigid graphite core wrapped in ground enhancing product	AT-028F	10
AT-073H	Ø50 x 1500	Rigid graphite core	AT-028F + AT-032L	35

AT-070H



APPLICATION AT-070H

INSTALLATION

The reference AT-070H consists of a rigid graphite core surrounded by a layer of graphite powder and salts, which whilst helping to avoid mechanical damage during transportation and installation, also improves the conductivity of the electrode. This ensemble is placed into the perforation, which connects to the test bonding bar placed in the earth pit using Ø8-10 mm cable or 30 x 2 mm tape.

In order to optimize its duration and effectiveness, the hole should be filled with a thin clay-like powder and special graphite powder for earthing systems:

Ø200 mm borehole

Machinery needed:
> Drill with Ø200 mm drill bit at least 2 m long.
> Mixer (recommended)

Material:
> 2 kg of graphite powder (AT-020L).
> 6 kg of thin clay-like powder (AT-030L).

Procedure:
1. Make a Ø200 mm borehole with a depth of at least 2 m
2. Connect the necessary length of the Ø8-10 mm cable or the 30 x 2 mm tape to the electrode to be able to subsequently make the connections in the earth pit.
3. In an appropriate container (preferably a mixer), mix the fine clay-like powder (AT-030L) and the graphite powder (AT-020L) with 60 litres of water.
   Note: If a mixer or appropriate tool is not available, the borehole may be filled in batches. For example, the borehole may be filled in four stages, each time using approximately 15 litres of water, 1.5 kg of thin clay-like powder and 0.5 kg of graphite powder.
4. Empty the mixture into the borehole, making sure it reaches the bottom.
5. Place the electrode with the wrapping in the borehole, taking care not to knock it.
6. Carry out the necessary connections in the test bonding bar installed in the earth pit and close it.

1.5 x 1.5 x 2 meter hole

Machinery needed:
> Backhoe

Material:
> Two 25 kg bags of graphite powder (AT-020L)
> Six 25 kg bags of thin clay-like powder (AT-030L)
> Plenty of water

Procedure:
1. Using the backhoe, dig a hole 1.5 m wide and 2 m deep.
2. Mix two bags of thin clay-like powder (AT-030L) and enough earth to sufficiently cover approximately 30 cm of the hole. Fill the bottom of the excavation.
3. Connect the necessary meters of Ø8-10 mm cable or 30 x 2 mm tape to the electrode in order to be able to subsequently carry out the connections in the earth pit.
4. Place the electrode with the wrapping in the borehole, taking care not to knock it.
5. Cover with water until you reach a level of 10 cm (approximately 225 litres of water). Wait a few minutes for the water to filter and the increase in volume of the thin clay-like powder.
6. Continue filling the hole by mixing a bag of thin clay-like powder, half a bag of graphite powder and enough soil to fill another 30 cm in height Empty the mixture into the hole and spread evenly.
7. Repeat steps 5 and 6 until you have used up the thin clay-like powder and the graphite powder.
8. Carry out the necessary connections in the test bonding bar installed in the earth pit and close it.

> EARTH ELECTRODES, GROUND ENHANCING PRODUCTS AND EARTH PITS

135 > 254 µm COPPERBOND EARTH RODS

Aplicaciones Tecnológicas, S.A. uses copperbond earth rods of a high quality which comply with even the most demanding regulations in order to achieve long-lasting earthing. All these earth rods are electrolytically coated with copper which is 254 µm thick and 99.9% pure, with a proven resistance to corrosion. This type of electrolytic coating prevents cracks or fissures, which may be caused in the outer layer of the earth rods with mechanical coating.

Numerous regulations specify that the copper coating on the copperbond earth electrodes should be at least 250 µm:

> BS 7430: Implementation guide for earthing systems (Great Britain)
> UL 467: Grounding and bonding equipment (United States)
> Section 250 of National Electrical Code (NEC) (United States)
> Technical Guide for implementing no. 18 of the Spanish Low Voltage Electrotechnical Regulations
> IEC 62305-3 (international lightning protection standard)
> EN 50164 (IEC 62561-2 (international standard on components of lightning protection systems)

Using the appropriate accessories, threaded copperbond earth rods enable the electrode to extend in order to obtain better earth resistances.

INSTALLATION

The electrodes should be placed at a depth of at least 50 cm.
It is preferable to use several conductors conveniently spread out rather than one very long conductor.
In the case of an earthing system made up of various interconnected electrodes, it is recommended that:

> The buried earth rods must be placed in a triangle or line and spaced out at a distance of at least that of their buried depth.

> The buried earth rods are connected by an identical or compatible conductor to the one used for the down-conductor.

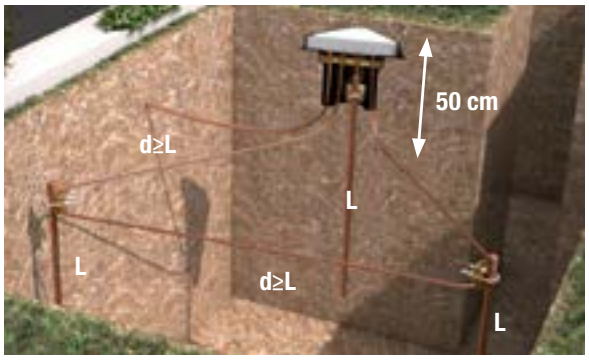
> The conductor joining the earth rod should be buried at a depth of at least 50 cm.

> Apply the ground enhancing product CONDUCTIVER PLUS (AT-010L) to the buried electrodes in order to obtain a lower earth resistance.

Reference	Dimensions (mm)	Ø minimum (mm)	Shape	Weight (kg)
AT-076H	Ø16 x 1200	14.23	Two 5/8” threads	1.50
AT-077H	Ø16 x 1500	14.23	Two 5/8” threads	1.90
AT-078H	Ø16 x 1800	14.23	Two 5/8” threads	2.28
AT-041H	Ø16 x 2000	14.23	Two 5/8” threads	2.53
AT-016H	Ø16 x 2400	14.23	Two 5/8” threads	3.00
AT-098H	Ø16 x 3000	14.23	Two 5/8” threads	3.80
AT-069H	Ø14,23 x 1200	14.23	No thread	1.50
AT-071H	Ø14,23 x 1500	14.23	No thread	1.90
AT-053H	Ø14,23 x 1800	14.23	No thread	2.28
AT-072H	Ø14,23 x 2000	14.23	No thread	2.53
AT-026H	Ø14,23 x 2400	14.23	No thread	3.00
AT-043H	Ø14,23 x 3000	14.23	No thread	3.80
AT-086H	Ø19 x 1200	17.28	Two 3/4” threads	2.15
AT-087H	Ø19 x 1500	17.28	Two 3/4” threads	2.75
AT-017H	Ø19 x 1800	17.28	Two 3/4” threads	3.27
AT-042H	Ø19 x 2000	17.28	Two 3/4” threads	3.62
AT-018H	Ø19 x 2400	17.28	Two 3/4” threads	4.35
AT-019H	Ø19 x 3000	17.28	Two 3/4” threads	5.44
AT-079H	Ø17,28 x 1200	17.28	No thread	2.15
AT-081H	Ø17,28 x 1500	17.28	No thread	2.75
AT-027H	Ø17,28 x 1800	17.28	No thread	3.27
AT-082H	Ø17,28 x 2000	17.28	No thread	3.62
AT-028H	Ø17,28 x 2400	17.28	No thread	4.35
AT-029H	Ø17,28 x 3000	17.28	No thread	5.44
Complies with BS 7430, UL 467, IEC 62305, EN 50164 (IEC 62561), NFPA 780, UNE 21186, NF C 17-102				

Other copper thickness also available. Please contact us.

APPLICATION AT-041H



> ACCESSORIES FOR COPPERBOND EARTH RODS

Reference	Denomination	Dim. (mm)	Material	Weight(g)
AT-002K	5/8” threaded coupling (Ø16 mm)	Ø19 x 70	Gunmetal	124
AT-003K	5/8” threaded driving stud (Ø16 mm)	54 x 22	Stainless steel	60
AT-004K	Threaded clamp 3/4” (Ø19 mm)	Ø24 x 70	Gunmetal	192
AT-005K	Threaded driving stud 3/4” (Ø19 mm)	54 x 25	Stainless steel	130
Complies with EN 50164 (IEC 62562), BS EN 1982				

> EARTH ELECTRODES, GROUND ENHANCING PRODUCTS AND EARTH PITS

136 > SOLID COPPER EARTH RODS

AT-031H

Solid copper rods enable long-lasting earthing in ground with high corrosion levels. Threaded electrodes with the correct accessories enable the length to be increased, thus achieving a better earth resistance.

Reference	Dimensions (mm)	Shape	Weight (kg)
AT-031H	Ø15 x 1200	M10 internal thread	1.63
AT-036H	Ø20 x 1200	M16 internal thread	3.35
Complies with BS 7430, UL 467, IEC 62305, EN 50164 (IEC 62561), NFPA 780, UNE 21186, NF C 17-102			

APPLICATION AT-031H

137 > STAINLESS STEEL EARTH RODS

AT-080H

AT-038H

AT-037H

Stainless steel earth rods enable long-lasting earthing in ground with high corrosion levels. Threaded electrodes with the correct accessories enable the length to be increased, thus achieving a better earth resistance.

Reference	Dimensions (mm)	Shape	Weight (kg)
AT-000H	Ø10 x 1500	No thread	1.50
AT-099H	Ø16 x 1000	No thread	1.60
AT-100H	Ø16 x 1500	No thread	2.20
AT-080H	Ø16 x 2000	No thread	3.33
AT-038H	Ø20 x 1500	Extendible type Z	3.75
AT-037H	Ø16 x 1200	M10 internal thread	1.65
Complies with BS 7430, UL 467, IEC 62305, EN 50164 (IEC 62561), NFPA 780, UNE 21186, NF C 17-102			

APPLICATION AT-038H

138 > ACCESSORIES FOR SOLID COPPER AND STAINLESS STEEL EARTH RODS

AT-006K

AT-008K

AT-007K

AT-067K

Reference	Denomination	Dimensions (mm)	Material	Weight (g)
AT-006K	15/16 mm driving stud	Ø14 x 39	Stainless steel	40
AT-007K	15/16 mm spike	Ø14 x 42	Stainless steel	40
AT-008K	M10 Coupling dowel	Ø10 x 40	Stainless steel	20
AT-086K	M16 Coupling dowel	Ø15 x 40	Stainless steel	40
AT-009K	20 mm driving stud	Ø19 x 42	Stainless steel	60
AT-042K	20 mm spike	Ø19 x 55	Stainless steel	80
AT-067K	Z and S type driving studs	Ø19 x 42	Stainless steel	60
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102				

> EARTH ELECTRODES, GROUND ENHANCING PRODUCTS AND EARTH PITS

139 > GALVANIZED STEEL EARTH RODS

Galvanized steel earth rods are a good option to obtain a good earth resistance in unaggressive ground. There are extendible models to reach longer lengths and achieve better earth resistances.

Reference	Dimensions (mm)	Shape	Weight (kg)
AT-039H	Ø16 x 1000	No thread	1.65
AT-044H	Ø16 x 1500	No thread	2.53
AT-045H	Ø16 x 2000	No thread	3.42
AT-046H	Ø20 x 1500	Extendible type Z	3.71
AT-003H	Ø20 x 1500	Extendible type S	3.71
AT-047H	Ø25 x 1500	Extendible type Z	5.62
AT-049H	Ø25 x 1500	Extendible type S	5.62
AT-093H	1000 x 50 x 50 x 5	X-shape profile	3.90
AT-094H	1500 x 50 x 50 x 5	X-shape profile	5.85
AT-095H	2000 x 50 x 50 x 5	X-shape profile	7.81
AT-096H	2500 x 50 x 50 x 5	X-shape profile	9.75
AT-097H	3000 x 50 x 50 x 5	X-shape profile	11.75
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102			

AT-045H

AT-046H

AT-095H

APPLICATION AT-003H

APPLICATION AT-095H

> ACCESSORIES FOR GALVANIZED STEEL EARTH RODS

Reference	Denomination	Dimensions (mm)	Material	Weight (g)
AT-037K	Impact tip for Ø20 mm earth rods	Ø20 x 40	Galvanized steel	50
AT-038K	Impact tip for Ø25 mm earth rods	Ø25 x 45	Galvanized steel	70
AT-067K	Z and S type driving studs	Ø19 x 42	Stainless steel	60
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102				

AT-037K

AT-067K

140 > GOOSE FOOT

The goose foot is a configuration recommended by lightning protection standards UNE 21186 and NF C 17-102 in order to obtain low inductance in the earthing system. It consists of 30 x 2 mm tin-plated copper tape.

INSTALLATION

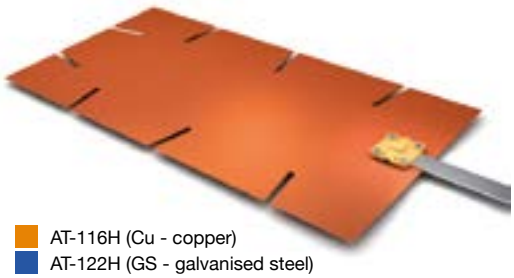
> Make trenches at least half a meter deep.
> Extend the tape and cut the lengths required.
> Unscrew the clamp and insert the stretches of tape as indicated in the drawing at a 45º angle.
> Attach the clamp screws.

Reference	Dimensions (mm)	Material	Weight (kg)
AT-000K	30 x 2 mm (4 m + 3 x 7 m)	Tin-plated copper tape	13
AT-001K	30 x 2 mm (1 m + 3 x 3 m)	Tin-plated copper tape	5
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102			

AT-000K

> EARTH ELECTRODES, GROUND ENHANCING PRODUCTS AND EARTH PITS

141 > EARTH PLATES



AT-116H (Cu - copper)
AT-122H (GS - galvanised steel)

The use of earth plates as electrodes significantly reduces the resistance of earthing in stony grounds, as it increases the area of contact between the electrode and the ground.

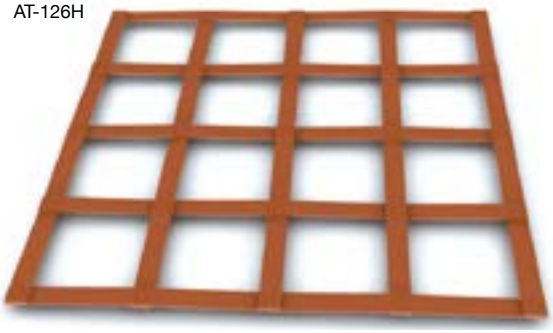
The references AT-116H and AT-122H comply with the minimum dimensions recommended in the Technical Guide for implementing no. 18 of the Spanish Low Voltage Electrotechnical Regulations of 2002.

Reference	Dimensions (mm)	Includes	Material	Weight (kg)
AT-050J	500 x 500 x 2	AT-020F	Copper	4
AT-116H	1000 x 500 x 2	AT-020F	Copper	8
AT-117H	600 x 600 x 1.5	AT-020F	Copper	5
AT-118H	600 x 600 x 3	AT-020F	Copper	10
AT-119H	900 x 900 x 1.5	AT-020F	Copper	11
AT-120H	900 x 900 x 3	AT-020F	Copper	22
AT-121H	500 x 500 x 3	AT-046C	Galvanized steel	4
AT-122H	1000 x 500 x 3	AT-046C	Galvanized steel	8
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102				

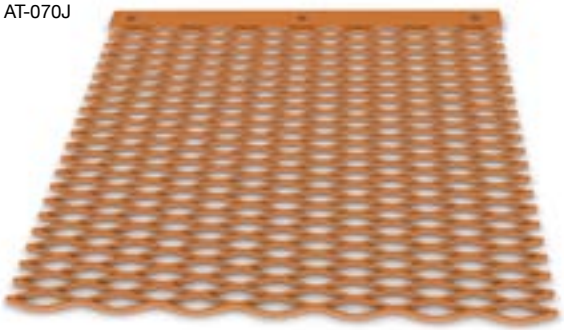
142 > COPPER LATTICES AND GRIDS

Mesh earthing systems are a more cost-effective option than earth plates and still work well in stony ground, reducing the step or contact voltages that may occur. AT-070J is recommended to avoid step voltages in public buildings with low resistivity soil.

AT-126H



AT-070J



Reference	Dimensions (mm)	Grille	Weight (kg)
AT-128H	1000 x 1000 x 2	115 x 55 mm	3.0
AT-123H	2000 x 1000 x 2	115 x 55 mm	4.0
AT-070J	3000 x 1000 x 2	115 x 55 mm	5.0
AT-126H	600 x 600 x 3	120 x 120 mm	4.0
AT-125H	900 x 900 x 3	190 x 190 mm	7.3
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102			

> EARTH ELECTRODES, GROUND ENHANCING PRODUCTS AND EARTH PITS

143 > JOINT PROTECTION

Strips to protect buried connections from corrosion.

Reference	Dimensions	Material	Weight (g)
AT-000J	20 mm x 10 m roll	Self-vulcanizing strip	180
AT-010J	50 mm x 10 m roll	Denso tape (Bituminous strip)	610
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102			

AT-000J

AT-010J

144 > EARTH PITS

Aplicaciones Tecnológicas earth pits cover all industrial and commercial applications as they are available in 3 materials: polypropylene, concrete and cast iron.

AT-010H can withstand 5,000 kg loads. The main advantage of this earth pit is:

> Designed to facilitate handling and storage.

> Good resistance to chemical substances.

> Resistant to UV rays.

> Attached using two individual screws

AT-010H

AT-010K

Reference	Dimensions (mm)	Material	Weight (kg)
AT-010H	250 x 250 x 250	Polypropylene	1.5
AT-010K	410 x 410 x 300	Concrete	60.0
AT-012K	390 x 390 x 30	Iron cast	8.9
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102			

AT-012K

> EARTH ELECTRODES, GROUND ENHANCING PRODUCTS AND EARTH PITS

145 > CONDUCTIVER PLUS

AT-010L

CONDUCTIVER PLUS is a ground enhancing gel with low solubility which is, nonetheless, very hygroscopic. It is made of an electrolyte base, which contributes to the conductivity of the mixture.

The conductivity of the ground is almost exclusively of an electrolytic nature due to the salts dispersed in the water which impregnate it and concentrate on the surface due to adhesion of the sand grains and clay in the ground.

It is therefore possible to increase the conductivity of the ground, improving its absorption power, water retention and increasing its concentration of soluble salts.

It would be very easy to achieve this effect using a simple method, impregnating the ground with any electrolyte, such as common salt (NaCl) or sodium carbonate (Na_2CO_3). However, the high solubility of these salts, as well as their low absorption in the ground mean that they are quickly swept away by the infiltration waters and, as a result, their effect is very short term. Another inconvenience of common salts is their corrosive effect on the earthing electrodes.

The components of the **CONDUCTIVER PLUS** gel have been selected according to their solubility, in order to obtain a low soluble product from the soluble components, which will provide us with a long-lasting conductive material deposit. **The main advantage of this product is that a gel is formed below the soil near the electrode.**

EMPLOYMENT MODE

1. The ground can be dry. No previous preparation is necessary.
2. Prepare a solution of the yellow product in 5 litres of water using the measuring container.
3. Pour the first solution into the ground and add another 5 litres of water.
4. Let the product completely disappear into the ground.
5. Clean the container of any residue before continuing with the next product.
6. Prepare a second solution with the white product and 5 litres of water. Pour this mixture evenly onto the ground. Add another 5 litres of water. Leave to filter until complete absorption.
7. Once the second product has filtered, the earth resistance measurement can then be taken.

In summary, the **CONDUCTIVER PLUS** is characterised by:

> Its capacity to create partially ionized electrolytes, with a high charge and capacity to retain water and form gels.

> Remaining in the ground for a long time, thanks to the formation of bonds with the particles.

> Increasing the conductivity of the ground for one year (considering rainfall of 700 litres/m^2).

> Not causing corrosion of the earth electrodes.

> Being totally ecological.

Reference	Denomination	Description	Weight (kg)
AT-010L	CONDUCTIVER PLUS	Non-corrosive and ecological gel that improves soil conductivity	4.5

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

> EARTH ELECTRODES, GROUND ENHANCING PRODUCTS AND EARTH PITS

146 > APLICEM

In high resistivity soils it is necessary to use a specific material to obtain a suitable grounding resistance.

APLICEM ground enhancing cement improves grounding effectiveness around any type of earthing rod.

This product is very useful in industries that require a low grounding resistance such as computer installations, radio frequency facilities and substations etc.

APLICEM increases the conductive surface of the earth electrode, reducing the earthing resistance of the loose electrode.

Additionally, resistance remains stable regardless of soil moisture

Therefore, costs are reduced as it requires fewer boreholes for appropriate resistance.

Moreover, as it is an inert material, it prevents any corrosion forming on the electrode.

AT-034L

INSTALLATION

APLICEM ground enhancing cement is supplied in 11.5 kg bags, and is to be mixed with 5 litres of water. The bag contains two parts: the conductive mixture and the cement.

It is installed as filling or resistance improver with two applications:

1. Vertical boreholes: for filling the ground around the electrode, increasing its size and thus reducing the earthing resistance.

> Make the borehole with the required dimensions.
> Mix the cement included in the **APLICEM** conductive mixture bag with water.
> Pour water into the ground to moisten the soil and insert the electrode.
> Fill the rest of the hole with **APLICEM**, stirring the electrode to ensure even coverage.

2. Trenches: for filling the ground around the conductor in order to prevent the corrosion of the conductor and preserve the obtained resistance.

> Dig the trench with the dimensions that are required
> Mix the cement included in the **APLICEM** conductive mixture bag with water.
> Cover the bottom of the trench with **APLICEM** until achieving a thickness of at least 5 cm.
> Place the conductor on the **APLICEM** layer.
> Cover the conductor with **APLICEM** until achieving a thickness of at least 5 cm.
> Let the mixture harden before filling the rest of the trench.

Number of APLICEM bags for backfilling around earth rods

Øhole	Depth						
	1.5 m	2 m	2.5 m	3 m	4 m	5 m	6 m
7.5 cm	2	2	2	2	4	4	4
10.0 cm	2	3	3	3	6	7	7
12.5 cm	3	4	4	5	9	10	10
15.0 cm	5	5	6	7	13	14	15
17.5 cm	6	7	8	9	17	19	20
20.0 cm	8	9	11	12	22	25	26
22.5 cm	10	12	13	15	28	31	32
25.0 cm	12	14	16	18	34	38	40

Meters of trench for each **APLICEM** bag:

Trench Width	**APLICEM** total thickness (cm)			
	2.5	5	7.5	10
10 cm	4.30 m	2.10 m	1.40 m	1.00 m
15 cm	2.80 m	1.40 m	0.90 m	0.70 m
20 cm	2.10 m	1.00 m	0.70 m	0.60 m
25 cm	1.70 m	0.80 m	0.60 m	0.40 m
30 cm	1.40 m	0.70 m	0.50 m	0.35 m

APLICEM allows rapid and versatile installation, maintains a constant volume. It does not filter through the ground, therefore its resistivity values remain constant. It is not corrosive for the conductor, reduces installation and maintenance costs and is easily stored for long periods.

Reference	Denomination	Description	Weight (kg)
AT-034L	APLICEM	Ground enhancing cement for improving grounding effectiveness	11.5

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

> EARTH ELECTRODES, GROUND ENHANCING PRODUCTS AND EARTH PITS

147 > APLIFILL AND OTHER GROUND ENHANCING PRODUCTS

APLIFILL is a highly hygroscopic compound, and therefore retains the moisture around the electrode if we use it to fill the excavation made for soil replacement.

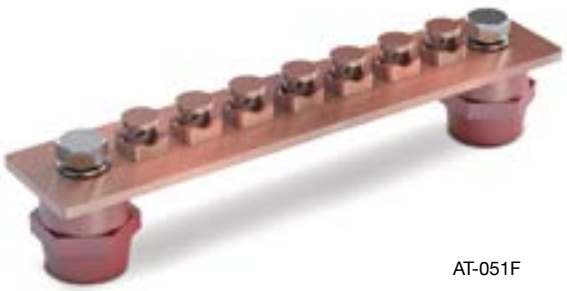
AT-032L

Reference	Denomination	Description	Weight (kg)
AT-020L	Graphite powder	Backfill specifically for earthing systems	25
AT-030L	Thin clay-like powder	Backfill specifically for earthing systems	25
AT-031L	APLIFILL	Compound that reduces soil resistivity by retaining moisture	1
AT-032L	APLIFILL	Compound that reduces soil resistivity by retaining moisture	25
AT-0205L	Graphite powder	Backfill specifically for earthing systems	5
AT-0305L	Thin clay-like powder	Backfill specifically for earthing systems	5
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102			

> EQUIPOTENTIAL BONDING

148 > BONDING BARS FOR EARTH PITS

AT-020H (NB - naval brass)
AT-021J (SS - Stainless steel)



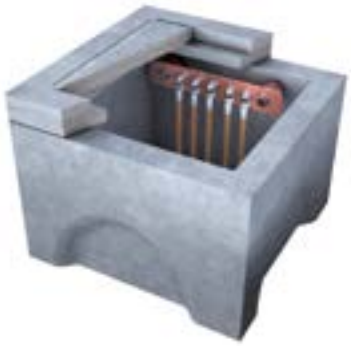
AT-051F

AT-020H and AT-021J enable the down-conductor of the lightning protection system to disconnect from the earth electrode in order to correctly measure the earth resistance. They are ready to be fixed to the AT-010H earth pit. Up to 4 copper cables or round bars and 3 tapes can be connected.

AT-051F enables up to 7 copper cables or round bars to be connected. The isolators at the end of the bar are separated by 264 mm and have a M10 thread.

AT-006J enables up to 5 conductors to be connected by table 151 terminals. This equipotential bar can be attached to the AT-010K earth pit (Table 144).

APPLICATION AT-020H



APPLICATION AT-006J

Reference	Dimensions (mm)	Conductor dimension range		Material	Weight (kg)
		Round	Tape		
AT-020H	235 x 40 x 25	4 x (Ø8 - 10 mm) (50 - 70 mm²)	3 x (30 x 2 mm - 30 x 3.5 mm)	Naval brass	0.50
AT-021J	235 x 40 x 25	4 x (Ø8 - 10 mm) (50 - 70 mm²)	3 x (30 x 2 mm - 30 x 3.5 mm)	Stainless steel	0.50
AT-051F	325 x 70 x 6	7 x (Ø8 - 10 mm) (50 - 70 mm²)	-	Copper	1.50
AT-006J	300 x 64 x 53	5 M10 screws		Copper	1.11
IEC 62305, IEC 62561, UNE 21186, NF C 17-102					

149 > EQUIPOTENTIAL BONDING BAR

Equipotential bar enabling several conductors to be connected to each other (cable, tape, round bar). The attachment holes at the end of the bar are separated by 164 x 35 mm and have a diameter of 8.5 mm.

APPLICATION AT-050F

Reference	Dimensions (mm)	Conductor dimension range		Material	Weight (g)
		Round	Tape		
AT-050F	190 x 52 x 42	6 x (2.5 - 25 mm²) / 2 x (Ø8 - 10 mm)	30 x 2 mm - 30 x 3.5 mm	Tin-plated copper (contact bar)	200
Complies with BS 2874					

> EQUIPOTENTIAL BONDING

150 > EARTH BARS

AT-053J

AT-055J

AT-054J (Cu - copper)
AT-116J (SS - Stainless steel)

AT-057J

AT-056J

APPLICATION AT-054J

Equipotential bars enable connection of various cables or round conductors with tin-plated copper connection terminals (for instance, AT-021K) carried out using 50 x 5 mm tape.

Reference	Denomination	Dimensions (mm)	Conductor connections	Material	Weight (kg)
AT-053J	Insulator	Ø36 x 51	M10 screw	Polyester	0.12
AT-150J	4 way earth bar	300 x 90 x 90	M10 screw	Copper	1.40
AT-054J	6 way earth bar	400 x 90 x 90	M10 screw	Copper	1.80
AT-116J	6 way earth bar	400 x 90 x 90	M10 screw	Stainless steel	1.00
AT-055J	6 way earth bar with single disconnecting link	475 x 90 x 96	M10 screw	Copper	2.30
AT-056J	6 way earth bar with twin disconnecting links	550 x 90 x 96	M10 screw	Copper	2.80
AT-057J	Disconnecting link	125 x 90 x 90	M10 screw	Copper	0.60
AT-058J	8 way earth bar	500 x 90 x 90	M10 screw	Copper	2.20
AT-117J	8 way earth bar	500 x 90 x 90	M10 screw	Stainless steel	1.20
AT-020J	8 way earth bar with single disconnecting link	575 x 90 x 96	M10 screw	Copper	2.70
AT-079J	8 way earth bar with twin disconnecting links	650 x 90 x 96	M10 screw	Copper	3.20
AT-090J	10 way earth bar	600 x 90 x 90	M10 screw	Copper	2.80
AT-118J	10 way earth bar	600 x 90 x 90	M10 screw	Stainless steel	1.40
AT-062J	10 way earth bar with single disconnecting link	675 x 90 x 96	M10 screw	Copper	3.30
AT-063J	10 way earth bar with twin disconnecting links	750 x 90 x 96	M10 screw	Copper	3.80
AT-064J	12 way earth bar	700 x 90 x 90	M10 screw	Copper	3.20
AT-119J	12 way earth bar	700 x 90 x 90	M10 screw	Stainless steel	1.60
AT-065J	12 way earth bar with single disconnecting link	775 x 90 x 96	M10 screw	Copper	3.70
AT-066J	12 way earth bar with twin disconnecting links	850 x 90 x 96	M10 screw	Copper	4.20
AT-067J	14 way earth bar	800 x 90 x 90	M10 screw	Copper	3.60
AT-068J	14 way earth bar with single disconnecting link	875 x 90 x 96	M10 screw	Copper	4.10
AT-069J	14 way earth bar with twin disconnecting links	950 x 90 x 96	M10 screw	Copper	4.60
AT-059J	16 way earth bar	900 x 90 x 90	M10 screw	Copper	4.00
AT-071J	16 way earth bar with single disconnecting link	975 x 90 x 96	M10 screw	Copper	4.50
AT-072J	16 way earth bar with twin disconnecting links	1050 x 90 x 96	M10 screw	Copper	5.00
AT-073J	18 way earth bar	1000 x 90 x 90	M10 screw	Copper	4.40
AT-074J	18 way earth bar with single disconnecting link	1075 x 90 x 96	M10 screw	Copper	4.90
AT-075J	18 way earth bar with twin disconnecting links	1150 x 90 x 96	M10 screw	Copper	5.40
AT-076J	20 way earth bar	1100 x 90 x 90	M10 screw	Copper	5.00
AT-077J	20 way earth bar with single disconnecting link	1175 x 90 x 96	M10 screw	Copper	5.50
AT-078J	20 way earth bar with twin disconnecting links	1250 x 90 x 96	M10 screw	Copper	6.00

Complies with UNE 21186, NF C 17-102, IEC 62305, IEC 62561

> EQUIPOTENTIAL BONDING

151 > TIN-PLATED COPPER COMPRESSION TERMINALS

Copper compression terminals to correctly connect cable with screw-nut connections.

Reference	Cable dimensions (mm²)	Screw size	Weight (g)
AT-091K	10	M5	2.2
AT-092K	10	M6	2.0
AT-015K	16	M6	5.0
AT-016K	16	M8	4.0
AT-017K	25	M8	8.0
AT-018K	25	M10	9.0
AT-019K	35	M8	10.0
AT-020K	35	M10	9.0
AT-093K	50	M10	15.0
AT-021K	50	M12	14.0
AT-022K	70	M10	22.0
AT-023K	70	M12	20.0
AT-094K	95	M10	28.0
AT-024K	95	M12	25.0
AT-070K	120	M12	44.5
AT-028K	120	M16	41.0
AT-061K	150	M12	56.0
AT-030K	150	M16	53.0
AT-095K	185	M12	67.0
AT-031K	185	M16	63.0
AT-072K	240	M12	117.0
AT-032K	240	M16	112.0

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

Other dimensions, please contact us

AT-021K

152 > EARTH POINTS

Equipotential earth points which are fixed to the structure to provide attachment points for the earthing conductors.

Reference	Denomination	Dimensions (mm)	Material	Weight (g)
AT-096J	1 hole (M8 x 15 mm)	Ø33 x 80	Gunmetal	140
AT-097J	2 holes (M8 x 12 mm)	80 x 63 x 63	Gunmetal	280
AT-098J	4 holes (M8 x 14 mm)	80 x 63 x 63	Gunmetal	410
AT-099J	1 hole (M8 x 15 mm) with 500 mm tail, 70 mm²	Ø33 x 80	Gunmetal / PVC coated copper	560
AT-100J	2 holes (M8 x 12 mm) with 500 mm tail, 70 mm²	80 x 63 x 63	Gunmetal / PVC coated copper	840
AT-101J	4 holes (M8 x 14 mm) with 500 mm tail, 70 mm²	80 x 63 x 63	Gunmetal / PVC coated copper	1140

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

AT-096J

AT-097J

AT-098J

AT-100J

APPLICATION AT-100J

> EQUIPOTENTIAL BONDING

153 > EARTH BOSS

Earth boss for metal structure. M10 thread.

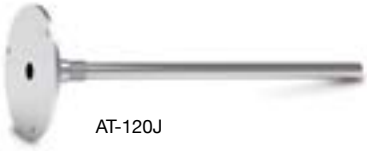
Reference	Dimensions	Material	Weight (g)
AT-102J	50 x 50 x 65 mm	Mild steel	800
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102			

AT-102J

154 > FIXED EARTHING TERMINAL

Terminal which is attached to the structure to provide accessible earth point. M10 thread.

Reference	Dimensions	Material	Weight (g)
AT-120J	Ø80 x 200 mm	Stainless steel	300
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102			



AT-120J

155 > DISTANCE HOLDER

Allows the use of galvanized steel tape as a ground conductor at foundation level.

Reference	Dimensions (mm)	Conductor dimension range		Material	Weight (g)
		Round	Tape		
AT-036K	280 x 35 x 8	Ø8 - 10 mm / 50 - 70 mm²	30 x 2 mm - 40 x 3.5 mm	Galvanized steel	80
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102					

APPLICATION AT-036K

156 > TAPE SUPPORT

Allows the formation of an equipotential ring using tape conductor.

APPLICATION AT-040K (GS - galvanized steel)
AT-039K (Cu - copper)
AT-041K (SS - stainless steel)

Reference	Dimensions (mm)	Conductor dimension range	Material	Weight (g)
		Tape		
AT-033K	60 x 36 x 27	30 x 2 mm - 50 x 6 mm	Copper	120
AT-034K	60 x 36 x 27	30 x 2 mm - 50 x 6 mm	Galvanized steel	120
AT-035K	60 x 36 x 27	30 x 2 mm - 50 x 6 mm	Stainless steel	120
AT-039K	70 x 40 x 27	30 x 2 mm - 50 x 11 mm	Copper	120
AT-040K	70 x 40 x 27	30 x 2 mm - 50 x 11 mm	Galvanized steel	120
AT-041K	70 x 40 x 27	30 x 2 mm - 50 x 11 mm	Stainless steel	120
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102				

> EQUIPOTENTIAL BONDING

157 > SPARK GAP FOR EARTH BONDING

AT-050K

Reference	Dimensions (mm)	Conductor dimension range		Material	Weight (kg)
		Round	Tape		
AT-050K	216 x 57 x 38	Ø8 - 10 mm (50 - 70 mm^2)	3 x (30 x 2 mm - 30 x 3.5 mm)	Naval brass (contact)	1

The lightning protection regulations earth connections, i.e. those relating to both the earthing system and the lightning protection system. In this way, we avoid serious problems due to resistive earth couplings.

However, on some occasions this connection cannot be made as, for example, it may cause corrosion problems. In these cases, the AT-050K is the most appropriate means of joining the different earth connections.

In normal conditions, this protector keeps the earth connections isolated, thus avoiding corrosion problems. When a discharge occurs and the voltage increases in the earth connections, the spark gap will activate, directly joining the earth connections and thus preventing current passing from one to another through equipment or internal installations.

> INSTALLATION

The protector has two AT-020F clamps for installation. It is advisable to carry out installation in a specific earth pit.

APPLICATION AT-050K

> TECHNICAL DATASHEET

Lightning impulse current (10/350μs wave):	I_p (10/350 μs) > 100 kA
Nominal discharge current:	I_n(8/20 μs) = 50 kA
Protection level 1.2/50 μs wave):	U_p < 4 kV
Working temperature:	-55 °C to +85 °C
Dimensions:	Ø32 x 40 mm
Connections:	SPCR: clamp for Ø8 - 10 mm round bar or 30 x 2 mm / 25 x 3 mm tape
Material	Polyurethane resin
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102	

> EARTH CLAMPING

158 > MULTIPURPOSE CLAMP

AT-090H
(APPLICATION WITH CABLE)

AT-090H
(APPLICATION WITH TAPE)

Earth clamp for connection between cable, round bar or copper tape and copper or copperbond earth rods.

Reference	Dimensions (mm)	Range			Material	Weight (g)
		Earth rod	Round	Tape		
AT-090H	52 x 41 x 30	Ø14 - 19 mm	Ø8 - 10 mm (50 - 70 mm²)	30 x 2 mm - 30 x 3.5 mm	Naval brass	240

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

159 > ROD TO TAPE A CLAMP

AT-080J

APPLICATION AT-080J

Earth clamp for connection between copper tape and copper or copperbond earth rods.

Reference	Dimensions (mm)	Range		Material	Weight (g)
		Earth rod	Tape		
AT-080J	51 x 36 x 18	Ø12 - 20 mm	25 x 3 mm - 26 x 12 mm	Gunmetal	150
AT-081J	44 x 51 x 22	Ø16 - 20 mm	30 x 2 mm - 40 x 12 mm	Gunmetal	240
AT-082J	47 x 69 x 21	Ø16 - 20 mm	50 x 6 mm - 51 x 12 mm	Gunmetal	300

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102, BS EN 1982

160 > ROD TO CABLE G CLAMP

- AT-083J (Gu - gunmetal)
- AT-112J (GS - galvanized steel)

APPLICATION AT-083J

Earth clamp for connection between cable or round bar and earth rod.

Reference	Dimensions (mm)	Range		Material	Weight (g)
		Earth rod	Round		
AT-083J	41 x 21 x 18	Ø16 mm	16 - 50 mm²	Gunmetal	60
AT-112J	41 x 21 x 18	Ø16 mm	16 - 70 mm²	Galvanized steel	60
AT-086J	48 x 30 x 19	Ø20 mm	35 - 95 mm²	Gunmetal	60

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102, BS EN 1982

> EARTH CLAMPING

161 > U-BOLT ROD E CLAMP

AT-087J

APPLICATION AT-087J

Earth clamp for connection between copper tape and earth rods or metal re-bars.

Reference	Range		Material	Weight (g)
	Earth rod	Tape		
AT-087J	Ø16 mm	25 x 3 mm	Gunmetal	260
AT-088J	Ø20 mm	25 x 3 mm	Gunmetal	260
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102, BS EN 1982				

162 > ROD TO CABLE CGUV CLAMP

APPLICATION AT-089J

Earth clamp for connection between copper cable or round bar and earth rods or metal re-bars.

Reference	Range		Material	Weight (g)
	Earth rod	Round		
AT-089J	Ø14 - 20 mm	2 x (50 - 120 mm²)	Naval brass	250
AT-092J	Ø14 - 20 mm	2 x (150 - 300 mm²)	Naval brass	240
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102				

163 > ROD TO CABLE LUG B CLAMP

AT-093J

APPLICATION AT-093J

Earth clamp for connection between copper cable with copper compression terminal (table 151) and copper or copperbond earth rods.

Reference	Dimensions (mm)	Range		Material	Weight (g)
		Earth rod	Round		
AT-093J	52 x 26 x 25	Ø16 mm	M10 screw	Gunmetal	300
AT-095J	50 x 29 x 28	Ø20 mm	M10 screw	Gunmetal	300
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102, BS EN 1982					

> EARTH CLAMPING

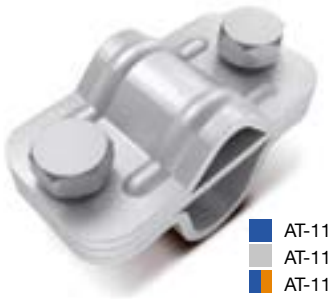
164 > DISCONNECTING SLEEVE

AT-135J

Linear earth clamp for connection between galvanized steel round bar and galvanized steel earth rods.

Reference	Dimensions (mm)	Range		Material	Weight (g)
		Earth rod	Round		
AT-135J	43 x 41 x 30	Ø16 mm	Ø7 - 10 mm (35 - 70 mm²)	Galvanized steel	120
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102					

165 > UNIVERSAL DISCONNECTING CLAMP FOR CABLE



AT-114J (GS - galvanized steel)
AT-115J (SS - stainless steel)
AT-113J (GS / Cu - galvanized steel/copper)

APPLICATION AT-114J

Earth clamp for connection between cable or round bar and galvanized steel or Stainless steel earth rods.

Reference	Dimensions (mm)	Range		Material	Weight (g)
		Earth rod	Round		
AT-113J	58 x 30 x 20	Ø16 mm (Galvanized steel)	Ø8 - 10 mm (50 - 70 mm²) (copper)	Bimetal	150
AT-114J	58 x 30 x 20	Ø16 mm	Ø8 - 10 mm (50 - 70 mm²)	Galvanized steel	150
AT-115J	58 x 30 x 20	Ø16 mm	Ø8 - 10 mm (50 - 70 mm²)	Stainless steel	100
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102					

166 > UNIVERSAL CLAMP

AT-025F (SS - stainless steel)
AT-127J (Cu - copper)
AT-128J (GS - galvanized steel)

APPLICATION AT-025F

L or cross-shape earth clamp for connection between cable or round bar and earth rod.

Reference	Dimensions (mm)	Range		Material	Weight (g)
		Earth rod	Round		
AT-126J	70 x 70 x 80	Ø15 - 25 mm	Ø8 - 10 mm (50 - 70 mm²)	Galvanized steel	380
AT-025F	48 x 44 x 20	Ø16 mm	Ø8 - 10 mm (50 - 70 mm²)	Stainless steel	130
AT-127J	48 x 44 x 20	Ø16 mm	Ø8 - 10 mm (50 - 70 mm²)	Copper	130
AT-128J	48 x 44 x 20	Ø16 mm	Ø8 - 10 mm (50 - 70 mm²)	Galvanized steel	130
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102					

> EARTH CLAMPING

167 > T AND L CLAMP

APPLICATION AT-015J (GS - galvanized steel)
AT-017J (Cu - copper)
AT-016J (SS - stainless steel)

AT-136J (GS - galvanized steel)
AT-137J (SS - stainless steel)
AT-138J (Cu - copper)

T and L-shape earth clamp for connection between cable, round bar or tape and earth rod.

Reference	Dimensions (mm)	Range			Material	Weight (g)
		Earth rod	Round	Tape		
AT-136J	60 x 60 x 22	Ø16 mm	Ø8 - 10 mm (50 - 70 mm²)	-	Galvanized steel	330
AT-137J	60 x 60 x 22	Ø16 mm	Ø8 - 10 mm (50 - 70 mm²)	-	Stainless steel	330
AT-138J	60 x 60 x 22	Ø16 mm	Ø8 - 10 mm (50 - 70 mm²)	-	Copper	330
AT-015J	60 x 60 x 19	Ø16 mm	-	30 x 2 mm - 30 x 3.5 mm	Galvanized steel	330
AT-016J	60 x 60 x 19	Ø16 mm	-	30 x 2 mm - 30 x 3.5 mm	Stainless steel	330
AT-017J	60 x 60 x 19	Ø16 mm	-	30 x 2 mm - 30 x 3.5 mm	Copper	330

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

168 > CONNECTING CLAMP

APPLICATION AT-130J

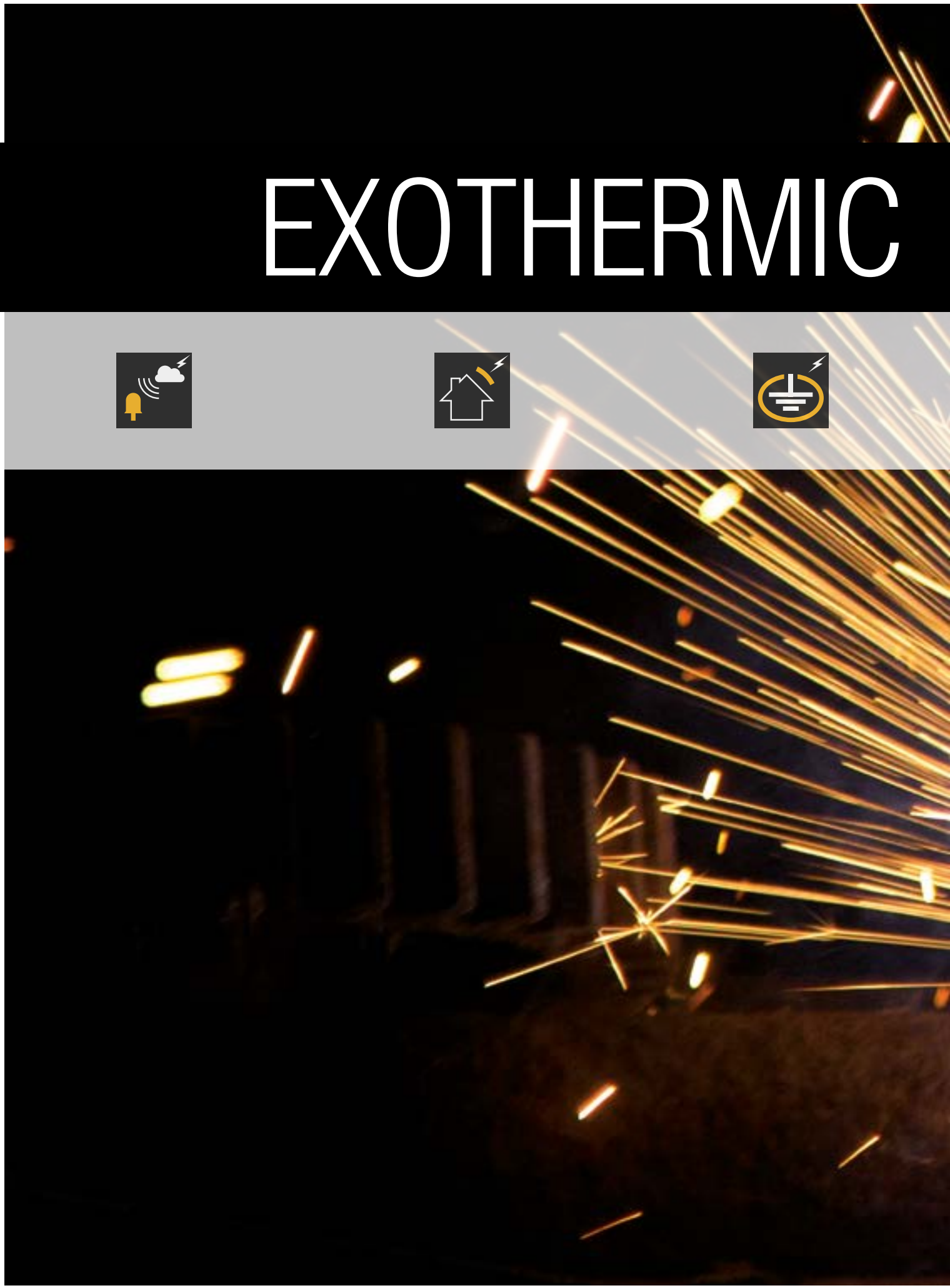
AT-130J (GS - galvanized steel)
AT-133J (SS - stainless steel)

Cross-shape earth clamp for connection between cable, round bar or tape and earth rod.

Reference	Dimensions (mm)	Range		Material	Weight (g)
		Earth rod	Round/Tape		
AT-129J	108 x 30 x 22	Ø20 mm	Ø8 - 10 mm (50 - 70 mm²) / 30 x 2 mm - 30 x 3.5 mm	Galvanized steel	370
AT-130J	108 x 30 x 18	Ø16 mm	Ø8 - 10 mm (50 - 70 mm²) / 30 x 2 mm - 30 x 3.5 mm	Galvanized steel	370
AT-131J	108 x 30 x 27	Ø25 mm	Ø8 - 10 mm (50 - 70 mm²) / 30 x 2 mm - 30 x 3.5 mm	Galvanized steel	370
AT-132J	108 x 30 x 22	Ø20 mm	Ø8 - 10 mm (50 - 70 mm²) / 30 x 2 mm - 30 x 3.5 mm	Stainless steel	370
AT-133J	108 x 30 x 18	Ø16 mm	Ø8 - 10 mm (50 - 70 mm²) / 30 x 2 mm - 30 x 3.5 mm	Stainless steel	370
AT-134J	108 x 30 x 27	Ø25 mm	Ø8 - 10 mm (50 - 70 mm²) / 30 x 2 mm - 30 x 3.5 mm	Stainless steel	370

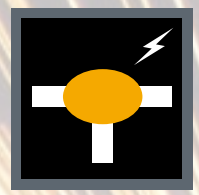
Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102

EXOTHERMIC



4

WELDING



> APLIWELD® SECURE+ EXOTHERMIC WELDING SYSTEM

> EXOTHERMIC WELDING IN TABLETS

APLIWELD® Secure+ replaces the traditional welding powders and their manual spark activation with a tablet compound shape activated remotely using an electronic starter.

> APLIWELD®-T
Welding compounds in tablets

> APLIWELD®-E
Electronic starters for exothermic welding

> KIT APLIWELD®-E
Electronic starting device

REDUCES OCCUPATIONAL HAZARDS
> Remote ignition control
> Non-flammable materials involved

SAVES ON COST
> No package size limitations
> Simplifies transport and storage conditions
> Reduces workforce and training

SIMPLIFIES WORK
> Easy to use
> Enables work to continue in windy or humid conditions
> Reduces waste

> APLIWELD® SECURE+ EXOTHERMIC WELDING SYSTEM

> EXOTHERMIC WELDING IN TABLETS

> CERTIFICATIONS

Certification in agreement with UL467 Grounding and bonding equipment

Underwriters Laboratories is a global recognised safety science company which certifies, validates and tests a wide range of products. In electrical connections, and particularly for exothermic welding, UL467 standard "Grounding and bonding equipment" is the reference for the quality and reliability in connections between electric conductors. Connections are subject to a current test and a stringent mechanical test, involving two parts: a secureness and pull-out assays.

Apliweld has achieved this UL certification for the cable/cable, cable/earth rod, cable/metal surface and tape/tape connections appearing in this catalogue and validated in UL installations. Also 50 mm^2 cable and cross shape rebar, 30 x 2 mm tape to T-shape earth rod and all 50 mm^2 cable to 30 x 2 mm tape connections are certified.

Explosive atmosphere certificate:

The Apliweld compound has shown zero flammability, passing the explosive atmosphere test in Laboratorio Oficial Madariaga (LOM). In this assay, explosive limits, minimum flammability energy and temperature, as well as parameters such as pressure and product explosive limits are tested under the applicable UNE standards. The sample turned out to be inert during testing and was classified as St0, or non-explosive/non-flammable.

Other certifications

Apliweld Secure+ has passed short-current tests supervised by the Technological Institute of Energy (ITE) in Spain, demonstrating even better conductivity than the conductors themselves.

> REGULATIONS

Compliance with NTP 1028 safety in copper aluminothermic welding.

"The electronic ignition method is the most suitable for aluminothermic welding, as it encompasses significant improvements in safety in relation to any other method"

Compliance with ITC-BT-26 internal housing installations. General installation requirements.

"Earthings: […] if applicable, the metal structure of the building will be connected to the annealed conductor, or the electrodes, or when the foundation of the structure is built using reinforced concrete footings, a certain number of irons of those considered most important and a minimum of one per footing. Those connections will be made in a safe and reliable way using aluminothermic or autogenous welding methods"

WITH ALL THE BENEFITS OF EXOTHERMIC WELDING

The connection has equal or higher electrical conductivity than the conductors themselves.

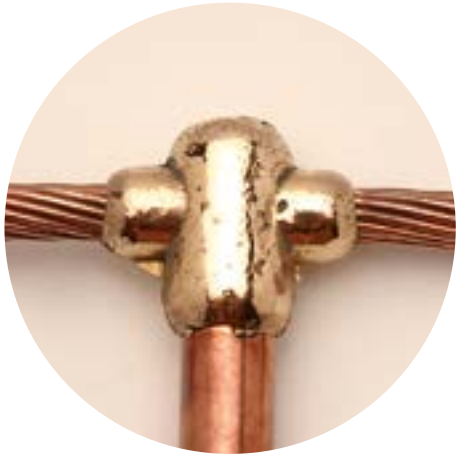
Welding does not degrade throughout time and is resistant to galvanic coupling.

Withstands repeated current impulses.

Resistance never increases.

Higher mechanical and crush resistance than the conductors themselves.

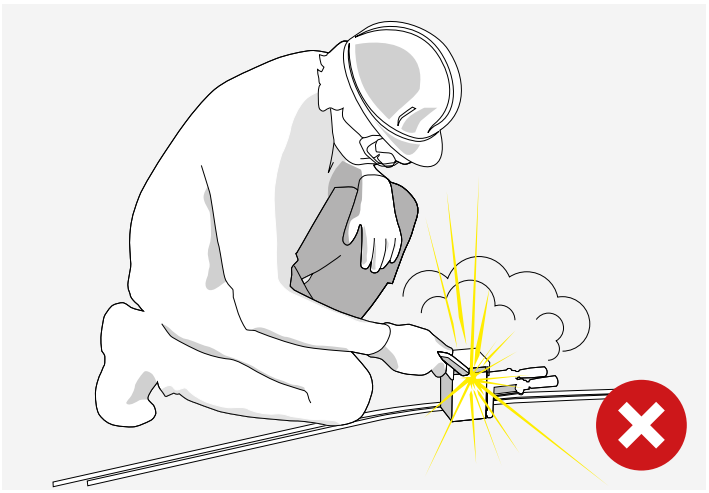
Apliweld® Secure+ offers a permanent welding and high-resistance connection which is essential to achieve a lasting and reliable result for any earthing.



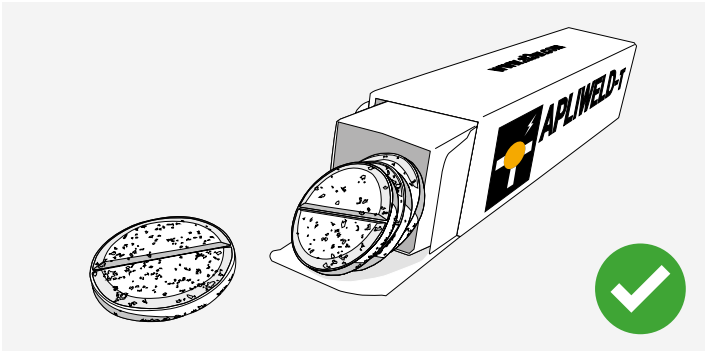
> APLIWELD® SECURE+ EXOTHERMIC WELDING SYSTEM

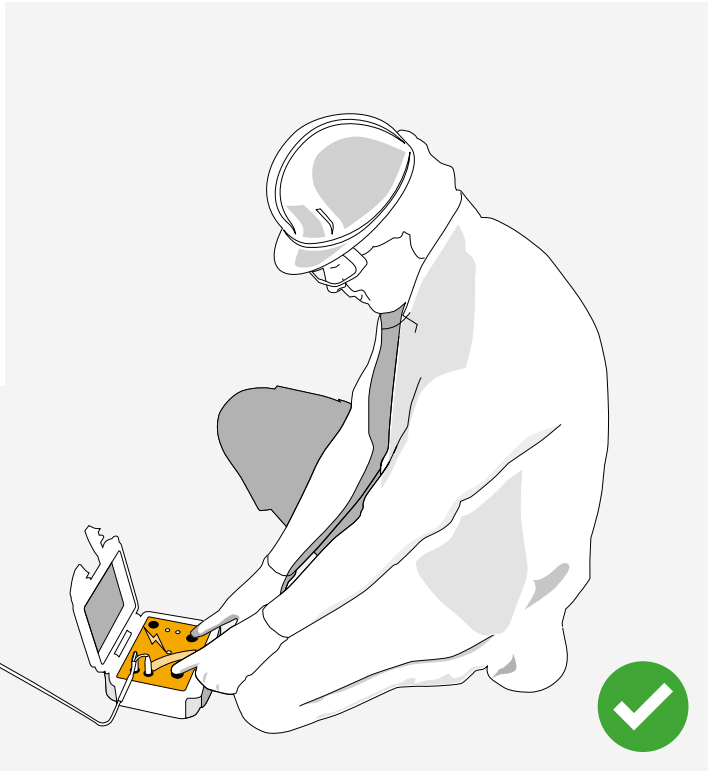
> INNOVATION, REDUCTION IN STORAGE COSTS AND INCREASED SAFETY

Traditionally, exothermic welding required the user to have multiple cartridges with different powder weights for carrying out the various connections. Once the conductors were inserted in the graphite mould, the welding compound and the reactive powder (usually a flammable compound) were poured into the crucible. Then a flint gun, applied manually to the starting powder at arm's length produced a spark triggering the exothermic reaction.



With **APLIWELD® Secure+** the required number of tablets are placed inside the graphite mould. The electronic starter is inserted on top and activated from a distance. Hence there is no need for multiple cartridges and it is completely safe for the operator.

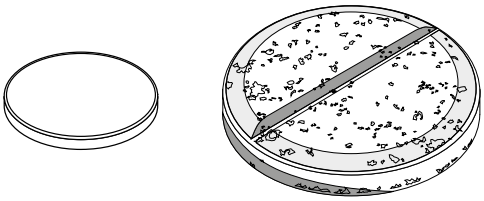




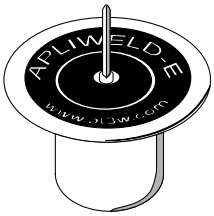
> APLIWELD® SECURE+ EXOTHERMIC WELDING SYSTEM

> THIS IS HOW THE NEW COMPONENTS ARE USED

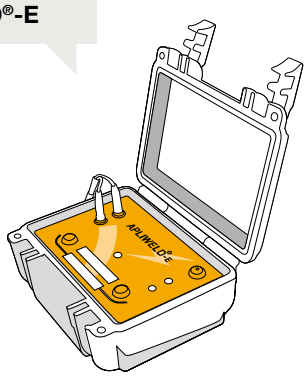
Insert the retaining disc and the **APLIWELD®-T tablets**



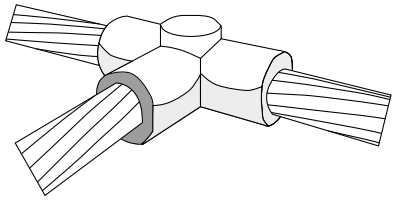
Insert and connect the electronic starter **APLIWELD®-E**



Press both buttons at the same time in **Kit APLIWELD®-E**



Remove the completed joint from the **graphite mould**



> APLIWELD® SECURE+

> APLIWELD®-T

AT-020N: tablets for exothermic welding

Innovative welding compound in tablet form for carrying out any connections using one or more tablets.

Two references: **AT-020N**, the most common one (valid for 90% of connections) and **AT-021N**, biggest tablets, suitable for welding larger conductors.

- ✓ Compact and easy to use
- ✓ Reduces stock costs
- ✓ Improves welding process times
- ✓ Increases equipment life-time
- ✓ Both electronic and powder starters can be used

> TECHNICAL CHARACTERISTICS

Reference:	AT-020N	AT-021N
Tablet dimensions:	Ø43 mm	Ø55 mm
Units per pack:	20 tablets	20 tablets
Dimensions:	52 x 52 x 220 mm	66 x 66 x 260 mm
Weight:	900 g	2.000 g

> APLIWELD®-E

AT-010N: electronic starter for exothermic welding

Non-flammable electronic starters only ignite by means of the energy they receive from the ignition device.

Includes 10 metal retaining disks for better product/slag separation.

> TECHNICAL CHARACTERISTICS

Reference:	AT-010N
Dimensions:	Ø24 mm x 26 mm
Units per pack:	10 starters
Dimensions:	125 x 105 x 40 mm
Weight:	130 g
Reaction time:	<10 seconds
Material:	non-flammable

- ✓ Its safety features in terms of handling, storage and transport reduce occupational hazards labour risks
- ✓ Safe and easy set up

> KIT APLIWELD®-E

AT-100N: ignition box

Ignition box enables controlled and remote electronic ignition in a quick and safe way. Includes: ignition unit (**AT-096N**), cable (**AT-098N**), 5 crocodile clips (**AT-099N**), battery charger and transporting bag.

> TECHNICAL CHARACTERISTICS

Reference:	AT-100N
Power supply:	Lead-acid battery 6 V 7 Ah
Operating voltage:	6 V_{DC}
Battery charge:	12-36V_{DC} 500 mA
Battery life:	more than 100 welds
Case dimensions:	216 x 180 x 102 mm
Case weight:	2.300 g
Cable dimensions:	2 x 1.5 x 1.500 mm
Total packaging weight:	3.500 g
Work temperature:	-10 ºC to +60 ºC

- ✓ Enables remote electronic ignition thereby reducing occupational hazards

> GRAPHITE MOULDS

> SPECIFIC MOULDS

Each mould makes a particular connection: one mould welds two specific conductors (cable to cable, tape to tape, cable to earth rod…), with specific dimensions (50 mm², 70 mm², etc.) and joined in a certain way (cross or T shape etc.).

> TECHNICAL CHARACTERISTICS

> Each mould can carry out around 50-100 welds, depending on the model.

> Consult all references, accessories and required tablets in this guide (reference selection on pages 156-169) or use the “specific mould selection” on our website.

> The welding manual explains the procedures for correctly using specific moulds. **APLIWELD®** (download it at www.at3w.com).

> All specific moulds are adapted for both the electronic starter (**APLIWELD-E®**) and starting powder (**AT-012N**) ignition types.

> MULTIPLE MOULD

The multiple mould is a system designed to make different connections using the same graphite pieces (see multiple mould selection guide on page 168).

> TECHNICAL CHARACTERISTICS

> Multiple mould is focused for horizontal T, cross and earth rod welding. However, in some cases it can also weld straightand parallel bonds. It welds cables up to 95 mm², tapes up to 30 mm wide and earth rods up to 19 mm in diameter.

> The product is supplied in a case that contains all the necessary materials to carry out the welding, except for the consumables (see page 168).

> The **MM-CS** cavity sealants are, along with the tablets, the consumables involved in the process. MM-CS are supplied in packets of 60 units. They form the welding cavity and are placed according to the table of connections (see page 168).

> Graphite moulds can withstand at least 80 welds.

> The multiple mould is the best solution if only a few common welding types are required, when the features of the work to be carried out cannot be predicted, when conductor sizes are variable or in case of any unexpected occurrences during installation.

> Read the instructions provided with all multiple mould cases or download the **APLIWELD®** manual at www.at3w.com.

> It is adapted for both electronic starter (**APLIWELD-E®**) and starting powder (**AT-012N**) ignition types.

> ACCESSORIES

> CLAMPS, CLEANING TOOLS, CONDUCTOR FITTINGS AND OTHERS

> BASIC ACCESSORIES KIT

AT-068N

AT-069N is a cleaning tool set for conductors and moulds. It includes safety gloves and sealing paste.

The **AT-068N** tool set involves the same references as the one described but also includes a spark lighter, (**AT-060N**) essential for traditional starting powder ignition.

> TECHNICAL CHARACTERISTICS

AT-069N	Reference	Description
Includes:	AT-061N	Conductor cleaning brush
	AT-062N	Crucible and electronic starter cavity cleaning brush
	AT-063N	Slag scraper
	AT-064N	Welding cavity cleaning brush
	AT-065N	Sealing paste (0.45 kg)
	AT-073N	Safety gloves
Dimensions:	250 x 125 x 140 mm	
Weight:	1.000 g	

It is advisable to have a new set for every 250 welds

> GENERAL CLAMP TYPE S

AT-049N

Accessory to facilitate safe fastening, closing and handling of the moulds it is to be used with. This is the most common clamp, suitable for approximately 80% of connections. For connections to a metal surface (HT and HP type), **AT-058N** tool should be used together with the clamp **AT-049N** to avoid loss of material.

> TECHNICAL CHARACTERISTICS

Reference	**AT-049N**
Dimensions:	65 x 65 x 250 mm
Weight:	1.250 g
Service life:	Approx. 250 welds

> GENERAL CLAMP TYPE G

AT-050N

Accessory similar to **AT-049N** but bigger. Valid for large conductors and some particular welds such as LO, XO,TO types.

For connections to a metal surface (HT and HP type), **AT-058N** tool should be used together with the clamp **AT-050N** to avoid loss of material.

> TECHNICAL CHARACTERISTICS

Reference	**AT-050N**
Dimensions:	80 x 80 x 275 mm
Weight:	1.470 g
Service life:	Approx. 250 welds

> ACCESSORIES

> CLAMPS, CLEANING TOOLS, CONDUCTOR FITTINGS AND OTHERS

> OTHER CLAMPS AND ACCESSORIES

Besides the described products, other accessories are required for less common connections or to ensure good quality welding according to working conditions. Find all the references on page 169. The most common accessories are described next:

AT-065N: Sealing paste (0.45 kg). **AT-066N** (0.9 kg) and **AT-071N** (2.25 kg) also available.

MM-053N: Multiple mould clamp.

AT-051N: Clamp for vertical metal surface splices or along vertical rebars or earth rods.

AT-077N: Safety goggles: Recommended for all works.

AT-059N: Cable-holder clamp to prevent conductors from separating during the welding reaction. Complements **AT-049N** or **AT-050N** in any connection involving a through cable.

AT-072NCXX: Copper adapter sleeves with variable diameters depending on XX selection. XX indicates the mm^2 of the desired cable.They increase the conductor diameter fitting it in a mould designed for this XX bigger cable. X = 50, 70, 120...

> APLIWELD® SECURE+ RAILWAY APPLICATIONS

HEAD

Rail-head connections are usually intended to electrically connect two track sections, which are normally mechanically bonded. Welding must be done within the area marked by the splice bar. **Graphite moulds** and suitable clamps are used for cable to rail-head welds.

WEB

Besides the applications in rail to head connections, cable to web joints are also used to carry the return current to the substation or to balance this current on both sides of the railway on its way back. The utmost care must be taken to carry out the welding in the middle of the web, thereby preventing any damage to the rail. **Graphite moulds** and suitable clamps are used for cable to rail-head welds.

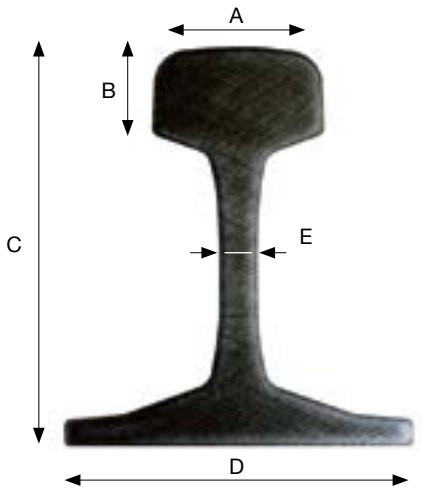
FOOT

The rail foot is usually the most sensitive part to carry out welding, but at the same time it is the most convenient and fastest part. Specific single-use sand moulds are used, including the corresponding railsleeve. Fastening clamps are not required.

The appropriate tools should be selected in order to carry out rail welding. Use the tables on page 167 to assign the proper mould, tablets and clamp required depending on where the welding is to be carried out (head-web-foot), the size of the conductor to be welded (35-50-95… mm^2) and if it goes all the way through or has an end point.

However, it is also important to establish the **rail profile** given that each rail varies in size and perhaps the same mould could work in a certain part of the rail and conductor for one rail but not for another.

In the following table you can find some examples of rail profiles, within a wide range of types, dimensions and shapes.



> TYPES OF RAIL

Standard	Type of rail	Dimensions (mm)				
		A	B	C	D	E
European	UIC54	70	49.4	159	140	16
European	UIC54E	67	51.4	161	125	16
European	UIC60	72	51	172	150	16.5
Chinese	CHINA 50	70	42	152	132	15
USA	ASCEP5	65.1	39.3	131.8	130.2	14.3

> APLIWELD® SECURE+ RAILWAY APPLICATIONS

> CLAMPS, CLEANING TOOLS, CONDUCTOR FITTINGS AND OTHERS

> CLAMPS

AT-054N

AT-056N

AT-057N

Fastening, closing and handling clamp accessories for rail head, web and foot mould.

> TECHNICAL CHARACTERISTICS

Reference	AT-054N	AT-056N	AT-057N
Type of welding:	Cable clamp/Rail web	Cable clamp/Rail head	Cable clamp/Rail head according to E.T. 03.364.005.3, ADIF or similar
Dimensions:	65 x 65 x 250 mm	80 x 80 x 275 mm	80 x 80 x 275 mm
Weight:	1.250 g	950 g	1.470 g
Service life:	Approx. 120 welds	Approx. 120 welds	Approx. 120 welds

> HAMMER-DIE AND RAIL SLEEVES

Rail sleeve

Hammer-die

In order to ensure the connection is secure and to prevent material leakages, it is advisable (when not compulsory) to make use of the hammer-die corresponding to the rail sleeve at the end of the conductor to be welded:

To weld with:	Adapter sleeve ref:	Hammer-die
35 mm² cable	AT-SC35	AT-M035N
50 mm² cable	AT-SC50	AT-M050N
70 mm² cable	AT-SC70	AT-M070N
95 mm² cable	AT-SC95	AT-M095N
120 mm² cable	AT-SC120	AT-M120N
150 mm² cable	AT-SC150	AT-M150N
185 mm² cable	AT-SC185	AT-M185N

> REFERENCE SELECTION GUIDE

1

The following diagram shows you how to select the correct **APLIWELD®** products for each welding using the reference selection tables on pages 158-169.

a Find the required connections and conductors

b Mould reference

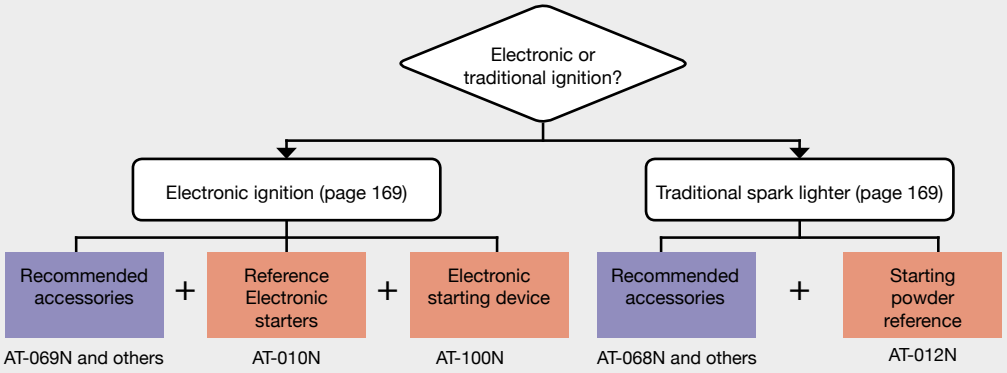
c Tablet reference and no. of tablets per connection

d Corresponding clamp reference

1 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp
LV 	C35/C35/LV	35 mm² cable	35 mm² cable	AT-020N	1	AT-049N
	C50/C50/LV	50 mm² cable	50 mm² cable	AT-020N	1	AT-049N
	C70/C70/LV	70 mm² cable	70 mm² cable	AT-020N	1.5	AT-049N
	C95/C95/LV	95 mm² cable	95 mm² cable	AT-020N	2	AT-049N
	C120/C120/LV	120 mm² cable	120 mm² cable	AT-020N	2	AT-049N
	C150/C150/LV	150 mm² cable	150 mm² cable	AT-020N	2.5	AT-049N

From table 1 (page 158)

2



3

Set the corresponding quantities for each reference, underthe following criteria:

Reference	Description	Use
Mould references	Specific or multiple	**50 - 100 welds** per mould
AT-020N	Welding compounds in tablets	**20 tablets** per box
AT-021N	Welding compounds in tablets	**20 tablets** per box
AT-010N	Electronic starters for exothermic welding	**10 electronic starters** per box
AT-012N	Exothermic welding starting powder	**10 starters** in powder per box
AT-049N	General clamp type S	**250 connections** per clamp
AT-050N	General clamp type G	**250 connections** per clamp
AT-068N	Basic accessories kit	**250 welds** per basic accessories kit
AT-100N	Electronic starting device	**10 years** use of electronic ignition device

> In order to determine the number of other accessories needed, please consult our technical department.

> Note that quantities may change depending on the working conditions (if there is more than one installer, more than one working place or any particular harsh conditions).

> Download the Welding Manual **APLIWELD®** for further information regarding the products and how to use them. Find answers to the most common **APLIWELD®** welding issues.

Please contact us if you have any questions.

> REFERENCE SELECTION GUIDE

> SELECTION EXAMPLE 1:

An installer should carry out 300 horizontal T type welds, between two cables of 50 mm² using the electronic ignition system.
Then please use as follows:

1

a Find the required connections and conductors

b Mould reference

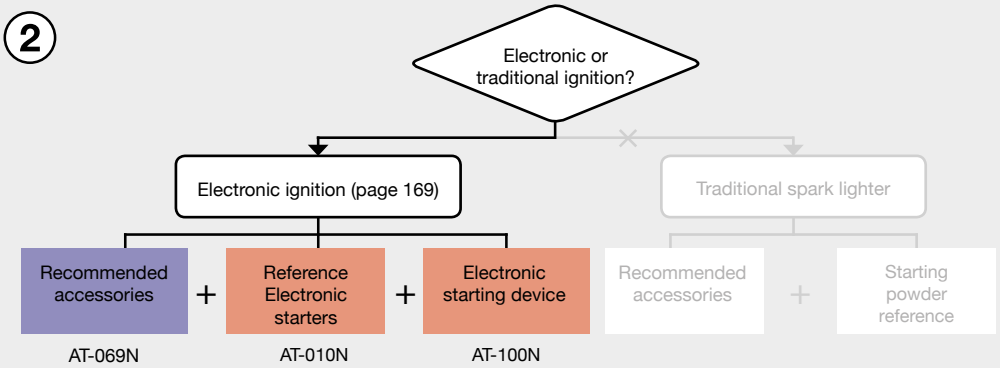
c Tablet reference and no. of tablets per connection

d Corresponding clamp reference

2 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp
TH 	C35/C35/TH	35 mm² cable	35 mm² cable	AT-020N	1.5	AT-049N
	C50/C50/TH	50 mm² cable	50 mm² cable	AT-020N	2	AT-049N
	C70/C70/TH	70 mm² cable	70 mm² cable	AT-020N	2	AT-049N
	C95/C95/TH	95 mm² cable	95 mm² cable	AT-020N	2.5	AT-049N
	C120/C120/TH	120 mm² cable	120 mm² cable	AT-020N	3	AT-049N

From table 2 (page 158)

2



3

With the data and the references obtained, the order could be as follows:

Reference	Units
C50/C50/TH	4
AT-020N	30
AT-010N	30
AT-049N	2
AT-069N	2
AT-100N	1

> SELECTION EXAMPLE 2:

Two working groups should carry out 450 welds between 120 mm²cables in a horizontal cross shape using traditional spark lighter ignition.

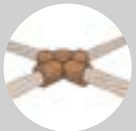
1

a Find the required connections and conductors

b Mould reference

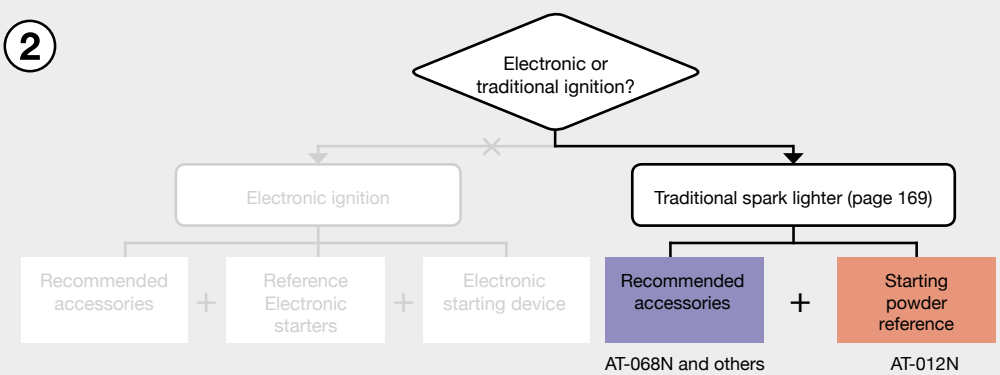
c Tablet reference and no. of tablets per connection

d Corresponding clamp reference

3 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp
XH 	C35/C35/XH	35 mm² cable	35 mm² cable	AT-020N	2	AT-049N
	C50/C50/XH	50 mm² cable	50 mm² cable	AT-020N	2	AT-049N
	C70/C70/XH	70 mm² cable	70 mm² cable	AT-020N	2.5	AT-049N
	C95/C95/XH	95 mm² cable	95 mm² cable	AT-020N	3	AT-049N
	C120/C120/XH	120 mm² cable	120 mm² cable	AT-020N	4.5	AT-049N

From table 3 (page 159)

2



3

With the data and the references obtained, the order could be as follows:

Reference	Units
C120/C120/XH	9
AT-020N	102
AT-012N	45
AT-049N	2
AT-068N	4
AT-100N	NA

> REFERENCE SELECTION TABLE: SUITABLE MOULDS, TABLETS AND CLAMPS

Connection: Drawing and union type code.

In tables where more than one connection appears, the correct mould reference is obtained by replacing the letters of the union type with those of the connection required.

Reference: Conductor 1/Conductor 2/Union type.

Conductor 1: Code of conductor to be welded.

If conductors from different sections are welded, then Conductor 1 will be the run conductor.

Conductor 2: Code of conductor to be welded.

If conductors from different sections are welded, then Conductor 2 will be the tap conductor.

Tab ref.: Tablet size reference.

Tab/con: Tablets required per connection.

Clamp: Reference of accessory needed for a tight lock and safe handling of the mould.

Notes: Warnings and recommended accessories.

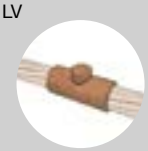
For e.g.: If a vertical T mould for 240 mm² cables is required, just replace C240/C240/TH with C240/C240/TV. The number of tablets and other accessories will remain the same.

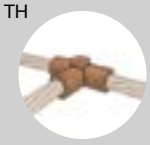
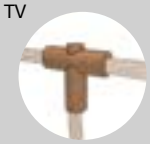
2 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
TH 	C35/C35/TH	35 mm² cable	35 mm² cable	AT-020N	1.5	AT-049N	
	C50/C50/TH	50 mm² cable	50 mm² cable	AT-020N	2	AT-049N	
	C70/C70/TH	70 mm² cable	70 mm² cable	AT-020N	2	AT-049N	
	C95/C95/TH	95 mm² cable	95 mm² cable	AT-020N	2.5	AT-049N	
	C120/C120/TH	120 mm² cable	120 mm² cable	AT-020N	3	AT-049N	
TV 	C150/C150/TH	150 mm² cable	150 mm² cable	AT-020N	4	AT-049N	
	C185/C185/TH	185 mm² cable	185 mm² cable	AT-021N	2	AT-050N	
	C240/C240/TV	240 mm² cable	240 mm² cable	AT-021N	3	AT-050N	
	C50/C35/TH	50 mm² cable	35 mm² cable	AT-020N	1.5	AT-049N	
	C70/C35/TH	70 mm² cable	35 mm² cable	AT-020N	1.5	AT-049N	

COMMON CONNECTIONS:

Cable/Cable:	Tables 1-5
Cable/Earth rod:	Tables 6-8
Cable/Rebar:	Tables 9-13
Cable/Metal surface:	Tables 14-15
Tape/Tape:	Tables 16-18
Cable/tape:	Tables 19-20
Tape/Earth rod:	Table 21
Others:	Table 22
Railroad:	Tables 23-28
Multiple mould: :	Tables 29-30

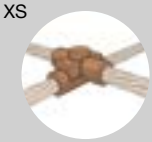
> CABLE/CABLE

1 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
LV 	C35/C35/LV	35 mm² cable	35 mm² cable	AT-020N	1	AT-049N	
	C50/C50/LV	50 mm² cable	50 mm² cable	AT-020N	1	AT-049N	
	C70/C70/LV	70 mm² cable	70 mm² cable	AT-020N	1.5	AT-049N	
	C95/C95/LV	95 mm² cable	95 mm² cable	AT-020N	2	AT-049N	
	C120/C120/LV	120 mm² cable	120 mm² cable	AT-020N	2	AT-049N	
	C150/C150/LV	150 mm² cable	150 mm² cable	AT-020N	2.5	AT-049N	
	C185/C185/LV	185 mm² cable	185 mm² cable	AT-021N	2	AT-050N	
	C240/C240/LV	240 mm² cable	240 mm² cable	AT-021N	2	AT-050N	

2 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
TH 	C35/C35/TH	35 mm² cable	35 mm² cable	AT-020N	1.5	AT-049N	
	C50/C35/TH	50 mm² cable	35 mm² cable	AT-020N	1.5	AT-049N	
	C50/C50/TH	50 mm² cable	50 mm² cable	AT-020N	2	AT-049N	
	C70/C35/TH	70 mm² cable	35 mm² cable	AT-020N	1.5	AT-049N	
	C70/C50/TH	70 mm² cable	50 mm² cable	AT-020N	2	AT-049N	
TV 	C70/C70/TH	70 mm² cable	70 mm² cable	AT-020N	2	AT-049N	
	C95/C35/TH	95 mm² cable	35 mm² cable	AT-020N	2	AT-049N	
	C95/C50/TH	95 mm² cable	50 mm² cable	AT-020N	2	AT-049N	
	C95/C70/TH	95 mm² cable	70 mm² cable	AT-020N	2.5	AT-049N	
	C95/C95/TH	95 mm² cable	95 mm² cable	AT-020N	2.5	AT-049N	
	C120/C35/TH	120 mm² cable	35 mm² cable	AT-020N	2	AT-049N	
	C120/C50/TH	120 mm² cable	50 mm² cable	AT-020N	2.5	AT-049N	
	C120/C70/TH	120 mm² cable	70 mm² cable	AT-020N	2.5	AT-049N	
	C120/C95/TH	120 mm² cable	95 mm² cable	AT-020N	3	AT-049N	
	C120/C120/TH	120 mm² cable	120 mm² cable	AT-020N	3	AT-049N	
	C150/C35/TH	150 mm² cable	35 mm² cable	AT-020N	2.5	AT-049N	
	C150/C50/TH	150 mm² cable	50 mm² cable	AT-020N	2.5	AT-049N	
	C150/C70/TH	150 mm² cable	70 mm² cable	AT-020N	3	AT-049N	
	C150/C95/TH	150 mm² cable	95 mm² cable	AT-020N	3	AT-049N	
	C150/C120/TH	150 mm² cable	120 mm² cable	AT-020N	3.5	AT-049N	
	C150/C150/TH	150 mm² cable	150 mm² cable	AT-020N	4	AT-049N	
	C185/C185/TH	185 mm² cable	185 mm² cable	AT-021N	2	AT-050N	
	C240/C240/TH	240 mm² cable	240 mm² cable	AT-021N	3	AT-050N	

3 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
XH 	C35/C35/XH	35 mm² cable	35 mm² cable	AT-020N	2	AT-049N	
	C50/C35/XH	50 mm² cable	35 mm² cable	AT-020N	2	AT-049N	
	C50/C50/XH	50 mm² cable	50 mm² cable	AT-020N	2	AT-049N	
	C70/C35/XH	70 mm² cable	35 mm² cable	AT-020N	2	AT-049N	
	C70/C50/XH	70 mm² cable	50 mm² cable	AT-020N	2	AT-049N	
PH 	C70/C70/XH	70 mm² cable	70 mm² cable	AT-020N	2.5	AT-049N	
	C95/C35/XH	95 mm² cable	35 mm² cable	AT-020N	2.5	AT-049N	
	C95/C50/XH	95 mm² cable	50 mm² cable	AT-020N	2.5	AT-049N	
	C95/C70/XH	95 mm² cable	70 mm² cable	AT-020N	3	AT-049N	
	C95/C95/XH	95 mm² cable	95 mm² cable	AT-020N	3	AT-049N	
	C120/C35/XH	120 mm² cable	35 mm² cable	AT-020N	2.5	AT-049N	
	C120/C50/XH	120 mm² cable	50 mm² cable	AT-020N	3	AT-049N	
	C120/C70/XH	120 mm² cable	70 mm² cable	AT-020N	3.5	AT-049N	
	C120/C95/XH	120 mm² cable	95 mm² cable	AT-020N	4	AT-049N	
	C120/C120/XH	120 mm² cable	120 mm² cable	AT-020N	4.5	AT-049N	
	C150/C35/XH	150 mm² cable	35 mm² cable	AT-020N	3	AT-049N	
	C150/C50/XH	150 mm² cable	50 mm² cable	AT-020N	3.5	AT-049N	
	C150/C70/XH	150 mm² cable	70 mm² cable	AT-020N	3.5	AT-049N	
	C150/C95/XH	150 mm² cable	95 mm² cable	AT-020N	4.5	AT-049N	
	C150/C120/XH	150 mm² cable	120 mm² cable	AT-020N	4.5	AT-049N	
	C150/C150/XH	150 mm² cable	150 mm² cable	AT-020N	4.5	AT-049N	
	C185/C185/XH	185 mm² cable	185 mm² cable	AT-021N	3	AT-050N	
	C240/C240/XH	240 mm² cable	240 mm² cable	AT-021N	4	AT-050N	

4 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
PV 	C35/C35/PV	35 mm² cable	35 mm² cable	AT-020N	2	AT-049N	
	C50/C50/PV	50 mm² cable	50 mm² cable	AT-020N	2	AT-049N	
	C70/C70/PV	70 mm² cable	70 mm² cable	AT-020N	2.5	AT-049N	
	C95/C95/PV	95 mm² cable	95 mm² cable	AT-020N	3.5	AT-049N	
	C120/C120/PV	120 mm² cable	120 mm² cable	AT-020N	4.5	AT-049N	
	C150/C150/PV	150 mm² cable	150 mm² cable	AT-020N	5	AT-049N	
	C185/C185/PV	185 mm² cable	185 mm² cable	AT-021N	3	AT-050N	
	C240/C240/PV	240 mm² cable	240 mm² cable	AT-021N	4	AT-050N	

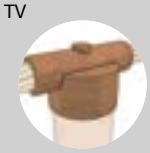
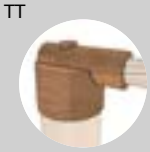
5 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
XS 	C35/C35/XS	35 mm² cable	35 mm² cable	AT-020N	2.5	AT-049N	
	C50/C35/XS	50 mm² cable	35 mm² cable	AT-020N	3	AT-049N	
	C50/C50/XS	50 mm² cable	50 mm² cable	AT-020N	3	AT-049N	
	C70/C35/XS	70 mm² cable	35 mm² cable	AT-020N	3	AT-049N	
	C70/C50/XS	70 mm² cable	50 mm² cable	AT-020N	3.5	AT-049N	
	C70/C70/XS	70 mm² cable	70 mm² cable	AT-020N	4	AT-049N	
	C95/C35/XS	95 mm² cable	35 mm² cable	AT-020N	3.5	AT-049N	
	C95/C50/XS	95 mm² cable	50 mm² cable	AT-020N	3.5	AT-049N	
	C95/C70/XS	95 mm² cable	70 mm² cable	AT-020N	4	AT-049N	
	C95/C95/XS	95 mm² cable	95 mm² cable	AT-020N	4.5	AT-049N	
	C120/C35/XS	120 mm² cable	35 mm² cable	AT-020N	4	AT-049N	
	C120/C50/XS	120 mm² cable	50 mm² cable	AT-020N	4.5	AT-049N	
	C120/C70/XS	120 mm² cable	70 mm² cable	AT-020N	5	AT-049N	
	C120/C95/XS	120 mm² cable	95 mm² cable	AT-020N	5	AT-049N	
	C120/C120/XS	120 mm² cable	120 mm² cable	AT-020N	5	AT-049N	
	C150/C35/XS	150 mm² cable	35 mm² cable	AT-020N	4	AT-049N	
	C150/C50/XS	150 mm² cable	50 mm² cable	AT-020N	4.5	AT-049N	
	C150/C70/XS	150 mm² cable	70 mm² cable	AT-020N	5	AT-049N	
	C150/C95/XS	150 mm² cable	95 mm² cable	AT-020N	5	AT-049N	
	C150/C120/XS	150 mm² cable	120 mm² cable	AT-020N	5	AT-049N	
	C150/C150/XS	150 mm² cable	150 mm² cable	AT-020N	5	AT-049N	
	C185/C185/XS	185 mm² cable	185 mm² cable	AT-021N	4	AT-050N	
	C240/C240/XS	240 mm² cable	240 mm² cable	AT-021N	5	AT-050N	

> REFERENCE SELECTION TABLE: SUITABLE MOULDS, TABLETS AND CLAMPS

> CABLE/EARTH ROD

If more than one connection appears in the table, simply replace the last letters of the reference with those of the connection required in order to obtain the correct mould.

E.g.: If a vertical TT mould is needed for a 50 mm² cable to Ø14.3 mm earth rod, then the reference will be C50/T14/TT (instead of C50/T14/TV). The number of tablets and other accessories will remain the same.

6 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
TV 	C35/T14/TV	35 mm² cable	Ø14.3 mm earth rod	AT-020N	2	AT-049N	
	C35/T16/TV	35 mm² cable	Ø15.9 mm earth rod	AT-020N	2	AT-049N	
	C50/T14/TV	50 mm² cable	Ø14.3 mm earth rod	AT-020N	2	AT-049N	
	C50/T16/TV	50 mm² cable	Ø15.9 mm earth rod	AT-020N	2	AT-049N	
	C50/T17/TV	50 mm² cable	Ø17.2 mm earth rod	AT-020N	2.5	AT-049N	
TT 	C50/T18/TV	50 mm² cable	Ø18.3 mm earth rod	AT-020N	2.5	AT-049N	
	C50/T19/TV	50 mm² cable	Ø19 mm earth rod	AT-020N	2.5	AT-049N	
	C70/T14/TV	70 mm² cable	Ø14.3 mm earth rod	AT-020N	2.5	AT-049N	
	C70/T16/TV	70 mm² cable	Ø15.9 mm earth rod	AT-020N	2.5	AT-049N	
	C70/T17/TV	70 mm² cable	Ø17.2 mm earth rod	AT-020N	2.5	AT-049N	
	C70/T18/TV	70 mm² cable	Ø18.3 mm earth rod	AT-020N	2.5	AT-049N	
	C70/T19/TV	70 mm² cable	Ø19 mm earth rod	AT-020N	3	AT-049N	
	C95/T14/TV	95 mm² cable	Ø14.3 mm earth rod	AT-020N	2.5	AT-049N	
	C95/T16/TV	95 mm² cable	Ø15.9 mm earth rod	AT-020N	2.5	AT-049N	
	C95/T17/TV	95 mm² cable	Ø17.2 mm earth rod	AT-020N	2.5	AT-049N	
	C95/T18/TV	95 mm² cable	Ø18.3 mm earth rod	AT-020N	3	AT-049N	
	C95/T19/TV	95 mm² cable	Ø19 mm earth rod	AT-020N	3	AT-049N	
	C120/T17/TV	120 mm² cable	Ø17.2 mm earth rod	AT-020N	3	AT-049N	
	C120/T18/TV	120 mm² cable	Ø18.3 mm earth rod	AT-020N	3	AT-049N	
	C120/T19/TV	120 mm² cable	Ø19 mm earth rod	AT-020N	3.5	AT-049N	
	C120/T20/TV	120 mm² cable	Ø20 mm earth rod	AT-020N	3.5	AT-049N	
	C120/T22/TV	120 mm² cable	Ø22 mm earth rod	AT-020N	4	AT-049N	
	C120/T25/TV	120 mm² cable	Ø25 mm earth rod	AT-020N	4.5	AT-049N	
	C150/T17/TV	150 mm² cable	Ø17.2 mm earth rod	AT-020N	4	AT-049N	
	C150/T18/TV	150 mm² cable	Ø18.3 mm earth rod	AT-020N	4	AT-049N	
	C150/T19/TV	150 mm² cable	Ø19 mm earth rod	AT-020N	4.5	AT-049N	
	C150/T20/TV	150 mm² cable	Ø20 mm earth rod	AT-020N	4.5	AT-049N	
	C150/T22/TV	150 mm² cable	Ø22 mm earth rod	AT-020N	4.5	AT-049N	
	C150/T25/TV	150 mm² cable	Ø25 mm earth rod	AT-020N	5	AT-049N	
	C185/T19/TV	185 mm² cable	Ø19 mm earth rod	AT-021N	2	AT-050N	
	C185/T20/TV	185 mm² cable	Ø20 mm earth rod	AT-021N	2	AT-050N	
	C185/T22/TV	185 mm² cable	Ø22 mm earth rod	AT-021N	3	AT-050N	
	C185/T25/TV	185 mm² cable	Ø25 mm earth rod	AT-021N	3	AT-050N	
	C240/T19/TV	240 mm² cable	Ø19 mm earth rod	AT-021N	3	AT-050N	
	C240/T20/TV	240 mm² cable	Ø20 mm earth rod	AT-021N	3	AT-050N	
	C240/T22/TV	240 mm² cable	Ø22 mm earth rod	AT-021N	3	AT-050N	
	C240/T25/TV	240 mm² cable	Ø25 mm earth rod	AT-021N	3	AT-050N	

> REFERENCE SELECTION TABLE: SUITABLE MOULDS, TABLETS AND CLAMPS

7 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
XO or VPH + AVX 	C35/M/VPH +AV14	35 mm² cable	Ø14.3 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C35/M/VPH +AV16	35 mm² cable	Ø15.9 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VPH + AV14	50 mm² cable	Ø14.3 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VPH + AV16	50 mm² cable	Ø15.9 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VPH + AV17	50 mm² cable	Ø17.2 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VPH + AV18	50 mm² cable	Ø18.3 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VPH + AV19	50 mm² cable	Ø19 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VPH + AV14	70 mm² cable	Ø14.3 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VPH + AV16	70 mm² cable	Ø15.9 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VPH + AV17	70 mm² cable	Ø17.2 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VPH + AV18	70 mm² cable	Ø18.3 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VPH + AV19	70 mm² cable	Ø19 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C95/T14/XO	95 mm² cable	Ø14.3 mm earth rod	AT-020N	2.5	AT-050N	Requires sealing paste AT-065N or AT-066N
	C95/T16/XO	95 mm² cable	Ø15.9 mm earth rod	AT-020N	2.5	AT-050N	Requires sealing paste AT-065N or AT-066N
	C95/T17/XO	95 mm² cable	Ø17.2 mm earth rod	AT-020N	3	AT-050N	Requires sealing paste AT-065N or AT-066N
	C95/T18/XO	95 mm² cable	Ø18.3 mm earth rod	AT-020N	3.5	AT-050N	Requires sealing paste AT-065N or AT-066N
	C95/T19/XO	95 mm² cable	Ø19 mm earth rod	AT-020N	4	AT-050N	Requires sealing paste AT-065N or AT-066N
	C120/T17/XO	120 mm² cable	Ø17.2 mm earth rod	AT-020N	3	AT-050N	AT-065N or AT-066N Sealing paste and AT-091N jack tool
	C120/T18/XO	120 mm² cable	Ø18.3 mm earth rod	AT-020N	4.5	AT-050N	AT-065N or AT-066N Sealing paste and AT-091N jack tool
	C120/T19/XO	120 mm² cable	Ø19 mm earth rod	AT-020N	4.5	AT-050N	AT-065N or AT-066N Sealing paste and AT-091N jack tool
	C120/T20/XO	120 mm² cable	Ø20 mm earth rod	AT-020N	4.5	AT-050N	AT-065N or AT-066N Sealing paste and AT-091N jack tool
	C120/T22/XO	120 mm² cable	Ø22 mm earth rod	AT-020N	4.5	AT-050N	AT-065N or AT-066N Sealing paste and AT-091N jack tool
	C120/T25/XO	120 mm² cable	Ø25 mm earth rod	AT-020N	5	AT-050N	AT-065N or AT-066N Sealing paste and AT-091N jack tool

8 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
PO or VTA + AVX 	C35/M/VTA + AV14	35 mm² cable	Ø14.3 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C35/M/VTA + AV16	35 mm² cable	Ø15.9 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VTA + AV14	50 mm² cable	Ø14.3 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VTA + AV16	50 mm² cable	Ø15.9 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VTA + AV17	50 mm² cable	Ø17.2 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VTA + AV18	50 mm² cable	Ø18.3 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VTA + AV19	50 mm² cable	Ø19 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VTA + AV14	70 mm² cable	Ø14.3 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VTA + AV16	70 mm² cable	Ø15.9 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VTA + AV17	70 mm² cable	Ø17.2 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VTA + AV18	70 mm² cable	Ø18.3 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VTA + AV19	70 mm² cable	Ø19 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C95/M/VTA + AV14	95 mm² cable	Ø14.3 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C95/M/VTA + AV16	95 mm² cable	Ø15.9 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C95/M/VTA + AV17	95 mm² cable	Ø17.2 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C95/M/VTA + AV18	95 mm² cable	Ø18.3 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C95/M/VTA + AV19	95 mm² cable	Ø19 mm earth rod	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C120/T17/PO	120 mm² cable	Ø17.2 mm earth rod	AT-020N	4.5	AT-050N	AT-065N or AT-066N Sealing paste and AT-091N jack tool
	C120/T18/PO	120 mm² cable	Ø18.3 mm earth rod	AT-020N	4.5	AT-050N	AT-065N or AT-066N Sealing paste and AT-091N jack tool
	C120/T19/PO	120 mm² cable	Ø19 mm earth rod	AT-020N	4.5	AT-050N	AT-065N or AT-066N Sealing paste and AT-091N jack tool
	C120/T20/PO	120 mm² cable	Ø20 mm earth rod	AT-020N	4.5	AT-050N	AT-065N or AT-066N Sealing paste and AT-091N jack tool
	C120/T22/PO	120 mm² cable	Ø22 mm earth rod	AT-020N	4.5	AT-050N	AT-065N or AT-066N Sealing paste and AT-091N jack tool
	C120/T25/PO	120 mm² cable	Ø25 mm earth rod	AT-020N	5	AT-050N	AT-065N or AT-066N Sealing paste and AT-091N jack tool

>REFERENCE SELECTION TABLE: SUITABLE MOULDS, TABLETS AND CLAMPS

> CABLE/REBAR

If more than one connection appears in the table, simply replace the last letters of the reference with those of the connection required in order to obtain the correct mould.

E.g.: If a PT mould for 35 mm² cable to Ø10 mm horizontal rebar is required, simply replace C35/V10/PV with C35/V10/PT. The number of tablets and other accessories will remain the same.

9 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
PV 	C35/V10/PV	35 mm² cable	Ø10 mm rebar	AT-020N	2	AT-049N	Requires sealing paste AT-065N or AT-066N
	C35/V12/PV	35 mm² cable	Ø12 mm rebar	AT-020N	2.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C35/V16/PV	35 mm² cable	Ø16 mm rebar	AT-020N	1.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C35/V20/PV	35 mm² cable	Ø20 mm rebar	AT-020N	1.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C35/V25/PV	35 mm² cable	Ø25 mm rebar	AT-020N	1.5	AT-049N	Requires sealing paste AT-065N or AT-066N
PT 	C50/V10/PV	50 mm² cable	Ø10 mm rebar	AT-020N	2	AT-049N	Requires sealing paste AT-065N or AT-066N
	C50/V12/PV	50 mm² cable	Ø12 mm rebar	AT-020N	2.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C50/V16/PV	50 mm² cable	Ø16 mm rebar	AT-020N	2	AT-049N	Requires sealing paste AT-065N or AT-066N
	C50/V20/PV	50 mm² cable	Ø20 mm rebar	AT-020N	2	AT-049N	Requires sealing paste AT-065N or AT-066N
	C50/V25/PV	50 mm² cable	Ø25 mm rebar	AT-020N	2	AT-049N	Requires sealing paste AT-065N or AT-066N
	C70/V10/PV	70 mm² cable	Ø10 mm rebar	AT-020N	2	AT-049N	Requires sealing paste AT-065N or AT-066N
	C70/V12/PV	70 mm² cable	Ø12 mm rebar	AT-020N	2.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C70/V16/PV	70 mm² cable	Ø16 mm rebar	AT-020N	2	AT-049N	Requires sealing paste AT-065N or AT-066N
	C70/V20/PV	70 mm² cable	Ø20 mm rebar	AT-020N	2	AT-049N	Requires sealing paste AT-065N or AT-066N
	C70/V25/PV	70 mm² cable	Ø25 mm rebar	AT-020N	2	AT-049N	Requires sealing paste AT-065N or AT-066N
	C95/V10/PV	95 mm² cable	Ø10 mm rebar	AT-020N	2.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C95/V12/PV	95 mm² cable	Ø12 mm rebar	AT-020N	3	AT-049N	Requires sealing paste AT-065N or AT-066N
	C95/V16/PV	95 mm² cable	Ø16 mm rebar	AT-020N	2	AT-049N	Requires sealing paste AT-065N or AT-066N
	C95/V20/PV	95 mm² cable	Ø20 mm rebar	AT-020N	2	AT-049N	Requires sealing paste AT-065N or AT-066N
	C95/V25/PV	95 mm² cable	Ø25 mm rebar	AT-020N	2	AT-049N	Requires sealing paste AT-065N or AT-066N

10 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
XS 	C35/V10/XS	35 mm² cable	Ø10 mm rebar	AT-020N	2.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C35/V12/XS	35 mm² cable	Ø12 mm rebar	AT-020N	3	AT-049N	Requires sealing paste AT-065N or AT-066N
	C35/V16/XS	35 mm² cable	Ø16 mm rebar	AT-020N	3	AT-049N	Requires sealing paste AT-065N or AT-066N
	C35/V20/XS	35 mm² cable	Ø20 mm rebar	AT-020N	3	AT-049N	Requires sealing paste AT-065N or AT-066N
	C35/V25/XS	35 mm² cable	Ø25 mm rebar	AT-020N	4	AT-049N	Requires sealing paste AT-065N or AT-066N
	C50/V10/XS	50 mm² cable	Ø10 mm rebar	AT-020N	3	AT-049N	Requires sealing paste AT-065N or AT-066N
	C50/V12/XS	50 mm² cable	Ø12 mm rebar	AT-020N	3.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C50/V16/XS	50 mm² cable	Ø16 mm rebar	AT-020N	3.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C50/V20/XS	50 mm² cable	Ø20 mm rebar	AT-020N	3.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C50/V25/XS	50 mm² cable	Ø25 mm rebar	AT-020N	4	AT-049N	Requires sealing paste AT-065N or AT-066N
	C70/V10/XS	70 mm² cable	Ø10 mm rebar	AT-020N	3.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C70/V12/XS	70 mm² cable	Ø12 mm rebar	AT-020N	4	AT-049N	Requires sealing paste AT-065N or AT-066N
	C70/V16/XS	70 mm² cable	Ø16 mm rebar	AT-020N	4	AT-049N	Requires sealing paste AT-065N or AT-066N
	C70/V20/XS	70 mm² cable	Ø20 mm rebar	AT-020N	4	AT-049N	Requires sealing paste AT-065N or AT-066N
	C70/V25/XS	70 mm² cable	Ø25 mm rebar	AT-020N	4.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C95/V10/XS	95 mm² cable	Ø10 mm rebar	AT-020N	3.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C95/V12/XS	95 mm² cable	Ø12 mm rebar	AT-020N	4	AT-049N	Requires sealing paste AT-065N or AT-066N
	C95/V16/XS	95 mm² cable	Ø16 mm rebar	AT-020N	4.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C95/V20/XS	95 mm² cable	Ø20 mm rebar	AT-020N	4.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C95/V25/XS	95 mm² cable	Ø25 mm rebar	AT-020N	5	AT-049N	Requires sealing paste AT-065N or AT-066N

11 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
TH 	C35/V10/TH	35 mm² cable	Ø10 mm rebar	AT-020N	2	AT-049N	Requires sealing paste AT-065N or AT-066N
	C35/V12/TH	35 mm² cable	Ø12 mm rebar	AT-020N	2.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C35/V16/TH	35 mm² cable	Ø16 mm rebar	AT-020N	3	AT-049N	Requires sealing paste AT-065N or AT-066N
	C35/V20/TH	35 mm² cable	Ø20 mm rebar	AT-020N	3.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C35/V25/TH	35 mm² cable	Ø25 mm rebar	AT-020N	4	AT-049N	Requires sealing paste AT-065N or AT-066N
	C50/V10/TH	50 mm² cable	Ø10 mm rebar	AT-020N	2.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C50/V12/TH	50 mm² cable	Ø12 mm rebar	AT-020N	2.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C50/V16/TH	50 mm² cable	Ø16 mm rebar	AT-020N	3	AT-049N	Requires sealing paste AT-065N or AT-066N
	C50/V20/TH	50 mm² cable	Ø20 mm rebar	AT-020N	3.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C50/V25/TH	50 mm² cable	Ø25 mm rebar	AT-020N	4.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C70/V10/TH	70 mm² cable	Ø10 mm rebar	AT-020N	2.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C70/V12/TH	70 mm² cable	Ø12 mm rebar	AT-020N	2.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C70/V16/TH	70 mm² cable	Ø16 mm rebar	AT-020N	4	AT-049N	Requires sealing paste AT-065N or AT-066N
	C70/V20/TH	70 mm² cable	Ø20 mm rebar	AT-020N	4.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C70/V25/TH	70 mm² cable	Ø25 mm rebar	AT-020N	5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C95/V10/TH	95 mm² cable	Ø10 mm rebar	AT-020N	3	AT-049N	Requires sealing paste AT-065N or AT-066N
	C95/V12/TH	95 mm² cable	Ø12 mm rebar	AT-020N	3.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C95/V16/TH	95 mm² cable	Ø16 mm rebar	AT-020N	4	AT-049N	Requires sealing paste AT-065N or AT-066N
	C95/V20/TH	95 mm² cable	Ø20 mm rebar	AT-020N	4.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C95/V25/TH	95 mm² cable	Ø25 mm rebar	AT-020N	5	AT-049N	Requires sealing paste AT-065N or AT-066N

12 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
XO or VPH+AVX 	C35/M/VPH + AV10	35 mm² cable	Ø10 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C35/M/VPH + AV12	35 mm² cable	Ø12 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C35/M/VPH + AV16	35 mm² cable	Ø16 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C35/M/VPH + AV20	35 mm² cable	Ø20 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C35/M/VPH + AV25	35 mm² cable	Ø25 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VPH + AV10	50 mm² cable	Ø10 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VPH + AV12	50 mm² cable	Ø12 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VPH + AV16	50 mm² cable	Ø16 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VPH + AV20	50 mm² cable	Ø20 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VPH + AV25	50 mm² cable	Ø25 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VPH + AV10	70 mm² cable	Ø10 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VPH + AV12	70 mm² cable	Ø12 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VPH + AV16	70 mm² cable	Ø16 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VPH + AV20	70 mm² cable	Ø20 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VPH + AV25	70 mm² cable	Ø25 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C95/V10/XO	95 mm² cable	Ø10 mm rebar	AT-020N	3.5	AT-049N	Requires sealing paste AT-065N or AT-066N
	C95/V12/XO	95 mm² cable	Ø12 mm rebar	AT-020N	3.5	AT-051N	Requires sealing paste AT-065N or AT-066N
	C95/V16/XO	95 mm² cable	Ø16 mm rebar	AT-020N	3.5	AT-051N	Requires sealing paste AT-065N or AT-066N
	C95/V20/XO	95 mm² cable	Ø20 mm rebar	AT-020N	4	AT-051N	Requires sealing paste AT-065N or AT-066N
	C95/V25/XO	95 mm² cable	Ø25 mm rebar	AT-020N	4	AT-051N	Requires sealing paste AT-065N or AT-066N

13 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
TO or VTH + AVX 	C35/M/VTH + AV10	35 mm² cable	Ø10 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C35/M/VTH + AV12	35 mm² cable	Ø12 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C35/M/VTH + AV16	35 mm² cable	Ø16 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C35/M/VTH + AV20	35 mm² cable	Ø20 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VTH + AV10	50 mm² cable	Ø10 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VTH + AV12	50 mm² cable	Ø12 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VTH + AV16	50 mm² cable	Ø16 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VTH + AV20	50 mm² cable	Ø20 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VTH + AV10	70 mm² cable	Ø10 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VTH + AV12	70 mm² cable	Ø12 mm rebar	AT-020N	2.5	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VTH + AV16	70 mm² cable	Ø16 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VTH + AV20	70 mm² cable	Ø20 mm rebar	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C95/V12/TO	95 mm² cable	Ø12 mm rebar	AT-020N	3.5	AT-051N	Requires sealing paste AT-065N or AT-066N
	C95/V16/TO	95 mm² cable	Ø16 mm rebar	AT-020N	4	AT-051N	Requires sealing paste AT-065N or AT-066N
	C95/V20/TO	95 mm² cable	Ø20 mm rebar	AT-020N	4.5	AT-051N	Requires sealing paste AT-065N or AT-066N

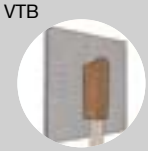
> REFERENCE SELECTION TABLE: SUITABLE MOULDS, TABLETS AND CLAMPS

> CABLE/METAL SURFACE

If more than one connection appears in the table, simply replace the last letters of the code with those of the connection required in order to obtain the correct mould.

E.g.: If a HP mould for 35 mm² cable over horizontal surface is required, simply replace C35/M/HT with C35/M/HP. The number of tablets and other accessories will remain the same.

14 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
HT 	C35/M/HT	35 mm² cable	Metal part	AT-020N	1.5	AT-049N	AT-058N clamp is recommended to ensure a secure connection
	C50/M/HT	50 mm² cable	Metal part	AT-020N	2	AT-049N	AT-058N clamp is recommended to ensure a secure connection
	C70/M/HT	70 mm² cable	Metal part	AT-020N	2	AT-049N	AT-058N clamp is recommended to ensure a secure connection
	C95/M/HT	95 mm² cable	Metal part	AT-020N	2	AT-049N	AT-058N clamp is recommended to ensure a secure connection
HP 	C120/M/HT	120 mm² cable	Metal part	AT-020N	2.5	AT-049N	AT-058N clamp is recommended to ensure a secure connection
	C150/M/HT	150 mm² cable	Metal part	AT-020N	2.5	AT-049N	AT-058N clamp is recommended to ensure a secure connection
	C185/M/HT	185 mm² cable	Metal part	AT-021N	2	AT-050N	AT-058N clamp is recommended to ensure a secure connection
	C240/M/HT	240 mm² cable	Metal part	AT-021N	2	AT-050N	AT-058N clamp is recommended to ensure a secure connection

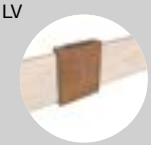
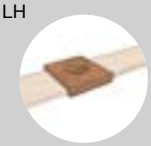
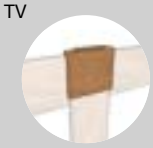
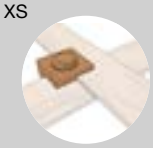
15 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
VTB 	C35/M/VTB	35 mm² cable	Metal part	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C50/M/VTB	50 mm² cable	Metal part	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C70/M/VTB	70 mm² cable	Metal part	AT-020N	2	AT-051N	Requires sealing paste AT-065N or AT-066N
	C95/M/VTB	95 mm² cable	Metal part	AT-020N	2.5	AT-051N	Requires sealing paste AT-065N or AT-066N
	C120/M/VTB	120 mm² cable	Metal part	AT-020N	2.5	AT-051N	Requires sealing paste AT-065N or AT-066N
	C150/M/VTB	150 mm² cable	Metal part	AT-020N	2.5	AT-051N	Requires sealing paste AT-065N or AT-066N
VPV 	C185/M/VTB	185 mm² cable	Metal part	AT-021N	2	AT-050N	Requires sealing paste AT-065N or AT-066N
	C240/M/VTB	240 mm² cable	Metal part	AT-021N	2	AT-050N	Requires sealing paste AT-065N or AT-066N
VTH 							
VPH 							

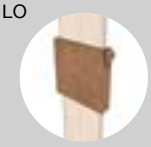
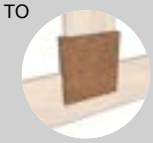
> REFERENCE SELECTION TABLE: SUITABLE MOULDS, TABLETS AND CLAMPS

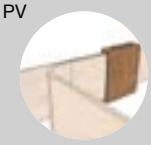
> TAPE/TAPE

If more than one connection appears in the table, simply replace the last letters of the reference with those of the connection required in order to obtain the correct mould.

E.g.: If a LH mould for a horizontal tape to tape bond is required, simply replace P302/P302/LV with P302/P302/LH. The number of tablets will remain the same.

16 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
LV 	P302/P302/LV	Tape 30 x 2 mm	Tape 30 x 2 mm	AT-020N	2	AT-049N	
	P253/P253/LV	Tape 25 x 3 mm	Tape 25 x 3 mm	AT-020N	1.5	AT-049N	
	P305/P305/LV	Tape 30 x 5 mm	Tape 30 x 5 mm	AT-020N	2.5	AT-049N	
	P405/P405/LV	Tape 40 x 5 mm	Tape 40 x 5 mm	AT-020N	3.5	AT-049N	
	P605/P605/LV	Tape 60 x 5 mm	Tape 60 x 5 mm	AT-021N	3	AT-050N	
LH 							
TH 							
TV 							
XS 							

17 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
LO 	P302/P302/LO	Tape 30 x 2 mm	Tape 30 x 2 mm	AT-020N	3	AT-050N	
	P253/P253/LO	Tape 25 x 3 mm	Tape 25 x 3 mm	AT-020N	3	AT-050N	
	P305/P305/LO	Tape 30 x 5 mm	Tape 30 x 5 mm	AT-020N	4.5	AT-050N	
	P405/P405/LO	Tape 40 x 5 mm	Tape 40 x 5 mm	AT-020N	4.5	AT-050N	
	P605/P605/LO	Tape 60 x 5 mm	Tape 60 x 5 mm	AT-020N	5	AT-050N	
TO 							

18 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
PV 	P302/P302/PV	Tape 30 x 2 mm	Tape 30 x 2 mm	AT-020N	3	AT-049N	
	P253/P253/PV	Tape 25 x 3 mm	Tape 25 x 3 mm	AT-020N	2	AT-049N	
	P305/P305/PV	Tape 30 x 5 mm	Tape 30 x 5 mm	AT-020N	3	AT-049N	
	P405/P405/PV	Tape 40 x 5 mm	Tape 40 x 5 mm	AT-020N	5	AT-049N	
	P605/P605/PV	Tape 60 x 5 mm	Tape 60 x 5 mm	AT-021N	4	AT-050N	

> REFERENCE SELECTION TABLE: SUITABLE MOULDS, TABLETS AND CLAMPS

> CABLE/TAPE

If more than one connection appears in the table, simply replace the last letters of the reference with those of the connection required in order to obtain the correct mould. E.g.: If a LH mould for 30 x 2 mm tape to 50 mm² cable is required, simply replace C50/P302/TH with C50/P302/LH. The number of tablets will remain the same.

19 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
TH 	C35/P302/TH	35 mm² cable	Tape 30 x 2 mm	AT-020N	1.5	AT-049N	
	C50/P302/TH	50 mm² cable	Tape 30 x 2 mm	AT-020N	2	AT-049N	
	C70/P302/TH	70 mm² cable	Tape 30 x 2 mm	AT-020N	2	AT-049N	
	C35/P253/TH	35 mm² cable	Tape 25 x 3 mm	AT-020N	1.5	AT-049N	
	C50/P253/TH	50 mm² cable	Tape 25 x 3 mm	AT-020N	2	AT-049N	
LH 	C70/P253/TH	70 mm² cable	Tape 25 x 3 mm	AT-020N	2	AT-049N	
	C70/P305/TH	70 mm² cable	Tape 30 x 5 mm	AT-020N	3	AT-049N	
	C95/P305/TH	95 mm² cable	Tape 30 x 5 mm	AT-020N	3	AT-049N	
	C120/P305/TH	120 mm² cable	Tape 30 x 5 mm	AT-020N	4.5	AT-049N	
	C150/P305/TH	150 mm² cable	Tape 30 x 5 mm	AT-020N	4.5	AT-049N	
	C150/P605/TH	150 mm² cable	Tape 60 x 5 mm	AT-020N	5	AT-049N	
	C185/P605/TH	240 mm² cable	Tape 60 x 5 mm	AT-021N	3	AT-050N	
	C240/P605/TH	240 mm² cable	Tape 60 x 5 mm	AT-021N	4	AT-050N	

20 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
TH 	P302/C35/TH	35 mm² cable	Tape 30 x 2 mm	AT-020N	1	AT-049N	
	P302/C50/TH	50 mm² cable	Tape 30 x 2 mm	AT-020N	2	AT-049N	
	P302/C70/TH	70 mm² cable	Tape 30 x 2 mm	AT-020N	2	AT-049N	
	P302/C95/TH	95 mm² cable	Tape 30 x 2 mm	AT-020N	2.5	AT-049N	
	P302/C120/TH	120 mm² cable	Tape 30 x 2 mm	AT-020N	2.5	AT-049N	
	P253/C35/TH	35 mm² cable	Tape 25 x 3 mm	AT-020N	1.5	AT-049N	
	P253/C50/TH	50 mm² cable	Tape 25 x 3 mm	AT-020N	2	AT-049N	
	P253/C70/TH	70 mm² cable	Tape 25 x 3 mm	AT-020N	2	AT-049N	
	P253/C95/TH	95mm² cable	Tape 25 x 3 mm	AT-020N	2.5	AT-049N	
	P253/C120/TH	120 mm² cable	Tape 25 x 3 mm	AT-020N	2.5	AT-049N	
	P305/C70/TH	70 mm² cable	Tape 30 x 5 mm	AT-020N	2	AT-049N	
	P305/C95/TH	95 mm² cable	Tape 30 x 5 mm	AT-020N	2.5	AT-049N	
	P305/C120/TH	120 mm² cable	Tape 30 x 5 mm	AT-020N	2.5	AT-049N	
	P305/C150/TH	150 mm² cable	Tape 30 x 5 mm	AT-020N	2.5	AT-049N	
	P605/C150/TH	150 mm² cable	Tape 60 x 5 mm	AT-020N	5	AT-049N	
	P605/C185/TH	185mm² cable	Tape 60 x 5 mm	AT-021N	2	AT-050N	
	P605/C240/TH	240 mm² cable	Tape 60 x 5 mm	AT-021N	3	AT-050N	

> TAPE/EARTH ROD

21 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
TV 	P302/T14/TV	Tape 30 x 2 mm	Ø14.3 mm earth rod	AT-020N	3	AT-049N	
	P302/T16TV	Tape 30 x 2 mm	Ø15.9 mm earth rod	AT-020N	3	AT-049N	
	P302/T18/TV	Tape 30 x 2 mm	Ø18.3 mm earth rod	AT-020N	3.5	AT-049N	
	P253/T14/TV	Tape 25 x 3 mm	Ø14.3 mm earth rod	AT-020N	2.5	AT-049N	
	P253/T16/TV	Tape 25 x 3 mm	Ø15.9 mm earth rod	AT-020N	3	AT-049N	
	P253/T18/TV	Tape 25 x 3 mm	Ø18.3 mm earth rod	AT-020N	3	AT-049N	

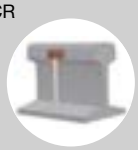
> OTHERS

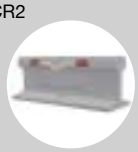
22 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Notes
HT 	C35/B/HT	35 mm² cable	Metal part	AT-020N	1.5	AT-049N	Consult before placing an order
	C50/B/HT	50 mm² cable	Metal part	AT-020N	2	AT-049N	Consult before placing an order
	C70/B/HT	70 mm² cable	Metal part	AT-020N	2	AT-049N	Consult before placing an order
	C95/B/HT	95 mm² cable	Metal part	AT-020N	2.5	AT-049N	Consult before placing an order
	C120/B/HT	120 mm² cable	Metal part	AT-020N	2.5	AT-049N	Consult before placing an order
VTO 	C150/B/HT	150 mm² cable	Metal part	AT-020N	3	AT-049N	Consult before placing an order
	C185/B/HT	185 mm² cable	Metal part	AT-021N	2	AT-050N	Consult before placing an order
	C240/B/HT	240 mm² cable	Metal part	AT-021N	2	AT-050N	Consult before placing an order

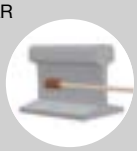
> REFERENCE SELECTION TABLE: SUITABLE MOULDS, TABLETS AND CLAMPS

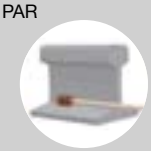
> APLIWELD® Secure+ WELDING FOR TRACKS

Cable to train railway welding operates in the exact same way as the others, although the rail to be used in each case must be specified. If the connection you need is not mentioned, please contact us.

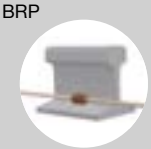
23 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Rail sleeve
CR 	C35/CR	35 mm² cable	Rail head	2	AT-020N	AT-056N	AT-SC35
	C50/CR	50 mm² cable	Rail head	2	AT-020N	AT-056N	AT-SC50
	C70/CR	70 mm² cable	Rail head	2	AT-020N	AT-056N	AT-SC70
	C95/CR	95 mm² cable	Rail head	2.5	AT-020N	AT-056N	AT-SC95
	C120/CR	120 mm² cable	Rail head	2.5	AT-020N	AT-056N	AT-SC120
	C150/CR	150 mm² cable	Rail head	3	AT-020N	AT-056N	AT-SC150

24 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Remarks
CR2 	C35/CR2	35 mm² cable	Rail head	2 + 2	AT-020N	AT-057N	Clamp comprises 2 AT-056N
	C50/CR2	50 mm² cable	Rail head	2 + 2	AT-020N	AT-057N	Clamp comprises2 AT-056N
	C70/CR2	70 mm² cable	Rail head	2 + 2	AT-020N	AT-057N	Clamp comprises 2 AT-056N
	C95/CR2	95 mm² cable	Rail head	2.5 + 2.5	AT-020N	AT-057N	Clamp comprises 2 AT-056N
	C120/CR2	120 mm² cable	Rail head	2.5 + 2.5	AT-020N	AT-057N	Clamp comprises 2 AT-056N
	C150/CR2	150 mm² cable	Rail head	3 + 3	AT-020N	AT-057N	Clamp comprises 2 AT-056N

25 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Rail sleeve
AR 	C35/AR	35 mm² cable	Rail web	2	AT-020N	AT-054N	AT-SC35
	C50/AR	50 mm² cable	Rail web	2	AT-020N	AT-054N	AT-S50
	C70/AR	70 mm² cable	Rail web	2	AT-020N	AT-054N	AT-SC70
	C95/AR	95 mm² cable	Rail web	2.5	AT-020N	AT-054N	AT-SC95
	C120/AR	120 mm² cable	Rail web	2.5	AT-020N	AT-054N	AT-SC120
	C150/AR	150 mm² cable	Rail web	3	AT-020N	AT-054N	AT-SC150

26 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Railsleeve
PAR 	C35/PAR	35 mm² cable	Rail web/foot	2	AT-020N	AT-054N	AT-SC35
	C50/PAR	50 mm² cable	Rail web/foot	2	AT-020N	AT-054N	AT-SC50
	C70/PAR	70 mm² cable	Rail web/foot	2	AT-020N	AT-054N	AT-SC70
	C95/PAR	95 mm² cable	Rail web/foot	2.5	AT-020N	AT-054N	AT-SC95
	C120/PAR	120 mm² cable	Rail web/foot	2.5	AT-020N	AT-054N	AT-SC120
	C150/PAR	150 mm² cable	Rail web/foot	3	AT-020N	AT-054N	AT-SC150

27 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Remarks
BR 	C35/BR	35 mm2 cable	Rail foot	2	AT-020N	N/A	Single-use mould
	C50/BR	50 mm² cable	Rail foot	2	AT-020N	N/A	Single-use mould
	C70/BR	70 mm² cable	Rail foot	2	AT-020N	N/A	Single-use mould
	C95/BR	95 mm² cable	Rail foot	2.5	AT-020N	N/A	Single-use mould
	C120/BR	120 mm² cable	Rail foot	2.5	AT-020N	N/A	Single-use mould
	C150/BR	150 mm² cable	Rail foot	3	AT-020N	N/A	Single-use mould

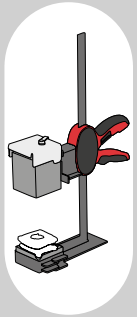
28 Connection	Reference	Conductor 1	Conductor 2	Tab Ref.	Tab/Conn.	Clamp	Remarks
BRP 	C35/BRP	35 mm² cable	Rail foot	2	AT-020N	N/A	Single-use mould
	C50/BRP	50 mm² cable	Rail foot	2	AT-020N	N/A	Single-use mould
	C70/BRP	70 mm² cable	Rail foot	2	AT-020N	N/A	Single-use mould
	C95/BRP	95 mm² cable	Rail foot	2.5	AT-020N	N/A	Single-use mould
	C120/BRP	120 mm² cable	Rail foot	2.5	AT-020N	N/A	Single-use mould
	C150/BRP	150 mm² cable	Rail foot	3.5	AT-020N	N/A	Single-use mould

It is recommended to use AT-065N or AT-066N sealing paste for all the connections

> MULTIPLE MOULD SELECTION GUIDE

The multiple mould is normally supplied in a case with the general reference **MM-CTX** (*), where X is the diameter of the earth rod required. All other references related to the multiple mould, such as the individual parts in the case and the basic kits, are also listed.

29



Reference	Description	Notes
MM-CT14	Multiple mould case for Ø14.3 mm earth rod	See description in table 30
MM-CT16	Multiple mould case for Ø16 mm earth rod	See description in table 30
MM-CT17	Multiple mould case for Ø17.2 mm earth rod	See description in table 30
MM-CT18	Multiple mould case for Ø18.3 mm earth rod	See description in table 30
MM-CT19	Multiple mould case for Ø19 mm earth rod	See description in table 30
MM-BT14	Basic multiple mould kit for Ø14.3 mm earth rod	Includes crucible, clamp and lower parts
MM-BT16	Basic multiple mould kit for Ø16 mm earth rod	Includes crucible, clamp and lower parts
MM-BT17	Basic multiple mould kit for Ø17.2 mm earth rod	Includes crucible, clamp and lower parts
MM-BT18	Basic multiple mould kit for Ø18.3 mm earth rod	Includes crucible, clamp and lower parts
MM-BT19	Basic multiple mould kit for Ø19 mm earth rod	Includes crucible, clamp and lower parts
MM-053N	Multiple mould clamp	Included in all MM-CTX and MM-BTX kits (*)
MM-CS	Cavity sealant (60 units)	2 included in all MM-CTX
MM-PH	Lower part for cable and tape welding	Included in all MM-CTX and MM-BTX
MM-PT14	Lower part for Ø14.3 mm earth rod	Included in MM-CT14 and MM-BT14
MM-PT16	Lower part for Ø16 mm earth rod	Included in MM-CT16 and MM-BT16
MM-PT17	Lower part for Ø17.2 mm earth rod	Included in MM-CT17 and MM-BT17
MM-PT18	Lower part for Ø18.3 mm earth rod	Included in MM-CT18 and MM-BT18
MM-PT19	Lower part for Ø19 mm earth rod	Included in MM-CT19 and MM-BT19
MM-T	Multiple mould crucible	Included in all MM-CTX and MM-BTX
AT-082N	Vertical stand pliers	Included in all MM-CTX

(*) X = 14, 16, 17, 18 and 19

References included in every MM-CTX case

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Code	Description	Units
MM-PTX	Lower part for earth rod with X diameter (*)	1
MM-053N	Multiple mould clamp	1
MM-T	Multiple mould crucible	1
MM-PH	Lower part for cable and tape welding	1
MM-CS	Cavity sealant (60 units)	2
AT-080N	Multiple mould case	1
AT-060N	Spark lighter (for powder starter)	1
AT-061N	Conductor cleaning brush	1
AT-062N	Crucible and electronic starter cavity cleaning brush	1
AT-063N	Slag removal spade	1
AT-064N	Welding cavity cleaning brush	1
AT-065N	Sealing paste to prevent material leaking	1
AT-073N	Safety gloves	1
AT-082N	Vertical stand pliers for earth rod welding	1

(*) X = 14, 16, 17, 18 and 19
All parts may be purchased individually or as spare parts.

The following table describes the appropriate number of tablets and cavity sealants for any connection, as well as how to use them:

31

Conductor 1		Conductor 2		Connection	Tablets	SC	SC/Layers
Cable	Up to 70 mm²	Cable	Up to 70 mm²	Horizontal T	2	2	1+1
Cable	95 mm²	Cable	Up to 95 mm²	Horizontal T	2.5	4	2+2
Cable	Up to 50 mm²	Cable	Up to 50 mm²	Cross	2	3	1+1+1
Cable	70 mm²	Cable	70 mm²	Cross	2.5	4	1+2+1
Cable	95 mm²	Cable	Up to 95 mm²	Cross	2.5	6	2+2+2
Cable	Up to 70 mm²	Ø Earth rod	Any	Vertical T	2	2	1+1
Cable	95 mm²	Ø Earth rod	Any	Vertical T	2.5	4	2+2
Tape	Any	Tape	Any	T/cross	2	3	1+1+1
Tape	Any	Ø Earth rod	Any	T	2	2	1+1

> SC = Cavity Sealants.
> SC/layer: Number of sealants between layers of conductors.
> Besides those described, linear welds are possible for all combinations. They require 2 tablets with the exception of 95 mm² cable which requires 2.5 tablets.
> The following equivalence can be applied for round bar up to 12 mm: C70 = V10 and C95 = V12.
> For cable to tape bonds, the tape corresponds to cables of up to 50 mm².
> Parallel connections are possible for cables of up to 50 mm². They all require 2.5 tablets with 1+2+2 SC.
> For any other bond required but not described, please get in touch with us.

> REFERENCE LIST APLIWELD® SECURE+

APLIWELD®-T **tablet references**

32	Reference	Description	Notes
	AT-020N	20 standard **APLIWELD®** tablets	
	AT-021N	20 large format **APLIWELD®** tablets	

References for using **APLIWELD®-E** electronic ignition

33	Reference	Description	Notes
	AT-100N	Electronic starting device	
	AT-010N	10 electronic starters + 10 contention discs	
	AT-069N	Basic accessories kit **APLIWELD®-E**	
	AT-096N	Electronic ignition device (without accessories)	Included in AT-100N
	AT-098N	Standard cable for the ignition device (2m)	Included in AT-100N
	AT-099N	5 spare clamps for electronic starter connector	Included in AT-100N
	AT-101N	Battery charger for the electronic ignition device	Included in AT-100N

References for traditional ignition

34	Reference	Description	Notes
	AT-012N	10 units of starting powder + 10 contention discs	
	AT-068N	**APLIWELD®** basic accessories kit with spark lighter	

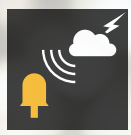
References for clamps and clamp accessories

35	Reference	Description	Reference	Description
	AT-049N	General clamp type S	AT-059N	Cable-holder clamp
	AT-050N	General clamp type G	AT-056N	Cable clamp/Rail head
	AT-051N	Clamp for welding to vertical surface or rebars	AT-057N	Cable clamp/Rail head
	AT-058N	Clamp accessory for welding to horizontal surfaces	AT-054N	Cable clamp/Rail web

Other accessories and tools

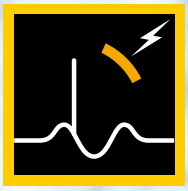
36	Reference	Description	Notes
	AT-060N	Spark lighter	Included in AT-068N
	AT-061N	Conductor cleaning brush	Included in AT-069N and AT-068N
	AT-062N	Crucible and electronic starter cavity cleaning brush	Included in AT-069N and AT-068N
	AT-063N	Slag removal spade	Included in AT-069N and AT-068N
	AT-064N	Welding cavity cleaning brush	Included in AT-069N and AT-068N
	AT-065N	Sealing paste (0.45 kg)	Included in AT-069N and AT-068N
	AT-066N	Sealing paste (0.9 kg)	
	AT-070N	Spark lighter spare flint	
	AT-071N	Sealing paste (2.25 kg)	
	AT-072N	25 cable wrap sleeves (0.3 mm)	
	AT-072NCXX	Adapters to XX cable	XX can be 50, 70, 120...
	AT-073N	Safety gloves	Included in AT-069N and AT-068N
	AT-074N	Spark lighter extension	
	AT-075N	Blow torch for pre-heating moulds	
	AT-076N	Spare multigas cartridge for the blow torch	
	AT-077N	Safety goggles	
	AT-081N	Ceramic tray	
	AT-083N	Ceramic blanket	
	AT-092N	Double brush for conductor cleaning	
	AT-093N	Double conductor brush replacements	
	AT-094N	Surface rasp + replacement	

TRANSIENT

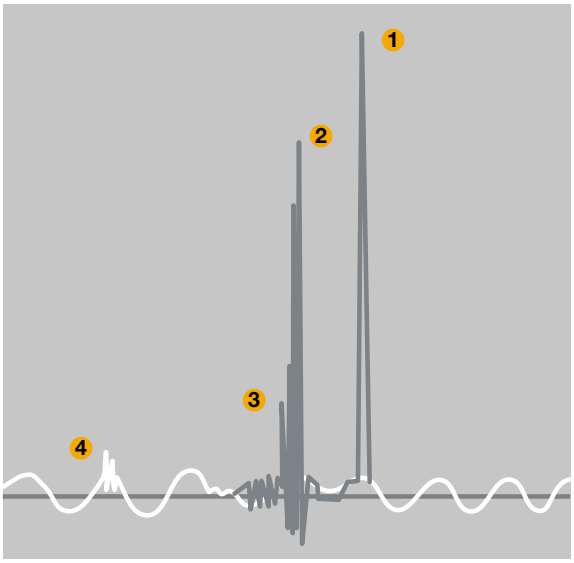


5

OVERVOLTAGES



> OVERVOLTAGES AND THEIR DAMAGES



Types of overvoltages:

1. Overvoltages due to atmospheric discharges
2. Switching overvoltages
3. Occasional increases in voltage
4. Harmonics

Overvoltages are an increase of voltage on the electrical network, measured between two conductors, which can cause damage to the electric installation and equipment. There are two different types: transient and permanent.

Permanent, temporary or power frequency overvoltages are characterized by their relatively long duration (several cycles). These overvoltages are explained from page 368 onwards.

Transient overvoltages are increases in voltage of very short duration between two conductors or between a conductor and the ground. They may be due to atmospheric electrical discharges (lightning), switching or electrical faults (contact with earth or short circuit).

HOW DO OVERVOLTAGES ENTER THE EQUIPMENT?

Power supply, telephone, TV or data lines often cover long distances, far from any protected areas, and are connected to very sensitive equipment. This condition makes the lines especially receptive to overvoltages, which will then be transmitted by conduction to the connected equipment.

Care must be taken with overhead lines that connect sensitive equipment even in protected environments, as it is likely that dangerous voltages may be induced. It is also important to take into account that lightning and power switching generate high magnitude electromagnetic fields, thus inducing currents in the conductors placed inside this field. Even cloud to cloud lightning strikes can cause damage to electrical installations.

In general, it is convenient to install surge protection on any line entering or leaving a building that is connected to or could be connected to sensitive equipment.

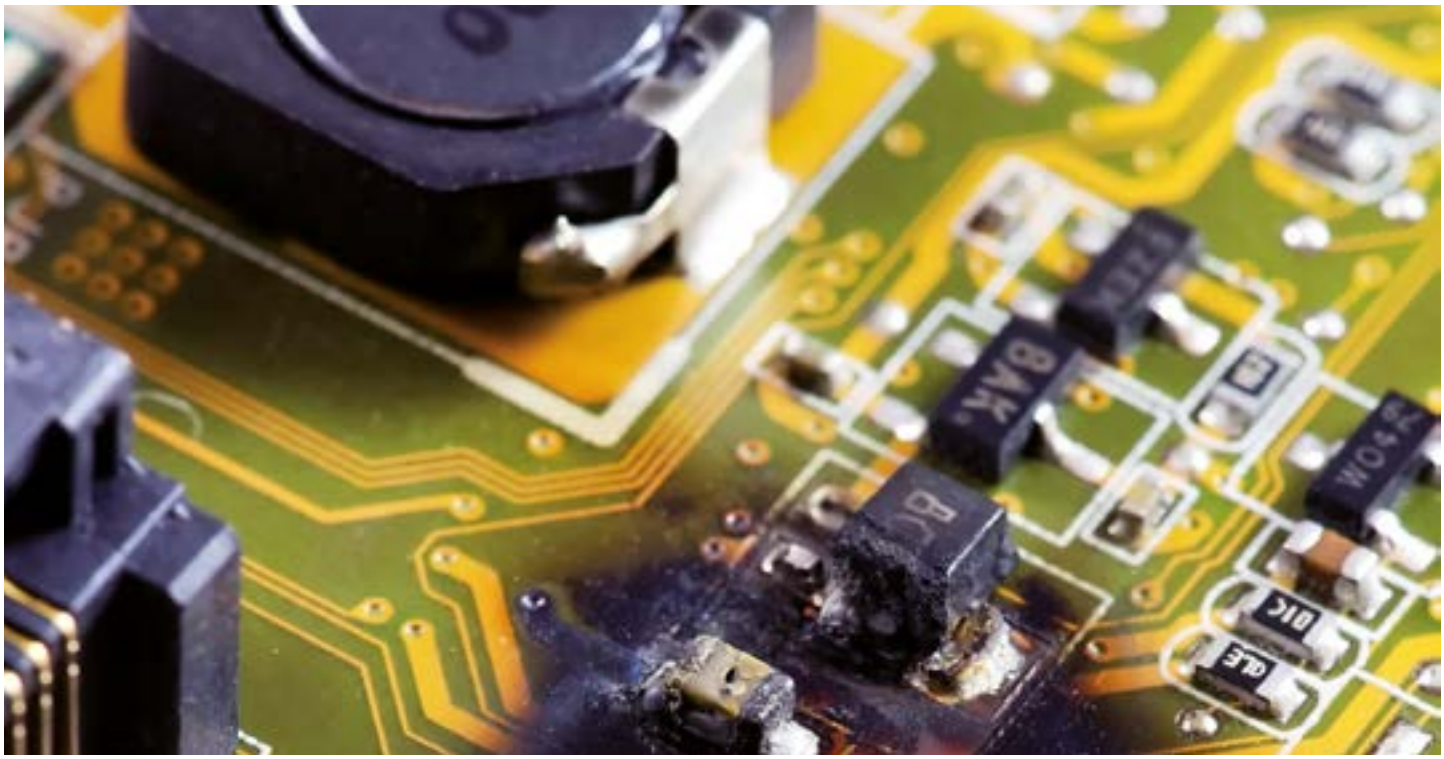
Finally, lightning effects can enter through the earthing network, changing the voltage reference of all the equipment connected to it or to the power supply line itself. The most susceptible equipment in this case are those that have the voltages of its elements referenced to two different grounds.

In this case, it is recommended to link all the earth connections, including those of the lightning protection system, in order to avoid overvoltages and larger flowing currents.

In addition, when there are several buildings in the same complex, the risk will usually increase due to the higher number of interconnections.

OVERVOLTAGES AND THEIR DAMAGES

> CONSEQUENCES OF OVERVOLTAGES



The most typical transient overvoltages are due to switching operations of machinery. However, the most destructive ones are due to atmospheric discharges.

Surge effects range from simple brief work interruptions to the total destruction of an installation or equipment.

> DISRUPTION

Interruption of system operation, data loss and corruption, computer failures, etc.

> DAMAGE

Severe transient overvoltages can damage components, circuit boards and can even burn or destroy the equipment, as well as causing an outbreak of fire.

> DETERIORATION

Exposure to transient overvoltages will, without the user realising, deteriorate electronic components and circuits, reducing the effective life of the equipment and increasing the possibility of failures.

All of these effects involve financial losses due to replacing damaged components, as well as the indirect cost of interruption to production.

Moreover, these effects can carry risks for people which must be avoided according to occupational health and safety laws:

Minimum health and safety requirements for workers using installations and equipment. R.D. 1215/97. Annex II, point 12.

“Any installation or machinery used for work which can be reached by lightning must be protected against its effects by adequate measures and devices.”

OVERVOLTAGES AND THEIR DAMAGES

ELECTRONIC COMPONENTS: FROM VALVES TO NANOTECHNOLOGY

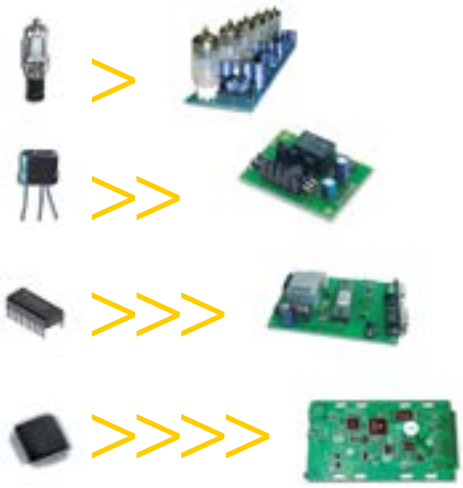
Although transient overvoltages have existed since the creation of electrical networks, nowadays the need for protection is much greater. This is due to advanced technology making electrical components smaller and smaller and more sensitive to electromagnetic disturbances.

ELECTRIC VALVES
Large and resistant. The majority can generally withstand overvoltages without suffering irreparable damages.

FIRST TRANSISTORS
More sensitive but with good insulation.

INTEGRATED CIRCUITS
They are made up of a large quantity of transistors and work with every low currents and voltages.

SMD COMPONENTS
Their small size, proximity of components and lines which join them, makes them very susceptible to overvoltages.



Damage caused by overvoltages

The effect of conducted or induced currents due to atmospheric discharges either from distant strikes, lightning between clouds or the switching operations of heavy machinery (which cause overvoltages similar to those produced by lightning strikes), can cause devastating damage to electronic equipment and electrical installations.

Atmospheric discharges produce voltage peaks on the signal, which are very intense but very short. The current associated with a direct lightning strike can reach over 100 kA, thus even its secondary effects include currents that may still cause great damage to the lines and equipment they reach.

Most electrical systems are equipped with security measures to avoid short-circuits and electrical shocks to people. Almost every electrical board contains protectors, such as circuit breakers and residual current devices. However, they cannot prevent the consequences of transient overvoltages, since their reaction is much slower than the voltage peak that appears.

UPS (Uninterrupted Power Supply) is a special case. These elements ensure the power supply of the equipment connected to it, even when there is a cut in the electricity supply. Most of this equipment also has a voltage filter that enables a stable power supply within ± 15% variation of nominal voltage. However, they can suffer serious damage when subjected to transient overvoltages, as they are sophisticated elements with microprocessor technology and are, therefore, very sensitive to overvoltages.

Surge Protection Devices complement the previously mentioned protection. They remain inactive with small deformations in the signal or network overloads. However, they respond instantly to transient voltage peaks and are able to drive lightning current (main or secondary) to earth, safeguarding the connected equipment.

> CAUSES OF OVERVOLTAGES

Depending on their nature, there are two categories of overvoltages:

Surges due to lightning strikes

Thunderstorms are very common and dangerous. It is estimated that, every second on our planet, there are 2,000 storms and 100 lightning strikes taking place simultaneously. In total, this represents 4,000 storms and 9 million atmospheric discharges every day.

When lightning strikes, it causes a current impulse that can reach tens of thousands of amperes. This discharge produces an overvoltage in the electrical lines and can cause fire, damage to equipment and even death.

Switching overvoltages

These overvoltages are generated in electrical lines mainly due to the following two reasons:

1. Electrical switching of large machinery.

Electrical motors are very inductive loads and their connection and disconnection can cause overvoltages. There are also other processes capable of producing them, for example turning a welding arch on/off and connecting and disconnecting power electronic devices.

2. Manoeuvres and/or faults in power supply network.

In the event of a short circuit at any point in the network, the circuit breakers will respond by opening the circuit and making subsequent autoreclosing attempts if it is a transient fault. Such faults can generate overvoltages that are typical in the connection of inductive loads.

OVERVOLTAGES AND THEIR DAMAGES

> MECHANISMS OF PROPAGATION

The prevailing mechanism of switching overvoltages is conduction, as it starts in the very same power supply networks. All kinds of different propagation methods can be observed in atmospheric discharges.

Therefore, we can differentiate between the following mechanisms:

Conducted overvoltages

Lightning can strike overhead lines directly. Surges then propagate and reach the user, finally diverting to the ground through the equipment, causing failures.

A common mistake is to think that discharges hitting power distribution lines (Medium Voltage) do not reach the Low Voltage ones because of the galvanic insulation provided by the transformer. However, this is not true due to the fact that the aforementioned insulation is effective for nominal frequencies in the network, while for the wave forms associated with lightning, the transformer produces little attenuation.

Induced overvoltages

The electromagnetic field produced by electrical discharges induces transient currents in nearby equipment, which can then enter facilities and damage the equipment.

Overvoltages due to capacitive coupling

There is always a capacitive coupling, also known as stray capacity, between every pair of conductors. Overvoltages due to capacitive coupling become more important as the voltage waveform velocity increases.

Overvoltage due to voltage raises at the grounding

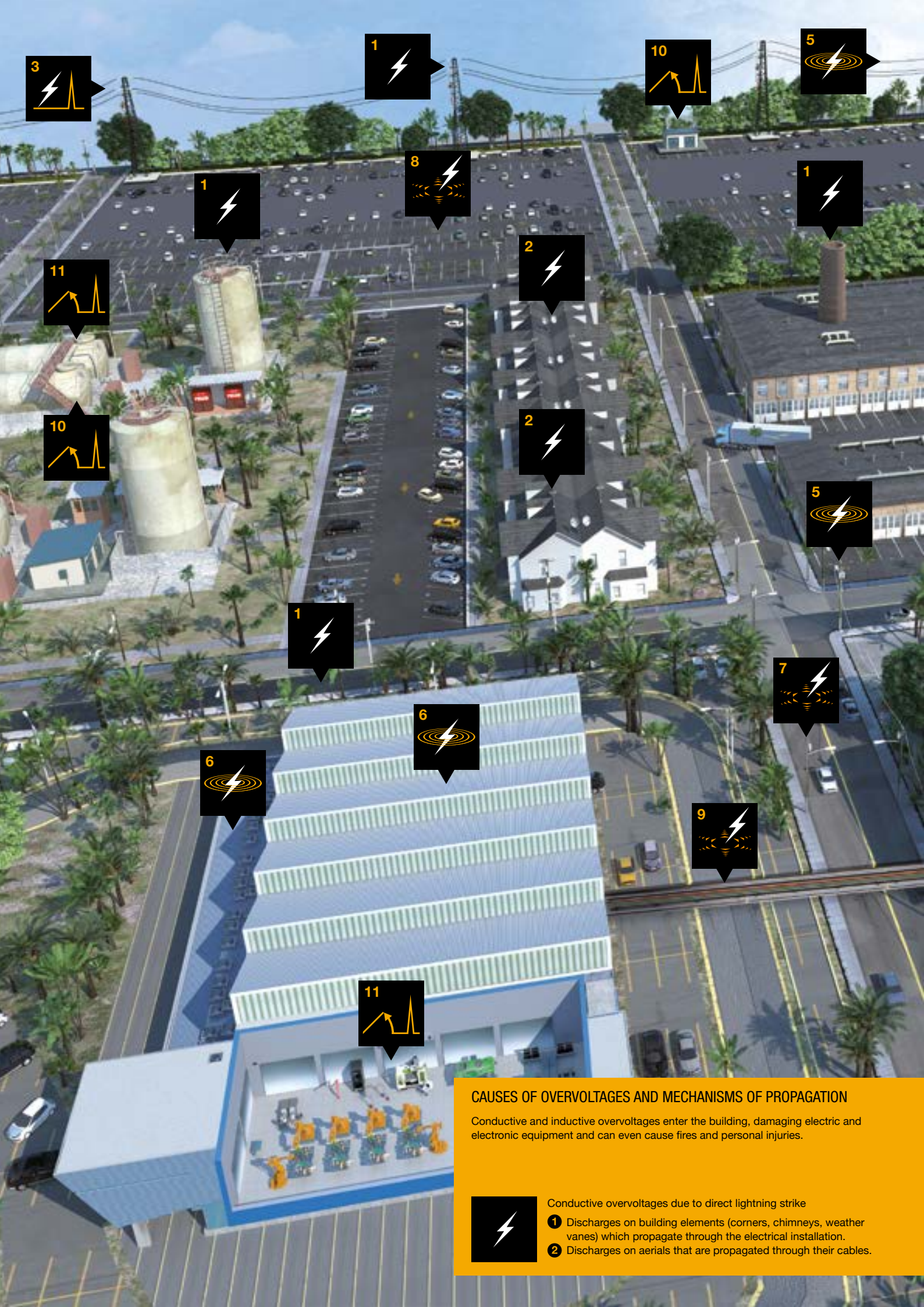
This mechanism is a special case of conducted overvoltages (described before) but due to its high incidence, it deserves a special mention.

When lightning disperses in the earth, the discharge current can consequently raise the ground voltage around the point of impact by several thousands of volts.

Any object on the affected ground will acquire the associated voltage during that time, which can produce a dangerous voltage difference with regard to other points of the installation. Special care is to be taken with buried metal objects, such as piping and earth terminals.

	Overvoltage	Intensity
Conducted overvoltages	Up to several tens of kV	Long distance impact: up to 1 kA Close impacts: up to some kA Direct impacts: up to tens of kA
Induced overvoltages	Up to some kV between conductors which are not ground Up to several tens of kV between ground and conductor	Up to a few kA Up to several tens of kA
Overvoltages due to capacitive coupling	Up to some kV between conductors which are not ground Up to a few kV between ground and conductor	Up to a few kA

The table represents each transmission mechanism, the corresponding overvoltage order of magnitude, as well as its associated currents.



CAUSES OF OVERVOLTAGES AND MECHANISMS OF PROPAGATION

Conductive and inductive overvoltages enter the building, damaging electric and electronic equipment and can even cause fires and personal injuries.

Conductive overvoltages due to direct lightning strike

1. Discharges on building elements (corners, chimneys, weather vanes) which propagate through the electrical installation.
2. Discharges on aerials that are propagated through their cables.

Conductive overvoltages due to indirect lightning discharge

- 3 Discharges on overhead power lines.
- 4 Discharges on overhead telephone lines.

Overvoltages due to voltage raises in the grounding

- 7 Direct discharges on objects near buildings (trees, metal railings, lamp posts).
- 8 Direct discharges to ground.
- 9 Discharges near underground power supply and data lines that connect to equipment between different buildings.

Induced overvoltages

- 5 Inductions in overhead power supply lines and telephone lines.
- 6 Inductions in power supply and computer lines inside buildings.

Switching overvoltages

- 10 Manoeuvres in power supply.
- 11 Switching in heavy machinery.

> COMPLETE DESIGN GUIDE FOR OVERVOLTAGE PROTECTION SYSTEM

The aim of an overvoltage protection system is to ensure continuity of service and minimise any probability of incidents due to transient overvoltages to an acceptable level.

The main feature of overvoltage protectors is their rapid response time.

Transient overvoltages could easily reach several kilovolts in a few microseconds. During this increase time and while the protector has not reacted, the rising voltage will reach the connected equipment. Generally, the response time of the protectors varies between 20 and 100 nanoseconds.

Overvoltage protection devices can be installed in series or in parallel, however they must always remain inactive under normal conditions. As soon as there is an overvoltage, the protector will start working, driving the lightning current to ground. There should not be any momentary interruptions, meaning that the end user should not notice that the protector is activated. Moreover, sustained interruptions are not permitted. When the overvoltage has been absorbed, the protector should return to its inactive state without affecting the normal operation of the signal.

In those cases where the components of the protector have suffered a bigger overvoltage than they can withstand, the fault mode should be open circuit thus preventing a signal short-circuit. Most of protectors are provided with a visual or remote control warning system which activates when the protector is no longer in service and should be replaced.

No protector nowadays is able to both absorb high currents and let harmless residual voltage pass through. Therefore, a number of devices are required in order to achieve a good balance between current and voltage, minimising any further damage to the equipment. From the user's point of view, this is the most important thing: the residual voltage should not represent a threat.

Protection against overvoltages are aimed to maintain service continuity and reduce, for the people security and machinery, the probabilities of accidents caused by transient overvoltages.

> COMPLETE DESIGN GUIDE FOR OVERVOLTAGE PROTECTION SYSTEM

> APPLICABLE REGULATIONS

The standards of series 61643 of the International Electrotechnical Committee (IEC) define the requirements and implementation of overvoltage protectors. These standards have already been adopted as European standards (EN), and translated as Spanish standards (UNE). There are other applicable regulations, among which are the lightning protection standards. Regulations for the installation of electrical boards should always be fulfilled.

The tests carried out on the protectors are mainly based on standard IEC 61643, although APLICACIONES TECNOLOGICAS products also comply with the requirements of UL 1449.

UL 1449 is a safety standard, not an operation standard. Therefore, it does not test the specific current or voltage values on the protector, but rather its safety. On the other hand, IEC 61643 certifies both security and working conditions.

> TESTS CARRIED OUT. IEC 61643 series

According to this regulation, overvoltage protection devices can be classified into three types depending on what they are used for: if they should be able to withstand direct lightning strikes, their secondary effects or attenuated overvoltages.

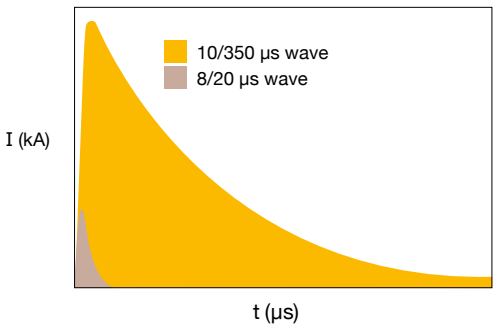
According to the class established, the manufacturer provides a piece of information that characterises the device and determines the type of test to be carried out. Although there is no set value of current defined in the standards for the protector to withstand, any value stated on the label and on its technical datasheet must pass a series of laboratory tests defined in the standard.

APLICACIONES TECNOLOGICAS, S.A. has tested its overvoltage protection devices in official and independent laboratories, passing all tests with the values described in their technical sheets and labels.

> CLASSIFICATION ACCORDING TO IMPULSE TEST

Information to be provided by the manufacturer for each type of protection

	I_{imp} (with 10/350 µs wave)	I_n (with 8/20 µs wave)	I_{max} (with 8/20 µs wave)	Ignition voltage with 1.2/50 µs wave	U_{OC} Open circuit voltage with combined wave 1.2/50 µs; 8/20 µs
Type 1	x	x		x	
Type 2		x	x	x	
Type 3					x



Impulse current waves applied to overvoltage protectors in order to check their characteristics. The area of each curve in this graph shows the specific energy applied.

> STANDARD IMPULSE CURRENT TESTS

There are two different current tests that simulate the effects of a lightning strike:

a Direct lightning strike test, modelled on wave form 10/350 µs in order to determine I_{imp}.

b Test on secondary lightning effects and switching elements, with 8/20 µs wave in order to determine I_{max}. Due to the different make up of the wave form tested, I_{imp} tests have a much higher energy than I_{max} and I_n tests.

During the tests, the protectors are submitted to repeated current and voltage impulses and the residual voltage is measured. The established level of protection (U_p) cannot be exceeded in any test. Residual voltage does not always increase with the current value: there may be some particularly critical current values. Therefore, it is very important to apply stepped current impulses, above and below the nominal current, in order to be aware of the voltage the protector can let pass. Thermal and mechanical tests are also performed.

> COMPLETE DESIGN GUIDE FOR OVERVOLTAGE PROTECTION SYSTEM

> OTHER APPLICABLE STANDARDS

There are other regulations to take into account when designing and installing overvoltage protection devices. Furthermore, these protectors are part of the internal protection described in the following lightning protection standards:

> **Standard UNE 21186 and NF C 17-102**, deals with "protection of structures and of open areas against lightning using early streamer emission air terminals".

> **Standard IEC 62305**, deals with "Lightning protection" using conventional systems (meshed conductors and air terminals).

> **Other standards**
Typically, in every country there are codes that may be related to overvoltage protection, such as National Electric Code and National Construction Code.

It is highly advisable to check carefully if there are surge protection requirements within national obligatory standards.

In National Electric Codes typical cases from REBT GUIDE-BT-23 are:

- Total or partial low voltage supply lines when the installation includes air lines.
- Risk of failure affecting human life. I.e., Security services, emergency centres, medical equipment and hospitals.
- Risk of failure affecting animal life. I.e., Fish farms
- Risk of failure affecting public services. I.e., Telecommunication systems, informatics centres.
- Risk of failure affecting industrial or agricultural processes and operations which cannot be interrupted. I.e., Industries with ovens or general industrial processes which are continuous.
- Risk of failure affecting the structures and equipments from the local public establishments which have security services or non autonomous emergency illuminating systems.
- Installations on buildings with external protection systems against lightning such as: Lightning conductors, Franklin rods, Faraday cages, installed on the same building in an area lower than 50 metres.

> **ENDESA VADEMECUM Guide for electrical Low Voltage installations.** In the section on Centralized Counter indicates that you must install surge protectors type 1.

- In the main switchboard, permanent and transient overvoltage protection must be installed.

> **IBERDROLA Distribution Technical Manual MT 2.80.12 for electrical installations.** In the section on Centralized Counter indicates that, when specified by the ITC-BT-23 and GUIDE-BT-23 of REBT, install surge protectors type 1.

> COMPLETE DESIGN GUIDE FOR OVERVOLTAGE PROTECTION SYSTEM

> SURGE PROTECTIVE DEVICE (SPD) SELECTION

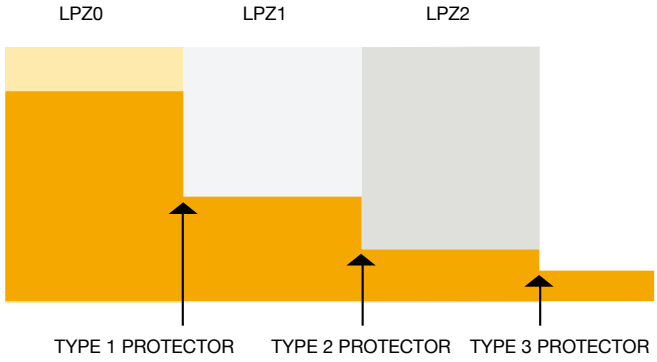
To protect any equipment correctly, it is necessary to know in detail all its characteristics. The most important parameters to take into account are:

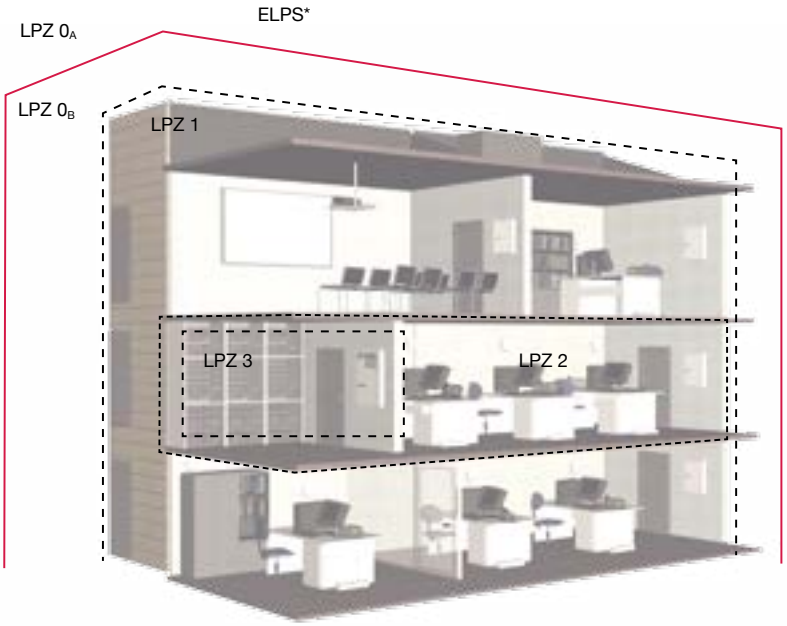
- **a** ZONES OF PROTECTION
- **b** MAXIMUM RESIDUAL VOLTAGE ALLOWED
- **c** ADDITIONAL PARAMETERS OF THE LINE

a ZONES OF PROTECTION

Lightning protection standards, as IEC 62305, define Lightning Protection Zones (LPZ) depending on the electromagnetic characteristics of each area around and inside the structure to be protected. For each of these zones, the damage that surges can cause is different, and therefore equipment should be protected according to this risk.

Surge protective devices are installed in the transitions between zones. A good coordination between them is very important: they should act in coordinated stages and be able to withstand lightning currents letting residual voltages that are harmless to the equipment.





Example of the division by zones in an office building:
* External Lighning Protection System

ZONE	CHARACTERISTICS	SURGES
LPZ 0_A	External zone, exposed to direct lightning strikes.	Full lightning current and electromagnetic field.
LPZ 0_B	External zone but within the LPS protection area and, therefore, protected against direct strikes.	Can enter part of the lightning current and all the electromagnetic field.
LPZ 1	Internal zone, where surges are limited by current spreading, up-stream SPDs and sometimes by screening.	Low currents and attenuated electric fields.
LPZ 2…n	Internal zones with more limited surges thanks to current spreading, screening and up-stream SPDs.	Minimum currents and very attenuated electric fields.

> COMPLETE DESIGN GUIDE FOR OVERVOLTAGE PROTECTION SYSTEM

Three different types of protectors are described in the regulations according to the area where they are located:

TYPE 1 PROTECTORS

Type 1 protectors should be tested with 10/350 µs lightning impulse wave, simulating the effects of direct lightning discharges.

They are to be installed where lightning currents and electromagnetic effects are unattenuated.

TYPE 2 PROTECTORS

Type 2 protectors should be tested with 8/20 µs current impulse wave, simulating lightning secondary effects.

They have to be installed where lightning currents and electromagnetic effects are already attenuated.

TYPE 3 PROTECTORS

Type 3 protectors should be tested with a combination impulse wave but with low values, simulating very attenuated overvoltages. Normally they are installed near the equipment and have low residual voltages.

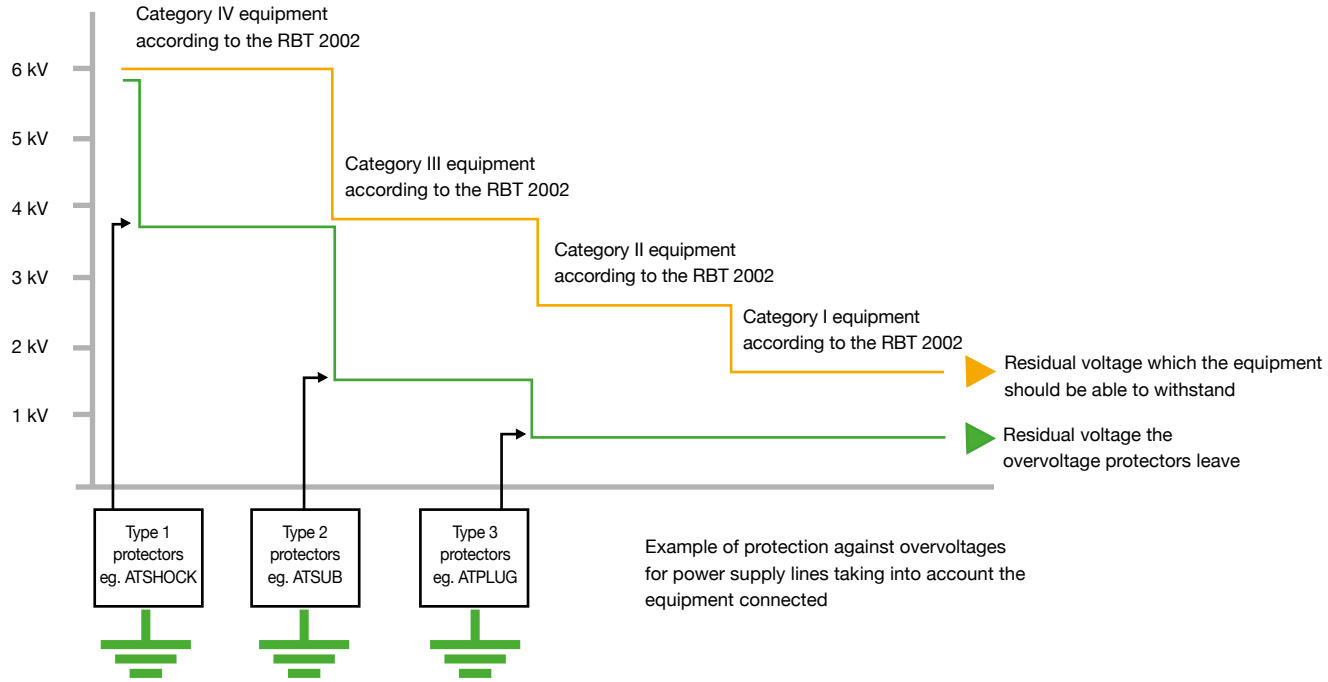
One way of reducing the electromagnetic fields and the danger they bring with them is to shield the structures, rooms and/or equipment. For buildings, the equipotential bonding of metal objects manages to reduce disturbances and is highly recommendable. If this interconnection is carried out during construction of the building, it is more effective and less costly.

In any case, all the lines entering or leaving a zone should be protected with the proper devices in order to prevent overvoltages.

b MAXIMUM RESIDUAL VOLTAGE ALLOWED

A low residual voltage is always a positive characteristic of protectors, given that the equipment will suffer less damage when surges reach high levels, even if they are capable of supporting them.

However, there is more robust equipment or including internal protection that does not require especially low residual voltage, whilst other equipment can be very sensitive and hence require very low residual voltage. Protectors, in this last case, must be installed very near the equipment. In order to select a suitable protector, the characteristics of each equipment connected should be taken into account.



Example of protection against overvoltages for power supply lines taking into account the equipment connected

> COMPLETE DESIGN GUIDE FOR OVERVOLTAGE PROTECTION SYSTEM

c ADDITIONAL PARAMETERS OF THE LINE

To finalise the protection details, it is convenient and in some cases, essential, to know the characteristics of the line to be protected. For example:

> Maximum operating voltage, to avoid the protector activates at an acceptable voltage level to the user.

> Type of voltage: alternating, continuous, impulses, etc.

> Working current of the line, absolutely essential if an element is inserted in series.

> Supply system TN, TT, IT (in power supply lines) to protect the suitable lines.

> Characteristics of the connections.

It is essential that the protector does not affect the working conditions of the line or produce significant losses of signal.

SPD selection

1 Check the line characteristics in order to find out the direct and/or alternating maximum operating voltage between each of the conductors. Select protectors such that:

U_c > maximum operating voltage of the line

2 Select the protector type and its maximum current according to the effects it should withstand:

Current that can reach the protector	Type of protector
Direct lightning current:	Type 1
Lightning secondary effects:	Type 2
Attenuated overvoltages:	Type 3

3 Select the protector residual voltage according to the equipment to be protected. For example, for power supply lines it is recommended:

Equipment to be protected	Residual Voltage (1.2/50 µs)
Very robust equipment (large motors, air conditioning, etc.):	< 4 kV
Non-sensitive or internally protected equipment:	< 1.5 kV
Very sensitive or unprotected equipment against electromagnetic disturbances	< 1 kV

> SPD COORDINATION

Once the protection requirements have been observed, it is likely that one commercial device will not meet the required characteristics for discharge current and residual voltage. For this reason, the installation and coordination of several devices is required.

In general, the higher the current withstanding capacity of a protector is, the higher the residual voltage and therefore also its level of protection:

$$\text{if } I_{max} \uparrow \longrightarrow U_p \uparrow$$

Therefore, proper overvoltage protection requires staggered and coordinated protectors with several protection stages acting sequentially so that they are able to, on the one hand, withstand all the lightning current and, on the other, leave a residual voltage which is harmless for the existing equipment or that which will later be installed.

If protectors are connected to the same electrical point, without any impedance between them, then the fastest one will withstand the whole overvoltage, whereas the most robust protector has no time to activate. If the overvoltage is very large, it could destroy or damage the protector. Even if the surge does not harm the protector, there is no sense in installing a robust protector with a huge current withstanding capability, if it never acts.

For two protectors to be correctly coordinated, the length of the cable between them should be at least 10 metres. If this is not possible (for example, if both are in the same electrical board), a decoupling inductor should be installed between them.

Aplicaciones Tecnológicas, S.A. supplies complete cabinets where all stages are already installed and coordinated by a decoupling inductor. Suitable for those installations where separation by cable is not possible.

> COMPLETE DESIGN GUIDE FOR OVERVOLTAGE PROTECTION SYSTEM

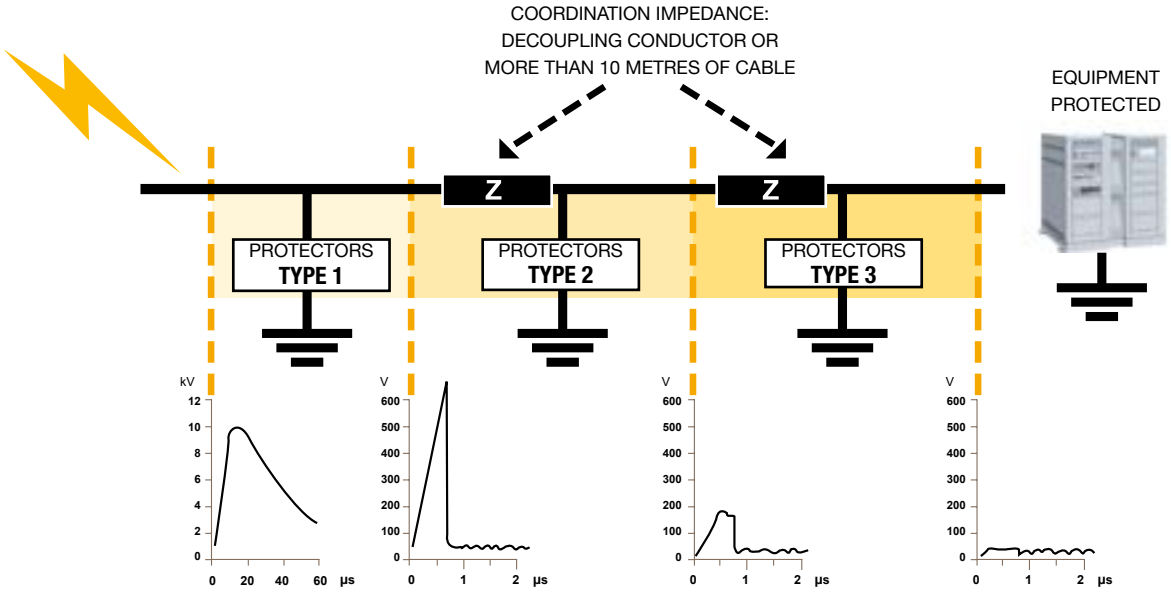
> PROTECTION STAGES

Usually, the **first protection** (coarse protection) should be a spark gap or gas discharge tube (GDT).

These elements typically remain completely open, without any flowing current, when the signal is normal. Each one has its typical breakdown voltage (although it varies slightly with the wave form). When this voltage is exceeded, then the component is short-circuited, driving all the current to ground. When the high level voltage disappears, these components return to inactive status, or in other words, to being an open circuit.

The element forming the **second protection,** finer than the first one, is usually a varistor. Varistors are electronic components with variable resistances. Their impedance is very high when voltage is normal and it begins to decrease in a non-linear way as voltage increases. In general, they are faster than spark gaps but the disadvantage is that, while voltage is normal, their impedance may be very high but still produce small current leakages.

The **third protection barrier** is normally formed by transient voltage suppressor diodes, very fast elements, capable of leaving very low residual voltages but unable to withstand currents greater than a few amperes.



Reduction of transient overvoltages by means of stepped protection.

Many protectors are formed by the combination of these elements or by several of them coordinated in a single device. Decoupling elements are normally resistances or inductors with very low impedances given that, as they are in series with the line, current continuously flows through them. If impedances were high, they would cause unnecessary losses and consumptions.

Normally the problem with electrical consumption is worse in power supply lines, where the flowing current is in amperes. For data lines, the current flowing is in milliamperes, hence consumption is not of concern. However, the operating voltages of electronic components are usually very low, thus preventing a voltage decrease in the decoupling impedance causing problems with data transmission.

For power supply lines, different combinations of ATSHOCK, ATSUB and ATCOVER have been tested, using ATLINK devices as decoupling inductors, verifying their coordination and proper operation even with lightning impulse waves (100 kA, 10/350 µs).

ATBARRIER, combined protectors

Aplicaciones Tecnológicas, S.A. Overvoltage Protection Devices have not only been tested individually but also in coordination with other protectors of different levels.

With regards to protectors for telephone, data lines, etc., our overvoltage protectors internally coordinate several protection stages.

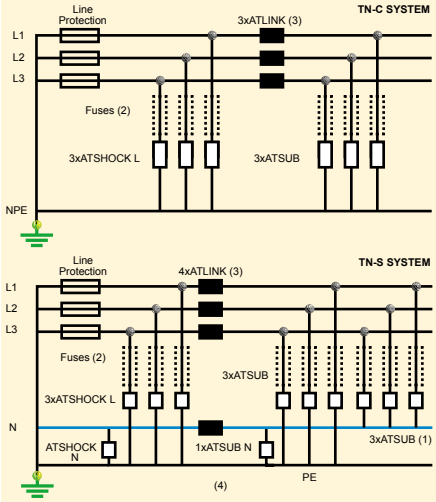
> COMPLETE DESIGN GUIDE FOR OVERVOLTAGE PROTECTION SYSTEM

> PROTECTOR SELECTION ACCORDING TO POWER SUPPLY SYSTEMS

Power supply networks are built following different wiring systems, defined in low voltage codes. It is necessary to know this information about the line to be protected in order to determine the overvoltage protection installation.

Electrical supply systems are characterized by their connections, on the one hand, with the distribution or supply grounding network and, on the other, the receiver installation ground.

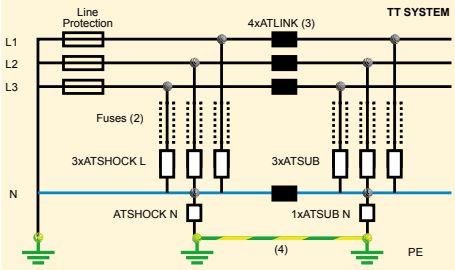
Systems are named using a letter code indicating the situation of the supply with respect to the earthing (T indicates direct connection, I means isolation, N connection to neutral). The main supply systems are the following:



> TN SYSTEM

TN systems have one point of the supply, generally the neutral, directly connected to earth. The exposed conductive part of the receiver installation is connected to that point by protective conductors. There are several TN distribution systems depending on the relative arrangement of the neutral conductor and the protective earth (PE) conductor.

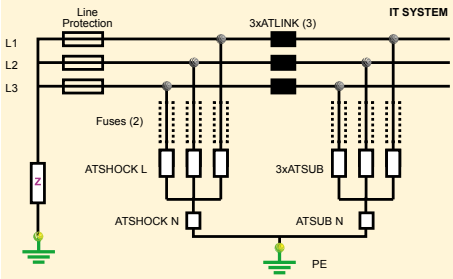
When the protective earth (PE) and the neutral are combined in the same conductor along the whole system (TN-C systems) then overvoltage protection is complete merely by installing protectors between each phase and the corresponding neutral/earth conductor. However, if neutral and earth are two different conductors (TN-S systems), then protectors should be installed between the phase or neutral and earth.



> TT SYSTEM

TT systems have one point of the supply, generally the neutral, directly connected to earth. The exposed conductive part of the receiver installation is connected to a separate earth system.

In order to protect these systems against transient overvoltages, it is necessary to at least place protectors between each phase and neutral, and between neutral and earth.



> IT SYSTEM

IT systems have no direct connection between a certain point of the supply and the earth, nonetheless the exposed conductive part of the receiver installations is directly connected to earth.

In this type of system, it is not recommended to distribute the neutral. However, overvoltage protection needs a common point where the protector earth terminals must be connected, and this common point will be connected to earth by means of a neutral protector (ATSHOCK-N, ATSUB-N).

> NOTES

(1) Three ATSUB devices installed between phases and neutral at TN-S systems are recommended, although the lines are also protected without them.

(2) The fuses specified in the characteristics of each protector should be used provided that there is no equal or lower current protection in the upstream power supply.

(3) ATLINK devices are not necessary if there are at least 10 metres of cable between the protectors.

(4) For effective protection, it is useful that all the structure's earthing systems are bonded together.

> OTHER COMBINATIONS

> All ATSUB devices, including ATSUB N, can be replaced by one single ATCOVER400T.

> ATSHOCK can be replaced by ATSHIELD or ATSUB, although then the withstood current will be lower.

> If only the first stage protection is installed, then the residual voltage would be too high, possibly damaging the equipment.

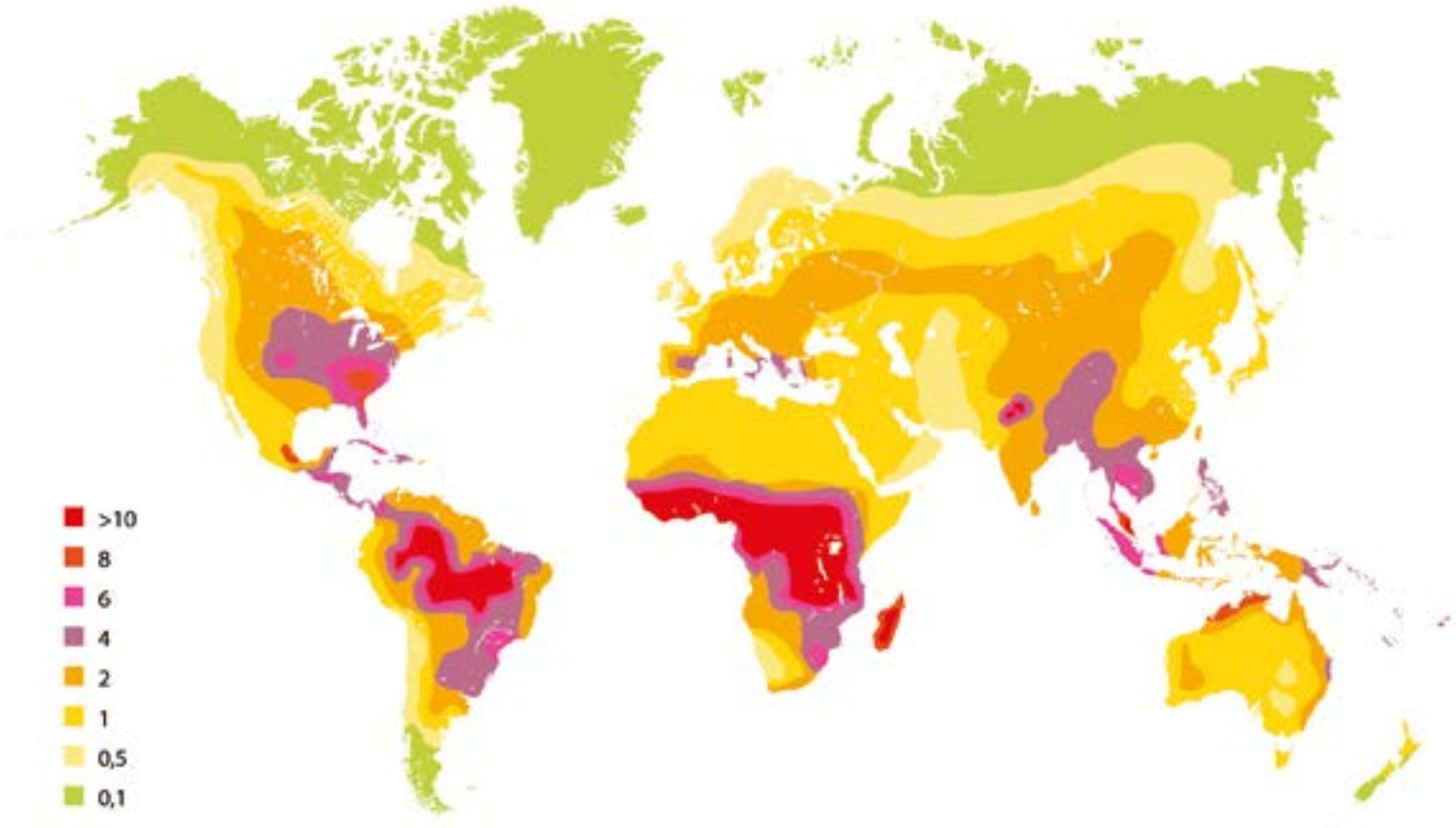
> Only tight protection (ATSUB or ATCOVER) can be installed if lightning currents reaching the installation are not expected to be higher than what the protector can withstand, and as long as indoor overvoltages are not expected.

> Further protection stages may be installed, where the surge will arrive more attenuated. They should be able to reduce transient overvoltages to very low levels (for example, ATCOVER series).

> SIMPLIFIED SELECTION GUIDE FOR SURGE PROTECTORS BY MEANS OF RISK ASSESSMENT

In order to design an accurate overvoltage protection system, you will first need to know the overvoltage risk in the protected area (L) and, later, the probability of a surge reaching the connected equipment (E).

The calculation of these two-risk indices (L and E) is based on the guidelines in ITC-BT-23 from the REBT and in the standard UNE 21186.



Ng: lightning strike density, expressed in lightning flashes per km².

World isokeraunic map (Ng)

> SIMPLIFIED SELECTION GUIDE FOR SURGE PROTECTORS BY MEANS OF RISK ASSESSMENT

> RISK ASSESSMENT IN THE AREA TO BE PROTECTED (L)

L

Risk in the area to be protected (L):

L = NG+BT+MT+U

NG

Parameter related to Ng (average annual value of the number of lightning strikes per km²)

NG = 1	NG = 2	NG = 3
Ng≤1	1<Ng<4	Ng≥4

BT

Index proportional in length in metres to the low voltage aerial line, which provides the power supply to the installation

BT = 0	BT = 0.25	BT = 0.5	BT = 0.75	BT = 1
Underground	1 to 150 m	150 a 300 m	300 a 500 m	> 500 m

MT

Parameter showing the location of the medium voltage line

MT = 0	MT = 1
Underground medium voltage line	Medium voltage aerial line

U

Parameter showing the location of the medium voltage line

U = 0	U = 0.5	U = 0.75	U = 1
Input line close to trees or structures of a similar height or higher	Input line surrounded by lower structures	Isolated input line	Isolated input line on a hill or mound

> RISK ASSESSMENT OF CONNECTED EQUIPMENT (E)

E

Risk of connected equipment (E):

E = S + V + C

S

Sensitivity of the equipment according to the ITC-BT-23 from the RBT

S = 1	S = 2	S = 3	S = 4
Category IV. Equipment connected to the origin of the installation	Category III. Robust industrial equipment. I.e.: motors, pumps, compressors	Category II. Less robust industrial equipment. I.e.: electrical appliances, lighting, CNC machines	Category I. Electronically sensitive equipment. I.e. computers, PLCs, frequency converters

V

Cost of the equipment

V = 1	V = 2	V = 3
Low cost (<€1,500)	Medium cost (€1,500 to 15,000)	Expensive (>€15,000)

C

Continuity of service

C = 1	C = 2	C = 3
Service continuity not required	Service continuity required	Unacceptable economic consequences due to interruption of service

> SUGGESTED SELECTION

With these two indices and the table, you can make a quick choice in order to determine the protectors required for the power supply side protection of the equipment. Please note that for complete protection, telephone and data lines should also be protected.

	L = 1 or 2	L = 3	L = 4	L = 5 or 6
E = 8, 9 or 10	ATCOVER (page 285)	ATSUB65 + ATCOVER* (page 224) (page 285)	ATSHIELD + ATCOVER* (page 216) (page 285)	ATSHOCK + ATCOVER* (page 208) (page 285)
E = 6 or 7	ATCOVER (page 285)	ATSUB65 (page 224)	ATSHIELD + ATSUB40* (page 216) (page 224)	ATSHOCK +ATSUB40* (page 208) (page 224)
E < 5	ATCOVER (page 285)	ATSUB65 (page 224)	ATSHIELD (page 216)	ATSHOCK (page 208)

* Protector for distribution boards

> QUICK SELECTION GUIDE FOR PROTECTION DEVICES BY REFERENCE (POWER SUPPLY LINES)

Is there any external lightning protection?

Yes

Overhead power supply lines?

Yes

	Central meter board – Main board		Consumer distribution board – Secondary board	
	Single-phase	Three-phase	Single-phase	Three-phase
Domestic	 **ATSUB 140** AT-8214/AT-8218	 **ATSUB 140** 3xAT-8214/AT-8218	 **ATSUB-2P 40** AT-8235	 **ATSUB 40-D** AT-8017
Industrial	 **ATSHOCK** AT-8350/AT-8399	 **ATSHOCK** 3xAT-8350/AT-8399	 **ATCOVER** AT-8112	 **ATCOVER** AT-8133

No

Overhead power supply lines?

Yes

	Central meter board – Main board		Consumer distribution board – Secondary board	
	Single-phase	Three-phase	Single-phase	Three-phase
Domestic	 **ATSUB 100** AT-8256/AT-8259	 **ATSUB 100** 3xAT-8256/AT-8399	 **ATSUB D** AT-8216	 **ATSUB D** AT-8217
Industrial	 **ATSHOCK 30** AT-8310/AT-8398	 **ATSHOCK 30** 3xAT-8310/AT-8398	 **ATSUB-2P 15** AT-8232	 **ATSUB-4P 15** AT-8282

No

Overhead power supply lines?

Yes

	Central meter board – Main board		Consumer distribution board – Secondary board	
	Single-phase	Three-phase	Single-phase	Three-phase
Domestic			 **ATSUB-2P 40** AT-8235	 **ATSUB 40-D** AT-8017
Industrial	 **ATSUB-2P 65** AT-8238	 **ATSUB-4P 65** AT-8287	 **ATCOVER** AT-8112	 **ATCOVER** AT-8133

No

	Central meter board – Main board		Consumer distribution board – Secondary board	
	Single-phase	Three-phase	Single-phase	Three-phase
Domestic			 **ATSUB-D 3/4** AT-8219  **ATSUB-D M 1DIN** AT-8200	 **ATSUB-D** AT-8217
Industrial	 **ATSUB-2P 40** AT-8235	 **ATSUB-4P 40** AT-8285	 **ATSUB-2P 15** AT-8232	 **ATSUB-4P 15** AT-8282

> QUICK SELECTION GUIDE FOR PROTECTION DEVICES BY REFERENCE (TELEPHONE AND DATA LINES)

Telephone lines

Screw

ATFONO
AT-9101

RJ11

ATFONO RJ11
AT-9104

RJ45

ATFONO RJ45
AT-9108

KRONE

ATFONO KRONE
AT-9109

Data lines

Screw

ATLINE
AT-9205 - AT-9280

DB9

ATDB9
AT-2300

Computer lines

CAT 5E

ATLAN
AT-2107
AT-2207

ATLAN-C 8
AT-2221

ATLAN 24/16/8
AT-2206
AT-2209
AT-2208

CAT 6

ATLAN CAT6
AT-2213

ATLAN 12/8/4 CAT6
AT-2211
AT-2212
AT-2217

CAT 5E POE

ATLAN POE
AT-2204

ATLAN 24/16/8 POE
AT-2223
AT-2224
AT-2225

CAT 6 POE

ATLAN CAT6 POE
AT-2210

ATLAN 12/8/4 CAT6 POE
AT-2226
AT-2227
AT-2228

Coaxial lines

Coaxial

ATFREQ
AT-2102 - AT-2126

> PRACTICAL EXAMPLES OF OVERVOLTAGE PROTECTION

> INDUSTRIAL INSTALLATIONS

Power supply line
Telephone line
Data line
Computer line
Coaxial line

Power supply		
TYPE 1 (direct lightning effects)	1	ATSHOCK (pages 208 - 215)

Are there more than 10 m of separation cable?

YES	NO
	Coordination inductor
	ATLINK (pages 291 - 292)
2	TYPE 2 (attenuated lightning effects) ATSHIELD (pages 216 - 223) | ATSUB (pages 224 - 284) | ATCOVER (pages 285 - 290)
3	TYPE 3 (attenuated electromagnetic effects) ATSOCKET (pages 331 - 332) | ATPLUG (pages 333 - 336)

Data and telecommunication		
TYPE 2 and 3 (coordinated)	4	ATFONO (pages 340 - 347)
	5	ATLINE (pages 348 - 350)
	6	ATFREQ (pages 364 - 367)
	7	ATLAN (pages 352 - 361)

> PRACTICAL EXAMPLES OF OVERVOLTAGE PROTECTION

> DOMESTIC INSTALLATIONS

Power supply		
TYPE 1 and 2 (direct or attenuated lightning effects)	1	ATSHIELD (pages 216 - 223) ATSUB (pages 224 - 284) ATCOVER (pages 285 - 290)
TYPE 3 (attenuated electromagnetic effects)	2	ATSOCKET (pages 331 - 332) ATPLUG (pages 333 - 336)

Power supply line
Telephone line
Coaxial line

Data and telecommunication		
TYPE 2 and 3 (coordinated)	3	ATFONO (pages 340 - 347)
	4	ATFREQ (pages 364 - 367)

> PRACTICAL EXAMPLES OF OVERVOLTAGE PROTECTION

> HOUSING BLOCKS

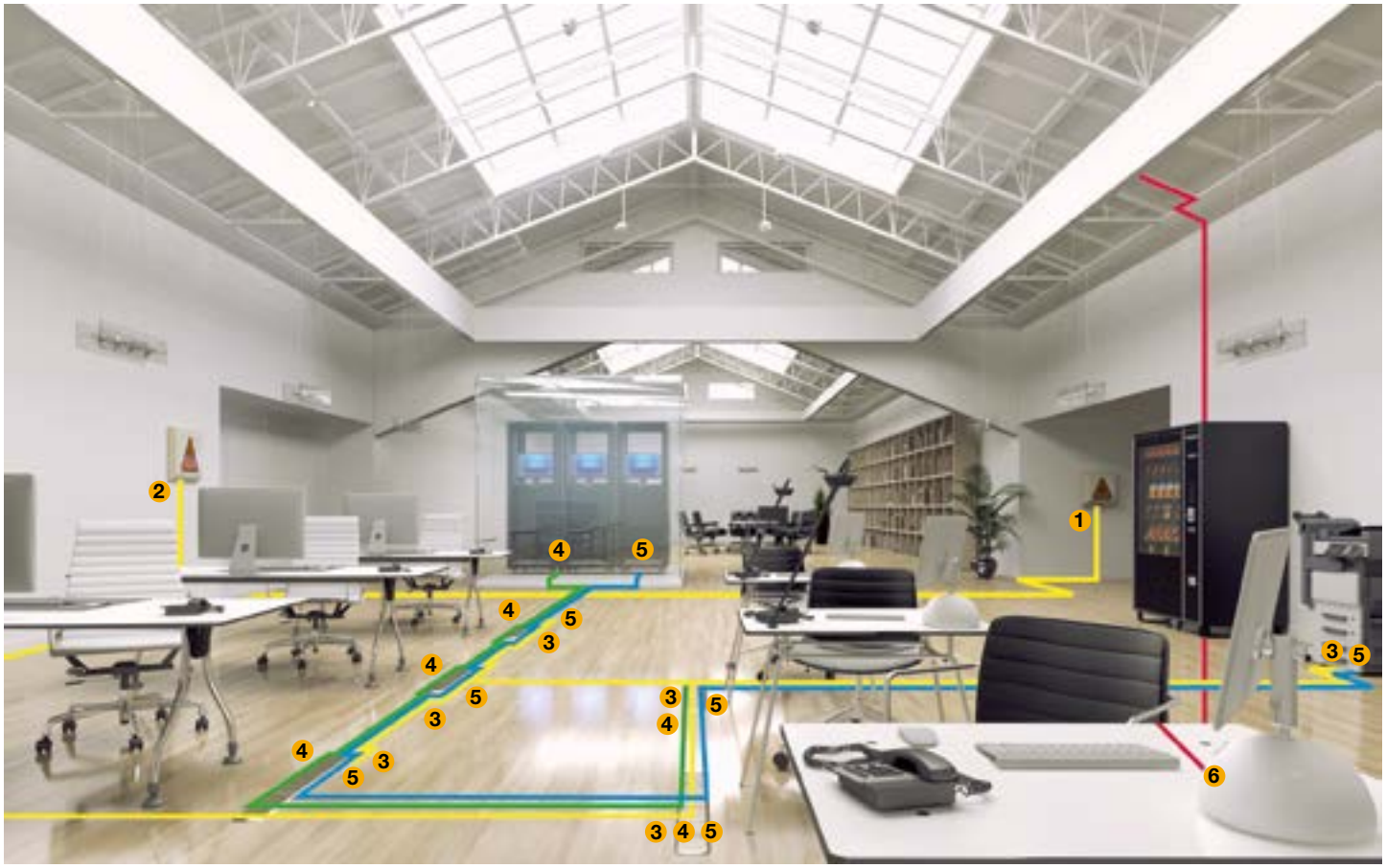
Power supply line
Telephone line
Coaxial line

Power supply			
Meter room TYPE 1 (direct effects of lightning)	1	ATCOMPACT CDA	(pages 293 - 296)
Common areas (lift) + housing TYPE 2 (attenuated lightning effects)	2	ATCONTROL /R T ATCONTROL /R M	(pages 382 - 387)
Housing TYPE 3 (attenuated electromagnetic effects)	3	ATSOCKET ATPLUG	(pages 331 - 332) (pages 333 - 336)

Data and telecommunication		
TYPE 2 and 3 (coordinated)	4	ATFONO KRONE (pages 346 - 347)
	5	ATFONO RJ11 (pages 342 - 343)
	6	ATFREQ F (pages 364 - 365)
	7	ATFREQ TV (pages 364 - 365)

> PRACTICAL EXAMPLES OF OVERVOLTAGE PROTECTION

> OFFICES



Power supply line
Telephone line
Computer line
Coaxial line

Power supply		
TYPE 1 (direct lightning effects)	1	ATSHIELD (pages 216-223)

Are there more than 10 m of separation cable?

YES	NO
	Coordination inductor
	ATLINK (pages 291 -292)
2	TYPE 2 (attenuated lightning effects) ATSUB (pages 224 - 284) | ATCOVER (pages 285 - 290)
3	TYPE 3 (attenuated electromagnetic effects) ATSOCKET (pages 331 - 332) | ATPLUG (pages 333 - 336)

Data and telecommunication		
TYPE 2 and 3 (coordinated)	4	ATFONO (pages 340 - 347)
	5	ATLAN (pages 352 - 361)
	6	ATFREQ (pages 364 - 367)

> PRACTICAL EXAMPLES OF OVERVOLTAGE PROTECTION

> PHOTOVOLTAIC INSTALLATIONS

Power supply line
Continuous supply line

Continuous supply		
TYPE 2 (attenuated lightning effects)	1	ATPV (pages 319 - 322)

Power supply		
TYPE 1+2 (direct or attenuated lightning effects)	2	ATSHIELD (pages 216 - 223) ATSUB (pages 224 - 284)

> PRACTICAL EXAMPLES OF OVERVOLTAGE PROTECTION

> WIND TURBINES

Power supply line
Data line
Computer line

Power supply		
TYPE 1 (direct lightning effects)	1	ATSHOCK (pages 208 - 215)

Are there more than 10 m of separation cable?

YES	NO
	Coordination inductor
	ATLINK (pages 291 - 292)
2 TYPE 2 (attenuated lightning effects) ATSUB-400 (pages 224 - 284)	

Data and telecommunication		
TYPE 2 and 3 (coordinated)	3	ATLINE (pages 348 - 350)
	4	ATLAN (pages 352 - 361) ATFREQ (pages 364 - 367)

> PRACTICAL EXAMPLES OF OVERVOLTAGE PROTECTION

> TELECOMMUNICATION TOWERS

Power supply		
TYPE 1+2 (direct or attenuated lightning effects)	1	ATSHIELD (pages 216 - 223)

Continuous supply		
TYPE 2+3 (coordinated)	2	ATVOLT (pages 323 - 327)

Coaxial		
TYPE 2 and 3 (coordinated)	3	ATFREQ (pages 364 - 367)

Power supply line
Continuous supply line
Coaxial line

> PRACTICAL EXAMPLES OF OVERVOLTAGE PROTECTION

> TRAFFIC LIGHTS AND STREET LIGHTING

Power supply line

Power supply		
Protection against TYPE 2 transient overvoltages and permanent resettable overvoltages	1	**Traffic lights** KIT ATCONTROL/R M (pages 385 - 386)
	2	**Street lighting board** KIT ATCONTROL/R T (pages 387)
Protection against TYPE 3 transient overvoltages	3	**Lights** ATSOCKET (pages 331 - 332)

> PRACTICAL EXAMPLES OF OVERVOLTAGE PROTECTION

> WATER TREATMENT PLANTS

Power supply		
1	**Transformer substation** TYPE 1 (direct lightning effects)	ATSHOCK (pages 208 - 215)

Are there more than 10 m of separation cable?

YES	NO
	Coordination inductor ATLINK (pages 291 - 292)

2	**Central building** TYPE 2 (attenuated lightning effects) ATSUB65 (pages 228 - 276)
3	**Motor control centre** TYPE 2 AND PERMANENT (attenuated lightning effects) ATCONTROL/R (pages 382 - 387)
4	**Control panel** TYPE 3 (attenuated electromagnetic effects) ATCOVER (pages 285 - 290)

Power supply line
Telephone line
Data line
Coaxial line

Telephony and data		
TYPES 2 and 3 (coordinated)	5	**Sensors** **(pH, flow meter, oxygen, among others)** ATLINE (pages 348 - 350)
	6	**Transmission and telemetry antennas** ATFREQ (pages 364 - 367)
	7	**Telephone line** ATFONO (pages 340 - 347)

> PRACTICAL EXAMPLES OF OVERVOLTAGE PROTECTION

> BANKS AND SECURITY SYSTEMS

Power supply line
Telephone line
Data line
Computer line
Coaxial line

Power supply		
TYPE 1 + 2 (direct or attenuated lightning effects)	1	ATSHIELD (pages 216 - 223) ATSUB (pages 224 - 284) ATCOVER (pages 285 - 290)
TYPE 3 (attenuated electromagnetic effects)	2	ATSOCKET (pages 331 - 332) ATPLUG (pages 333 - 336)

Data and telecommunication		
TYPE 2 and 3 (coordinated)	3	ATFONO (pages 340 - 347)
	4	ATLAN (POE) (pages 352 - 361) ATLINE (pages 348 - 350)
	5	ATLAN (pages 352 - 361)
	6	ATFREQ (pages 364 - 367)

> PRACTICAL EXAMPLES OF OVERVOLTAGE PROTECTION

> AIRPORTS

Power supply line
Continuous supply line
Computer line
Coaxial line

Power supply		
Main switch board	1	ATSHIELD (pages 216 - 223)
Secondary boards connected to an external element	2	ATSUB65 (pages 228 - 276)
Secondary boards to electronic equipment	3	ATCOVER (pages 285 - 290)

Computer or data line		
Computer equipment	5	ATLAN (pages 352 - 361)

Continuous supply		
Beacon	4	ATVOLT (pages 323 - 327)

Coaxial line		
Antennas	6	ATFREQ (pages 364 - 367)

> PRACTICAL EXAMPLES OF OVERVOLTAGE PROTECTION

> IRRIGATION SYSTEMS

Power supply line
Continuous supply line
Data line
Coaxial line

Power supply lines		
Main switch board	1	ATSHOCK (pages 208 - 215)
Secondary boards connected to an external element	2	3 x ATSUB65 (pages 257 - 276)
Secondary boards to electronic equipment	3	ATCONTROL/R (pages 382 - 387)

Computer or data line		
Exterior communications and sensors	5	ATLINE (pages 348 - 350)
Data telemetry counter	6	ATLINE (pages 348 - 350)

Continuous supply lines		
Automation supply and irrigation programmers	4	ATVOLT (pages 323 - 327)

Coaxial line		
RF Antennas	7	ATFREQ (pages 364 - 367)

> TECHNICAL GLOSSARY

> Overvoltage protector alarm

A device that gives a visual indication in the event of protector failure. Some protection devices are fitted with floating changeover contact for remote signalling. The alarm warns of protector disconnection in case of failure to avoid a sustained fault in the system.

> Follow up current extinguishing capability

When spark gaps or gas discharge tubes ignite, there is a dielectric breakdown, an ignition arc and the resulting short circuit between the two protected conductors. When working voltage conditions return, the referred short circuit and the arc must disappear. The follow up current extinguishing capability refers to the current that the protector is capable of extinguishing by itself in order to return to normal isolation conditions.

> Impulse current (I_{imp}) for type 1

Maximum peak value with 10/350 µs wave which has been applied to the protector, and which it safely diverts to ground.

> Maximum discharge current (I_{max}) for type 2

Maximum peak value with 8/20 µs wave which has been applied to the protector, and which it safely diverts to ground.

> Maximum working current (I_L)

RMS value of the alternating current or value of the continuous current in a line under normal working conditions so that the protector operates correctly.

> Nominal discharge current I_n (8/20)

Peak value of a 8/20 µs current wave that the protector can repeatedly withstand.

> Follow current (I_f)

Current supplied by the electrical power system and flowing through the protector after a discharge current impulse. It is expressed in kA_{eff}.

> Specific energy W/R for type 1 tests

The energy dissipated by the impulse I_{imp} per unit of resistance. This is equal to the power integral in the equivalent resistance during discharge. It is expressed in kJ/Ω or $kA^2 \cdot s$.

$$W/R = \int i^2 \cdot dt$$

> Thermal stability

An overvoltage protector is thermally stable if after the operating duty test, where it is connected to maximum continuous operating voltage and at specified ambient temperature conditions, the temperature begins to decrease with time (it is monitored for 30 minutes, the active power dissipation must show constant decline for the last 15 minutes).

> 1.2/50 voltage impulse

A voltage impulse with a virtual front time (from 10% to 90% of the peak value) of 1.2 µs and a time-to-half value of 50 µs.

> Methods of protection

An overvoltage protector can be connected Phase to Ground (common), Phase to Neutral (differential), or a combination of both. These connection types are called methods of protection.

> Level of protection (U_p)

Parameter that characterises the performance of the protector in limiting the voltage across its terminals and which is chosen from a chart of values. This value, in volts, should not be exceeded by any of the residual voltage values measured during the tests, including current impulses and 1.2/50 µs voltage tests.

> 10/350 µs current impulse

Current impulse, 10 µs of front time and 350 µs half-time value. Thus the direct effects of the lightning strike are simulated.

> 8/20 µs current impulse

Current impulse, 8 µs of front time and 20 µs half-time value. Thus the secondary effects of the lightning strike are simulated.

> Insertion loss

At a given frequency, the insertion loss of a connected protector is defined as the ratio of voltages appearing across the mains immediately beyond the point of insertion before and after the insertion of the SPD. This ratio is expressed in decibels (dB).

> Backup overcurrent protection

An overcurrent device (fuse or circuit breaker), which is a part of the electrical installation, located up-stream from the protector and located so as to prevent it from overheating and being destroyed in the event that the protector is not able to interrupt the sustained short-circuit current.

> Surge Protection Device (SPD)

A device intended to limit transient overvoltages and divert dangerous currents. It contains at least one nonlinear component.

There are one-port SPDs which are connected in parallel or two-port SPDs which are connected in series.

> Combined SPD

An SPD that includes both voltage switching components and voltage limiting components. It may display voltage switching behaviour, voltage limiting behaviour or a combination of both depending on the characteristics of the applied voltage.

> Voltage switching type protector

An SPD that has high impedance when no surge is present, but where the impedance can suddenly drop to a low value in response to a voltage surge in the line it is protecting. Typical examples are spark gaps, gas tubes, thyristors and triacs.

> Voltage limiting type SPD

An SPD that has high impedance when there is no overvoltage present, but which continuously decreases the bigger the surge current and voltage are; typical examples of components used as nonlinear devices are varistors and suppressor diodes.

> Working temperature (ϑ)

Temperature range where the SPD can be used

> Sparkover voltage of a voltage switching SPD

Maximum voltage value before disruptive discharge between the electrodes in the gap of an SPD (empty space between terminals).

> Voltage with combination wave ($U_{o.c.}$) for type 3

The combined wave is produced in a generator which applies a voltage impulse of 1.2/50 µs in an open circuit and a voltage impulse of 8/20 µs in a short-circuit. The parameters of voltage, current and wave shape produced are determined by the generator and the protector impedance.

> Maximum operating voltage (U_c)

Maximum voltage that can be continuously applied to the protector.

> Nominal voltage (U_n)

The value of the alternating or direct current voltage of the line under normal conditions so that the SPD works correctly.

> Response time (t_r):

Parameter that characterizes the speed of protector activation. It may vary according to the gradient of the applied waveshape, although in general the response time for the varistor is considered to be 25 ns, while for the spark gap it is 100 ns.

> PROTECTION OF POWER SUPPLY LINES

Power supply lines enter the structure from outside and distribute the current to all the electrical and electronic equipment, ranging from robust motors to more sensitive devices. Main power supplies often suffer small oscillations, harmonics, sudden increases or even more severe damage such as short circuits or earth faults. Devices for preventing these kind of problems and safeguarding equipment are available on the market (circuit breakers, residual current circuit breakers, fuses etc.), however the response time of these devices is too slow and they do not react properly against transient overvoltages.

Surge protection devices for power supply lines complement the above mentioned devices, since they only protect against transient overvoltages caused by lightning discharges and power switching.

In general, they are to be installed in parallel with the line in order to avoid unnecessary losses and consumption, although some elements such as decoupling inductors must be installed in series. When a protector has an element in series with the line then its maximum continuous working current must be clearly specified, indicating the maximum current that can flow through it continuously.

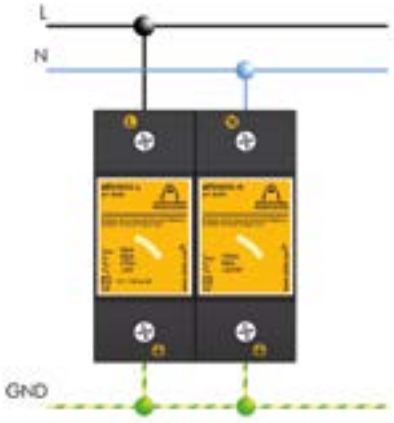
Within electrical power supply protection, Aplicaciones Tecnológicas, S.A. offers different ranges of protectors according to the intensity of the expected discharge current in the area to be protected and the sensitivity of the protected equipment. When different protection stages are used, it is essential that SPDs are well coordinated when a surge occurs.

> ATSHOCK series

Type 1 protectors. Can withstand maximum direct lightning currents of up to 100 kA, 10/350 µs wave, leaving a residual voltage of a few kilovolts.

They consist of gas discharge tubes, which do not produce external blowing or flashes. They are installed in points likely to directly receive large lightning discharges.

They should always be used in combination with ATSUB and/or ATCOVER series protectors as, in many cases, their residual voltage alone is still harmful to the connected equipment. They are single-pole protectors (they protect only one phase or the neutral depending on the earth) and can be installed in all types of supply systems. There are different versions available depending on the electrical supply.



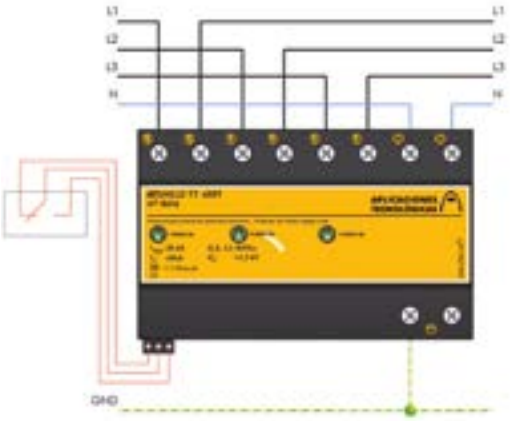
> PROTECTION OF POWER SUPPLY LINES

> ATSHIELD series

It combines very robust elements with limiter components in order to reach a better absorption capacity of direct lightning current along with a low residual voltage. Type 1 + 2 protectors.

Protectors which combine both the quick response time of the zinc-oxide varistors and the shunt capacity of gas discharge tubes. They are designed and tested as a type 1 protector, meaning that they can withstand tens of kiloamperes of direct atmospheric discharge current (10/350 µs wave) leaving a non-harmful amount of residual voltage for the connected equipment, equivalent to type 2 protectors. They have a bright warning light to detect any possible overvoltages.

They can be installed in lines with or without neutral, and they are available in three-phase or single-phase versions, for different network voltages.



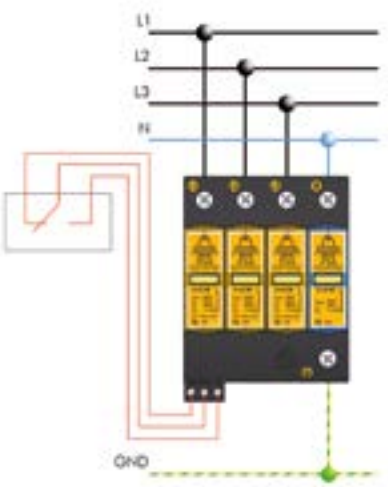
> ATSUB series

Withstands currents of tens of kiloamperes and reduces the overvoltage levels so that they cannot harm the equipment. Type 1 and 2 protectors.

They are made up of zinc oxide varistors and gas discharge tubes and have a visual alarm for when the protector is out of service. Available in any pole configuration so that it can be installed in all distribution schemes. ATSUB protectors can withstand tens of kiloamperes for an 8/20 µs wave (wave simulating secondary effects of lightning) and reduce overvoltages to harmless levels for the protected equipment.

These characteristics, together with their small size and low cost, make them the most suitable protectors for installing in secondary boards and close to the equipment. They can be combined with other ATSUB, ATSHOCK (which would receive the main lightning current) and ATCOVER protectors, which leave a lower residual voltage. In any case, there must be 10 metres of cable or ATLINK devices for proper coordination between protection stages.

There are also versions with removable modules (ATSUB-P) for easy substitution in the event of repeated overvoltages and versions with remote warning (ATSUB-R, ATSUB-PR).



> PROTECTION OF POWER SUPPLY LINES

> ATCOVER series

Robust and very complete, it protects all the stages in a quick and effective way, both in common and differential mode, leaving a low residual voltage. Type 2 + 3 protectors.

ATCOVER series protectors combine protection in common mode (to earth) and differential mode (between lines) in one single device. They can withstand currents up to 30 kA with a 8/20 µs wave, leaving very low residual voltages, completely harmless to the connected equipment. They have an internal combination of varistors and gas discharge tubes that prevent current leakage while the line is working under normal conditions.

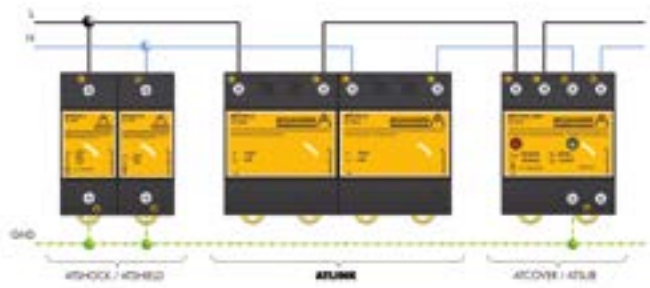
They are provided with a visual alarm and floating changeover contact output for remote control to enable operation monitoring. They can be installed in lines with or without neutral, and they are available in three-phase or single-phase versions, for different network voltages. They can be installed in combination with other ATSHOCK and ATSUB series protectors, always linked by at least 10 metres of cable or ATLINK decoupling inductor.

> ATLINK series

For the coordination of protection stages.

ATLINK decoupling inductors are installed in series with the line and therefore you should always check that the current flowing through it is not higher than the rated current of the installed ATLINK.

It enables the protection of different types of devices to be coordinated.



> PROTECTION OF POWER SUPPLY LINES

> ATCOMPACT series

Multi-pole protection cabinet consisting of single-pole elements.

These series consist of cabinets with different combinations of the aforementioned protectors, already wired and ready for installation. It is practical for installations where there is not enough space available in distribution boards.

> ATBARRIER series

Coordination protection cabinet.

These series consist of cabinets with different combinations of the aforementioned protectors, already wired and ready for installation. It is practical for installations where there is not enough space available in distribution boards.

> PROTECTION OF POWER SUPPLY LINES

> ATSHOCK series

> ATSHOCK

Maximum single-pole protection for power supply lines

> **AT-8350 ATSHOCK L**: phase-ground protection. U_c = 275 V
> **AT-8351 ATSHOCK L-130**: phase-ground protection. U_c = 150 V
> **AT-8352 ATSHOCK L-400**: phase-ground protection. U_c = 460 V
> **AT-8399 ATSHOCK N**: neutral-ground protection

The highest protection against transient overvoltages for power supply lines at the point they **enter the building**. ATSHOCK series provide protection even against **direct lightning strikes**. Tested and certified with lightning impulse current 10/350 µs wave, **50 kA**.

Coarse protection according to scaled protection recommended in Low Voltage Regulation (REBT).

Type 1 protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. For equipment of **categories III and IV** according to REBT.

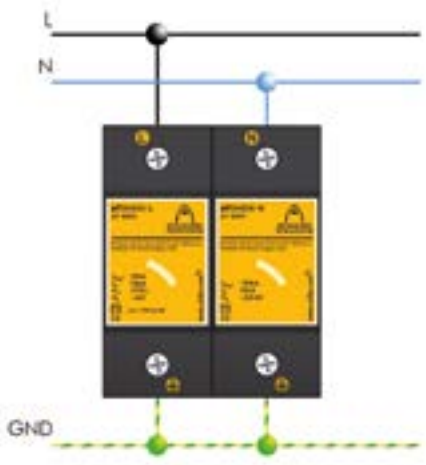
> Gas discharge tube inside.
> Suitable for TT, TN-C and TN-S systems.
> Can be coordinated with other SPDs such as ATSUB and ATCOVER.
> Quick response.
> Single-pole protection. Withstands direct lightning strike current (10/350 wave) up to 50 kA (ATSHOCK N up to 100 kA)
> Fork connection with fork terminal included for 16 mm² cable.
> High energy diverting capacity.
> Limits following current supply.

ATSHOCK series protectors have been tested in **official, independent laboratories** obtaining their characteristics according to applicable standards (shown in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

ATSHOCK surge protection devices are to be installed **in parallel** with the low voltage supply line, connected to a phase and ground (ATSHOCK L) or to neutral and ground (ATSHOCK N). One ATSHOCK L is needed for each phase.
Installation should be carried out **without power running through the line**.
ATSHOCK can be installed in combination with ATSUB or ATCOVER protectors. In either case, both must be separated by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.
Installation is recommended in distribution boards where the line enters the building and where direct lightning currents could penetrate.



> PROTECTION OF POWER SUPPLY LINES

> ATSHOCK series

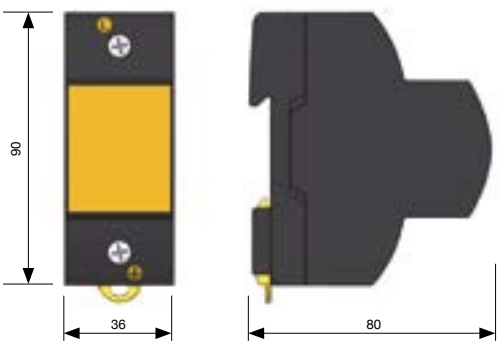
> TECHNICAL DATASHEET

Reference		ATSHOCK L **AT-8350**	ATSHOCK L-120 **AT-8351**	ATSHOCK L-400 **AT-8352**	ATSHOCK N **AT-8399**
Protection categories according to the REBT:		III and IV			
Type of tests according to EN 61643-11:		Type 1			
Nominal voltage:	U_n	230 V_{AC}	120 V_{AC}	400 V_{AC}	-
Maximum continuous operating voltage:	U_c	275 V_{AC}	150 V_{AC}	460 V_{AC}	-
Nominal frequency:		50 - 60 Hz			
Impulse current (10/350 µs wave):	I_{imp}	50 kA			100 kA
Specific energy:	W/R	625 kJ/Ω			2.5 MJ/Ω
Nominal discharge current (8/20 µs wave):	I_n	50 kA			
Protection level for I_n (8/20 µs):	U_p	2.5 kV			1.5 kV
Follow current extinguishing capability:	I_f	50 kA_{eff}			100 A_{eff}
Response time:	t_r	< 100 ns			-
Backup fuse(1):		160 A gL/gG			
Maximum short-circuit current:		50 kA (for maximum fuse)			
Working temperature:	ϑ	-40 °C to +70 °C			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections L/N/G:		Section 16 mm^2			

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATSHOCK series

> ATSHOCK30

Single-pole protection for power supply lines

> **AT-8310 ATSHOCK L30**: phase-ground protection. U_c = 275 V
> **AT-8311 ATSHOCK L30-130**: phase-ground protection. U_c = 150 V
> **AT-8312 ATSHOCK L30-400**: phase-ground protection. U_c = 460 V
> **AT-8398 ATSHOCK N60**: neutral-ground protection

High protection against transient overvoltages for power supply lines at the point they **enter the building**. ATSHOCK series provide protection even against **direct lightning strikes**. Tested and certified with lightning impulse current 10/350 µs wave, **30 kA**.

Coarse protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT).

Type 1 protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. For equipment of **categories III and IV** according to REBT.

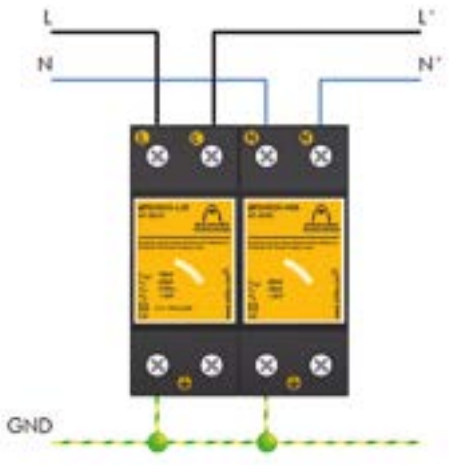
- Gas discharge tube inside.
- Double connection in order to facilitate wiring (limited to 63 A).
- Possibility of connection to M5 fork terminal
- Can be coordinated with other SPDs such as ATSUB and ATCOVER.
- Suitable for TT, TN-C and TN-S systems.
- Quick response.
- Single-pole protection. Withstands direct lightning strike current (10/350 wave) up to 30 kA (ATSHOCK-P N60 up to 60kA).
- High energy diverting capacity.
- Limits following current supply.

ATSHOCK series protectors have been tested in **official, independent laboratories** obtaining their characteristics according to applicable standards (shown in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

ATSHOCK 30 surge protection devices are to be installed **in parallel** with the low voltage supply line, connected to phase and ground (ATSHOCK L30) or to neutral and ground (ATSHOCK N60). ATSHOCK L30 is required for each phase.
Installation should be carried out **without power running through the line**.
ATSHOCK can be installed in combination with ATSUB or ATCOVER protectors. In either case, both must be separated by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.
Installation is recommended in distribution boards where the line enters the building and where direct lightning currents could penetrate.



> PROTECTION OF POWER SUPPLY LINES

> ATSHOCK series

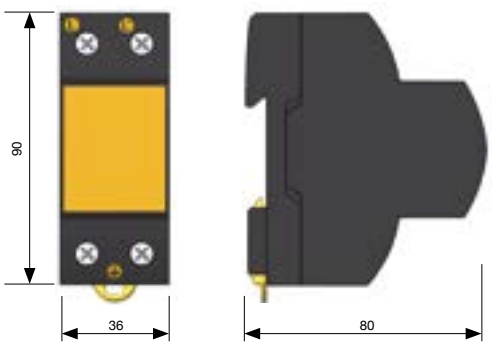
> TECHNICAL DATASHEET

Reference		ATSHOCK L30 **AT-8310**	ATSHOCK L30-130 **AT-8311**	ATSHOCK L30-400 **AT-8312**	ATSHOCK N60 **AT-8398**
Protection categories according to the REBT:		III and IV			
Type of tests according to EN 61643-11:		Type 1			
Nominal voltage:	U_n	230 V_{AC}	120 V_{AC}	400 V_{AC}	-
Maximum continuous operating voltage:	U_c	275 V_{AC}	150 V_{AC}	460 V_{AC}	-
Nominal frequency:		50 - 60 Hz			
Impulse current (10/350 µs wave):	I_{imp}	30 kA			60 kA
Specific energy:	W/R	224 kJ/Ω			900 kJ/Ω
Nominal discharge current (8/20 µs wave):	I_n	40 kA			
Protection level for I_n (8/20 µs):	U_p	2 kV			900 V
Follow current extinguishing capability:	I_f	50 kA_{eff}			100 A_{eff}
Response time:	t_r	< 100 ns			-
Backup fuse[1]:		160 A gL/gG			
Maximum short-circuit current:		50 kA (for maximum fuse)			
Working temperature:	ϑ	-40 ºC to +70 ºC			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2			

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATSHOCK series

> ATSHOCK25

Single-pole and pluggable protection for power supply lines

> **AT-8325 ATSHOCK L25**: phase-ground protection. U_c = 275 V
> **AT-8326 ATSHOCK L25-130**: phase-ground protection. U_c = 150 V
> **AT-8327 ATSHOCK L25-400**: phase-ground protection. U_c = 460 V

High protection against transient overvoltages for power supply lines at the point they **enter the building**. ATSHOCK series provide protection even against **direct lightning strikes**. Tested and certified with lightning impulse current 10/350 µs wave, **25 kA**.

Type 1 and 2 protectors according to EN 61643-11 and GUIA-BT-23 from REBT. Suitable for equipment of **categories I, II, III and IV** according to ITC-BT-23 from REBT.

- Gas discharge tube inside.
- Double connection in order to facilitate wiring (limited to 63 A).
- Possibility of connection to M5 fork terminal.
- Suitable for TT, TN-C and TN-S systems.
- Can be coordinated with other ATSUB and ATCOVER series protectors.
- Quick response.
- Single-pole protection. Withstands direct lightning strike current (10/350 wave) up to 25 kA.
- Limits following current supply.
- Thermodynamic control device and visual alarm.
- Test button for checking protector status. Green light indicates correct operation. If not, replace.
- This indicator does not generate any fault current during normal operation.
- Complies with IBERDROLA requirements for type 1 overvoltage protection on the Meter Board.

ATSHOCK series protectors have been tested in **official, independent laboratories** obtaining their characteristics according to applicable standards (shown in the table).

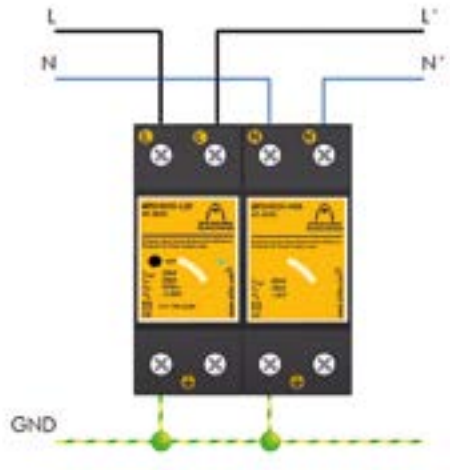
Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

ATSHOCK L25 surge protection devices are to be installed **in parallel** with the low voltage supply line, connected to phase and neutral. ATSHOCK N is recommended between neutral and earth.

Installation should be carried out **without power running through the line**. ATSHOCK can be installed in combination with ATSUB or ATCOVER protectors. In either case, both must be separated by at least 10 metres of cable or, if this is not possible, by a decoupling inductor ATLINK, in order to achieve **correct coordination** between them.

Installation is recommended in distribution boards where the line enters the building and where direct lightning currents could penetrate.



> PROTECTION OF POWER SUPPLY LINES

> ATSHOCK series

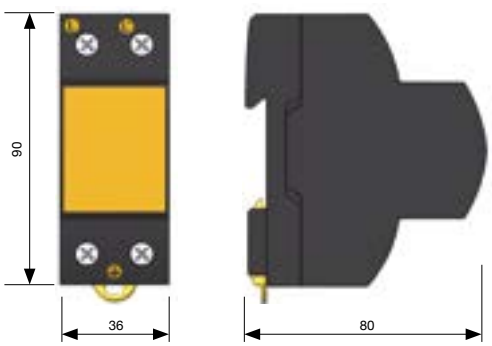
> TECHNICAL DATASHEET

Reference		ATSHOCK L25 **AT-8325**	ATSHOCK L25-130 **AT-8326**	ATSHOCK L25-400 **AT-8327**
Protection categories according to the REBT:		I, II, III and IV		
Type of tests according to EN 61643-11:		Type 1 and 2		
Nominal voltage:	U_n	230 V_{AC}	120 V_{AC}	400 V_{AC}
Maximum continuous operating voltage:	U_c	275 V_{AC}	150 V_{AC}	460 V_{AC}
Nominal frequency:		50 - 60 Hz		
Impulse current (10/350 µs wave):	I_{imp}	25 kA		
Specific energy:	W/R	156 kJ/Ω		
Nominal discharge current (8/20 µs wave):	I_n	25 kA		
Protection level for I_n (8/20 µs):	U_p	1.5 kV		
Follow current extinguishing capability:	I_f	50 kA_{eff}		
Response time:	t_r	< 100 ns		
Backup fuse(1):		160 A gL/gG		
Maximum short-circuit current:		50 kA (for maximum fuse)		
Working temperature:	ϑ	-40 ºC to +70 ºC		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2		

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATSHOCK series

> ATSHOCK-P 30

Single-pole and removable plug protection for power supply lines

> **AT-8330 ATSHOCK-P L30**: phase-ground protection. Uc = 275 V
> **AT-8331 ATSHOCK-P L30-130**: phase-ground protection. Uc = 145 V
> **AT-8332 ATSHOCK-P L30-400**: phase-ground protection. Uc = 440 V
> **AT-8397 ATSHOCK-P N60**: neutral-ground protection

High protection against transient overvoltages for power supply lines at the point they **enter the building**. ATSHOCK series provide protection even against **direct lightning strikes**. Tested and certified with lightning impulse current, **30 kA, 10/350 µs** wave in removable modules.

Coarse protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT).

Type 1 protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. For equipment of **categories III and IV** according to REBT.

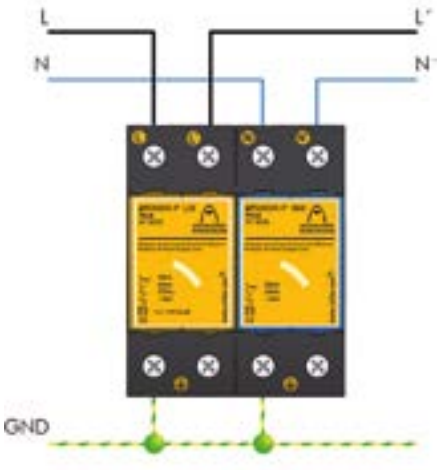
- Gas discharge tube inside.
- Double connection in order to facilitate wiring (limited to 63 A).
- Possibility of connection to M5 fork terminal.
- Suitable for TT, TN-C and TN-S systems.
- Can be coordinated with other ATSUB and ATCOVER series protectors.
- Quick response.
- Single-pole protection. Withstands direct lightning strike current (10/350 wave) up to 30 kA (ATSHOCK-P N60 up to 60 kA).
- High energy diverting capacity.
- Limits following current supply.

ATSHOCK series protectors have been tested in **official, independent laboratories** obtaining their characteristics according to applicable standards (shown in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

ATSHOCK-P 30 surge protection devices are to be installed **in parallel** with the low voltage supply line, connected to phase and ground (ATSHOCK L30) or to neutral and ground (ATSHOCK N60). ATSHOCK L30 is required for each phase.
Installation should be carried out **without power running through the line**.
ATSHOCK can be installed in combination with ATSUB or ATCOVER protectors. In either case, both must be separated by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.
Installation is recommended in distribution boards where the line enters the building and where direct lightning currents could penetrate.



> PROTECTION OF POWER SUPPLY LINES

> ATSHOCK series

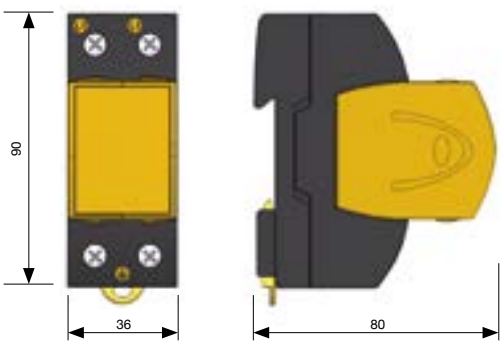
> TECHNICAL DATASHEET

Reference		ATSHOCK-P L30 **AT-8330**	ATSHOCK-P L30-130 **AT-8331**	ATSHOCK-P L30-400 **AT-8332**	ATSHOCK-P N60 **AT-8397**
Protection categories according to the REBT:		III and IV			
Type of tests according to EN 61643-11:		Type 1			
Nominal voltage:	U_n	230 V_{AC}	120 V_{AC}	400 V_{AC}	-
Maximum continuous operating voltage:	U_c	275 V_{AC}	150 V_{AC}	460 V_{AC}	-
Nominal frequency:		50 - 60 Hz			
Impulse current (10/350 µs wave):	I_{imp}	30 kA			60 kA
Specific energy:	W/R	224 kJ/Ω			900 kJ/Ω
Nominal discharge current (8/20 µs wave):	I_n	40 kA			
Protection level for I_n (8/20 µs):	U_p	2 kV			900 V
Follow current extinguishing capability:	I_f	50 kA_{eff}			100 A_{eff}
Response time:	t_r	< 100 ns			
Backup fuse[1]:		160 A gL/gG			-
Maximum short-circuit current:		50 kA (for maximum fuse)			
Working temperature:	ϑ	-40 ºC to +70 ºC			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2			

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> ACCESSORIES

> AT-8333 ATSHOCK-P L30 Mod.: I_{imp} 30 kA. U_n 230 V
> AT-8334 ATSHOCK-P L30-130 Mod.: I_{imp} 30 kA. U_n 130 V
> AT-8335 ATSHOCK-P L30-400 Mod.: I_{imp} 30 kA. U_n 400 V
> AT-8336 ATSHOCK-P N60 Mod.: I_{imp} 60 kA.

> PROTECTION OF POWER SUPPLY LINES

> ATSHIELD series

> ATSHIELD TT

Combined technology against direct lightning strikes

> **AT-8616 ATSHIELD TT 400T**: protection of both phase and neutral to ground for 400 V_{AC} three-phase lines

> **AT-8617 ATSHIELD TT 230T**: protection of both phase and neutral to ground for 230 V_{AC} three-phase lines

Effective and compact protection against transient overvoltages for TT and TNS power supply systems, using an internal combination of gas discharge tubes and varistors.

This element is internally connected in such a way that no element in series with the line is needed for correct coordination of the protection. This protector combines the best qualities of the latest overvoltage protection technologies: the passing residual voltage of the varistors along with the gas discharge tube capacity to absorb lightning current. Tested and certified as a **type 1 and 2** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV** equipment according to the REBT.

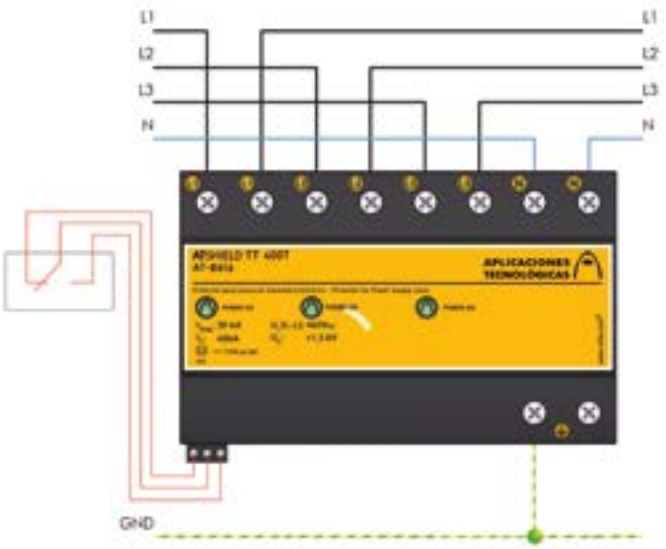
- Can be coordinated with other ATSUB and ATCOVER series protectors.
- Double connection in order to facilitate wiring (limited to 63 A).
- Short response time.
- Does not produce deflagration.
- Multi-pole protection.
- Their activation causes no interruption in power supply.
- Compact protection.
- Thermodynamic control device and visual alarm for each phase.

ATSHIELD series protectors have been tested in **official and independent laboratories,** obtaining their characteristics according to relevant standards (shown in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

ATSHIELD TT surge protection devices must be installed **in parallel** with the low voltage three-phase power supply line provided with a neutral. Installation should be carried out **without power running through the line**.
They can be installed as single protection or in combination with other protectors that leave less residual voltage, in which case they need to be separated by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.
Installation is recommended in distribution boards where the line enters the building or where large overvoltages can occur.
They are particularly recommended for places where direct lightning strikes can occur and when lines are connected to very sensitive equipment that cannot withstand large overvoltages.



> PROTECTION OF POWER SUPPLY LINES

> ATSHIELD series

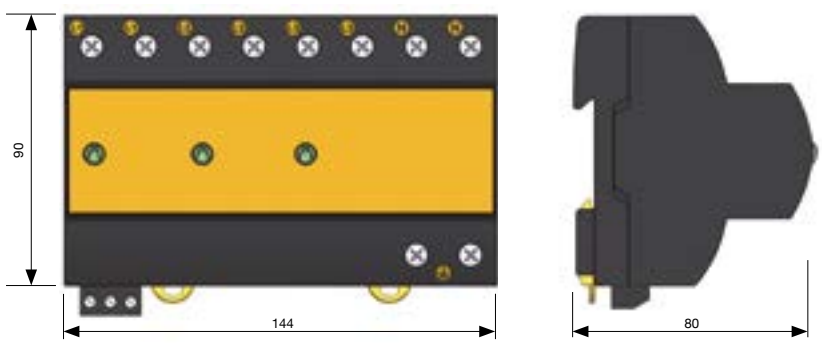
> TECHNICAL DATASHEET

Reference:		ATSHIELD TT 400T **AT-8616**	ATSHIELD TT 230T **AT-8617**
Protection categories according to the REBT:		I, II, III, IV	
Type of tests according to EN 61643-11:		Type 1 + 2	
Nominal voltage:	U_n	400 V_{AC} (L-L) 230 V_{AC} (L-N, L-GND)	230 V_{AC} (L-L) 130 V_{AC} (L-N, L-GND)
Maximum continuous operating voltage:	U_c	460 V_{AC} (L-L) 275 V_{AC} (L-N, L-GND)	275 V_{AC} (L-L) 150 V_{AC} (L-N, L-GND)
Nominal frequency:		50 - 60 Hz	
Impulse current per pole (10/350 µs wave):	I_{imp}	30 kA	
Specific energy:	W/R	224 kJ/Ω	
Nominal discharge current per pole (8/20 µs wave):	I_n	40 kA	
Maximum discharge current per pole (8/20 µs wave):	I_{max}	65 kA	
Protection level:	U_p	< 1500 V	
Follow current extinguishing capability:	I_f	50 kA_{eff}	
Response time:	t_r	< 100 ns	
Backup fuse(1):		125 A gL/gG	
Maximum short-circuit current:		25 kA (for maximum fuse)	
Working temperature:	ϑ	-40 ºC to +70 ºC	
Protector location:		Indoor	
Type of connection:		Parallel (one port)	
No. of poles:		4	
Dimensions:		144 x 90 x 80 mm (8 modules DIN 43880)	
Fixing:		DIN Rail	
Enclosure material:		Polyamide	
Enclosure protection:		IP20	
Insulation resistance:		> 10^{14} Ω	
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)	
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2	

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATSHIELD series

> ATSHIELD T

Combined technology against direct lightning strikes

> **AT-8603 ATSHIELD 400T**: protection of both phase and neutral for 400V_{AC} three-phase lines

> **AT-8604 ATSHIELD 230T**: protection of both phase and neutral for 230 V_{AC} three-phase lines

Effective and compact protection against transient overvoltages for TT and TNS power supply systems, using an internal combination of gas discharge tubes and varistors.

This element is internally connected in such a way that no element in series with the line is needed for correct coordination of the protection.

This protector combines the best qualities of the latest overvoltage protection technologies: the passing residual voltage of the varistors along with the gas discharge tube capacity to absorb lightning current.

Tested and certified as a **type 1 and 2** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

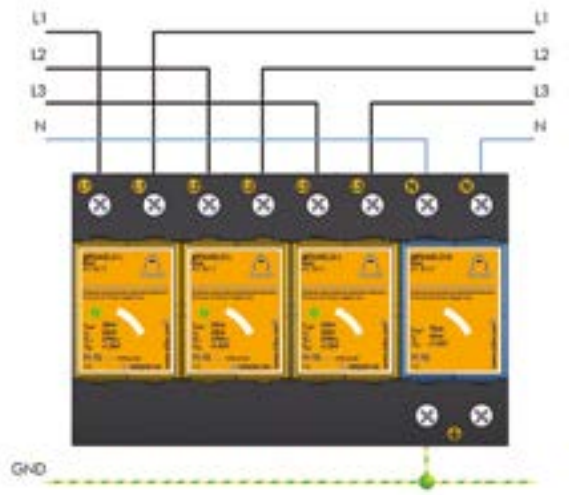
- Can be coordinated with other ATSUB and ATCOVER series protectors.
- Double connection in order to facilitate wiring (limited to 63 A).
- Short response time.
- Does not produce deflagration.
- Multi-pole protection.
- Their activation causes no interruption in power supply.
- Compact protection.
- Thermodynamic control device and visual alarm for each phase.
- Removable modules for easy replacement.

ATSHIELD series protectors have been tested in **official and independent laboratories,** obtaining their characteristics according to relevant standards (shown in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

ATSHIELD T surge protection devices must be installed **in parallel** with the low voltage three-phase power supply line provided with a neutral.
Installation should be carried out **without power running through the line**.
They can be installed as single protection or in combination with other protectors that leave less residual voltage, in which case they need to be separated by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.
Installation is recommended in distribution boards where the line enters the building or where large overvoltages can occur.
They are particularly recommended for places where direct lightning strikes can occur and when lines are connected to very sensitive equipment that cannot withstand large overvoltages.



> PROTECTION OF POWER SUPPLY LINES

> ATSHIELD series

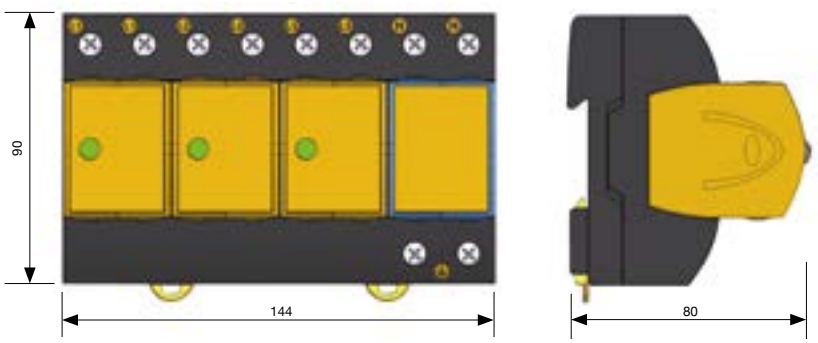
> TECHNICAL DATASHEET

Reference:		ATSHIELD 400T **AT-8603**	ATSHIELD 230T **AT-8604**
Protection categories according to the REBT:		I, II, III, IV	
Type of tests according to EN 61643-11:		Type 1 + 2	
Nominal voltage:	U_n	400 V_{AC} (L-L) 230 V_{AC} (L-N, L-GND)	230 V_{AC} (L-L) 130 V_{AC} (L-N, L-GND)
Maximum continuous operating voltage:	U_c	460 V_{AC} (L-L) 275 V_{AC} (L-N, L-GND)	275 V_{AC} (L-L) 150 V_{AC} (L-N, L-GND)
Nominal frequency:		50 - 60 Hz	
Impulse current per pole (10/350 µs wave):	I_{imp}	25 kA	
Specific energy:	W/R	156 kJ/Ω	
Nominal discharge current per pole (8/20 µs wave):	I_n	40 kA	
Maximum discharge current per pole (8/20 µs wave):	I_{max}	65 kA	
Protection level:	U_p	< 1500 V	
Follow current extinguishing capability:	I_f	50 kA_{eff}	
Response time:	t_r	< 100 ns	
Backup fuse(1):		125 A gL/gG	
Maximum short-circuit current:		25 kA (for maximum fuse)	
Working temperature:	ϑ	-40 ºC to +70 ºC	
Protector location:		Indoor	
Type of connection:		Parallel (one port)	
No. of poles:		4	
Dimensions:		144 x 90 x 80 mm (8 modules DIN 43880)	
Fixing:		DIN Rail	
Enclosure material:		Polyamide	
Enclosure protection:		IP20	
Insulation resistance:		> 10^{14} Ω	
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)	
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2	

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> ACCESSORIES

> AT-8611 ATSHIELD L Mod: I_{imp} 25 kA. U_n 230 V
> AT-8612 ATSHIELD L-130 Mod: I_{imp} 25 kA. U_n 130 V
> AT-8613 ATSHIELD N Mod: I_{imp} 75 kA

> PROTECTION OF POWER SUPPLY LINES

> ATSHIELD series

> ATSHIELD S

Combined technology against direct lightning strikes

> **AT-8618 ATSHIELD S 230M**: protection of both phase and neutral to ground for 230 V_{AC} single-phase lines

> **AT-8619 ATSHIELD S 130M**: protection of both phase and neutral to ground for 130 V_{AC} single-phase lines

Effective and compact protection against transient overvoltages for power supply systems, using an internal combination of gas discharge tubes and varistors.

This element is internally connected in such a way that no element in series with the line is needed for correct coordination of the protection. This protector combines the best qualities of the latest overvoltage protection technologies: the passing residual voltage of the varistors along with the gas discharge tube capacity to absorb lightning current. Tested and certified as a **type 1 and 2** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

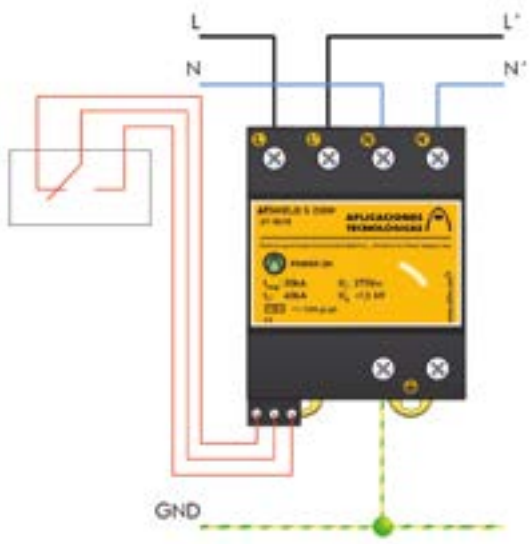
- Can be coordinated with other ATSUB and ATCOVER series protectors.
- Double connection in order to facilitate wiring (limited to 63 A).
- Short response time.
- Do not produce deflagration.
- Bipolar protection.
- Their activation causes no interruption in power supply.
- Compact protection.
- Thermodynamic control device and visual alarm for phase.

ATSHIELD series protectors have been tested in **official and independent laboratories,** obtaining their characteristics according to relevant standards (shown in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

ATSHIELD surge protection devices must be installed **in parallel** with the low voltage single-phase power supply line.
Installation should be carried out **without power running through the line**.
They can be installed as single protection or in combination with other protectors that leave less residual voltage, in which case they need to be separated by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.
Installation is recommended in distribution boards where the line enters the building or where large overvoltages can occur.
They are particularly recommended for places where direct lightning strikes can occur and when lines are connected to very sensitive equipment that cannot withstand large overvoltages.



> PROTECTION OF POWER SUPPLY LINES

> ATSHIELD series

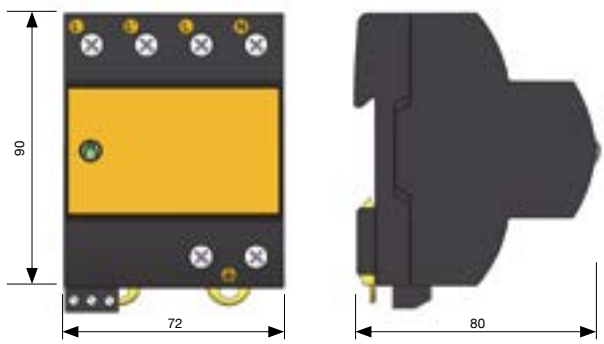
> TECHNICAL DATASHEET

Reference:		ATSHIELD S 230M **AT-8618**	ATSHIELD S 130M **AT-8619**
Protection categories according to the REBT:		I, II, III, IV	
Type of tests according to EN 61643-11:		Type 1 + 2	
Nominal voltage:	U_n	230 V_{AC}	130 V_{AC}
Maximum continuous operating voltage:	U_c	275 V_{AC}	150 V_{AC}
Nominal frequency:		50 - 60 Hz	
Impulse current per pole (10/350 µs wave):	I_{imp}	30 kA	
Specific energy:	W/R	224 kJ/Ω	
Nominal discharge current per pole (8/20 µs wave):	I_n	40 kA	
Maximum discharge current per pole (8/20 µs wave):	I_{max}	65 kA	
Protection level:	U_p	< 1500 V	
Follow current extinguishing capability:	I_f	50 kA_{eff}	
Response time:	t_r	< 100 ns	
Backup fuse(1):		125 A gL/gG	
Maximum short-circuit current:		25 kA (for maximum fuse)	
Working temperature:	ϑ	-40 ºC to + 70 ºC	
Protector location:		Indoor	
Type of connection:		Parallel (one port)	
No. of poles:		2	
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)	
Fixing:		DIN Rail	
Enclosure material:		Polyamide	
Enclosure protection:		IP20	
Insulation resistance:		> 10^{14} Ω	
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)	
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2	

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATSHIELD series

> ATSHIELD M

Combined technology against direct lightning strikes

> **AT-8607 ATSHIELD 230M**: protection of both phase and neutral to ground for 230 V_{AC} single-phase lines.

> **AT-8608 ATSHIELD 130M**: protection of both phase and neutral to ground for 130 V_{AC} single-phase lines.

Effective and compact protection against transient overvoltages for power supply systems, using an internal combination of gas discharge tubes and varistors.

This element is internally connected in such a way that no element in series with the line is needed for correct coordination of the protection. This protector combines the best qualities of the latest overvoltage protection technologies: the passing residual voltage of the varistors along with the gas discharge tube capacity to absorb lightning current. Tested and certified as a **type 1 and 2** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

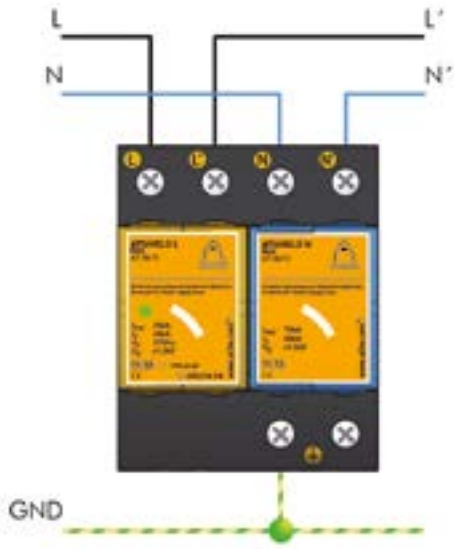
- Can be coordinated with other ATSUB and ATCOVER series protectors.
- Double connection in order to facilitate wiring (limited to 63 A).
- Short response time.
- Do not produce deflagration.
- Bipolar protection.
- Their activation causes no interruption in power supply.
- Compact protection.
- Thermodynamic control device and visual alarm for phase.
- Removable modules for easy replacement.

ATSHIELD series protectors have been tested in **official and independent laboratories,** obtaining their characteristics according to relevant standards (shown in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

ATSHIELD M surge protection devices must be installed **in parallel** with the low voltage single-phase power supply line.
Installation should be carried out **without power running through the line**.
They can be installed as single protection or in combination with other protectors that leave less residual voltage, in which case they need to be separated by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.
Installation is recommended in distribution boards where the line enters the building or where large overvoltages can occur.
They are particularly recommended for places where direct lightning strikes can occur and when lines are connected to very sensitive equipment that cannot withstand large overvoltages.



> PROTECTION OF POWER SUPPLY LINES

> ATSHIELD series

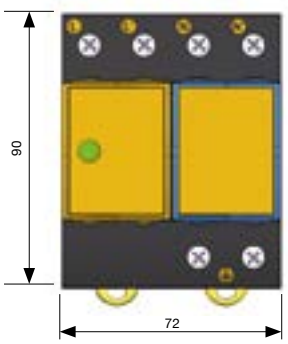
> TECHNICAL DATASHEET

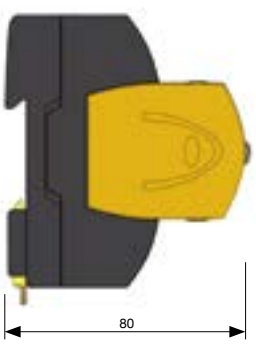
Reference:		ATSHIELD 230M **AT-8607**	ATSHIELD 130M **AT-8608**
Protection categories according to the REBT:		I, II, III, IV	
Type of tests according to EN 61643-11:		Type 1 + 2	
Nominal voltage:	U_n	230 V_{AC}	130 V_{AC}
Maximum continuous operating voltage:	U_c	275 V_{AC}	150 V_{AC}
Nominal frequency:		50 - 60 Hz	
Impulse current per pole (10/350 µs wave):	I_{imp}	25 kA	
Specific energy:	W/R	156 kJ/Ω	
Nominal discharge current per pole (8/20 µs wave):	I_n	40 kA	
Maximum discharge current per pole (8/20 µs wave):	I_{max}	65 kA	
Protection level:	U_p	< 1500 V	
Follow current extinguishing capability:	I_f	50 kA_{eff}	
Response time:	t_r	< 100 ns	
Backup fuse(1):		125 A gL/gG	
Maximum short-circuit current:		25 kA (for maximum fuse)	
Working temperature:	ϑ	-40 ºC to +70 ºC	
Protector location:		Indoor	
Type of connection:		Parallel (one port)	
No. of poles:		2	
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)	
Fixing:		DIN Rail	
Enclosure material:		Polyamide	
Enclosure protection:		IP20	
Insulation resistance:		> 10^{14} Ω	
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)	
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2	

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)





> ACCESSORIES

> AT-8611 ATSHIELD L Mod: I_{imp} 25 kA. U_n 230 V
> AT-8612 ATSHIELD L-130 Mod: I_{imp} 25 kA. U_n 130 V
> AT-8613 ATSHIELD N Mod: I_{imp} 75 kA

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> ATSUB140

Single-pole and pluggable protection for power supply lines

- **AT-8214 ATSUB 140-230**: line protection. Maximum current 140 kA a U_n=230 V_{AC}
- **AT-8215 ATSUB 140-130**: line protection. Maximum current 140 kA a U_n=130 V_{AC}
- **AT-8213 ATSUB 140-400**: line protection. Maximum current 140 kA a U_n=400 V_{AC}
- **AT-8218 ATSUB 140-N**: neutral protection. Maximum current 140 KA

> NOMENCLATURE

ATSUB 140 – 230

Max. discharge voltage in kA

Line - ground nominal voltage

Effective protection against transient overvoltages, using metal oxide varistors, for power supply lines with or without a neutral. Medium protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

Tested and certified as a **type 1 and 2** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

- Containing zinc oxide varistors, able to withstand very high currents.
- Short response time.
- Do not produce deflagration.
- Single-pole protection.
- Their activation causes no interruption in power supply.
- Thermodynamic control device and visual alarm.

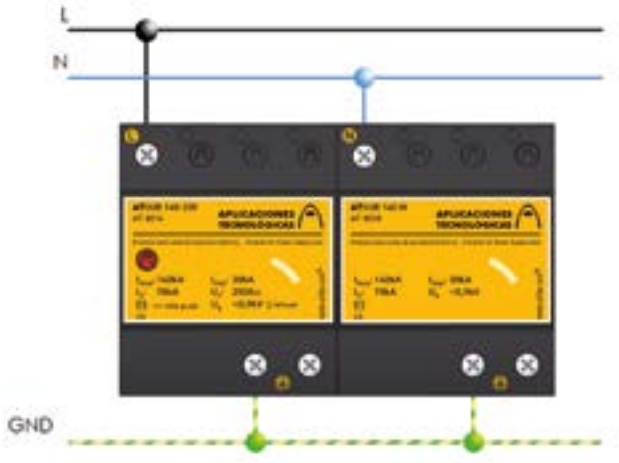
ATSUB series protectors have been tested in **official, independent laboratories,** obtaining their characteristics according to relevant standards (listed in the table).

> INSTALLATION

They are installed **in parallel** with the low voltage line, with connections to the phases that are to be protected (or to neutral) and to ground.

Installation should be carried out **without power running through the line**.

They are recommended for installations where large overvoltages can occur after the main switchboard and when these lines are not connected to very sensitive equipment.



Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

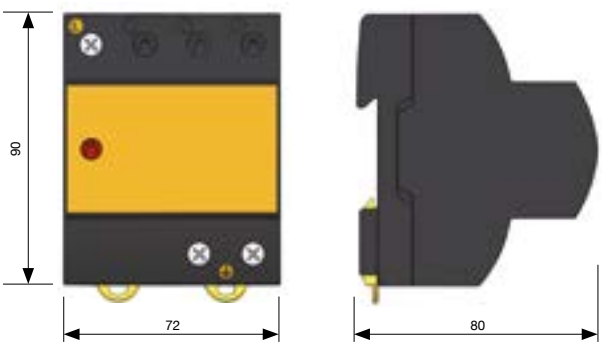
> TECHNICAL DATASHEET

Reference:		ATSUB 140-230 **AT-8214**	ATSUB 140-400 **AT-8213**	ATSUB 140-130 **AT-8215**	ATSUB 140-N **AT-8218**
Protection categories according to the REBT:		I, II, III, IV			
Type of tests according to EN 61643-11:		Type 1 + 2			
Nominal voltage:	U_n	230 V_{AC}	400 V_{AC}	130 V_{AC}	-
Maximum continuous operating voltage:	U_c	275 V_{AC}	460 V_{AC}	150 V_{AC}	-
Nominal frequency:		50 - 60 Hz			
Impulse current (10/350 µs wave):	I_{imp}	30 kA			
Nominal discharge current (8/20 µs wave):	I_n	40 kA			
Maximum discharge current per pole (8/20 µs wave):	I_{max}	140 kA			
Protection level 1.2/50 µs wave:	U_p	900 V	1500 V	500 V	900 V
Response time:	t_r	< 25 ns			
Backup fuse(1):		125 A gL/gG			
Maximum short-circuit current:		25 kA (for maximum fuse)			
Working temperature:	ϑ	-40 °C to +70 °C			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Insulation resistance:		> 10^{14} Ω			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2			

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> ATSUB100

Single-pole and pluggable protection for power supply lines

- **AT-8256 ATSUB 100**: line protection.
  Maximum current 100 kA a U_n=230 V_{AC}
- **AT-8257 ATSUB 100-120**: line protection
  Maximum current 100 kA a U_n=120 V_{AC}
- **AT-8258 ATSUB 100-400**: line protection.
  Maximum current 100 kA a U_n=400 V_{AC}
- **AT-8259 ATSUB 100-N**: neutral protection.
  Maximum current 100 kA

> NOMENCLATURE

ATSUB 100 – 120

Max. discharge voltage in kA

Line - ground nominal voltage

Effective protection against transient overvoltages, using metal oxide varistors, for power supply lines with or without a neutral. Medium protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

Tested and certified as a **type 1 and 2** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

- Containing zinc oxide varistors, able to withstand very high currents.
- Double connection in order to facilitate wiring (limited to 63 A).
- Short response time.
- Do not produce deflagration.
- Single-pole protection.
- Their activation causes no interruption in power supply.
- Thermodynamic control device and visual alarm.

ATSUB series protectors have been tested in **official, independent laboratories,** obtaining their characteristics according to relevant standards (listed in the table).
It is possible to select a protector for the alternating voltage suitable for each particular case.

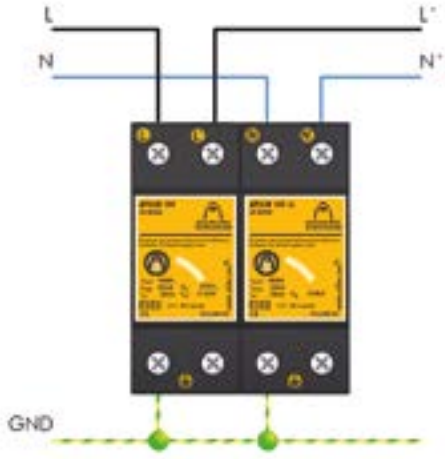
Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

They are installed **in parallel** with the low voltage line, with connections to the phases that are to be protected (or neutral) and ground.

Installation should be carried out **without power running through the line**.

They are recommended for installations where large overvoltages can occur after the main switchboard and when these lines are not connected to very sensitive equipment.



> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

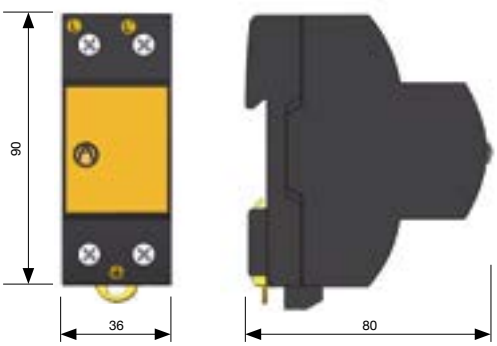
> TECHNICAL DATASHEET

Reference:		ATSUB 100 **AT-8256**	ATSUB 100-120 **AT-8257**	ATSUB 100-400 **AT-8258**	ATSUB 100-N **AT-8259**
Protection categories according to the REBT:		I, II, III, IV			
Type of tests according to EN 61643-11:		Type 1 + 2			
Nominal voltage:	U_n	230 V_{AC}	120 V_{AC}	400 V_{AC}	-
Maximum continuous operating voltage:	U_c	275 V_{AC}	150 V_{AC}	460 V_{AC}	-
Nominal frequency:		50 - 60 Hz			
Impulse current (10/350 µs wave):	I_{imp}	25 kA			
Nominal discharge current (8/20 µs wave):	I_n	30 kA			
Maximum discharge current per pole (8/20 µs wave):	I_{max}	100 kA			
Protection level 1.2/50 µs wave:	U_p	1.3 kV	0.9 kV	1.5 kV	1.3 kV
Response time:	t_r	< 25 ns			
Backup fuse(1):		125 A gL/gG			
Maximum short-circuit current:		25 kA (for maximum fuse)			
Working temperature:	ϑ	-40 °C to +70 °C			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Insulation resistance:		> 10^{14} Ω			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2			

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> ATSUB-4P-NR TT

Compact protection for TT three-phase power supply lines

> **AT-8034 ATSUB-4P-NR 15 TT**: peak current 15 kA. U_n 230 V
> **AT-8030 ATSUB-4P-NR 40 TT**: peak current 40 kA. U_n 230 V
> **AT-8036 ATSUB-4P-NR 65 TT**: peak current 65 kA. U_n 230 V

Effective protection against transient overvoltages for electrical supply lines with type TT neutral, using metal oxide varistors and gas discharge tubes. Medium protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

It includes removable modules for replacement in the event of a breakdown or fault, without needing to disconnect the wiring. Tested and certified as **type 1, 2 and 3** protectors according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV** equipment according to ITC-BT-23.

- Can be coordinated with other protectors such as ATSHOCK, ATSHIELD and ATCOVER series.
- Made up of zinc oxide varistors and gas discharge tubes able to withstand very high currents.
- Short response time.
- Do not produce deflagration.
- Compact protection with removable modules for quick replacement in case of breakage.
- Their activation causes no interruption in power supply.
- Thermodynamic control device, mechanical warning and remote alarm. When the warning light is yellow, the cartridge is in good condition. If not, replace.

ATSUB series protectors have been tested in **official, independent laboratories,** obtaining their characteristics according to relevant standards (listed in the table).

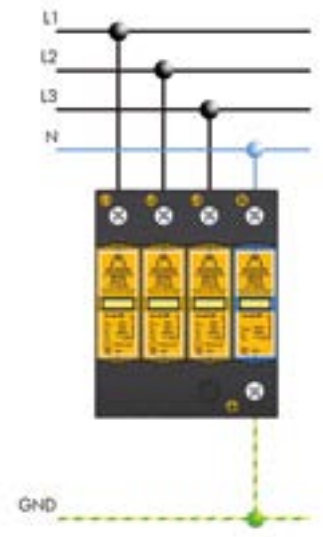
Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

They are installed **in parallel** with the low voltage line, with connections to the phases to be protected, neutral and ground. Installation should be carried out **without power running through the line**.

When ATSUB protectors are installed as medium protection, they must be separated from the coarse and/or tight protectors by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.

Installation is recommended in places where large overvoltages can occur and where lines are connected to very sensitive equipment that cannot withstand large overvoltages.



> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

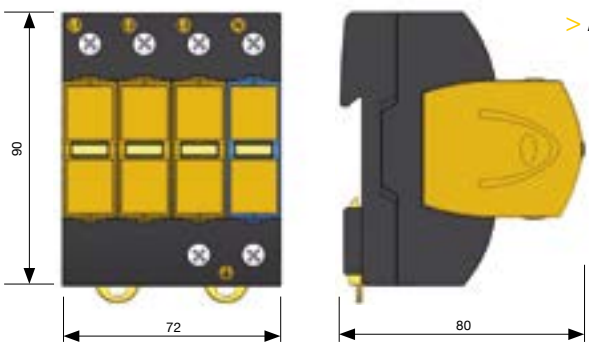
> TECHNICAL DATASHEET

Reference:		ATSUB-4P-NR 15 TT **AT-8034**	ATSUB-4P-NR 40 TT **AT-8030**	ATSUB-4P-NR 65 TT **AT-8036**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2
Nominal voltage:	U_n	400 V_{AC} (L-L) / 230 V_{AC} (L-N, L-GND)		
Maximum continuous operating voltage:	U_c	460 V_{AC} (L-L) / 275 V_{AC} (L-N, L-GND)		
Nominal frequency:		50 - 60 Hz		
Nominal discharge current per pole (8/20 µs wave):	I_n	5 kA	20 kA	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA
Protection level at I_n(8/20 µs wave):	$U_p(I_n)$	1200 V	1400 V	1600 V
Level protection for 1.2/50 µs wave:	U_p	700 V	700 V	900 V
Level protection for 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V
Impulse current per pole (10/350 µs):	I_{imp}	-		15 kA
Combined wave voltage:	$U_{o.c.}$	6 kV	-	
Response time:	t_r	< 25 ns		
Backup fuse(1):		125 A gL/gG		
Maximum short-circuit current:		25 kA (for maximum fuse)		
Working temperature:	ϑ	-40 °C to +70 °C		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
No. of poles:		4		
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2		

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> ACCESSORIES

> AT-8248 ATSUB Mod. 40: I_{max} 40 kA
> AT-8228 ATSUB Mod. 15: I_{max} 15 kA
> AT-8268 ATSUB Mod. 65: I_{max} 65 kA
> AT-8205 ATSUB Mod. N: neutral-ground

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> ATSUB-4P TT

Compact protection for TT three-phase power supply lines

> **AT-8282 ATSUB-4P 15 TT**: peak current 15 kA. U_n 230 V
> **AT-8285 ATSUB-4P 40 TT**: peak current 40 kA. U_n 230 V
> **AT-8287 ATSUB-4P 65 TT**: peak current 65 kA. U_n 230 V
> **AT-8283 ATSUB-4P 15-120 TT**: peak current 15 kA. U_n 120 V
> **AT-8286 ATSUB-4P 40-120 TT**: peak current 40 kA. U_n 120 V
> **AT-8289 ATSUB-4P 65-120 TT**: peak current 65 kA. U_n 120 V
> **AT-8206 ATSUB-4P 15-300 TT**: peak current 15 kA. U_n 300 V
> **AT-8207 ATSUB-4P 40-300 TT**: peak current 40 kA. U_n 300 V
> **AT-8239 ATSUB-4P 65-300 TT**: peak current 65 kA. U_n 300 V
> **AT-8281 ATSUB-4P 15-400 TT**: peak current 15 kA. U_n 400 V
> **AT-8284 ATSUB-4P 40-400 TT**: peak current 40 kA. U_n 400 V

Effective protection against transient overvoltages for electrical supply lines with type TT neutral, using metal oxide varistors and gas discharge tubes. Medium protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

> NOMENCLATURE

ATSUB 4P - 40 – 400 TT

- 40: Max. discharge voltage in kA
- 400: Line - ground nominal voltage

It includes removable modules for replacement in the event of a breakdown or fault, without needing to disconnect the wiring. Tested and certified as **type 1, 2 and 3** protectors according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV** equipment according to ITC-BT-23.

> Can be coordinated with other protectors such as ATSHOCK, ATSHIELD and ATCOVER series.
> Containing zinc oxide varistors, which are able to withstand very high currents.
> Short response time.
> Does not produce deflagration.
> Compact protection with removable modules enabling quick replacement in the event of breakage.
> Does not, at any moment, cause any interruption to the supply lines.
> Thermodynamic control device, mechanical warning and remote alarm. When the warning light is yellow, the cartridge is in good condition. If not, replace.

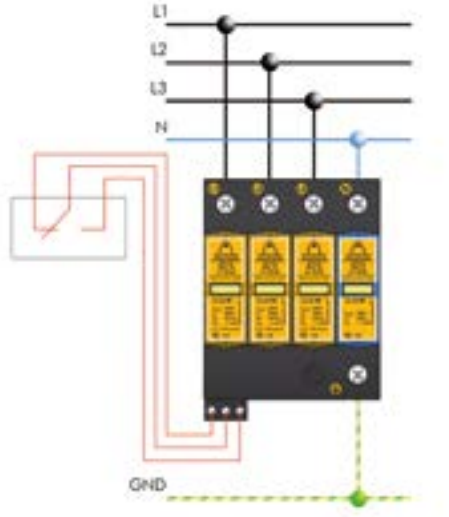
ATSUB series protectors have been tested in **official, independent laboratories,** obtaining their characteristics according to relevant standards (listed in the table). It is possible to select a protector for the alternating voltage suitable for each particular case.
For example, the technical datasheets of the optimal protectors for American voltages are also included (voltage line 230 V and Voltage line – neutral 120 V), voltages greater than 230 V (voltage line 520 V and voltage line – neutral 300 V), and wind generator voltages (voltage line 690 V and voltage line – ground 400 V).

> INSTALLATION

They are installed **in parallel** with the low voltage line, with connections to the phases to be protected, neutral and ground. Installation should be carried out **without power running through the line**.

When ATSUB protectors are installed as medium protection, they must be separated from the coarse and/or tight protectors by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.

They are recommended for installations where large overvoltages can occur after the main switchboard but which do not supply sensitive equipment.



Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω. If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> PROTECTION OF POWER SUPPLY LINES

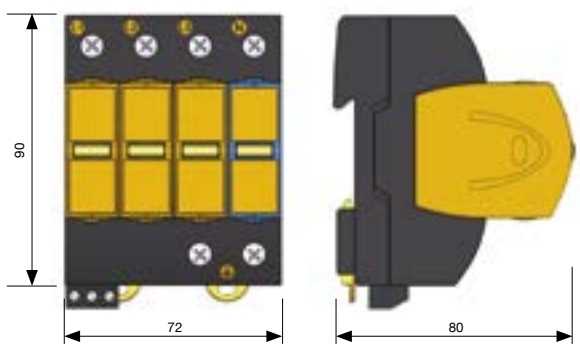
> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-4P 15 TT **AT-8282**	ATSUB-4P 40 TT **AT-8285**	ATSUB-4P 65 TT **AT-8287**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2
Nominal voltage:	U_n	400 V_{AC} (L-L) / 230 V_{AC} (L-N, L-GND)		
Maximum continuous operating voltage:	U_c	460 V_{AC} (L-L) / 275 V_{AC} (L-N, L-GND)		
Nominal frequency:		50 - 60 Hz		
Nominal discharge current per pole (8/20 µs wave):	I_n	5 kA	20 kA	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA
Protection level at I_n(8/20 µs wave):	$U_p(I_n)$	1200 V	1400 V	1600 V
Level protection for 1.2/50 µs wave:	U_p	700 V	700 V	900 V
Level protection for 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V
Impulse current per pole (10/350 µs):	I_{imp}	-		15 kA
Combined wave voltage:	$U_{o.c.}$	6 kV	-	
Response time:	t_r	< 25 ns		
Backup fuse(1):		125 A gL/gG		
Maximum short-circuit current:		25 kA (for maximum fuse)		
Working temperature:	ϑ	-40 ºC to +70 ºC		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
No. of poles:		4		
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2		
Voltage-free contact for the remote control				
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2		
Contact output:		Switch		
Operating voltage:		250 V_{AC} (Maximum operating voltage of the alarm power supply)		
Maximum current:		2 A (Maximum current of the alarm power supply)		
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305				

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> ACCESSORIES

> AT-8248 ATSUB Mod. 40: I_{max} 40 kA
> AT-8228 ATSUB Mod. 15: I_{max} 15 kA
> AT-8268 ATSUB Mod. 65: I_{max} 65 kA
> AT-8205 ATSUB Mod. N: neutral-ground

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-4P 15-120 TT **AT-8283**	ATSUB-4P 40-120 TT **AT-8286**	ATSUB-4P 65-120 TT **AT-8289**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2
Nominal voltage:	U_n	230 V_{AC} (L-L) / 120 V_{AC} (L-N, L-GND)		
Maximum continuous operating voltage:	U_c	275 V_{AC} (L-L) / 150 V_{AC} (L-N, L-GND)		
Nominal frequency:		50 - 60 Hz		
Nominal discharge current per pole (8/20 µs wave):	I_n	5 kA	20 kA	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA
Protection level for I_n (8/20 µs wave):	$U_p(I_n)$	1200 V	1400 V	1600 V
Protection level for 1.2/50 µs wave:	U_p	700 V	700 V	900 V
Protection level for 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V
Impulse current per pole (10/350 µs):	I_{imp}	-		15 kA
Combined wave voltage:	$U_{o.c.}$	6 k V	-	
Response time:	t_r	< 25 ns		
Backup fuse(1):		125 A gL/gG		
Maximum short-circuit current:		25 kA (for maximum fuse)		
Working temperature:	ϑ	-40 ºC to +70 ºC		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
No. of poles:		4		
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2		
Voltage-free contact for the remote control				
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2		
Contact output:		Switch		
Operating voltage:		250 V_{AC} (Maximum operating voltage of the alarm power supply)		
Maximum current:		2 A (Maximum current of the alarm power supply)		
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305				

(1) Required in cases where there is higher nominal current installed upstream from the protector

> ACCESSORIES

> AT-8296 ATSUB Mod. 40-120: I_{max} 40 kA / U_n120 V
> AT-8297 ATSUB Mod. 15-120: I_{max} 15 kA / U_n120 V
> AT-8298 ATSUB Mod. 65-120: I_{max} 65 kA / U_n120 V
> AT-8205 ATSUB Mod. N: neutral-ground

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-4P 15-300 TT **AT-8206**	ATSUB-4P 40-300 TT **AT-8207**	ATSUB-4P 65-300 TT **AT-8239**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2
Nominal voltage:	U_n	520 V_{AC} (L-L) / 300 V_{AC} (L-N, L-GND)		
Maximum continuous operating voltage:	U_c	555 V_{AC} (L-L) / 320 V_{AC} (L-N, L-GND)		
Nominal frequency:		50 - 60 Hz		
Nominal discharge current per pole (8/20 µs wave):	I_n	5 kA	20 kA	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA
Protection level for I_n (8/20 µs wave):	$U_p(I_n)$	1400 V	1500 V	1800 V
Protection level for 1.2/50 µs wave:	U_p	900 V	900 V	1100 V
Protection level for 5 kA; 8/20 µs wave:		1100 V	1200 V	1300 V
Impulse current per pole (10/350 µs):	I_{imp}	-		15 kA
Combined wave voltage:	$U_{o.c.}$	6 kV	-	
Response time:	t_r	< 25 ns		
Backup fuse(1):		125 A gL/gG		
Maximum short-circuit current:		25 kA (for maximum fuse)		
Working temperature:	ϑ	-40 ºC to +70 ºC		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
No. of poles:		4		
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2		
Voltage-free contact for the remote control				
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2		
Contact output:		Switch		
Operating voltage:		250 V_{AC} (Maximum operating voltage of the alarm power supply)		
Maximum current:		2 A (Maximum current of the alarm power supply)		
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305				

(1) Required in cases where there is higher nominal current installed upstream from the protector

> ACCESSORIES

> AT-8043 ATSUB Mod. 40-300: I_{max} 40 kA / U_n 300 V
> AT-8044 ATSUB Mod. 15-300: I_{max} 15 kA / U_n 300 V
> AT-8045 ATSUB Mod. 65-300: I_{max} 65 kA / U_n 300 V
> AT-8205 ATSUB Mod. N: neutral-ground

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-4P 15-400 TT **AT-8281**	ATSUB-4P 40-400 TT **AT-8284**
Protection categories according to the REBT:		I, II, III, IV	
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2
Nominal voltage:	U_n	690 V_{AC} (L-L) / 400 V_{AC} (L-N, L-GND)	
Maximum continuous operating voltage:	U_c	800 V_{AC} (L-L) / 460 V_{AC} (L-N, L-GND)	
Nominal frequency:		50 - 60 Hz	
Nominal discharge current per pole (8/20 µs wave):	I_n	5 kA	20 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA
Protection level for I_n (8/20 µs wave):	$U_p(I_n)$	2100 V	2300 V
Protection level for 1.2/50 µs wave:	U_p	1800 V	1800 V
Protection level for 5 kA; 8/20 µs wave:		1900 V	2000 V
Combined wave voltage:	$U_{o.c.}$	6 kV	-
Response time:	t_r	< 25 ns	
Backup fuse(1):		125 A gL/gG	
Maximum short-circuit current:		25 kA (for maximum fuse)	
Working temperature:	ϑ	-40 °C to +70 °C	
Protector location:		Indoor	
Type of connection:		Parallel (one port)	
No. of poles:		4	
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)	
Fixing:		DIN Rail	
Enclosure material:		Polyamide	
Enclosure protection:		IP20	
Insulation resistance:		> 10^{14} Ω	
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)	
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2	
Voltage-free contact for the remote control			
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2	
Contact output:		Switch	
Operating voltage:		250 V_{AC} (Maximum operating voltage of the alarm power supply)	
Maximum current:		2 A (Maximum current of the alarm power supply)	
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305			

(1) Required in cases where there is higher nominal current installed upstream from the protector

> ACCESSORIES

> AT-8249 ATSUB Mod. 40-400: I_{max} 40 kA / U_n 400 V
> AT-8229 ATSUB Mod. 15-400: I_{max} 15 kA / U_n 400 V
> AT-8205 ATSUB Mod. N: neutral-ground

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> ATSUB-4P TNS

Compact protection for TNS three-phase power supply lines

> **AT-8000 ATSUB-4P 15 TNS**: peak current 15 kA. U_n 230 V
> **AT-8001 ATSUB-4P 40 TNS**: peak current 40 kA. U_n 230 V
> **AT-8002 ATSUB-4P 65 TNS**: peak current 65 kA. U_n 230 V
> **AT-8003 ATSUB-4P 15-120 TNS** peak current 15 kA. U_n 120 V
> **AT-8004 ATSUB-4P 40-120 TNS** peak current 40 kA. U_n 120 V
> **AT-8005 ATSUB-4P 65-120 TNS** peak current 65 kA. U_n 120 V
> **AT-8050 ATSUB-4P 15-300 TNS** peak current 15 kA. U_n 300 V
> **AT-8051 ATSUB-4P 40-300 TNS** peak current 40 kA. U_n 300 V
> **AT-8052 ATSUB-4P 65-300 TNS** peak current 65 kA. U_n 300 V
> **AT-8006 ATSUB-4P 15-400 TNS** peak current 15 kA. U_n 400 V
> **AT-8007 ATSUB-4P 40-400 TNS** peak current 40 kA. U_n 400 V

Effective protection against transient overvoltages for electrical supply lines with neutral type TNS using metal oxide varistors. Medium protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

> NOMENCLATURE

ATSUB 4P - 40 – 400 TNS

- 40: Max. discharge voltage in kA
- 400: Line-ground nominal voltage

It includes removable modules for replacement in the event of a breakdown or fault, without needing to disconnect the wiring. Tested and certified as **type 1, 2 and 3** protectors according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

> Can be coordinated with other ATSHOCK, ATSHIELD and ATCOVER series protectors.
> Made up of zinc oxide varistors and gas discharge tubes able to withstand very high currents.
> Short response time.
> Do not produce deflagration.
> Compact protection with removable modules enabling quick replacement in the event of breakage.
> Does not, at any time, cause interruption to the power supply lines.
> Thermodynamic control device, mechanical warning and remote alarm. When the warning light is yellow, the cartridge is in good condition. If not, replace.

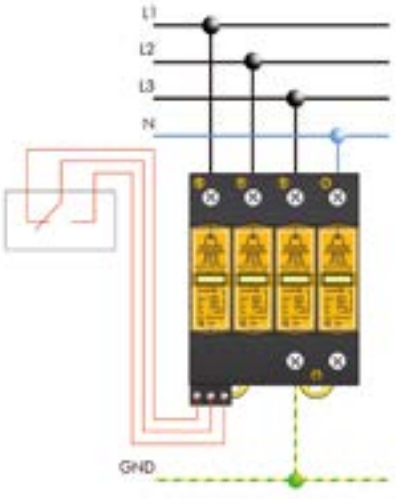
ATSUB series protectors have been tested in **official and independent laboratories,** obtaining their characteristics according to relevant standards (shown in the table).
It is possible to select a protector for the alternating voltage suitable for each particular case. For example, the technical datasheets of the optimal protectors for American voltages are also included (line voltage 230 V and line – neutral voltage 120 V), voltages greater than 230 V (line voltage 520 V and line – neutral voltage 300 V), and wind generator voltages (line voltage 690 V and line – ground voltage 400 V).

> INSTALLATION

They are installed **in parallel** with the low voltage line, with connections to the phases that are to be protected and to ground. Installation should be carried out **without power running through the line**.

When ATSUB protectors are installed as medium protection, they must be separated from the coarse and/or tight protectors by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.

They are recommended for installations where large overvoltages can occur after the main switchboard but which do not supply sensitive equipment.



Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω. If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> PROTECTION OF POWER SUPPLY LINES

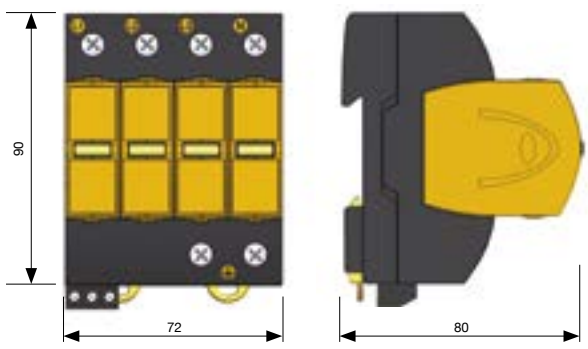
> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-4P 15 TNS **AT-8000**	ATSUB-4P 40 TNS **AT-8001**	ATSUB-4P 65 TNS **AT-8002**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2
Nominal voltage:	U_n	400 V_{AC} (L-L) / 230 V_{AC} (L-GND)		
Maximum continuous operating voltage:	U_c	460 V_{AC} (L-L) / 275 V_{AC} (L-GND)		
Nominal frequency:		50 - 60 Hz		
Nominal discharge current per pole (8/20 µs wave):	I_n	5 kA	20 kA	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA
Protection level at I_n (8/20 µs wave):	$U_p(I_n)$	1200 V	1400 V	1600 V
Protection level per wave 1.2/50 µs:	U_p	700 V	700 V	900 V
Protection level for 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V
Impulse current per pole (10/350 µs):	I_{imp}	-		15 kA
Combined wave voltage:	$U_{o.c.}$	6 kV	-	
Response time:	t_r	< 25 ns		
Backup fuses(1):		125 A gL/gG		
Maximum short-circuit current:		25 kA (for maximum fuse)		
Working temperature:	ϑ	-40 °C to +70 °C		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
No. of poles:		4		
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2		
Voltage-free contact for the remote control				
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2		
Contact output:		Switch		
Operating voltage:		250 V_{AC} (Maximum operating voltage of the alarm power supply)		
Maximum current:		2 A (Maximum current of the alarm power supply)		
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305				

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> ACCESSORIES

> AT-8248 ATSUB Mod. 40: I_{max} 40 kA
> AT-8228 ATSUB Mod. 15: I_{max} 15 kA
> AT-8268 ATSUB Mod. 65: I_{max} 65 kA

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-4P 15-120 TNS **AT-8003**	ATSUB-4P 40-120 TNS **AT-8004**	ATSUB-4P 65-120 TNS **AT-8005**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2
Nominal voltage:	U_n	230 V_{AC} (L-L) / 120 V_{AC} (L-GND)		
Maximum continuous operating voltage:	U_c	275 V_{AC} (L-L) / 150 V_{AC} (L-GND)		
Nominal frequency:		50 - 60 Hz		
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1200 V	1400 V	1600 V
Protection level for 1.2/50 µs wave:	U_p	700 V	700 V	900 V
Protection level 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V
Impulse current per pole (10/350 µs):	I_{imp}	-		15 kA
Combined wave voltage:	$U_{o.c.}$	6 kV	-	
Response time:	t_r	< 25 ns		
Backup fuse(1):		125 A gL/gG		
Maximum short-circuit current:		25 kA (for maximum fuse)		
Working temperature:	ϑ	-40 °C to +70 °C		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
No. of poles:		4		
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/GND:		Min/Max multi-stranded section: 4 / 35 mm² Min/Max single-stranded section: 1 / 35 mm²		
Voltage-free contact for the remote control				
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm²		
Contact output:		Switch		
Operating voltage:		250 V_{AC} (Maximum working voltage of the alarm power supply)		
Maximum current:		2 A (Maximum current of the alarm power supply)		
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305				

(1) Required in cases where there is higher nominal current installed upstream from the protector

> ACCESSORIES

> AT-8296 ATSUB Mod. 40-120: I_{max} 40 kA / U_n 120 V
> AT-8297 ATSUB Mod. 15-120: I_{max} 15 kA / U_n 120 V
> AT-8298 ATSUB Mod. 65-120: I_{max} 65 kA / U_n 120 V

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-4P 15 -300 TNS **AT-8050**	ATSUB-4P 40-300 TNS **AT-8051**	ATSUB-4P 65-300 TNS **AT-8052**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2
Nominal voltage:	U_n	520 V_{AC} (L-L) / 300 V_{AC} (L-GND)		
Maximum continuous operating voltage:	U_c	555 V_{AC} (L-L) / 320 V_{AC} (L-GND)		
Nominal frequency:		50 - 60 Hz		
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1400 V	1500 V	1800 V
Protection level for 1.2/50 µs wave:	U_p	900 V	900 V	1100 V
Protection level 5 kA; 8/20 µs wave:		1100 V	1200 V	1300 V
Impulse current per pole (10/350 µs):	I_{imp}	-		15 kA
Combined wave voltage:	$U_{o.c.}$	6 kV	-	
Response time:	t_r	< 25 ns		
Backup fuse(1):		125 A gL/gG		
Maximum short-circuit current:		25 kA (for maximum fuse)		
Working temperature:	ϑ	-40 °C to +70 °C		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
No. of poles:		4		
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/GND:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2		
Voltage-free contact for the remote control				
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2		
Contact output:		Switch		
Operating voltage:		250 V_{AC} (Maximum working voltage of the alarm power supply)		
Maximum current:		2 A (Maximum current of the alarm power supply)		

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> ACCESSORIES

> AT-8043 ATSUB Mod. 40-300: I_{max} 40 kA / U_n 300 V
> AT-8044 ATSUB Mod. 15-300: I_{max} 15 kA / U_n 300 V
> AT-8045 ATSUB Mod. 65-300: I_{max} 65 kA / U_n 300 V

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-4P 15-400 TNS **AT-8006**	ATSUB-4P 40-400 TNS **AT-8007**
Protection categories according to the REBT:		I, II, III, IV	
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2
Nominal voltage:	U_n	690 V_{AC} (L-L) / 400 V_{AC} (L-GND)	
Maximum continuous operating voltage:	U_c	800 V_{AC} (L-L) / 460 V_{AC} (L-GND)	
Nominal frequency:		50 - 60 Hz	
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	2100 V	2300 V
Protection level for 1.2/50 µs wave:	U_p	1800 V	1800 V
Protection level 5 kA; 8/20 µs wave:		1900 V	2000 V
Combined wave voltage:	$U_{o.c.}$	6 kV	-
Response time:	t_r	< 25 ns	
Backup fuses(1):		125 A gL/gG	
Maximum short-circuit current:		25 kA (for maximum fuse)	
Working temperature:	ϑ	-40 °C to +70 °C	
Protector location:		Indoor	
Type of connection:		Parallel (one port)	
No. of poles:		4	
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)	
Fixing:		DIN Rail	
Enclosure material:		Polyamide	
Enclosure protection:		IP20	
Insulation resistance:		> 10^{14} Ω	
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)	
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2	
Voltage-free contact for the remote control			
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2	
Contact output:		Switch	
Operating voltage:		250 V_{AC} (Maximum working voltage of the alarm power supply)	
Maximum current:		2 A (Maximum current of the alarm power supply)	
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305			

(1) Required in cases where there is higher nominal current installed upstream from the protector

> ACCESSORIES

> AT-8249 ATSUB Mod. 40-400: I_{max} 40 kA / U_n 400 V
> AT-8229 ATSUB Mod. 15-400: I_{max} 15 kA / U_n 400 V

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> ATSUB-3P-NR

Compact protection for two-phase power supply lines with neutral for american voltages

> **AT-8037 ATSUB-3P-NR 15-120:** peak current 15 kA. U_n 120 V
> **AT-8038 ATSUB-3P-NR 40-120:** peak current 40 kA. U_n 120 V
> **AT-8039 ATSUB-3P-NR 65-120:** peak current 65 kA. U_n 120 V

Effective protection against transient overvoltages for electrical two-phase power supply lines with neutral, using metal oxide varistors and gas discharge tubes. Medium protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

Surge protective devices ready for two-phase power supply lines with neutral seldom used in America. Moreover, they are tropicalised for these voltages.

It includes removable modules for replacement in the event of a breakdown or fault, without needing to disconnect the wiring. Tested and certified as **type 1, 2 and 3** protectors according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for Categories I, II, III and IV equipment according to ITC-BT-23.

- Can be coordinated with other ATSHOCK, ATSHIELD and ATCOVER series protectors.
- Made up of zinc oxide varistors and gas discharge tubes able to withstand very high currents.
- Short response time.
- Do not produce deflagration.
- Compact protection with removable modules for quick replacement in case of breakage.
- Their activation causes no interruption in power supply.
- Thermodynamic control device, mechanical warning and remote alarm. When the warning light is yellow, the cartridge is in good condition. If not, replace.

ATSUB series protectors have been tested in **official, independent laboratories,** obtaining their characteristics according to relevant standards (listed in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

They are installed **in parallel** with the low voltage line, with connections to the phases to be protected, neutral and ground. Installation should be carried out **without power running through the line**.

When ATSUB protectors are installed as medium protection, they must be separated from the coarse and/or tight protectors by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.

Installation is recommended in places where large overvoltages can occur and where lines are connected to very sensitive equipment that cannot withstand large overvoltages.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

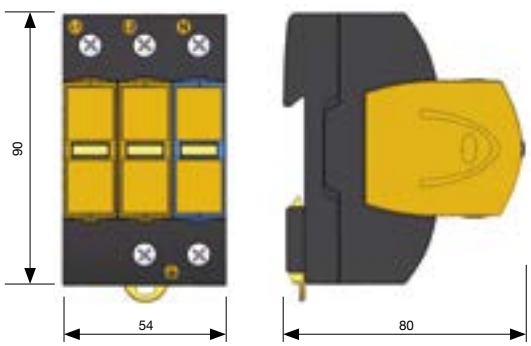
> TECHNICAL DATASHEET

Reference:		ATSUB-3P-NR 15-120 **AT-8037**	ATSUB-3P-NR 40-120 **AT-8038**	ATSUB-3P-NR 65-120 **AT-8039**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2
Nominal voltage:	U_n	230 V_{AC} (L-L) / 120 V_{AC} (L-N, L-GND)		
Maximum continuous operating voltage:	U_c	275 V_{AC} (L-L) / 150 V_{AC} (L-N, L-GND)		
Nominal frequency:		50 - 60 Hz		
Nominal discharge current per pole (8/20 µs wave):	I_n	5 kA	20 kA	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA
Protection level at I_n (8/20 µs wave):	$U_p(I_n)$	1200 V	1400 V	1600 V
Level protection for 1.2/50 µs wave:	U_p	700 V	700 V	900 V
Level protection for 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V
Impulse current per pole (10/350 µs):	I_{imp}	-		15 kA
Combined wave voltage:	$U_{o.c.}$	6 kV	-	
Response time:	t_r	< 25 ns		
Backup fuse(1):		125 A gL/gG		
Maximum short-circuit current:		25 kA (for maximum fuse)		
Working temperature:	ϑ	-40 ºC to +70 ºC		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
No. of poles:		3		
Dimensions:		54 x 90 x 80 mm (3 modules DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2		

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> ACCESSORIES

> AT-8296 ATSUB Mod. 40-120: I_{max} 40 kA / U_n 120 V
> AT-8297 ATSUB Mod. 15-120: I_{max} 15 kA / U_n 120 V
> AT-8298 ATSUB Mod. 65-120: I_{max} 65 kA / U_n 120 V
> AT-8205 ATSUB Mod. N: neutral-ground

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> ATSUB-3P TNC

Compact protector for TNC three-phase power supply lines

> **AT-8070 ATSUB-3P-NR 15 TNC:** peak current 15 kA. U_n 230 V
> **AT-8071 ATSUB-3P-NR 40 TNC:** peak current 40 kA. U_n 230 V
> **AT-8072 ATSUB-3P-NR 65 TNC:** peak current 65 kA. U_n 230 V
> **AT-8073 ATSUB-3P-NR 15-120 TNC:** peak current 15 kA. U_n 120 V
> **AT-8074 ATSUB-3P-NR 40-120 TNC:** peak current 40 kA. U_n 120 V
> **AT-8075 ATSUB-3P-NR 65-120 TNC:** peak current 65 kA. U_n 120 V

Effective protection against transient overvoltages for **TNC type** electrical supply lines, using metal oxide varistors. **Medium** protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

> NOMENCLATURE

ATSUB-3P-NR 40 – 120 TNC

- 40: Max. discharge voltage in kA
- 120: Line-ground nominal voltage

It includes removable modules for replacement in the event of a breakdown or fault, without needing to disconnect the wiring.
Tested and certified as a **type 1, 2 and 3** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV** equipment according to ITC-BT-23.

- Can be coordinated with other ATSHOCK, ATSHIELD and ATCOVER series protectors.
- Made up of zinc oxide varistors and gas discharge tubes able to withstand very high currents.
- Short response time.
- Do not produce deflagration.
- Compact protection with removable modules for quick replacement in the event of breakage.
- They do not cause any interruption to the power supply.
- Thermodynamic mechanical warning and remote alarm. When the warning light is yellow, the cartridge is in good condition. If not, replace.

ATSUB series protectors have been tested in **official, independent laboratories,** obtaining their characteristics according to relevant standards (listed in the table).
It is possible to select a protector for the alternating voltage suitable for each particular case.

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

They are installed **in parallel** with the low voltage line, with connections to the phases to be protected, neutral and ground. Installation should be carried out **without power running through the line**.

When ATSUB protectors are installed as medium protection, they must be separated from the coarse and/or tight protectors by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.

They are recommended for installations where large overvoltages can occur after the main switchboard but which do not supply sensitive equipment.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

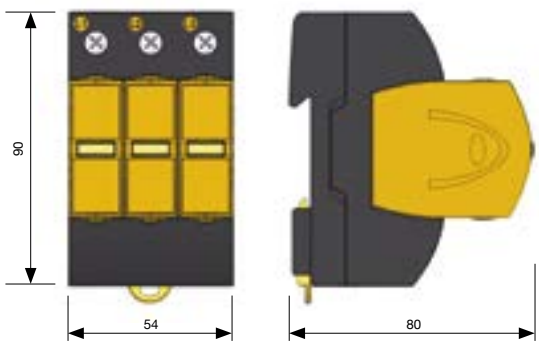
> TECHNICAL DATASHEET

Reference:		ATSUB-3P 15 TNC **AT-8070**	ATSUB-3P 40 TNC **AT-8071**	ATSUB-3P 65 TNC **AT-8072**
Protection categories according to the REBT:		I, II, III, IV		I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2
Nominal voltage:	U_n	230 V_{AC}		
Maximum continuous operating voltage:	U_c	275 V_{AC}		
Nominal frequency:		50 - 60 Hz		
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1200 V	1400 V	1600 V
Protection level for 1.2/50 µs wave:	U_p	700 V	700 V	900 V
Protection level 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V
Impulse current per pole (10/350 µs):	I_{imp}	-		15 kA
Combined wave voltage:	$U_{o.c.}$	6 kV	-	
Response time:	t_r	< 25 ns		
Backup fuse(1):		125 A gL/gG		
Maximum short-circuit current:		25 kA (for maximum fuse)		
Working temperature:	ϑ	-40 ºC to +70 ºC		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
No. of poles:		3		
Dimensions:		54 x 90 x 80 mm (3 modules DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2		

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> ACCESSORIES

> AT-8248 ATSUB Mod. 40: I_{max} 40 kA
> AT-8228 ATSUB Mod. 15: I_{max} 15 kA
> AT-8268 ATSUB Mod. 65: I_{max} 65 kA

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-3P-NR 15-120 TNC **AT-8073**	ATSUB-3P-NR 40-120 TNC **AT-8074**	ATSUB-3P-NR 65-120 TNC **AT-8075**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2
Nominal voltage:	U_n	120 V_{AC}		
Maximum continuous operating voltage:	U_c	150 V_{AC}		
Nominal frequency:		50 - 60 Hz		
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1200 V	1400 V	1600 V
Protection level for 1.2/50 µs wave:	U_p	700 V	700 V	900 V
Protection level 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V
Impulse current per pole (10/350 µs):	I_{imp}	-		15 kA
Combined wave voltage:	$U_{o.c.}$	6 kV	-	
Response time:	t_r	< 25 ns		
Backup fuse(1):		125 A gL/gG		
Maximum short-circuit current:		25 kA (for maximum fuse)		
Working temperature:	ϑ	-40 ºC to +70 ºC		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
No. of poles:		3		
Dimensions:		54 x 90 x 80 mm (3 modules DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2		

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> ACCESSORIES

> AT-8296 ATSUB Mod. 40-120: I_{max} 40 kA / U_n120 V
> AT-8297 ATSUB Mod. 15-120: I_{max} 15 kA / U_n120 V
> AT-8298 ATSUB Mod. 65-120: I_{max} 65 kA / U_n 120 V

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> ATSUB-2P-NR TT

Compact protection for TT single-phase power supply lines

> **AT-8035 ATSUB-2P-NR 15 TT**: peak current 15 kA. U_n 230 V
> **AT-8020 ATSUB-2P-NR 40 TT**: peak current 40 kA. U_n 230 V
> **AT-8026 ATSUB-2P-NR 65 TT**: peak current 65 kA. U_n 230 V

Effective protection against transient overvoltages for electrical supply lines with type TT neutral, using metal oxide varistors and gas discharge tubes. Medium protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

> NOMENCLATURE

ATSUB 2P - 40 – 400 TT

- 40: Max. discharge voltage in kA
- 400: Nominal voltage Line-ground

It includes removable modules for replacement in the event of a breakdown or fault, without needing to disconnect the wiring. Tested and certified as **type 1, 2 and 3** protectors according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV** equipment according to ITC-BT-23.

- Can be coordinated with other protectors such as ATSHOCK, ATSHIELD and ATCOVER series.
- Made up of zinc oxide varistors and gas discharge tubes able to withstand very high currents.
- Short response time.
- Does not produce deflagration.
- Compact protection with removable modules enabling quick replacement in the event of breakage.
- Does not, at any moment, cause any interruption to the supply lines.
- Thermodynamic control device, mechanical warning and remote alarm. When the warning light is yellow, the cartridge is in good condition. If not, replace.

ATSUB series protectors have been tested in **official, independent laboratories,** obtaining their characteristics according to relevant standards (listed in the table).
It is possible to select a protector for the alternating voltage suitable for each particular case.

> INSTALLATION

They are installed **in parallel** with the low voltage line, with connections to the phases to be protected, neutral and ground. Installation should be carried out **without power running through the line**.

When ATSUB protectors are installed as medium protection, they must be separated from the coarse and/or tight protectors by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.

They are recommended for installations where large overvoltages can occur after the main switchboard but which do not supply sensitive equipment.

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω. If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

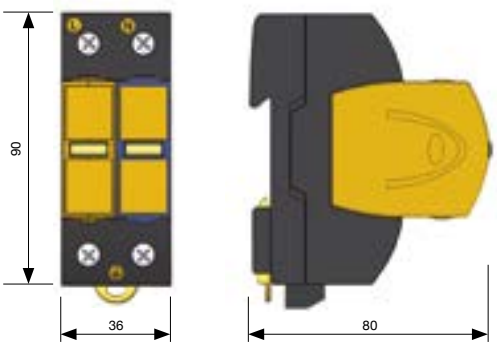
> TECHNICAL DATASHEET

Reference:		ATSUB-2P-NR 15 TT **AT-8035**	ATSUB-2P-NR 40 TT **AT-8020**	ATSUB-2P-NR 65 TT **AT-8026**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2
Nominal voltage:	U_n	230 V_{AC}		
Maximum continuous operating voltage:	U_c	275 V_{AC}		
Nominal frequency:		50 - 60 Hz		
Nominal discharge current per pole (8/20 µs wave):	I_n	5 kA	20 kA	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA
Protection level at I_n(8/20 µs wave):	$U_p(I_n)$	1200 V	1400 V	1600 V
Protection level for 1.2/50 µs wave:	U_p	700 V	700 V	900 V
Protection level for 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V
Impulse current per pole (10/350 µs):	I_{imp}	-		15 kA
Combined wave voltage:	$U_{o.c.}$	6 kV	-	
Response time:	t_r	< 25 ns		
Backup fuse(1):		125 A gL/gG		
Maximum short-circuit current:		25 kA (for maximum fuse)		
Working temperature:	ϑ	-40 ºC to +70 ºC		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
No. of poles:		2		
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2		

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> ACCESSORIES

> AT-8248 ATSUB Mod. 40: I_{max} 40 kA
> AT-8228 ATSUB Mod. 15: I_{max} 15 kA
> AT-8268 ATSUB Mod. 65: I_{max} 65 kA
> AT-8205 ATSUB Mod. N: neutral-ground

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> ATSUB-2P TT

Compact protection for TT single-phase power supply lines

- > **AT-8232 ATSUB-2P 15 TT**: peak current 15 kA. U_n 230 V
- > **AT-8235 ATSUB-2P 40 TT**: peak current 40 kA. U_n 230 V
- > **AT-8238 ATSUB-2P 65 TT**: peak current 65 kA. U_n 230 V
- > **AT-8234 ATSUB-2P 15-120 TT**: peak current 15 kA. U_n 120 V
- > **AT-8237 ATSUB-2P 40-120 TT**: peak current 40 kA. U_n 120 V
- > **AT-8280 ATSUB-2P 65-120 TT**: peak current 65 kA. U_n 120 V
- > **AT-8047 ATSUB-2P 15-300 TT**: peak current 15 kA. U_n 300 V
- > **AT-8048 ATSUB-2P 40-300 TT**: peak current 40 kA. U_n 300 V
- > **AT-8049 ATSUB-2P 65-300 TT**: peak current 65 kA. U_n 300 V
- > **AT-8233 ATSUB-2P 15-400 TT**: peak current 15 kA. U_n 400 V
- > **AT-8236 ATSUB-2P 40-400 TT**: peak current 40 kA. U_n 400 V

Effective protection against transient overvoltages for electrical supply lines with type TT neutral, using metal oxide varistors and gas discharge tubes. Medium protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

> NOMENCLATURE

ATSUB 2P - 40 – 400 TT

- 40: Max. discharge voltage in kA
- 400: Line - ground nominal voltage

It includes removable modules for replacement in the event of a breakdown or fault, without needing to disconnect the wiring. Tested and certified as **Type 1, 2 and 3** protectors according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **Categories I, II, III and IV** equipment according to ITC-BT-23.

- > Can be coordinated with other protectors such as ATSHOCK, ATSHIELD and ATCOVER series.
- > Made up of zinc oxide varistors and gas discharge tubes able to withstand very high currents.
- > Short response time.
- > Does not produce deflagration.
- > Compact protection with removable modules enabling quick replacement in the event of breakage.
- > Does not, at any moment, cause any interruption to the supply lines.
- > Thermodynamic control device, mechanical warning and remote alarm. When the warning light is yellow, the cartridge is in good condition. If not, replace.

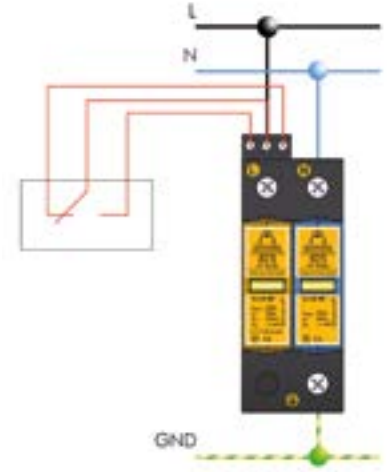
ATSUB series protectors have been tested in **official, independent laboratories,** obtaining their characteristics according to relevant standards (listed in the table).
It is possible to select a protector for the alternating voltage suitable for each particular case. For example, the technical datasheets of the optimal protectors for american voltages are also included (voltage line 230 V and voltage line – neutral 120 V), voltages greater than 230 V (voltage line 520 V and voltage line – neutral 300 V), and wind generator voltages (line voltages 690 V and line – ground voltages 400 V).

> INSTALLATION

They are installed **in parallel** or with the low voltage line, with connections to the phases to be protected, neutral and ground. Installation should be carried out **without power running through the line**.

When ATSUB protectors are installed as medium protection, they must be separated from the coarse and/or tight protectors by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.

They are recommended for installations where large overvoltages can occur after the main switchboard but which do not supply sensitive equipment.



Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω. If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> PROTECTION OF POWER SUPPLY LINES

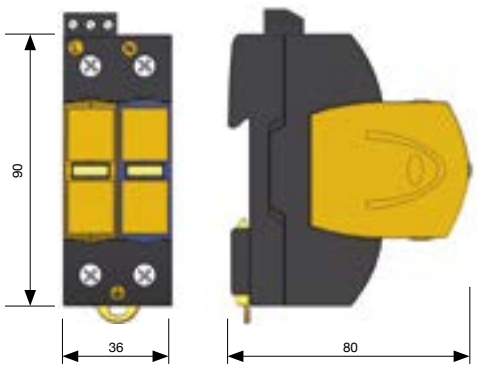
> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-2P 15 TT **AT-8232**	ATSUB-2P 40 TT **AT-8235**	ATSUB-2P 65 TT **AT-8238**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2
Nominal voltage:	U_n	230 V_{AC}		
Maximum continuous operating voltage:	U_c	275 V_{AC}		
Nominal frequency:		50 - 60 Hz		
Nominal discharge current per pole (8/20 µs wave):	I_n	5 kA	20 kA	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA
Protection level at I_n(8/20 µs wave):	$U_p(I_n)$	1200 V	1400 V	1600 V
Protection level for 1.2/50 µs wave:	U_p	700 V	700 V	900 V
Protection level for 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V
Impulse current per pole (10/350 µs):	I_{imp}	-		15 kA
Combined wave voltage:	$U_{o.c.}$	6 kV	-	
Response time:	t_r	< 25 ns		
Backup fuse(1):		125 A gL/gG		
Maximum short-circuit current:		25 kA (for maximum fuse)		
Working temperature:	ϑ	-40 ºC to +70 ºC		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
No. of poles:		2		
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2		
Voltage-free contact for the remote control				
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2		
Contact output:		Switch		
Operating voltage:		250 V_{AC} (Maximum operating voltage of the alarm power supply)		
Maximum current:		2 A (Maximum current of the alarm power supply)		
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305				

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> ACCESSORIES

> AT-8248 ATSUB Mod. 40: I_{max} 40 kA
> AT-8228 ATSUB Mod. 15: I_{max} 15 kA
> AT-8268 ATSUB Mod. 65: I_{max} 65 kA
> AT-8205 ATSUB Mod. N: neutral-ground

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-2P 15-120 TT **AT-8234**	ATSUB-2P 40-120 TT **AT-8237**	ATSUB-2P 65-120 TT **AT-8280**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2
Nominal voltage:	U_n	120 V_{AC}		
Maximum continuous operating voltage:	U_c	150 V_{AC}		
Nominal frequency:		50 - 60 Hz		
Nominal discharge current per pole (8/20 µs wave):	I_n	5 kA	20 kA	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA
Protection level for I_n (8/20 µs wave):	$U_p(I_n)$	1200 V	1400 V	1600 V
Protection level for 1.2/50 µs wave:	U_p	700 V	700 V	900 V
Protection level for 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V
Impulse current per pole (10/350 µs):	I_{imp}	-		15 kA
Combined wave voltage:	$U_{o.c.}$	6 kV	-	
Response time:	t_r	< 25 ns		
Backup fuse(1):		125 A gL/gG		
Maximum short-circuit current:		25 kA (for maximum fuse)		
Working temperature:	ϑ	-40 ºC to +70 ºC		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
No. of poles:		2		
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2		
Voltage-free contact for the remote control				
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2		
Contact output:		Switch		
Operating voltage:		250 V_{AC} (Maximum operating voltage of the alarm power supply)		
Maximum current:		2 A (Maximum current of the alarm power supply)		
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305				

(1) Required in cases where there is higher nominal current installed upstream from the protector

> ACCESSORIES

> AT-8296 ATSUB Mod. 40-120: I_{max} 40 kA / U_n 120 V
> AT-8297 ATSUB Mod. 15-120: I_{max} 15 kA / U_n 120 V
> AT-8298 ATSUB Mod. 65-120: I_{max} 65 kA / U_n 120 V
> AT-8205 ATSUB Mod. N: neutral-ground

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-2P 15-300 TT **AT-8047**	ATSUB-2P 40-300 TT **AT-8048**	ATSUB-2P 65-300 TT **AT-8049**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2
Nominal voltage:	U_n	300 V_{AC}		
Maximum continuous operating voltage:	U_c	320 V_{AC}		
Nominal frequency:		50 - 60 Hz		
Nominal discharge current per pole (8/20 µs wave):	I_n	5 kA	20 kA	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA
Protection level at I_n(8/20 µs wave):	$U_p(I_n)$	1400 V	1500 V	1800 V
Protection level for 1.2/50 µs wave:	U_p	900 V	900 V	1100 V
Protection level for 5 kA; 8/20 µs wave:		1100 V	1200 V	1300 V
Impulse current per pole (10/350 µs):	I_{imp}	-		15 kA
Combined wave voltage:	$U_{o.c.}$	6 kV	-	
Response time:	t_r	< 25 ns		
Backup fuse(1):		125 A gL/gG		
Maximum short-circuit current:		25 kA (for maximum fuse)		
Working temperature:	ϑ	-40 ºC to +70 ºC		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
No. of poles:		2		
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2		
Voltage-free contact for the remote control				
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2		
Contact output:		Switch		
Operating voltage:		250 V_{AC} (Maximum operating voltage of the alarm power supply)		
Maximum current:		2 A (Maximum current of the alarm power supply)		
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305				

(1) Required in cases where there is higher nominal current installed upstream from the protector

> ACCESSORIES

> AT-8043 ATSUB Mod. 40-300: Imax 40 kA / U_n 300 V
> AT-8044 ATSUB Mod. 15-300: Imax 15 kA / U_n 300 V
> AT-8045 ATSUB Mod. 65-300: Imax 65 kA / U_n 300 V
> AT-8205 ATSUB Mod. N: neutral-ground

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-2P 15-400 TT **AT-8233**	ATSUB-2P 40-400 TT **AT-8236**
Protection categories according to the REBT:		I, II, III, IV	
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2
Nominal voltage:	U_n	400 V_{AC}	
Maximum continuous operating voltage:	U_c	460 V_{AC}	
Nominal frequency:		50 - 60 Hz	
Nominal discharge current per pole (8/20 µs wave):	I_n	5 kA	20 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA
Protection level for 8/20 µs wave:	$U_p(I_n)$	2100 V	2300 V
Protection level 1.2/50 µs wave:	U_p	1800 V	1800 V
Protection level for 5 kA; 8/20 µs wave:		1900 V	2000 V
Combined wave voltage:	$U_{o.c.}$	6 kV	-
Response time:	t_r	< 25 ns	
Backup fuse(1):		125 A gL/gG	
Maximum short-circuit current:		25 kA (for maximum fuse)	
Working temperature:	ϑ	-40 °C to +70 °C	
Protector location:		Indoor	
Type of connection:		Parallel (one port)	
No. of poles:		2	
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)	
Fixing:		DIN Rail	
Enclosure material:		Polyamide	
Enclosure protection:		IP20	
Insulation resistance:		> 10^{14} Ω	
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)	
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2	
Voltage-free contact for the remote control			
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2	
Contact output:		Switch	
Operating voltage:		250 V_{AC} (Maximum working voltage of the alarm supply)	
Maximum current:		2 A (Maximum current of the alarm power supply)	

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> ACCESSORIES

> AT-8249 ATSUB Mod. 40-400: I_{max} 40 kA / U_n 400 V
> AT-8229 ATSUB Mod. 15-400: I_{max} 15 kA / U_n 400 V
> AT-8205 ATSUB Mod. N: neutral-ground

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> ATSUB-2P TN

Compact protection for TN single-phase power supply lines

> **AT-8010 ATSUB-2P 15 TN**: peak current 15 kA. U_n 230 V
> **AT-8009 ATSUB-2P 40 TN**: peak current 40 kA. U_n 230 V
> **AT-8011 ATSUB-2P 65 TN**: peak current 65 kA. U_n 230 V
> **AT-8012 ATSUB-2P 15-120 TN**: peak current 15 kA. U_n 120 V
> **AT-8013 ATSUB-2P 40-120 TN**: peak current 40 kA. U_n 120 V
> **AT-8014 ATSUB-2P 65-120 TN**: peak current 65 kA. U_n 120 V
> **AT-8053 ATSUB-4P 15-300 TN**: peak current 15 kA. U_n 300 V
> **AT-8054 ATSUB-4P 40-300 TN**: peak current 40 kA. U_n 300 V
> **AT-8055 ATSUB-4P 65-300 TN**: peak current 65 kA. U_n 300 V
> **AT-8015 ATSUB-2P 15-400 TN**: peak current 15 kA. U_n 400 V
> **AT-8016 ATSUB-2P 40-400 TN**: peak current 40 kA. U_n 400 V

Effective protection against transient overvoltages for TN type electrical supply lines. Medium protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

> NOMENCLATURE

ATSUB 2P - 40 – 400 TN

- 40: Max. discharge voltage in kA
- 400: Line-ground nominal voltage

It includes removable modules for replacement in the event of a breakdown or fault, without needing to disconnect the wiring. Tested and certified as **type 1, 2 and 3** protectors according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

> Can be coordinated with other protectors such as ATSHOCK, ATSHIELD and ATCOVER series.
> Made up of zinc oxide varistors and gas discharge tubes able to withstand very high currents.
> Short response time.
> Do not produce deflagration.
> Compact protection with removable modules for quick replacement in case of breakage.
> Their activation causes no interruption in power supply.
> Thermodynamic mechanical warning and remote alarm. When the warning light is yellow, the cartridge is in good condition. If not, replace.

ATSUB series protectors have been tested in **official and independent laboratories,** obtaining their characteristics according to relevant standards (shown in the table). It is possible to select a protector for the alternating voltage suitable for each particular case. For example, the technical datasheets of the optimal protectors for american voltages are also included (line voltage 230 V and line – neutral voltage 120 V), voltages greater than 230 V (line voltage 520 V and line – neutral voltage 300 V), and wind generator voltages (line voltage 690 V and line – ground voltage 400 V).

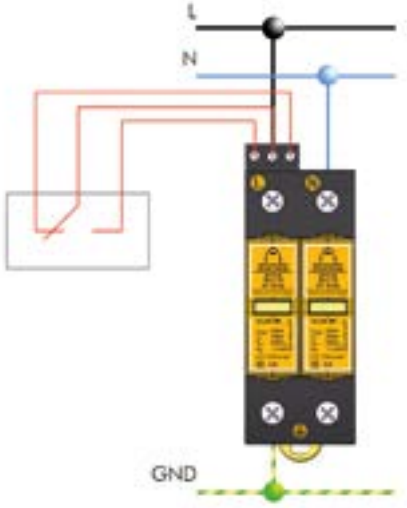
Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω. If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

They are installed **in parallel** with the low voltage line, with connections to the phases to be protected, neutral and ground. Installation should be carried out **without power running through the line**.

When ATSUB protectors are installed as medium protection, they must be separated from the coarse and/or tight protectors by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.

They are recommended for installations where large overvoltages can occur after the main switchboard but which do not supply sensitive equipment.



> PROTECTION OF POWER SUPPLY LINES

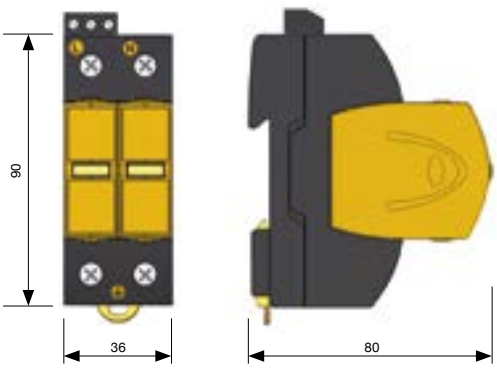
> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-2P 15 TN **AT-8010**	ATSUB-2P 40 TN **AT-8009**	ATSUB-2P 65 TN **AT-8011**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2
Nominal voltage:	U_n	230 V_{AC}		
Maximum continuous operating voltage:	U_c	275 V_{AC}		
Nominal frequency:		50 - 60 Hz		
Nominal discharge current per pole (8/20 µs wave):	I_n	5 kA	20 kA	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA
Protection level at I_n (8/20 µs wave):	$U_p(I_n)$	1200 V	1400 V	1600 V
Protection level per wave 1.2/50 µs:	U_p	700 V	700 V	900 V
Protection level for 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V
Impulse current per pole (10/350 µs):	I_{imp}	-		15 kA
Combined wave voltage:	$U_{o.c.}$	6 kV	-	
Response time:	t_r	< 25 ns		
Backup fuses(1):		125 A gL/gG		
Maximum short-circuit current:		25 kA (for maximum fuse)		
Working temperature:	ϑ	-40 °C to +70 °C		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
No. of poles:		4		
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2		
Voltage-free contact for the remote control				
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2		
Contact output:		Switch		
Operating voltage:		250 V_{AC} (Maximum operating voltage of the alarm power supply)		
Maximum current:		2 A (Maximum current of the alarm power supply)		
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305				

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> ACCESSORIES

> AT-8248 ATSUB Mod. 40: I_{max} 40 kA
> AT-8228 ATSUB Mod. 15: I_{max} 15 kA
> AT-8268 ATSUB Mod. 65: I_{max} 65 kA

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-2P 15-120 TN **AT-8012**	ATSUB-2P 40-120 TN **AT-8013**	ATSUB-2P 65-120 TN **AT-8014**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2
Nominal voltage:	U_n	120 V_{AC}		
Maximum continuous operating voltage:	U_c	150 V_{AC}		
Nominal frequency:		50 - 60 Hz		
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1200 V	1400 V	1600 V
Protection level for 1.2/50 µs wave:	U_p	700 V	700 V	900 V
Protection level 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V
Impulse current per pole (10/350 µs):	I_{imp}	-		15 kA
Combined wave voltage:	$U_{o.c.}$	6 kV	-	
Response time:	t_r	< 25 ns		
Backup fuses(1):		125 A gL/gG		
Maximum short-circuit current:		25 kA (for maximum fuse)		
Working temperature:	ϑ	-40 ºC to +70 ºC		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
No. of poles:		4		
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/GND:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2		
Voltage-free contact for the remote control				
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2		
Contact output:		Switch		
Operating voltage:		250 V_{AC} (Maximum working voltage of the alarm power supply)		
Maximum current:		2 A (Maximum current of the alarm power supply)		

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> ACCESSORIES

> AT-8296 ATSUB Mod. 40-120: I_{max} 40 kA / U_n 120 V
> AT-8297 ATSUB Mod. 15-120: I_{max} 15 kA / U_n 120 V
> AT-8298 ATSUB Mod. 65-120: I_{max} 65 kA / U_n 120 V

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-2P 15-300 TN **AT-8053**	ATSUB-2P 40-300 TN **AT-8054**	ATSUB-2P 65-300 TN **AT-8055**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2
Nominal voltage:	U_n	300 V_{AC}		
Maximum continuous operating voltage:	U_c	320 V_{AC}		
Nominal frequency:		50 - 60 Hz		
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1400 V	1500 V	1800 V
Protection level for 1.2/50 µs wave:	U_p	900 V	900 V	1100 V
Protection level 5 kA; 8/20 µs wave:		1100 V	12000 V	1300 V
Impulse current per pole (10/350 µs):	I_{imp}	-		15 kA
Combined wave voltage:	$U_{o.c.}$	6 kV	-	
Response time:	t_r	< 25 ns		
Backup fuses(1):		125 A gL/gG		
Maximum short-circuit current:		25 kA (for maximum fuse)		
Working temperature:	ϑ	-40 °C to +70 °C		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
No. of poles:		2		
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/GND:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2		
Voltage-free contact for the remote control				
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2		
Contact output:		Switch		
Operating voltage:		250 V_{AC} (Maximum working voltage of the alarm power supply)		
Maximum current:		2 A (Maximum current of the alarm power supply)		
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305				

(1) Required in cases where there is higher nominal current installed upstream from the protector

> ACCESSORIES

> AT-8043 ATSUB Mod. 40-300: Imax 40 kA / U_n 300 V
> AT-8044 ATSUB Mod. 15-300: Imax 15 kA / U_n 300 V
> AT-8045 ATSUB Mod. 65-300: Imax 65 kA / U_n 300 V

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-2P 15-400 TN **AT-8015**	ATSUB-2P 40-400 TN **AT-8016**
Protection categories according to the REBT:		I, II, III, IV	
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2
Nominal voltage:	U_n	400 V_{AC}	
Maximum continuous operating voltage:	U_c	460 V_{AC}	
Nominal frequency:		50 - 60 Hz	
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	2100 V	2300 V
Protection level for 1.2/50 µs wave:	U_p	1800 V	1800 V
Protection level 5 kA; 8/20 µs wave:		1900 V	2000 V
Combined wave voltage:	$U_{o.c.}$	6 kV	-
Response time:	t_r	< 25 ns	
Backup fuses(1):		125 A gL/gG	
Maximum short-circuit current:		25 kA (for maximum fuse)	
Working temperature:	ϑ	-40 °C to +70 °C	
Protector location:		Indoor	
Type of connection:		Parallel (one port)	
No. of poles:		4	
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)	
Fixing:		DIN Rail	
Enclosure material:		Polyamide	
Enclosure protection:		IP20	
Insulation resistance:		> 10^{14} Ω	
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)	
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2	
Voltage-free contact for the remote control			
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2	
Contact output:		Switch	
Operating voltage:		250 V_{AC} (Maximum working voltage of the alarm power supply)	
Maximum current:		2 A (Maximum current of the alarm power supply)	
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305			

(1) Required in cases where there is higher nominal current installed upstream from the protector

> ACCESSORIES

> AT-8249 ATSUB Mod. 40-400: I_{max} 40 kA / U_n 400 V
> AT-8229 ATSUB Mod. 15-400: I_{max} 15 kA / U_n 400 V

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> ATSUB-P

Single-pole and pluggable protection for power supply lines

> **AT-8222 ATSUB-P 15**: peak current of 15 kA. U_n 230 V
> **AT-8242 ATSUB-P 40**: peak current of 40 kA. U_n 230 V
> **AT-8262 ATSUB-P 65**: peak current of 65 kA. U_n 230 V
> **AT-8202 ATSUB-P N**: for neutral-ground protection
> **AT-8290 ATSUB-P 15-120**: peak current 15 kA. U_n 120 V
> **AT-8291 ATSUB-P 40-120**: peak current 40 kA. U_n 120 V
> **AT-8292 ATSUB-P 65-120**: peak current 65 kA. U_n 120 V
> **AT-8056 ATSUB-P 15-300**: peak current 15 kA. U_n 300 V
> **AT-8057 ATSUB-P 40-300**: peak current 40 kA. U_n 300 V
> **AT-8058 ATSUB-P 65-300**: peak current 65 kA. U_n 300 V
> **AT-8226 ATSUB-P 15-400**: peak current 15 kA. U_n 400 V
> **AT-8246 ATSUB-P 40-400**: peak current 40 kA. U_n 400 V

Effective protection against transient overvoltages for electrical supply lines with or without neutral, using metal oxide varistors and gas discharge tubes. Protects three-phase TT, TNS, TNC and IT type lines. Medium protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

> NOMENCLATURE

ATSUB-P **40** – **400**

- **40**: Max. discharge voltage in kA
- **400**: Line - ground nominal voltage

It includes removable modules for replacement in the event of a breakdown or fault, without needing to disconnect the wiring. Tested and certified as a **type 1, 2 and 3** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

> Can be coordinated with other protectors such as ATSHOCK, ATSHIELD and ATCOVER series.
> Made up of zinc oxide varistors and gas discharge tubes able to withstand very high currents.
> Short response time.
> Do not produce deflagration.
> Single-pole protection with removable module.
> They do not cause any interruption to the power supply.
> Small size modular protection.
> Thermodynamic control device, mechanical warning and remote alarm. When the warning light is yellow, the cartridge is in good condition. If not, replace.

ATSUB series protectors have been tested in **official, independent laboratories,** obtaining their characteristics according to relevant standards (listed in the table). It is possible to select a protector for the alternating voltage suitable for each particular case. For example, the technical datasheets of the optimal protectors for american voltages are also included (line voltage 230 V and line – neutral voltage 120 V), voltages greater than 230 V (line voltage 520 V and line – neutral Current 300 V), and wind generator voltages (line voltage 690 V and line – ground voltage 400 V).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω. If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

They are installed **in parallel** with the low voltage line, with connections to the phases that are to be protected and to ground. As an example, 3 ATSUB-P connections in a TNC type three-phase power supply line are shown.

Installation should be carried out **without power running through the line**.

When ATSUB protectors are installed as medium protection, they must be separated from the coarse and/or tight protectors by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.

They are recommended for installations where large overvoltages can occur after the main switchboard but which do not supply sensitive equipment.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

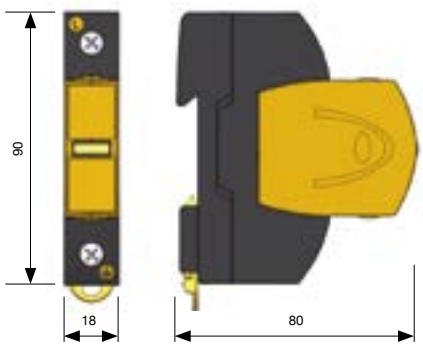
> TECHNICAL DATASHEET

Reference:		ATSUB-P 15 **AT-8222**	ATSUB-P 40 **AT-8242**	ATSUB-P 65 **AT-8262**	ATSUB-P N **AT-8202**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV	I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2	Type 2
Nominal voltage:	U_n	230 V_{AC}			-
Maximum continuous operating voltage:	U_c	275 V_{AC}			-
Nominal frequency:		50 - 60 Hz			
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA	20 kA
Maximum current (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA	40 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1200 V	1400 V	1600 V	1400 V
Protection level for 1.2/50 µs wave:	U_p	700 V	700 V	900 V	700 V
Protection level 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V	1000 V
Impulse current (10/350 µs wave):	I_{imp}	-		15 kA	-
Combined wave voltage:	$U_{o.c.}$	6 kV	-		
Response time:	t_r	< 25 ns			
Backup fuses(1):		125 A gL/gG			
Maximum short-circuit current:		25 kA (for maximum fuse)			
Working temperature:	ϑ	-40 °C to +70 °C			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Insulation resistance:		> 10^{14} Ω			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2			

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> ACCESSORIES

> AT-8248 ATSUB Mod. 40: I_{max} 40 kA
> AT-8228 ATSUB Mod. 15: I_{max} 15 kA
> AT-8268 ATSUB Mod. 65: I_{max} 65 kA
> AT-8205 ATSUB Mod. N: neutral-ground

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-P 15-120 **AT-8290**	ATSUB-P 40-120 **AT-8291**	ATSUB-P 65-120 **AT-8292**	ATSUB-P N **AT-8202**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV	I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2	Type 2
Nominal voltage:	U_n	120 V_{AC}			-
Maximum continuous operating voltage:	U_c	150 V_{AC}			-
Nominal frequency:		50 - 60 Hz			
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA	20 kA
Maximum current (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA	40 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1200 V	1400 V	1600 V	1400 V
Protection level for 1.2/50 µs wave:	U_p	700 V	700 V	900 V	700 V
Protection level 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V	1000 V
Impulse current (10/350 µs wave):	I_{imp}	-		15 kA	-
Combined wave voltage:	$U_{o.c.}$	6 kV	-		
Response time:	t_r	< 25 ns			
Backup fuses(1):		125 A gL/gG			
Maximum short-circuit current:		25 kA (for maximum fuse)			
Working temperature:	ϑ	-40 °C to +70 °C			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Insulation resistance:		> 10^{14} Ω			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2			

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> ACCESSORIES

> AT-8296 ATSUB Mod. 40-120: I_{max} 40 kA / U_n 120 V
> AT-8297 ATSUB Mod. 15-120: I_{max} 15 kA / U_n 120 V
> AT-8298 ATSUB Mod. 65-120: I_{max} 65 kA / U_n 120 V
> AT-8205 ATSUB Mod. N: neutral-ground

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-P 15-300 **AT-8056**	ATSUB-P 40-300 **AT-8057**	ATSUB-P 65-300 **AT-8058**	ATSUB-P N **AT-8202**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV	I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2	Type 2
Nominal voltage:	U_n	300 V_{AC}			-
Maximum continuous operating voltage:	U_c	320 V_{AC}			-
Nominal frequency:		50 - 60 Hz			
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA	20 kA
Maximum current (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA	40 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1400 V	1500 V	1800 V	1400 V
Protection level for 1.2/50 µs wave:	U_p	900 V	900 V	1100 V	700 V
Protection level 5 kA; 8/20 µs wave:		1100 V	1200 V	1300 V	1000 V
Impulse current (10/350 µs wave):	I_{imp}	-		15 kA	-
Combined wave voltage:	$U_{o.c.}$	6 kV	-		
Response time:	t_r	< 25 ns			
Backup fuses(1):		125 A gL/gG			
Maximum short-circuit current:		25 kA (for maximum fuse)			
Working temperature:	ϑ	-40 °C to +70 °C			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Insulation resistance:		> 10^{14} Ω			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2			

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> ACCESSORIES

> AT-8043 ATSUB Mod. 40-300: Imax 40 kA / U_n 300 V
> AT-8044 ATSUB Mod. 15-300: Imax 15 kA / U_n 300 V
> AT-8045 ATSUB Mod. 65-300: Imax 65 kA / U_n 300 V
> AT-8205 ATSUB Mod. N: neutral-ground

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-P 15-400 **AT-8226**	ATSUB-P 40-400 **AT-8246**	ATSUB-P N **AT-8202**
Protection categories according to the REBT:		I, II, III, IV		I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 2
Nominal voltage:	U_n	400 V_{AC}		-
Maximum continuous operating voltage:	U_c	460 V_{AC}		-
Nominal frequency:		50 - 60 Hz		
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	20 kA
Maximum current (8/20 µs wave):	I_{max}	15 kA	40 kA	40 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	2100 V	2300 V	2100 V
Protection level for 1.2/50 µs wave:	U_p	1800 V	1800 V	1800 V
Protection level 5 kA; 8/20 µs wave:		1900 V	2000 V	1900 V
Combined wave voltage:	$U_{o.c.}$	6 kV	-	
Response time:	t_r	< 25 ns		
Backup fuse(1):		125 A gL/gG		
Maximum short-circuit current:		25 kA (for maximum fuse)		
Working temperature:	ϑ	-40 ºC to +70 ºC		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2		

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> ACCESSORIES

> AT-8249 ATSUB Mod. 40-400: I_{max} 40 kA / U_n 400 V
> AT-8229 ATSUB Mod. 15-400: I_{max} 15 kA / U_n 400 V

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> ATSUB-PR

Single-pole and pluggable protection for power supply lines

> **AT-8223 ATSUB-PR 15**: peak current 15 kA. U_n 230 V
> **AT-8243 ATSUB-PR 40**: peak current 40 kA. U_n 230 V
> **AT-8263 ATSUB-PR 65**: peak current 65 kA. U_n 230 V
> **AT-8203 ATSUB-PR N**: for neutral-ground protection
> **AT-8293 ATSUB-PR 15-120**: peak current 15 kA. U_n 120 V
> **AT-8294 ATSUB-PR 40-120**: peak current 40 kA. U_n 120 V
> **AT-8295 ATSUB-PR 65-120**: peak current 65 kA. U_n 120 V
> **AT-8059 ATSUB-PR 15-300**: peak current 15 kA. U_n 300 V
> **AT-8060 ATSUB-PR 40-300**: peak current 40 kA. U_n 300 V
> **AT-8061 ATSUB-PR 65-300**: peak current 65 kA. U_n 300 V
> **AT-8227 ATSUB-PR 15-400**: peak current 15 kA. U_n 400 V
> **AT-8247 ATSUB-PR 40-400**: peak current 40 kA. U_n 400 V

Effective protection against transient overvoltages for electrical supply lines with or without neutral, using metal oxide varistors and gas discharge tubes. Protects three-phase TT, TNS, TNC and IT type lines. Medium protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

> NOMENCLATURE

ATSUB-PR 65 – 400

- 65: Max. discharge voltage in kA
- 400: Line - ground nominal voltage

It includes removable modules for replacement in the event of a breakdown or fault, without needing to disconnect the wiring. Tested and certified as a **type 1, 2 and 3** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV** equipment according to ITC-BT-23.

> Can be coordinated with other protectors such as ATSHOCK, ATSHIELD and ATCOVER series.
> Made up of zinc oxide varistors and gas discharge tubes able to withstand very high currents.
> Short response time.
> Does not produce deflagration.
> Single-pole protection with removable module.
> They do not cause any interruption to the power supply.
> Small size modular protection.
> Thermodynamic control device with mechanical warning and remote alarm. When the warning light is yellow, the cartridge is in good condition. If not, replace.

ATSUB series protectors have been tested in **official, independent laboratories,** obtaining their characteristics according to relevant standards (listed in the table). It is possible to select a protector for the alternating voltage suitable for each particular case. For example, the technical datasheets of the optimal protectors for american voltages are also included (line voltage of 230 V and line – neutral voltage of 120 V), voltages greater than 230 V (line voltage 520 V and line – neutral voltage 300 V), and wind generator voltages (line voltage 690 V and line – ground voltage 400 V).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω. If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

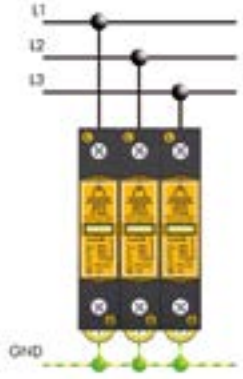
> INSTALLATION

They are installed **in parallel** with the low voltage line, with connections to the phases that are to be protected and to ground. As an example, 3 ATSUB-PR connections in a TNC type three-phase power supply line are shown.

Installation should be carried out **without power running through the line**.

When ATSUB protectors are installed as medium protection, they must be separated from the coarse and/or tight protectors by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.

They are recommended for installations where large overvoltages can occur after the main switchboard but which do not supply sensitive equipment.



> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

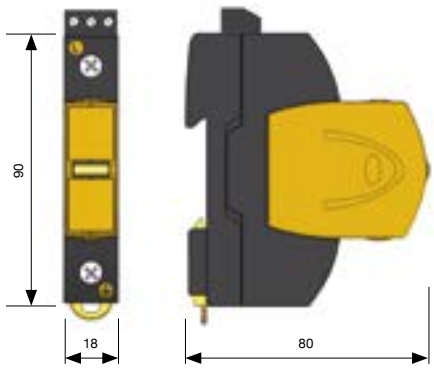
> TECHNICAL DATASHEET

Reference:		ATSUB-PR 15 **AT-8223**	ATSUB-PR 40 **AT-8243**	ATSUB-PR 65 **AT-8263**	ATSUB-PR N **AT-8203**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV	I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2	Type 2
Nominal voltage:	U_n	230 V_{AC}			-
Maximum continuous operating voltage:	U_c	275 V_{AC}			-
Nominal frequency:		50 - 60 Hz			
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA	20 kA
Maximum current (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA	40 kA
Protection level for 8/20 µs wave to I_n:	$U_p(I_n)$	1200 V	1400 V	1600 V	1400 V
Protection level per wave 1.2/50 µs:	U_p	700 V	700 V	900 V	700 V
Protection level for 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V	1000 V
Impulse current (10/350 µs):	I_{imp}	-		15 kA	-
Combined wave voltage:	$U_{o.c.}$	6 kV	-		
Response time:	t_r	< 25 ns			
Backup fuses(1):		125 A gL/gG			
Maximum short-circuit current:		25 kA (for maximum fuse)			
Working temperature:	ϑ	-40 ºC to +70 ºC			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Insulation resistance:		> 10^{14} Ω			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2			
Voltage-free contact for the remote control					
Connection:		Max. single-stranded/multi-stranded section: 1.5mm^2			
Contact output:		Switch			
Operating voltage:		250 V_{AC} (Maximum working voltage of the alarm supply)			
Maximum current:		2 A (Maximum current of the alarm power supply)			

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> ACCESSORIES

> AT-8248 ATSUB Mod. 40: I_{max} 40 kA
> AT-8228 ATSUB Mod. 15: I_{max} 15 kA
> AT-8268 ATSUB Mod. 65: I_{max} 65 kA
> AT-8205 ATSUB Mod. N: neutral-ground

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-PR 15-120 **AT-8293**	ATSUB-PR 40-120 **AT-8294**	ATSUB-PR 65-120 **AT-8295**	ATSUB-PR N **AT-8203**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV	I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2	Type 2
Nominal voltage:	U_n	120 V_{AC}			-
Maximum continuous operating voltage:	U_c	150 V_{AC}			-
Nominal frequency:		50 - 60 Hz			
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA	20 kA
Maximum current (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA	40 kA
Protection level for 8/20 µs wave to I_n:	$U_p(I_n)$	1200 V	1400 V	1600 V	1400 V
Protection level per wave 1.2/50 µs:	U_p	700 V	700 V	900 V	700 V
Protection level for 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V	1000 V
Impulse current (10/350 µs):	I_{imp}	-		15 kA	-
Combined wave voltage:	$U_{o.c.}$	6 kV	-		
Response time:	t_r	< 25 ns			
Backup fuses(1):		125 A gL/gG			
Maximum short-circuit current:		25 kA (for maximum fuse)			
Working temperature:	ϑ	-40 ºC to +70 ºC			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Insulation resistance:		> 10^{14} Ω			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2			
Voltage-free contact for the remote control					
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2			
Contact output:		Switch			
Operating voltage:		250 V_{AC} (Maximum operating voltage of the alarm power supply)			
Maximum current:		2 A (Maximum current of the alarm power supply)			
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305					

(1) Required in cases where there is higher nominal current installed upstream from the protector

> ACCESSORIES

> AT-8296 ATSUB Mod. 40-120: I_{max} 40 kA / U_n 120 V
> AT-8297 ATSUB Mod. 15-120: I_{max} 15 kA / U_n 120 V
> AT-8298 ATSUB Mod. 65-120: I_{max} 65 kA / U_n 120 V
> AT-8205 ATSUB Mod. N: neutral-ground

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-PR 15-300 **AT-8059**	ATSUB-PR 40-300 **AT-8060**	ATSUB-PR 65-300 **AT-8061**	ATSUB-PR N **AT-8203**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV	I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2	Type 2
Nominal voltage:	U_n	300 V_{AC}			-
Maximum continuous operating voltage:	U_c	320 V_{AC}			-
Nominal frequency:		50 - 60 Hz			
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA	20 kA
Maximum current (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA	40 kA
Protection level for 8/20 µs wave to I_n:	$U_p(I_n)$	1400 V	1500 V	1800 V	1400 V
Protection level per wave 1.2/50 µs:	U_p	900 V	900 V	1100 V	700 V
Protection level for 5 kA; 8/20 µs wave:		1100 V	1200 V	1300 V	1000 V
Impulse current (10/350 µs):	I_{imp}	-		15 kA	-
Combined wave voltage:	$U_{o.c.}$	6 kV	-		
Response time:	t_r	< 25 ns			
Backup fuses[1]:		125 A gL/gG			
Maximum short-circuit current:		25 kA (for maximum fuse)			
Working temperature:	ϑ	-40 ºC to +70 ºC			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Insulation resistance:		> 10^{14} Ω			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2			
Voltage-free contact for the remote control					
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2			
Contact output:		Switch			
Operating voltage:		250 V_{AC} (Maximum operating voltage of the alarm power supply)			
Maximum current:		2 A (Maximum current of the alarm power supply)			

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> ACCESSORIES

> AT-8043 ATSUB Mod. 40-300: I_{max} 40 kA / U_n 300 V
> AT-8044 ATSUB Mod. 15-300: I_{max} 15 kA / U_n 300 V
> AT-8045 ATSUB Mod. 65-300: I_{max} 65 kA / U_n 300 V
> AT-8205 ATSUB Mod. N: neutral-ground

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-PR 15-400 **AT-8227**	ATSUB-PR 40-400 **AT-8247**	ATSUB-PR N **AT-8203**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 2
Nominal voltage:	U_n	400 V_{AC}		
Maximum continuous operating voltage:	U_c	460 V_{AC}		
Nominal frequency:		50 - 60 Hz		
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	20 kA
Maximum current (8/20 µs wave):	I_{max}	15 kA	40 kA	40 kA
Protection level for 8/20 µs wave to I_n:	$U_p(I_n)$	2100 V	2300 V	2100 V
Protection level per wave 1.2/50 µs:	U_p	1800 V	1800 V	1800 V
Protection level for 5 kA; 8/20 µs wave:		1900 V	2000 V	1900 V
Combined wave voltage:	$U_{o.c.}$	6 kV	-	
Response time:	t_r	< 25 ns		
Backup fuses(1):		125 A gL/gG		
Maximum short-circuit current:		25 kA (for maximum fuse)		
Working temperature:	ϑ	-40 °C to +70 °C		
Protector location:		Indoor		
Type of connection:		Parallel (one port)		
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)		
Fixing:		DIN Rail		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2		
Voltage-free contact for the remote control				
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2		
Contact output:		Switch		
Operating voltage:		250 V_{AC} (Maximum operating voltage of the alarm power supply)		
Maximum current:		2 A (Maximum current of the alarm power supply)		

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> ACCESSORIES

> AT-8249 ATSUB Mod. 40-400: I_{max} 40 kA / U_n 400 V
> AT-8229 ATSUB Mod. 15-400: I_{max} 15 kA / U_n 400 V
> AT-8205 ATSUB Mod. N: neutral-ground

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> ATSUB

Single-pole protection for power supply lines

> **AT-8220 ATSUB 15**: peak current 15 kA. U_n 230 V
> **AT-8240 ATSUB 40**: peak current 40 kA. U_n 230 V
> **AT-8260 ATSUB 65**: peak current 65 kA. U_n 230 V
> **AT-8201 ATSUB N**: for neutral-ground protection
> **AT-8230 ATSUB 15-120**: peak current 15 kA. U_n 120 V
> **AT-8250 ATSUB 40-120**: peak current 40 kA. U_n 120 V
> **AT-8270 ATSUB 65-120**: peak current 65 kA. U_n 120 V
> **AT-8062 ATSUB 15-300**: peak current 15 kA. U_n 300 V
> **AT-8063 ATSUB 40-300**: peak current 40 kA. U_n 300 V
> **AT-8064 ATSUB 65-300**: peak current 65 kA. U_n 300 V
> **AT-8224 ATSUB 15-400**: peak current 15 kA. U_n 400 V
> **AT-8244 ATSUB 40-400**: peak current 40 kA. U_n 400 V
> **AT-8264 ATSUB 65-400**: peak current 65 kA. U_n 400 V

Effective protection against transient overvoltages for electrical supply lines with or without neutral, using metal oxide varistors and gas discharge tubes. Protects three-phase TT, TNS, TNC and IT type lines. Medium protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

> NOMENCLATURE

ATSUB 65 – 400

- 65: Max. discharge voltage in kA
- 400: Line - ground nominal voltage

Tested and certified as a **type 1, 2 and 3** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

> Can be coordinated with other protectors such as ATSHOCK, ATSHIELD and ATCOVER series.
> Made up of zinc oxide varistors and gas discharge tubes able to withstand very high currents.
> It is possible to join the modules using rivets in order to obtain blocks of 2, 3 or 4 elements.
> Short response time.
> Does not produce deflagration.
> Single-pole protection.
> They do not cause any interruption to the power supply.
> Small size modular protection.
> Thermodynamic control device and mechanical warning. When the warning light is yellow, the protector is in good condition. If not, replace.

ATSUB series protectors have been tested in **official, independent laboratories,** obtaining their characteristics according to relevant standards (listed in the table). It is possible to select a protector for the alternating voltage suitable for each particular case. For example, the technical datasheets of the optimal protectors for american voltages are also included (line voltage of 230 V and line – neutral voltage of 120 V), voltages greater than 230 V (line voltage 520 V and line – neutral voltage 300 V), and wind generator voltages (line voltage 690 V and line – ground voltage 400 V).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω. If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

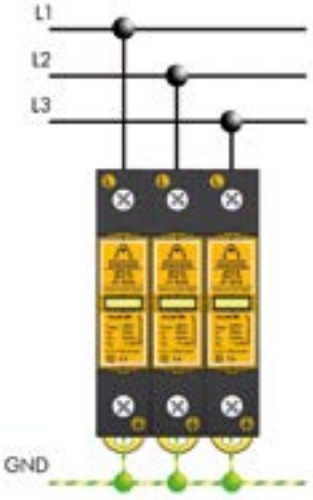
> INSTALLATION

They are installed **in parallel** with the low voltage line, with connections to the phases that are to be protected and to ground. As an example, 3 ATSUB connections in a TNC type three-phase power supply line are shown.

Installation should be carried out **without power running through the line**.

When ATSUB protectors are installed as medium protection, they must be separated from the coarse and/or tight protectors by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.

They are recommended for installations where large overvoltages can occur after the main switchboard but which do not supply sensitive equipment.



> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

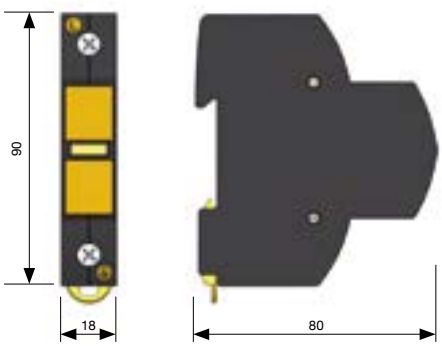
> TECHNICAL DATASHEET

Reference:		ATSUB 15 **AT-8220**	ATSUB 40 **AT-8240**	ATSUB 65 **AT-8260**	ATSUB N **AT-8201**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV	I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2	Type 2
Nominal voltage:	U_n	230 V_{AC}			-
Maximum continuous operating voltage:	U_c	275 V_{AC}			-
Nominal frequency:		50 - 60 Hz			
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA	20 kA
Maximum current (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA	40 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1200 V	1400 V	1600 V	1400 V
Protection level for 1.2/50 µs wave:	U_p	700 V	700 V	900 V	700 V
Protection level 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V	1000 V
Impulse current (10/350 µs wave):	I_{imp}	-		15 kA	-
Combined wave voltage:	$U_{o.c.}$	6 kV	-		
Response time:	t_r	< 25 ns			
Backup fuses(1):		125 A gL/gG			
Maximum short-circuit current:		25 kA (for maximum fuse)			
Working temperature:	ϑ	-40 °C to +70 °C			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Insulation resistance:		> 10^{14} Ω			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2			

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB 15-120 **AT-8230**	ATSUB 40-120 **AT-8250**	ATSUB 65-120 **AT-8270**	ATSUB N **AT-8201**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV	I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2	Type 2
Nominal voltage:	U_n	120 V_{AC}			-
Maximum continuous operating voltage:	U_c	150 V_{AC}			-
Nominal frequency:		50 - 60 Hz			
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA	20 kA
Maximum current (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA	40 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1200 V	1400 V	1600 V	1400 V
Protection level for 1.2/50 µs wave:	U_p	700 V	700 V	900 V	700 V
Protection level 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V	1000 V
Impulse current (10/350 µs wave):	I_{imp}	-		15 kA	-
Combined wave voltage:	$U_{o.c.}$	6 kV	-		
Response time:	t_r	< 25 ns			
Backup fuses(1):		125 A gL/gG			
Maximum short-circuit current:		25 kA (for maximum fuse)			
Working temperature:	ϑ	-40 °C to +70 °C			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Insulation resistance:		> 10^{14} Ω			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2			

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB 15-300 **AT-8062**	ATSUB 40-300 **AT-8063**	ATSUB 65-300 **AT-8064**	ATSUB N **AT-8201**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV	I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2	Type 2
Nominal voltage:	U_n	300 V_{AC}			-
Maximum continuous operating voltage:	U_c	320 V_{AC}			-
Nominal frequency:		50 - 60 Hz			
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA	20 kA
Maximum current (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA	40 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1400 V	1500 V	1800 V	2100 V
Protection level for 1.2/50 µs wave:	U_p	900 V	900 V	1100 V	1800 V
Protection level 5 kA; 8/20 µs wave:		1100 V	1200 V	1300 V	1900 V
Impulse current (10/350 µs wave):	I_{imp}	-		15 kA	-
Combined wave voltage:	$U_{o.c.}$	6 kV	-		
Response time:	t_r	< 25 ns			
Backup fuses(1):		125 A gL/gG			
Maximum short-circuit current:		25 kA (for maximum fuse)			
Working temperature:	ϑ	-40 °C to +70 °C			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Insulation resistance:		> 10^{14} Ω			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2			

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB 15-400 **AT-8224**	ATSUB 40-400 **AT-8244**	ATSUB 65-400 **AT-8264**	ATSUB N **AT-8201**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV	I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2	Type 2
Nominal voltage:	U_n	400 V_{AC}			-
Maximum continuous operating voltage:	U_c	460 V_{AC}			-
Nominal frequency:		50 - 60 Hz			
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA	20 kA
Maximum current (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA	40 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	2100 V	2300 V	2500 V	2100 V
Protection level for 1.2/50 µs wave:	U_p	1800 V	1800 V	1900 V	1800 V
Protection level 5 kA; 8/20 µs wave:		1900 V	2000 V	2100 V	1900 V
Impulse current (10/350 µs wave):	I_{imp}	-		15 kA	-
Combined wave voltage:	$U_{o.c.}$	6 kV	-		
Response time:	t_r	< 25 ns			
Backup fuses(1):		125 A gL/gG			
Maximum short-circuit current:		25 kA (for maximum fuse)			
Working temperature:	ϑ	-40 °C to +70 °C			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Insulation resistance:		> 10^{14} Ω			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2			

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> ATSUB-R

Single-pole protection for power supply lines

> **AT-8221 ATSUB-R 15**: peak current 15 kA. U_n 230 V
> **AT-8241 ATSUB-R 40**: peak current 40 kA. U_n 230 V
> **AT-8261 ATSUB-R 65**: peak current 65 kA. U_n 230 V
> **AT-8204 ATSUB-R N**: for neutral-ground protection
> **AT-8299 ATSUB-R 15-120**: peak current 15 kA. U_n 120 V
> **AT-8208 ATSUB-R 40-120**: peak current 40 kA. U_n 120 V
> **AT-8209 ATSUB-R 65-120**: peak current 65 kA. U_n 120 V
> **AT-8065 ATSUB-R 15-300**: peak current 15 kA. U_n 300 V
> **AT-8066 ATSUB-R 40-300**: peak current 40 kA. U_n 300 V
> **AT-8067 ATSUB-R 65-300**: peak current 65 kA. U_n 300 V
> **AT-8225 ATSUB-R 15-400**: peak current 15 kA. U_n 400 V
> **AT-8245 ATSUB-R 40-400**: peak current 40 kA. U_n 400 V
> **AT-8265 ATSUB-R 65-400**: peak current 65 kA. U_n 400 V

Effective protection against transient overvoltages for electrical supply lines with or without neutral, using metal oxide varistors and gas discharge tubes. Protects three-phase TT, TNS, TNC and IT type lines. Medium protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

> NOMENCLATURE

ATSUB-R 65 – 400

- 65: Max. discharge voltage in kA
- 400: Line - ground nominal voltage

Tested and certified as a type **1, 2 and 3** protector according to the standard UNE-EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

- Can be coordinated with other protectors such as ATSHOCK, ATSHIELD and ATCOVER series.
- Made up of zinc oxide varistors and gas discharge tubes able to withstand very high currents.
- It is possible to join the modules using rivets in order to obtain blocks of 2, 3 or 4 elements.
- Short response time.
- Does not produce deflagration.
- Single-pole protection.
- They do not cause any interruption to the power supply.
- Small size modular protection.
- Thermodynamic control device with mechanical warning and remote alarm. When the warning light is yellow, the protector is in good condition. If not, replace.

ATSUB series protectors have been tested in **official, independent laboratories,** obtaining their characteristics according to relevant standards (listed in the table). It is possible to select a protector for the alternating voltage suitable for each particular case. For example, the technical datasheets of the optimal protectors for american voltages are also included (line voltage 230 V and line – neutral voltage 120 V), voltages greater than 230 V (line voltage 520 V and line – neutral voltage 300 V), and wind generators (line voltage 690 V and line – ground voltage 400 V).

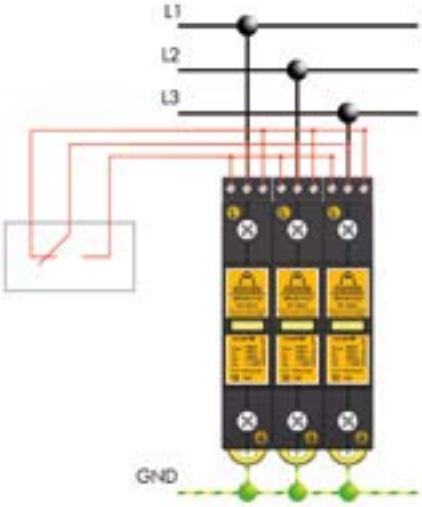
Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω. If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

They are installed **in parallel** with the low voltage line, with connections to the phases that are to be protected and to ground. As an example, 3 ATSUB-R connections in a TNC type three-phase power supply line are shown.

Installation should be carried out **without power running through the line**. When ATSUB protectors are installed as medium protection, they must be separated from the coarse and/or tight protectors by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.

They are recommended for installations where large overvoltages can occur after the main switchboard and when these lines are not connected to very sensitive equipment.



> PROTECTION OF POWER SUPPLY LINES

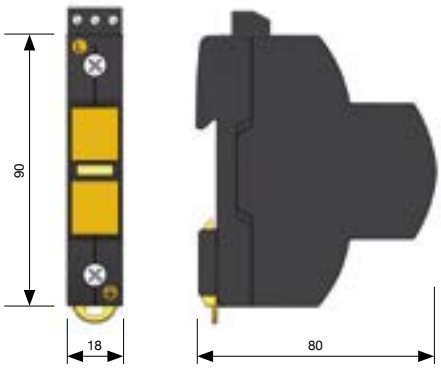
> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-R 15 **AT-8221**	ATSUB-R 40 **AT-8241**	ATSUB-R 65 **AT-8261**	ATSUB-R N **AT-8204**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV	I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2	Type 2
Nominal voltage:	U_n	230 V_{AC}			-
Maximum continuous operating voltage:	U_c	275 V_{AC}			-
Nominal frequency:		50 - 60 Hz			
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA	20 kA
Maximum current (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA	40 kA
Protection level for 8/20 µs wave to I_n:	$U_p(I_n)$	1200 V	1400 V	1600 V	1400 V
Protection level per wave 1.2/50 µs:	U_p	700 V	700 V	900 V	700 V
Protection level for 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V	1000 V
Impulse current (10/350 µs):	I_{imp}	-		15 kA	-
Combined wave voltage:	$U_{o.c.}$	6 kV	-		
Response time:	t_r	< 25 ns			
Backup fuses(1):		125 A gL/gG			
Maximum short-circuit current:		25 kA (for maximum fuse)			
Working temperature:	ϑ	-40 °C to +70 °C			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Insulation resistance:		> 10^{14} Ω			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2			
Voltage-free contact for the remote control					
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2			
Contact output:		Switch			
Operating voltage:		250 V 250 V (maximum operating voltage of the alarm power supply)			
Maximum current:		2 A (Maximum current of the alarm power supply)			
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305					

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-R 15-120 **AT-8299**	ATSUB-R 40-120 **AT-8208**	ATSUB-R 65-120 **AT-8209**	ATSUB-R N **AT-8204**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV	I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2	Type 2
Nominal voltage:	U_n	120 V_{AC}			-
Maximum continuous operating voltage:	U_c	150 V_{AC}			-
Nominal frequency:		50 - 60 Hz			
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA	20 kA
Maximum current (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA	40 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1200 V	1400 V	1600 V	1400 V
Protection level for 1.2/50 µs wave:	U_p	700 V	700 V	900 V	700 V
Protection level 5 kA; 8/20 µs wave:		900 V	1000 V	1100 V	1000 V
Impulse current (10/350 µs wave):	I_{imp}	-		15 kA	-
Combined wave voltage:	$U_{o.c.}$	6 kV	-		
Response time:	t_r	< 25 ns			
Backup fuses(1):		125 A gL/gG			
Maximum short-circuit current:		25 kA (for maximum fuse)			
Working temperature:	ϑ	-40 °C to +70 °C			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Insulation resistance:		> 10^{14} Ω			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2			
Voltage-free contact for the remote control					
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2			
Contact output:		Switch			
Operating voltage:		250 V_{AC} (Maximum working voltage of the alarm supply)			
Maximum current:		2 A (Maximum current of the alarm power supply)			

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-R 15-300 **AT-8065**	ATSUB-R 40-300 **AT-8066**	ATSUB-R 65-300 **AT-8067**	ATSUB-R N **AT-8204**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV	I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2	Type 2
Nominal voltage:	U_n	300 V_{AC}			-
Maximum continuous operating voltage:	U_c	320 V_{AC}			-
Nominal frequency:		50 - 60 Hz			
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA	20 kA
Maximum current (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA	40 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1400 V	1500 V	1800 V	1400 V
Protection level for 1.2/50 µs wave:	U_p	900 V	900 V	1100 V	700 V
Protection level 5 kA; 8/20 µs wave:		1100 V	1200 V	1300 V	1000 V
Impulse current (10/350 µs wave):	I_{imp}	-		15 kA	-
Combined wave voltage:	$U_{o.c.}$	6 kV	-		
Response time:	t_r	< 25 ns			
Backup fuses(1):		125 A gL/gG			
Maximum short-circuit current:		25 kA (for maximum fuse)			
Working temperature:	ϑ	-40 °C to +70 °C			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Insulation resistance:		> 10^{14} Ω			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2			
Voltage-free contact for the remote control					
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2			
Contact output:		Switch			
Operating voltage:		250 V_{AC} (Maximum working voltage of the alarm supply)			
Maximum current:		2 A (Maximum current of the alarm power supply)			
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305					

(1) Required in cases where there is higher nominal current installed upstream from the protector

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-R 15-400 **AT-8225**	ATSUB-R 40-400 **AT-8245**	ATSUB-R 65-400 **AT-8265**	ATSUB-R N **AT-8204**
Protection categories according to the REBT:		I, II, III, IV		II, III, IV	I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3	Type 2	Type 1 + 2	Type 2
Nominal voltage:	U_n	400 V_{AC}			-
Maximum continuous operating voltage:	U_c	460 V_{AC}			-
Nominal frequency:		50 - 60 Hz			
Nominal discharge current (8/20 µs wave):	I_n	5 kA	20 kA	30 kA	20 kA
Maximum current (8/20 µs wave):	I_{max}	15 kA	40 kA	65 kA	40 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	2100 V	2300 V	2500 V	2100 V
Protection level for 1.2/50 µs wave:	U_p	1800 V	1800 V	1900 V	1800 V
Protection level 5 kA; 8/20 µs wave:		1900 V	2000 V	2100 V	1900 V
Impulse current (10/350 µs wave):	I_{imp}	-		15 kA	-
Combined wave voltage:	$U_{o.c.}$	6 kV	-		
Response time:	t_r	< 25 ns			
Backup fuses[1]:		125 A gL/gG			
Maximum short-circuit current:		25 kA (for maximum fuse)			
Working temperature:	ϑ	-40 °C to +70 °C			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Insulation resistance:		> 10^{14} Ω			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2			
Voltage-free contact for the remote control					
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2			
Contact output:		Switch			
Operating voltage:		250 V_{AC} (Maximum working voltage of the alarm power supply)			
Maximum current:		2 A (Maximum current of the alarm power supply)			

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

For other voltages, get in touch with Aplicaciones Tecnologicas, S.A. Technical Department.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> ATSUB-D T

Three-phase compact protector

> **AT-8217 ATSUB-D T**: peak current 15 kA. U_n 230 V
> **AT-8017 ATSUB40-D T**: peak current 40 kA. U_n 230 V

Effective protection against transient overvoltages for three-line electrical supply lines with TT type neutral, using metal oxide varistors and gas discharge tubes. Medium protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23). Especially made to be installed in houses according to ITC-25 from REBT.

Tested and certified as a t**ype 2 and 3** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

- Can be coordinated with other protectors such as ATSHOCK, ATSHIELD and ATCOVER series.
- Made up of zinc oxide varistors and gas discharge tubes able to withstand very high currents.
- Short response time.
- Do not produce deflagration.
- Compact protection.
- Their activation causes no interruption in power supply.
- Thermodynamic control device, mechanical warning and remote alarm. When the warning light is yellow, the protector is in good condition. If not, replace.

ATSUB series protectors have been tested in **official, independent laboratories,** obtaining their characteristics according to relevant standards (listed in the table).

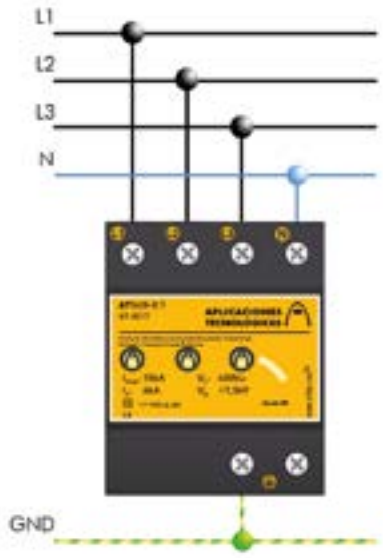
Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

They are installed **in parallel** with the low voltage line, with connections to the phase that is to be protected and to neutral and/or ground.

Installation should be carried out **without power running through the line**.

They are recommended for installations where large overvoltages can occur after the main switchboard and when these lines are not connected to very sensitive equipment.



> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

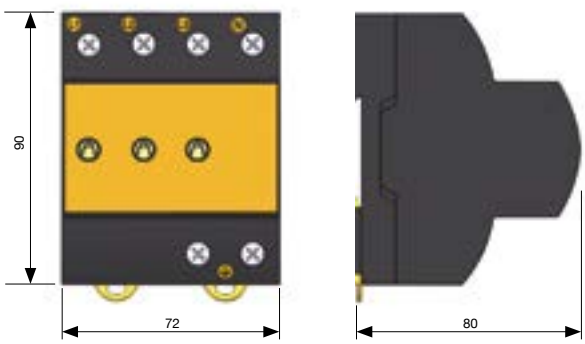
> TECHNICAL DATASHEET

Reference:		ATSUB-D T **AT-8217**	ATSUB40-D **AT-8017**
Protection categories according to the REBT:		I, II, III, IV	
Type of tests according to EN 61643-11:		Type 2	
Nominal voltage:	U_n	400 V_{AC} (L-L) / 230 V_{AC} (L-N, L-GND)	
Maximum continuous operating voltage:	U_c	460 V_{AC} (L-N, L-GND)	
Nominal frequency:		50 - 60 Hz	
Nominal discharge current (8/20 µs wave):	I_n	5 kA	15 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	40 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1500 V	1800 V
Response time:	t_r	< 25 ns	
Backup fuses(1):		80 A gL/gG	
Maximum short-circuit current:		25 kA (for maximum fuse)	
Working temperature:	ϑ	-40 ºC to +70 ºC	
Protector location:		Indoor	
Type of connection:		Parallel (one port)	
No. of poles:		4	
Dimensions:		72 x 90 x 80 mm (2 modules DIN 43880)	
Fixing:		DIN Rail	
Enclosure material:		Polyamide	
Enclosure protection:		IP20	
Insulation resistance:		> 10^{14} Ω	
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)	
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2	

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> ATSUB-D M

Compact single-phase protection for domestic use

> **AT-8216 ATSUB-D M**: peak current 15 kA. U_n 230V

Effective protection against transient overvoltages for single-line electrical supply lines with TT type neutral, using metal oxide varistors and gas discharge tubes. Medium protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23). Especially made to be installed in houses according to ITC-25 from REBT.

Tested and certified as a **type 2 and 3** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

- Can be coordinated with protectors from the ATSHOCK, ATSHIELD and ATCOVER series.
- Made up of zinc oxide varistors and gas discharge tubes able to withstand very high currents.
- Short response time.
- Do not produce deflagration.
- Compact protection.
- Their activation causes no interruption in power supply.
- Thermodynamic control device, mechanical warning and remote alarm. When the warning light is yellow, the protector is in good condition. If not, replace.

ATSUB series protectors have been tested in **official, independent laboratories,** obtaining their characteristics according to relevant standards (listed in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

They are installed **in parallel** with the low voltage line, with connections to the phases that are to be protected, as well as to neutral and/or ground. Installation should be carried out **without power running through the line**.

When ATSUB protectors are installed as medium protection, they must be separated from the coarse and/or tight protectors by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.

They are especially recommended for the main switchboard of houses according to article 16.3 from the REBT.

> PROTECTION OF POWER SUPPLY LINES

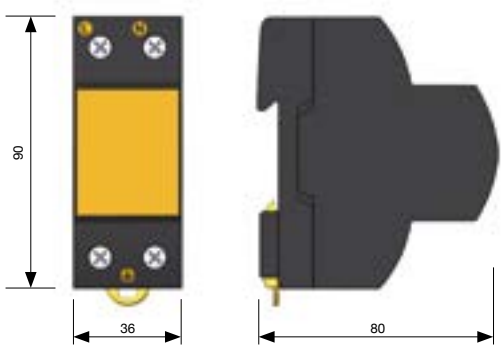
> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-D M **AT-8216**
Protection categories according to the REBT:		I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3
Nominal voltage:	U_n	230 V_{AC}
Maximum continuous operating voltage:	U_c	400 V_{AC}
Nominal frequency:		50 - 60 Hz
Nominal discharge current per pole (8/20 µs wave)	I_n	5 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA
Protection level at I_n (8/20 µs wave):	$U_P(I_n)$	1500 V
Protection level for 1.2/50 µs wave:	U_p	1100 V
Residual voltage with 6 kV/3 kA combination wave:	$U_{o.c.}$	1500 V
Response time:	t_r	< 25 ns
Backup fuses(1):		80 A gL/gG
Maximum short-circuit current:		25 kA (for maximum fuse)
Working temperature:	ϑ	-40 ºC to +70 ºC
Protector location:		Indoor
Type of connection:		Parallel (one port)
No. of poles:		4
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)
Fixing:		DIN Rail
Enclosure material:		Polyamide
Enclosure protection:		IP20
Insulation resistance:		> 10^{14} Ω
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305		

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> ATSUB-D M 3/4DIN

Compact single-phase protector

> **AT-8219 ATSUB-D M 3/4 DIN**: peak current 15 kA U_n 230 V
> **AT-8021 ATSUB-D M 3/4 DIN-120**: peak current 15 kA U_n 120 V

Effective protection against transient overvoltages for single-line electrical supply lines with TT type neutral, using metal oxide varistors and gas discharge tubes. Medium protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23). Especially made to be installed in houses according to ITC-25 from REBT.

Tested and certified as a **type 2 and 3** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

- Can be coordinated with other protectors such as ATSHOCK, ATSHIELD and ATCOVER series.
- Made up of zinc oxide varistors and gas discharge tubes able to withstand very high currents.
- Removable module that can be replaced in the event of a breakdown or fault without needing to disconnect the wiring.
- Thermodynamic control device and visual alarm. If the cartridge is damaged, a red warning light will show.
- Short response time.
- Compact protection.

ATSUB series protectors have been tested in **official, independent laboratories,** obtaining their characteristics according to relevant standards (listed in the table).

> INSTALLATION

They are installed **in parallel** to the low voltage line, with connections to the phase, neutral and ground. Installation should be carried out **without power running through the line**.

When ATSUB protectors are installed as medium protection, they must be separated from the coarse and/or tight protectors by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

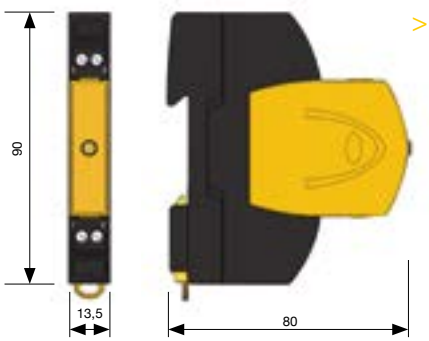
> TECHNICAL DATASHEET

Reference:		ATSUB-D M 3/4 DIN **AT-8219**	ATSUB-D M 3/4 DIN-120 **AT-8021**
Protection categories according to the REBT:		I, II, III, IV	
Type of tests according to EN 61643-11:		Type 2 + 3	
Nominal voltage:	U_n	230 V_{AC}	120 V_{AC}
Maximum continuous operating voltage:	U_c	400 V_{AC}	275 V_{AC}
Nominal frequency:		50 - 60 Hz	
Nominal discharge current per pole (8/20 µs wave):	I_n	5 kA	
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA	
Protection level at I_n(8/20 µs wave):	$U_p(I_n)$	1500 V	1000 V
Response time:	t_r	< 25 ns	
Backup fuse(1):		50 A gL/gG	
Maximum short-circuit current:		25 kA (for maximum fuse)	
Working temperature:	ϑ	-40 ºC to +70 ºC	
Protector location:		Indoor	
Type of connection:		Parallel (one port)	
No. of poles:		2	
Dimensions:		13.5 x 90 x 80 mm (3/4 modules DIN 43880)	
Fixing:		DIN Rail	
Enclosure material:		Polyamide	
Enclosure protection:		IP20	
Insulation resistance:		> 10^{14} Ω	
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)	
Connections:		4 mm^2 maximum section	

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> ACCESSORIES

> AT-8210 ATSUB-D M 3/4DIN Mod.: peak current 15 kA U_n 230 V
> AT-8027 ATSUB-D M 3/4DIN-120 Mod.: peak current 15 kA U_n 120 V

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> ATSUB-D M 1DIN

Compact single-phase protection for domestic use

> **AT-8200 ATSUB-D M 1DIN**: peak current 15 kA U_n 230 V

Effective protection against transient overvoltages for single-line electrical supply lines with TT type neutral, using metal oxide varistors and gas discharge tubes. Medium protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23). Especially made to be installed in houses according to ITC-25 from REBT.

Tested and certified as a **type 2 and 3** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

- Can be coordinated with other protectors such as ATSHOCK, ATSHIELD and ATCOVER series.
- Made up of zinc oxide varistors and gas discharge tubes able to withstand very high currents.
- Thermodynamic control device with mechanical warning. The warning light will be red if the protector is not in good condition.
- Short response time.
- Compact protection.

ATSUB series protectors have been tested in **official, independent laboratories,** obtaining their characteristics according to relevant standards (listed in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

They are installed **in parallel** to the low voltage line, with connections to the phase, neutral and ground. Installation should be carried out **without power running through the line**.

When ATSUB protectors are installed as medium protection, they must be separated from the coarse and/or tight protectors by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor, in order to achieve **correct coordination between them**.

They are especially recommended for the main switchboard of houses according to article 16.3 from the REBT.

> PROTECTION OF POWER SUPPLY LINES

> ATSUB series

> TECHNICAL DATASHEET

Reference:		ATSUB-D M 1DIN **AT-8200**
Protection categories according to the REBT:		I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3
Nominal voltage:	U_n	230 V_{AC}
Maximum continuous operating voltage:	U_c	320 V_{AC}
Nominal frequency:		50 - 60 Hz
Nominal discharge current per pole (8/20 µs wave)	I_n	5 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA
Protection level at I_n (8/20 µs wave):	$U_P(I_n)$	1500 V
Response time:	t_r	< 25 ns
Backup fuses(1):		50 A gL/gG
Maximum short-circuit current:		25 kA (for maximum fuse)
Working temperature:	ϑ	-40 ºC to +70 ºC
Protector location:		Indoor
Type of connection:		Parallel (one port)
No. of poles:		2
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)
Fixing:		DIN Rail
Enclosure material:		Polyamide
Enclosure protection:		IP20
Insulation resistance:		> 10^{14} Ω
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)
Connections:		6 mm^2 maximum section
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305		

(1) Required in cases where there is higher nominal current installed upstream from the protector

> PROTECTION OF POWER SUPPLY LINES

> ATCOVER series

> ATCOVER T

Compact protector for TT and TNS three-phase power supply lines in common and differential mode

> **AT-8133 ATCOVER 400T**: three-phase 400 V_{AC} line.
> **AT-8132 ATCOVER 230T**: three-phase 230 V_{AC} line.

Effective protection against transient overvoltages for TT and TNS electrical supply lines in only one device. Internal coordination of **medium and tight** protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

Tested and certified as a **type 2 and 3** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

- Discharge takes place in an internal encapsulated element with no external flash.
- Double connection in order to facilitate wiring (limited to 63 A).
- It remains inactive in normal conditions, without affecting the normal working of the line or producing leakages.
- Can be coordinated with other ATSHOCK, ATSHIELD and ATSUB series protectors.
- Both common and differential protection for the three lines and neutral.
- No interruptions in power supply, thus no data loss or any other inconveniences for the user.
- Low residual voltage.
- Double 'no protection' warning by means of a light indicating faults and a green light indicating good operation.
- With remote control alarm.
- Robust connectors, suitable for all types of connection.

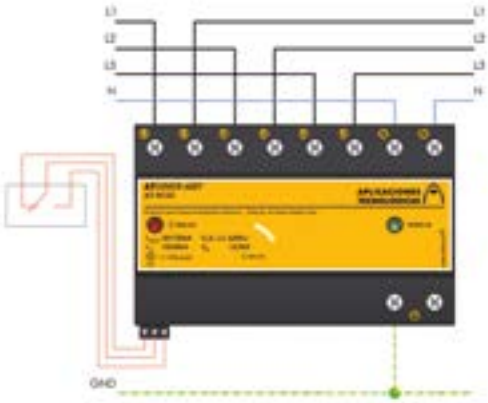
ATCOVER protectors have been tested in **official, independent laboratories,** obtaining their characteristics according to relevant standards (related in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

ATCOVER surge protection devices are to be installed **in parallel** with the low voltage supply line, connected to the phases, neutral and ground. Installation should be carried out **without power running through the line**.
When connecting the protector, the green light must light up indicating proper operation. If the fault warning lights up or the green pilot turns off, replace the protector.
ATCOVERs can be installed as single protection or in combination with other protectors that withstand higher discharge currents. In this case, both must be separated by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor in order to achieve **correct coordination between them**.
They are recommended for installation in:

- Secondary boards supplying systems sensitive to overvoltages (electronic or computer systems).
- Power supply of important equipment such as UPSs, PLCs, etc.



> PROTECTION OF POWER SUPPLY LINES

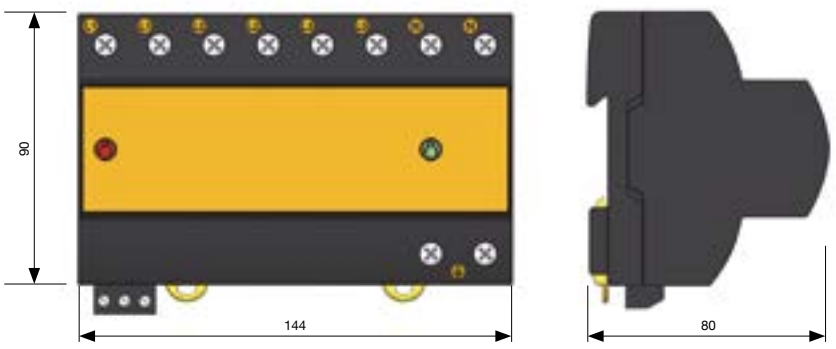
> ATCOVER series

> TECHNICAL DATASHEET

Reference:		ATCOVER 400T **AT-8133**	ATCOVER 230T **AT-8132**
Protection categories according to the REBT:		I, II, III, IV	
Type of tests according to EN 61643-11:		Type 2 + 3	
Nominal voltage:	U_n	400 V_{AC} (L-L) 220 V_{AC} (L-N, L-GND)	230 V_{AC} (L-L) 130 V_{AC} (L-N, L-GND)
Maximum continuous operating voltage:	U_c	460 V_{AC} (L-L) 275 V_{AC} (L-N, L-GND)	275 V_{AC} (L-L) 145 V_{AC} (L-N, L-GND)
Nominal frequency:		50 - 60 Hz	
Nominal discharge current per pole (8/20 µs wave):	I_n	10 kA	
Maximum discharge current per pole (8/20 µs wave):	I_{max}	30 kA	
Protection level (1.2/50 µs wave):	U_p	700 V	500 V
Protection level at I_n (8/20 µs wave):	$U_p(I_n)$	900 V	700 V
Combined wave voltage:	$U_{o.c.}$	6 kV	
Residual voltage with 6 kV/3 kA combination wave:		700 V	450 V
Response time:	t_r	< 25 ns	
Backup fuses(1):		125 A gL/gG	
Maximum short-circuit current:		25 kA (for maximum fuse)	
Working temperature:	ϑ	-40 ºC to +70 ºC	
Protector location:		Indoor	
Type of connection:		Parallel (one port)	
No. of poles:		4	
Dimensions:		144 x 90 x 80 mm (8 modules DIN 43880)	
Fixing:		DIN Rail	
Enclosure material:		Polyamide	
Enclosure protection:		IP20	
Insulation resistance:		> 10^{14} Ω	
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)	
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2	
Voltage-free contact for the remote control			
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2	
Contact output:		Switch	
Operating voltage:		250 V_{AC} (Maximum working voltage of the alarm supply)	
Maximum current:		2 A (Maximum current of the alarm power supply)	
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305			

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATCOVER series

> ATCOVER TNC

Compact protector for TNC and IT three-phase power supply lines in common and differential mode

> **AT-8153 ATCOVER TNC 400T**: three-phase 400 V_{AC} lines
> **AT-8152 ATCOVER TNC 230T**: three-phase 230 V_{AC} lines

Effective protection against transient overvoltages for TT and IT electrical supply lines in only one device. Internal coordination of **medium and tight** protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

Tested and certified as a **type 2 and 3** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

- Discharge takes place in an internal encapsulated element with no external flash.
- Double connection in order to facilitate wiring (limited to 63 A).
- It remains inactive in normal conditions, without affecting the normal working of the line or producing leakages.
- Can be coordinated with other ATSHOCK, ATSHIELD and ATSUB series protectors.
- Both common and differential protection for the three lines and neutral.
- No interruptions in power supply, thus no data loss or any other inconveniences for the user.
- Low residual voltage.
- Double 'no protection' warning by means of a light indicating faults and a green light indicating good operation.
- With remote control alarm.
- Robust connectors, suitable for all types of connection.

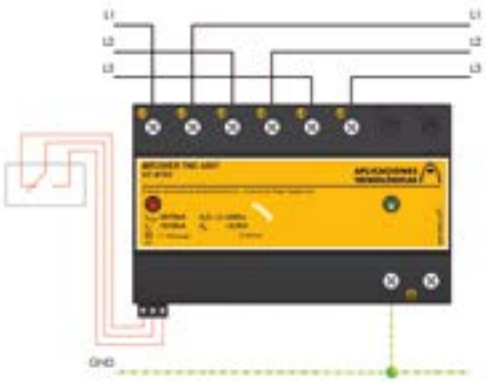
ATCOVER protectors have been tested in **official, independent laboratories,** obtaining their characteristics according to relevant standards (related in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

ATCOVER surge protection devices are to be installed **in parallel** with the low voltage supply line, connected to the phases and ground. Installation should be carried out **without power running through the line**.
When connecting the protector, the green light must light up indicating proper operation. If the fault warning lights up or the green pilot turns off, replace the protector.
ATCOVERs can be installed as single protection or in combination with other protectors that withstand higher discharge currents. In this case, both must be separated by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor in order to achieve **correct coordination between them**.
They are recommended for installation in:

- Secondary boards supplying systems sensitive to overvoltages (electronic or computer systems).
- Power supply of important equipment such as UPSs, PLCs, etc.



> PROTECTION OF POWER SUPPLY LINES

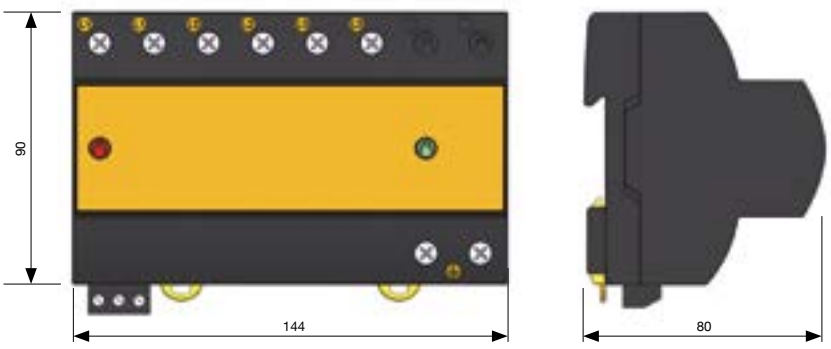
> ATCOVER series

> TECHNICAL DATASHEET

Reference:		ATCOVER 400T **AT-8153**	ATCOVER 230T **AT-8152**
Protection categories according to the REBT:		I, II, III, IV	
Type of tests according to EN 61643-11:		Type 2 + 3	
Nominal voltage:	U_n	400 V_{AC} (L-L) 220 V_{AC} (L-N, L-GND)	230 V_{AC} (L-L) 130 V_{AC} (L-N, L-GND)
Maximum continuous operating voltage:	U_c	440 V_{AC} (L-L) 275 V_{AC} (L-GND)	275 V_{AC} (L-L) 150 V_{AC} (L-GND)
Nominal frequency:		50 - 60 Hz	
Nominal discharge current per pole (8/20 µs wave):	I_n	10 kA	
Maximum discharge current per pole (8/20 µs wave):	I_{max}	30 kA	
Protection level (1.2/50 µs wave):	U_p	700 V	500 V
Protection level at I_n (8/20 µs wave):	$U_p(I_n)$	900 V	700 V
Combined wave voltage:	$U_{o.c.}$	6 kV	
Residual voltage with 6 kV/3 kA combination wave:		700 V	450 V
Response time:	t_r	< 25 ns	
Backup fuses(1):		125 A gL/gG	
Maximum short-circuit current:		25 kA (for maximum fuse)	
Working temperature:	ϑ	-40 °C to +70 °C	
Protector location:		Indoor	
Type of connection:		Parallel (one port)	
No. of poles:		3	
Dimensions:		144 x 90 x 80 mm (8 modules DIN 43880)	
Fixing:		DIN Rail	
Enclosure material:		Polyamide	
Enclosure protection:		IP20	
Insulation resistance:		> $10^{14}\Omega$	
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)	
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2	
Voltage-free contact for the remote control			
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2	
Contact output:		Switch	
Operating voltage:		250 V_{AC} (Maximum working voltage of the alarm supply)	
Maximum current:		2 A (Maximum current of the alarm power supply)	
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305			

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATCOVER series

> ATCOVER M

Compact protector for single-phase power supply lines in common and differential mode

> **AT-8112 ATCOVER 230M**: single-phase 230 V_{AC} lines
> **AT-8111 ATCOVER 130M**: single-phase 130 V_{AC} lines

Effective protection against transient overvoltages for single-phase electrical supply lines in only one device. Internal coordination of **medium and tight** protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

Tested and certified as a **type 2 and 3** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

- Discharge takes place in an internal encapsulated element with no external flash.
- Double connection in order to facilitate wiring (limited to 63 A).
- It remains inactive in normal conditions, without affecting the normal working of the line or producing leakages.
- Can be coordinated with other ATSHOCK, ATSHIELD and ATSUB series protectors.
- Both common and differential protection for the phase and neutral lines.
- No interruptions in power supply, thus no data loss or any other inconveniences for the user.
- Low residual voltage.
- Double 'no protection' warning by means of a light indicating faults and a green light indicating good operation.
- With remote control alarm.
- Robust connectors, suitable for all types of connection.

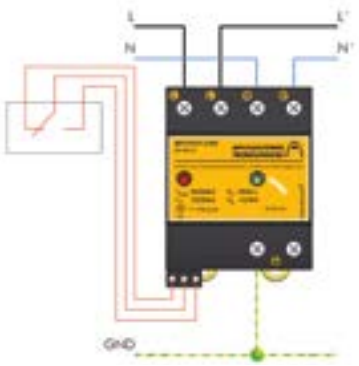
ATCOVER protectors have been tested in **official, independent laboratories,** obtaining their characteristics according to relevant standards (related in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

ATCOVER surge protection devices are to be installed **in parallel** with the low voltage supply line, connected to the phase, neutral and ground. Installation should be carried out **without power running through the line**.
When connecting the protector, the green light must light up indicating proper operation. If the fault warning lights up or the green pilot turns off, replace the protector.
ATCOVERs can be installed as single protection or in combination with other protectors that withstand higher discharge currents. In this case, both must be separated by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor in order to achieve **correct coordination between them**.
They are recommended for installation in:

- Secondary boards supplying systems sensitive to overvoltages (electronic or computer systems).
- Power supply of important equipment such as UPSs, PLCs, etc.



> PROTECTION OF POWER SUPPLY LINES

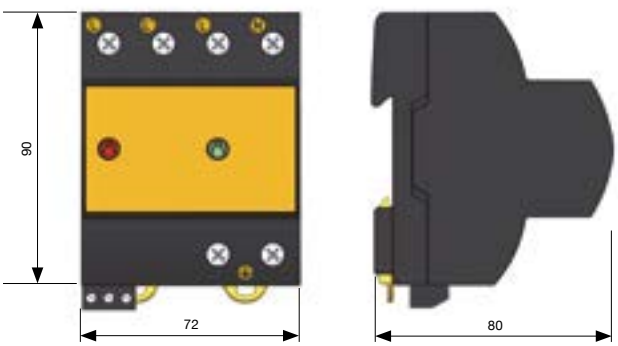
> ATCOVER series

> TECHNICAL DATASHEET

Reference:		ATCOVER 230M **AT-8112**	ATCOVER 130M **AT-8111**
Protection categories according to the REBT:		I, II, III, IV	
Type of tests according to EN 61643-11:		Type 2 + 3	
Nominal voltage:	U_n	230 V_{AC}	130 V_{AC}
Maximum continuous operating voltage:	U_c	275 V_{AC}	150 V_{AC}
Nominal frequency:		50 - 60 Hz	
Nominal discharge current per pole (8/20 µs wave):	I_n	10 kA	
Maximum discharge current per pole (8/20 µs wave):	I_{max}	30 kA	
Protection level (1.2/50 µs wave):	U_p	700 V	500 V
Protection level at I_n (8/20 µs wave):	$U_p(I_n)$	900 V	700 V
Combined wave voltage:	$U_{o.c.}$	6 kV	
Residual voltage with 6 kV/3 kA combination wave:		700 V	450 V
Response time:	t_r	< 25 ns	
Backup fuse(1):		125 A gL/gG	
Maximum short-circuit current:		25 kA (for maximum fuse)	
Working temperature:	ϑ	-40 °C to +70 °C	
Protector location:		Indoor	
Type of connection:		Parallel (one port)	
No. of poles:		2	
Dimensions:		72 x 90 x 80 mm (4 modules DIN43880)	
Fixing:		DIN Rail	
Enclosure material:		Polyamide	
Enclosure protection:		IP20	
Insulation resistance:		> 10^{14} Ω	
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)	
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2	
Voltage-free contact for the remote control			
Connection:		Max. single-stranded/multi-stranded section: 1.5 mm^2	
Contact output:		Switch	
Operating voltage:		250 V_{AC} (Maximum operating voltage of the alarm power supply)	
Maximum current:		2 A (Maximum current of the alarm power supply)	
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305			

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATLINK series

> ATLINK

Decoupling inductor for protector power supply coordination

> **AT-8435 ATLINK 35**: for lines with $I_L \leq 35$ A
> **AT-8463 ATLINK 63**: for lines with $I_L \leq 63$ A

Proper protection against transient overvoltages requires **good coordination between** protectors. ATLINK series inductors produce decoupling between protectors when they are connected **in parallel** on the same line so that each one acts at the right moment, achieving the double objective of withstanding the lightning current and reducing the overvoltage to an acceptable level for the connected equipment.

One ATLINK device is needed for each phase and another for the neutral. When selecting them, **the operating current of the line must be taken into account,** since this current will flow continuously through the device.

Its coordination capability has been tested and certified using **lightning wave** 10/350 µs according to EN 61643-11.

> Enables installation of protectors for different stages in the same place, since the inductor substitutes the necessary length of cable for protector coordination.

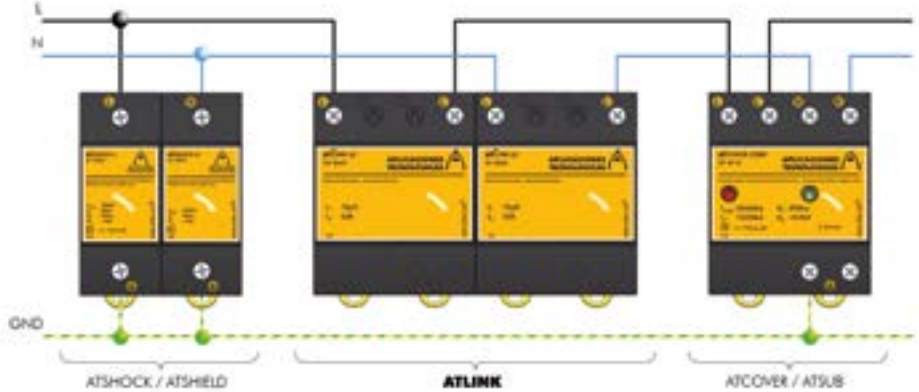
> Robust connectors, suitable for all types of connection.

ATLINK devices have been tested in **official, independent laboratories,** verifying that the protectors are correctly coordinated.

> INSTALLATION

ATLINK inductors are to be installed **in series** with the power supply line, that is, cutting the supply line and connecting the cable ends to the ATLINK input and output connectors. One ATLINK device is needed for each phase and another for the neutral. There should be no ground connection.

It coordinates the ATSHOCK and/or ATSHIELD protectors with ATSUB and/or ATCOVER protectors when they cannot be separated by a cable at least 10 metres in length.



> PROTECTION OF POWER SUPPLY LINES

> ATLINK series

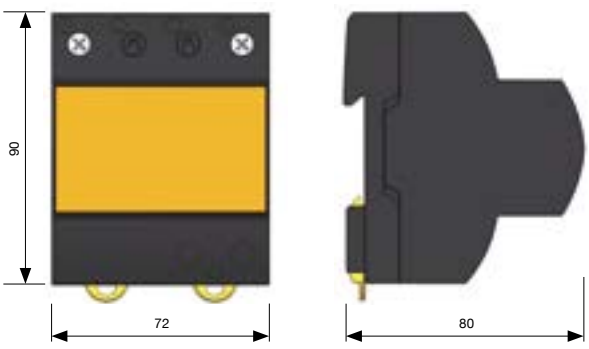
> TECHNICAL DATASHEET

Reference:		ATLINK 35 **AT-8435**	ATLINK 63 **AT-8463**
Protection categories according to the REBT:		I, II, III, IV	
Maximum operating current:	I_L	35 A	63 A
Nominal voltage:	U_n	230 V_{AC}	
Maximum continuous operating voltage:	U_c	275 V_{AC}	
Nominal frequency:		50 - 60 Hz	
Nominal discharge current (8/20 µs):	I_{max}	100 kA	
Impulse coordinated current (10/350 µs):	I_{imp}	100 kA	
Inductance:	L	15 µH	
Resistance:		3 mΩ	
Protector location:		Indoor	
Type of connection:		Series (two ports)	
Working temperature:	ϑ	-40 °C to +70 °C	
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)	
Fixing:		DIN Rail	
Enclosure material:		Polyamide	
Enclosure protection:		IP20	
Insulation resistance:		> 10^{14} Ω	
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)	
Connections:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2	

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATCOMPACT series

> ATCOMPACT CDA

Multi-pole power supply protection cabinet including protective fuses

> NOMENCLATURE

ATCOMPACT CDA-T1 15 kA

- T1: Three-phase type 1 protection
- T2: Three-phase type 2 protection
- M1: Single-phase type 1 protection
- M2: Single-phase type 2 protection

Peak current per pole

Reference	Model	Description
AT-8190	ATCOMPACT CDA T1 15 kA	Three-phase protection with 3 x ATSUB65 + ATSUB N in double isolation box
AT-8191	ATCOMPACT CDA T1 25 kA	Three-phase protection with 3 x ATSUB100 + ATSHOCK N in double isolation box
AT-8192	ATCOMPACT CDA T1 30 kA	Three-phase protection with 3 x ATSHOCK30 + ATSHOCK N in double isolation box

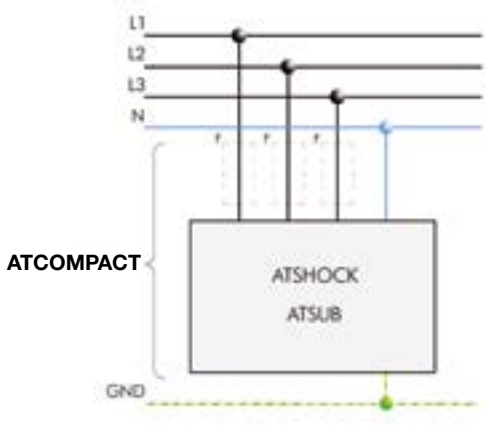
ATCOMPACT protection cabinets are made of several protectors from the same series with the aim of protecting all of the phases, including the protective fuses, against short-circuits.

ATCOMPACT surge protection devices are to be installed **in parallel** with the supply line, without affecting operation under normal conditions in any way at all. Combinations can be made for protection either in common (in relation to ground) or differential mode (between phase/s and neutral).
Compact box, easy to install and with the same advantages as Aplicaciones Tecnológicas protectors: robust, quick, reliable and tested according to applicable standards (EN 61643-11) in **official and independent laboratories.**

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

ATCOMPACT boxes are to be installed **in parallel** with the low voltage supply line, connected to the phases, neutral and ground.
Installation should be carried out without power in the line.
When ATCOMPACT protectors are installed as medium protection, they must be separated from coarse and/or tight protectors by at least 10 metres of cable or, if this is not possible, by ATLINK decoupling inductors in order to achieve **correct coordination between them.**



> PROTECTION OF POWER SUPPLY LINES

> ATCOMPACT series

> ATCOMPACT CDA T1 15 kA

Compact protection for three-phase power supply in double insulation cabinet.

> TECHNICAL DATASHEET

Reference:		**AT-8190**
Protection categories according to the REBT:		II, III, IV
Type of tests according to EN 61643-11:		Type 1, 2
Nominal voltage:	U_n	400 V_{AC} (L-L) 230 V_{AC} (L-GND)
Maximum continuous operating voltage:	U_c	440 V_{AC} (L-L) 275 V_{AC} (L-GND)
Nominal frequency:		50 – 60 Hz
Nominal discharge current (8/20 µs wave):	I_n	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	65 kA
Impulse current per pole (10/350 µs wave):	I_{imp}	15 kA
Protection level for 1.2/50 µs wave:	U_p	900 V
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1600 V
Response time:	t_r	< 25 ns
Fuse included:		80A gG
Maximum fuse short-circuit current:		100 kA
Working temperature:	ϑ	-40 ºC to +80 ºC
Protector location:		Outdoor
Type of connection:		Parallel (one port)
No. of poles:		4
Dimensions:		380 x 285 x 190 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 ºC according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> PROTECTION OF POWER SUPPLY LINES

> ATCOMPACT series

> ATCOMPACT CDA T1 25 kA

Compact protection for three-phase power supply in double insulation cabinet.

> TECHNICAL DATASHEET

Reference:		**AT-8191**
Protection categories according to the REBT:		II, III, IV
Type of tests according to EN 61643-11:		Type 1, 2
Nominal voltage:	U_n	400 V_{AC} (L-L) 230 V_{AC} (L-GND)
Maximum continuous operating voltage:	U_c	440 V_{AC} (L-L) 275 V_{AC} (L-GND)
Nominal frequency:		50 – 60 Hz
Nominal discharge current (8/20 µs wave):	I_n	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	100 kA
Impulse current per pole (10/350 µs wave):	I_{imp}	25 kA
Protection level for 1.2/50 µs wave:	U_p	1500 V
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	2400 V
Response time:	t_r	< 25 ns
Fuse included:		80A gG
Maximum fuse short-circuit current:		100 kA
Working temperature:	ϑ	-40 °C to +80 °C
Protector location:		Outdoor
Type of connection:		Parallel (one port)
No. of poles:		4
Dimensions:		380 x 285 x 190 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 °C according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> PROTECTION OF POWER SUPPLY LINES

> ATCOMPACT series

> ATCOMPACT CDA T1 30 kA

Compact protection for three-phase power supply in double insulation cabinet.

> TECHNICAL DATASHEET

Reference:		**AT-8192**
Protection categories according to the REBT:		II, III, IV
Type of tests according to EN 61643-11:		Type 1
Nominal voltage:	U_n	400 V_{AC} (L-L) 230 V_{AC} (L-GND)
Maximum continuous operating voltage:	U_c	440 V_{AC} (L-L) 275 V_{AC} (L-GND)
Nominal frequency:		50 – 60 Hz
Nominal discharge current (8/20 µs wave):	I_n	40 kA
Impulse current per pole (10/350 µs wave):	I_{imp}	30 kA
Protection level for 1.2/50 µs wave:	U_p	2500 V
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	3000 V
Response time:	t_r	< 25 ns
Fuse included:		80A gG
Maximum fuse short-circuit current:		100 kA
Working temperature:	ϑ	-40 ºC to +80 ºC
Protector location:		Outdoor
Type of connection:		Parallel (one port)
No. of poles:		4
Dimensions:		380 x 285 x 190 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 ºC according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> PROTECTION OF POWER SUPPLY LINES

> ATCOMPACT series

> ATCOMPACT

Multi-pole power supply protection cabinet including protective fuses

> NOMENCLATURE

ATCOMPACT T2 15 kA

- T2: Three-phase type 2 protection
- 15 kA: Peak current per pole

T1: Three-phase type 1 protection
M1: Single-phase type 1 protection
M2: Single-phase type 2 protection

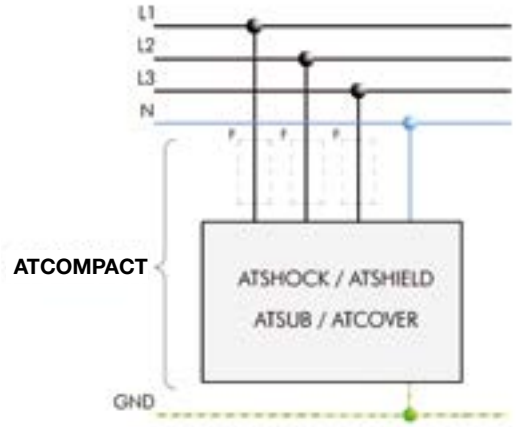
ATCOMPACT protection cabinets are made of several protectors from the same series with the aim of protecting all of the phases, including the protective fuses, against short-circuits.

Reference	Model	Description
AT-8131	ATCOMPACT M2 30 kA	Protection for single-phase lines with ATCOVER 230M
AT-8130	ATCOMPACT T2 30 kA	Protection for three-phase lines with ATCOVER 400T
AT-8117	ATCOMPACT M2 15 kA	Protection for single-phase lines with ATSUB-2P 15
AT-8122	ATCOMPACT T2 15 kA	Protection for three-phase lines with ATSUB-4P 15
AT-8139	ATCOMPACT M2 40 kA	Protection for single-phase lines with ATSUB-2P 40
AT-8140	ATCOMPACT T2 40 kA	Protection for three-phase lines with ATSUB-4P 40
AT-8119	ATCOMPACT M2 65 kA	Protection for single-phase lines with ATSUB-2P 65
AT-8120	ATCOMPACT T2 65 kA	Protection for three-phase lines with ATSUB-4P 65
AT-8161	ATCOMPACT M1 30 kA	Protection for single-phase lines with ATSHIELD 230M
AT-8160	ATCOMPACT T1 30 kA	Protection for three-phase lines with ATSHIELD 400T
AT-8149	ATCOMPACT M1 50 kA	Protection for single-phase lines with ATSHOCK
AT-8150	ATCOMPACT T1 50 kA	Protection for three-phase lines with ATSHOCK

> INSTALLATION

ATCOMPACT boxes are to be installed **in parallel** with the low voltage supply line, connected to the phases, neutral and ground.
Installation should be carried out without power in the line.
When ATCOMPACT protectors are installed as medium protection, they must be separated from coarse and/or tight protectors by at least 10 metres of cable or, if this is not possible, by ATLINK decoupling inductors in order to achieve **correct coordination between them.**

ATCOMPACT surge protection devices are to be installed **in parallel** with the supply line, without altering its operation under normal conditions. Combinations can be made for protection either in common (in relation to ground) or differential mode (between phase/s and neutral).
Compact box, easy to install and with the same advantages as Aplicaciones Tecnológicas protectors: robust, quick, reliable and tested according current standards (EN 61643-11) **in official independent laboratories.**



Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω. If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> PROTECTION OF POWER SUPPLY LINES

> ATCOMPACT series

> ATCOMPACT M2 30 kA

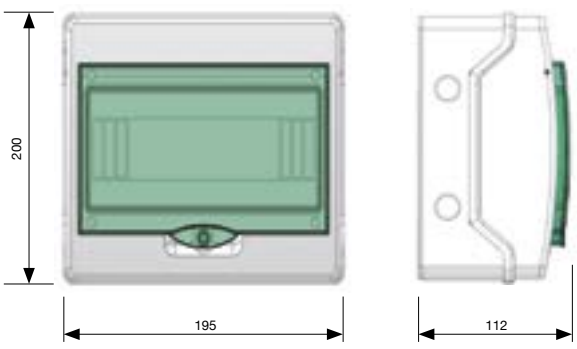
Compact protection for power supply single-phase lines

> TECHNICAL DATASHEET

Reference:		**AT-8131**
Protection categories according to the REBT:		I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3
Nominal voltage:	U_n	230 V_{AC}
Maximum continuous operating voltage:	U_c	275 V_{AC}
Nominal frequency:		50 – 60 Hz
Nominal discharge current (8/20 µs wave):	I_n	10 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	30 kA
Protection level for 1.2/50 µs wave:	U_p	700 V
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	900 V
Combined wave voltage:	$U_{o.c.}$	6 kV
Residual voltage with 6 kV/3 kA combination wave:		700 V
Response time:	t_r	< 25 ns
Fuse included:		50A gG
Maximum fuse short-circuit current:		100 kA
Working temperature:	ϑ	-40 ºC to +70 ºC
Protector location:		Outdoor
Type of connection:		Parallel (one port)
No. of poles:		2
Dimensions:		200 x 195 x 112 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 ºC according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm² maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATCOMPACT series

> ATCOMPACT T2 30 kA

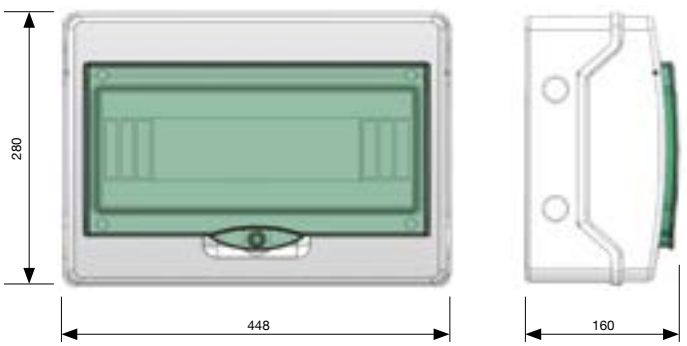
Compact protection for power supply three-phase lines

> TECHNICAL DATASHEET

Reference:		**AT-8130**
Protection categories according to the REBT:		I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3
Nominal voltage:	U_n	400 V_{AC} (L-L) 230 V_{AC} (L-GND)
Maximum continuous operating voltage:	U_c	460 V_{AC} (L-L) 275 V_{AC} (L-GND)
Nominal frequency:		50 – 60 Hz
Nominal discharge current (8/20 µs wave):	I_n	10 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	30 kA
Protection level for 1.2/50 µs wave:	U_p	700 V
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	900 V
Combined wave voltage:	$U_{o.c.}$	6 kV
Residual voltage with 6 kV/3 kA combination wave:		700 V
Response time:	t_r	< 25 ns
Fuse included:		50A gG
Maximum fuse short-circuit current:		100 kA
Working temperature:	ϑ	-40 ºC to +70 ºC
Protector location:		Outdoor
Type of connection:		Parallel (one port)
No. of poles:		4
Dimensions:		280 x 448 x 160 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 ºC according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm² maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATCOMPACT series

> ATCOMPACT M2 15 kA

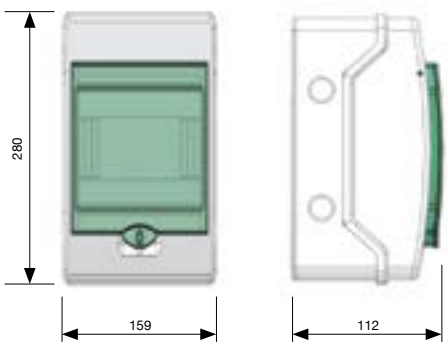
Compact protection for power supply single-phase lines

> TECHNICAL DATASHEET

Reference:		**AT-8117**
Protection categories according to the REBT:		I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3
Nominal voltage:	U_n	230 V_{AC}
Maximum continuous operating voltage:	U_c	275 V_{AC}
Nominal frequency:		50 – 60 Hz
Nominal discharge current (8/20 µs wave):	I_n	5 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA
Protection level for 1.2/50 µs wave:	U_p	700 V
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1200 V
Combined wave voltage:	$U_{o.c.}$	6 kV
Response time:	tr	< 25 ns
Fuse included:		50A gG
Maximum fuse short-circuit current:		100 kA
Working temperature:	ϑ	-40 ºC to +70 ºC
Protector location:		Outdoor
Type of connection:		Parallel (one port)
No. of poles:		2
Dimensions:		280 x 159 x 112 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 ºC according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATCOMPACT series

> ATCOMPACT T2 15 kA

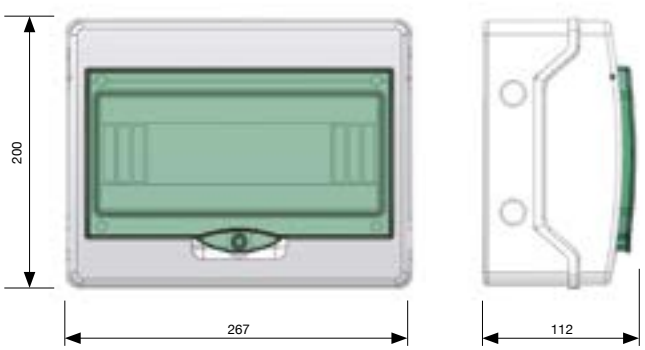
Compact protection for power supply three-phase lines

> TECHNICAL DATASHEET

Reference:		**AT-8122**
Protection categories according to the REBT:		I, II, III, IV
Type of tests according to EN 61643-11:		Type 2 + 3
Nominal voltage:	U_n	400 V_{AC} (L-L) 230 V_{AC} (L-GND)
Maximum continuous operating voltage:	U_c	460 V_{AC} (L-L) 275 V_{AC} (L-GND)
Nominal frequency:		50 – 60 Hz
Nominal discharge current (8/20 µs wave):	I_n	5 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	15 kA
Protection level for 1.2/50 µs wave:	U_p	700 V
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1200 V
Combined wave voltage:	$U_{o.c.}$	6 kV
Response time:	t_r	< 25 ns
Fuse included:		50A gG
Maximum fuse short-circuit current:		100 kA
Working temperature:	ϑ	-40 ºC to +70 ºC
Protector location:		Outdoor
Type of connection:		Parallel (one port)
No. of poles:		4
Dimensions:		200 x 267 x 112 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 ºC according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATCOMPACT series

> ATCOMPACT M2 40 kA

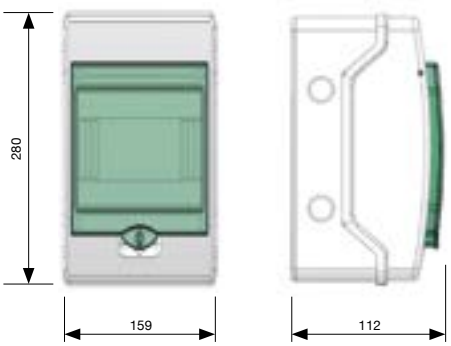
Compact protection for power supply single-phase lines

> TECHNICAL DATASHEET

Reference:		**AT-8139**
Protection categories according to the REBT:		I, II, III, IV
Type of tests according to EN 61643-11:		Type 2
Nominal voltage:	U_n	230 V_{AC}
Maximum continuous operating voltage:	U_c	275 V_{AC}
Nominal frequency:		50 – 60 Hz
Nominal discharge current (8/20 µs wave):	I_n	20 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	40 kA
Protection level for 1.2/50 µs wave:	U_p	700 V
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1400 V
Response time:	t_r	< 25 ns
Fuse included:		50A gG
Maximum fuse short-circuit current:		100 kA
Working temperature:	ϑ	-40 °C to +70 °C
Protector location:		Outdoor
Type of connection:		Parallel (one port)
No. of poles:		2
Dimensions:		280 x 159 x112 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 °C according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATCOMPACT series

> ATCOMPACT T2 40 kA

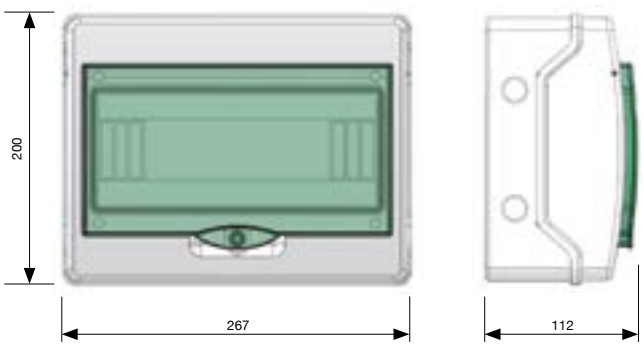
Compact protection for power supply three-phase lines

> TECHNICAL DATASHEET

Reference:		**AT-8140**
Protection categories according to the REBT:		I, II, III, IV
Type of tests according to EN 61643-11:		Type 2
Nominal voltage:	U_n	400 V_{AC} (L-L) 230 V_{AC} (L-GND)
Maximum continuous operating voltage:	U_c	460 V_{AC} (L-L) 275 V_{AC} (L-GND)
Nominal frequency:		50 – 60 Hz
Nominal discharge current (8/20 µs wave):	I_n	20 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	40 kA
Protection level for 1.2/50 µs wave:	U_p	700 V
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1400 V
Response time:	t_r	< 25 ns
Fuse included:		50A gG
Maximum fuse short-circuit current:		100 kA
Working temperature:	ϑ	-40 °C to +70 °C
Protector location:		Outdoor
Type of connection:		Parallel (one port)
No. of poles:		4
Dimensions:		200 x 267 x 112 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 °C according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATCOMPACT series

> ATCOMPACT M2 65 kA

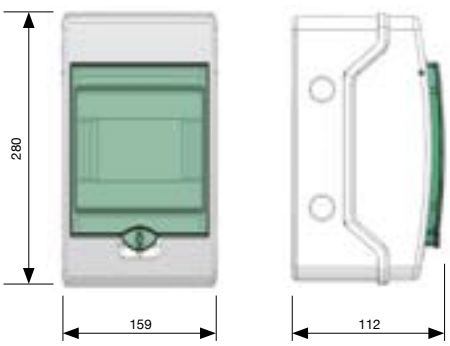
Compact protection for power supply single-phase lines

> TECHNICAL DATASHEET

Reference:		**AT-8119**
Protection categories according to the REBT:		II, III, IV
Type of tests according to EN 61643-11:		Type 1 + 2
Nominal voltage:	U_n	230 V_{AC}
Maximum continuous operating voltage:	U_c	275 V_{AC}
Nominal frequency:		50 – 60Hz
Nominal discharge current (8/20 µs wave):	I_n	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	65 kA
Impulse current per pole (10/350 µs wave):	$_{limp}$	15 kA
Protection level for 1.2/50 µs wave:	U_p	900 V
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1600 V
Response time:	t_r	< 25 ns
Fuse included:		50A gG
Maximum fuse short-circuit current:		100 kA
Working temperature:	ϑ	-40 °C to +70 °C
Protector location:		Outdoor
Type of connection:		Parallel (one port)
No. of poles:		2
Dimensions:		280 x 159 x 112 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 °C according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATCOMPACT series

> ATCOMPACT T2 65 kA

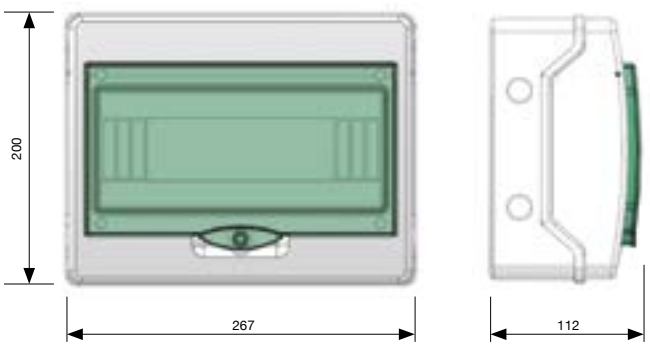
Compact protection for power supply single-phase lines

> TECHNICAL DATASHEET

Reference:		**AT-8120**
Protection categories according to the REBT:		II, III, IV
Type of tests according to EN 61643-11:		Type 1 + 2
Nominal voltage:	U_n	400 V_{AC} (L-L) 230 V_{AC} (L-GND)
Maximum continuous operating voltage:	U_c	460 V_{AC} (L-L) 275 V_{AC} (L-GND)
Nominal frequency:		50 – 60 Hz
Nominal discharge current (8/20 µs wave):	I_n	30 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	65 kA
Impulse current per pole (10/350 µs wave):	$_{limp}$	15 kA
Protection level for 1.2/50 µs wave:	U_p	900 V
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	1600 V
Response time:	t_r	< 25 ns
Fuse included:		50A gG
Maximum fuse short-circuit current:		100 kA
Working temperature:	ϑ	-40 ºC to +70 ºC
Protector location:		Outdoor
Type of connection:		Parallel (one port)
No. of poles:		4
Dimensions:		200 x 267 x 112 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 ºC according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATCOMPACT series

> ATCOMPACT M1 30 kA

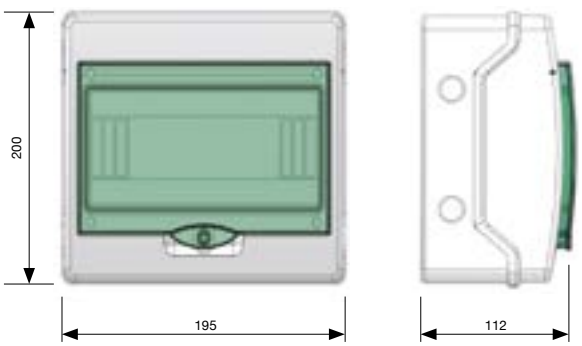
Compact protection for power supply single-phase lines

> TECHNICAL DATASHEET

Reference:		**AT-8161**
Protection categories according to the REBT:		I, II, III, IV
Type of tests according to EN 61643-11:		Type 1 + 2
Nominal voltage:	U_n	230 V_{AC}
Maximum continuous operating voltage:	U_c	275 V_{AC}
Nominal frequency:		50 – 60 Hz
Nominal discharge current (8/20 µs wave):	I_n	40 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	65 kA
Impulse current per pole (10/350 µs wave):	I_{imp}	30 kA
Protection level:	U_p	1500 V
Response time:	t_r	< 100 ns
Fuse included:		80A gG
Maximum fuse short-circuit current:		100 kA
Working temperature:	ϑ	-40 ºC to +70 ºC
Protector location:		Outdoor
Type of connection:		Parallel (one port)
No. of poles:		2
Dimensions:		200 x 195 x 112 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 ºC according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATCOMPACT series

> ATCOMPACT T1 30 kA

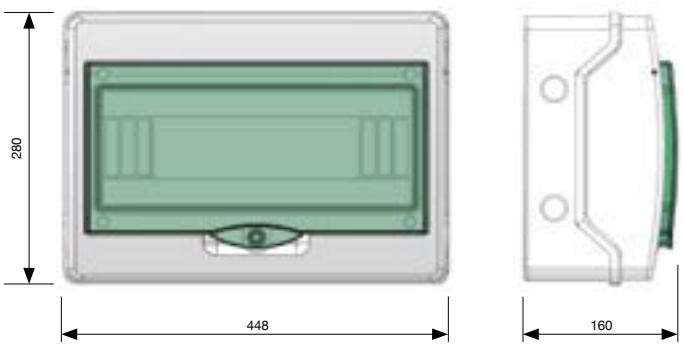
Compact protection for power supply three-phase lines

> TECHNICAL DATASHEET

Reference:		**AT-8160**
Protection categories according to the REBT:		I, II, III, IV
Type of tests according to EN 61643-11:		Type 1 + 2
Nominal voltage:	U_n	400 V_{AC} (L-L) 230 V_{AC} (L-GND)
Maximum continuous operating voltage:	U_c	460 V_{AC} (L-L) 275 V_{AC} (L-GND)
Nominal frequency:		50 – 60 Hz
Nominal discharge current (8/20 µs wave):	I_n	40 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	65 kA
Impulse current per pole (10/350 µs wave):	I_{imp}	30 kA
Protection level:	U_p	1500 V
Response time:	t_r	< 100 ns
Fuse included:		80A gG
Maximum fuse short-circuit current:		100 kA
Working temperature:	ϑ	-40 °C to +70 °C
Protector location:		Outdoor
Type of connection:		Parallel (one port)
No. of poles:		4
Dimensions:		280 x 448 x 160 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 °C according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATCOMPACT series

> ATCOMPACT M1 50 kA

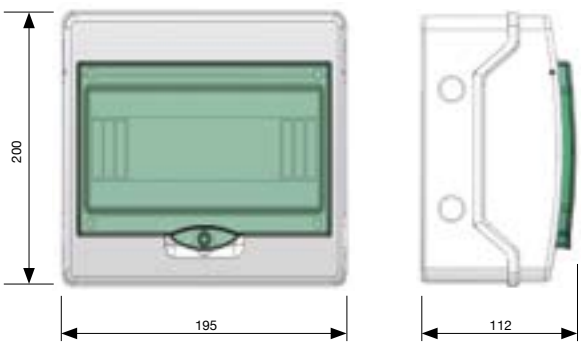
Compact protection for power supply single-phase lines

> TECHNICAL DATASHEET

Reference:		**AT-8149**
Protection categories according to the REBT:		III, IV
Type of tests according to EN 61643-11:		Type 1
Nominal voltage:	U_n	230 V_{AC}
Maximum continuous operating voltage:	U_c	275 V_{AC}
Nominal frequency:		50 – 60 Hz
Nominal discharge current (8/20 µs wave):	I_n	50 kA
Impulse current per pole (10/350 µs wave):	I_{max}	50 kA
Protection level:	U_p	4000 V
Response time:	t_r	< 100 ns
Fuse included:		80A gG
Maximum fuse short-circuit current:		100 kA
Working temperature:	ϑ	-40 ºC to +70 ºC
Protector location:		Outdoor
Type of connection:		Parallel (one port)
No. of poles:		2
Dimensions:		200 x 195 x 112 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 ºC according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATCOMPACT series

> ATCOMPACT T1 50 kA

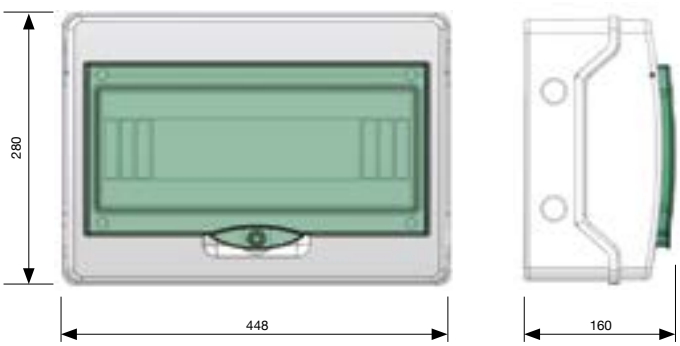
Compact protection for power supply three-phase lines

> TECHNICAL DATASHEET

Reference:		**AT-8150**
Protection categories according to the REBT:		III, IV
Type of tests according to EN 61643-11:		Type 1
Nominal voltage:	U_n	400 V_{AC} (L-L) 230 V_{AC} (L-GND)
Maximum continuous operating voltage:	U_c	460 V_{AC} (L-L) 275 V_{AC} (L-GND)
Nominal frequency:		50 – 60 Hz
Nominal discharge current (8/20 µs wave):	I_n	50 kA
Impulse current per pole (10/350 µs wave):	I_{max}	50 kA
Protection level:	U_p	4000 V
Response time:	t_r	< 100 ns
Fuse included:		80A gG
Maximum fuse short-circuit current:		100 kA
Working temperature:	ϑ	-40 °C to +70 °C
Protector location:		Outdoor
Type of connection:		Parallel (one port)
No. of poles:		4
Dimensions:		280 x 448 x 160 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 °C according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATBARRIER series

> ATBARRIER

Coordinated protection cabinets for power supply lines

Reference	Model	Description
AT-8114	ATBARRIER MFF	Coordinated protection for single-phase lines with ATSHOCK + ATCOVER
AT-8125	ATBARRIER MF	Coordinated protection for single-phase lines with ATSHOCK + ATSUB15
AT-8118	ATBARRIER MM	Coordinated protection for single-phase lines with ATSHOCK + ATSUB40
AT-8134	ATBARRIER TFF	Coordinated protection for three-phase lines with ATSHOCK + ATCOVER
AT-8141	ATBARRIER TF	Coordinated protection for three-phase lines with ATSHOCK + ATSUB15
AT-8121	ATBARRIER TM	Coordinated protection for three-phase lines with ATSHOCK + ATSUB40

-N: For lines with no neutral

> NOMENCLATURE

ATBARRIER **T** **F**

T: if three-phase
M: if single-phase

M: for medium protection (with ATSUB40)
F: for tight protection (with ATSUB15)
FF: for very tight protection (with ATCOVER)

For all of the protectors to work, they must be separated by at least 10 metres of cable or a decoupling inductor which also withstands the line operating current. The complete ATBARRIER systems have been designed in this way.
ATBARRIER series protection cabinets contain all the different protectors required for coordinated protection of all of the phases. ATBARRIER boxes are to be installed in series with the line. In normal conditions, they remain inactive without affecting line operation at all. Compact box, easy to install and with the same advantages as Aplicaciones Tecnológicas protectors: robust, quick, reliable and tested according to applicable standards (EN 61643-11) in **official and independent laboratories.**

Correct overvoltage protection is only achieved if all of the protection stages are well coordinated. Otherwise, the most robust protection will not work, possibly even causing the destruction of the most sensitive protectors and even the equipment that they should protect.

> INSTALLATION

ATBARRIER boxes are to be installed **in series** with the low voltage line, connected to phase/s, neutral and ground. **Fuses or circuit breakers must be present upstream.** They will be disconnected during installation for operator safety.
Installation is recommended where **direct lightning currents** could penetrate and very sensitive equipment is connected, without enough space to separate the different protection stages.

The operating current of the line must be lower than 63 A.

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> PROTECTION OF POWER SUPPLY LINES

> ATBARRIER series

> ATBARRIER MFF

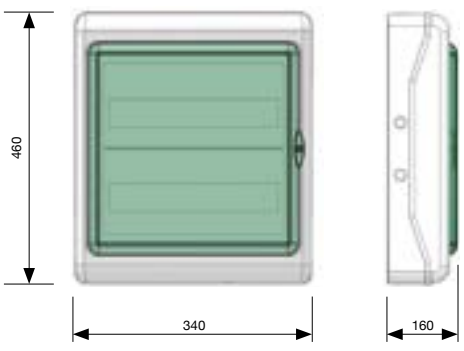
Coordinated protection for power supply single-phase lines

> TECHNICAL DATASHEET

Reference:		**AT-8114**
Protection categories according to the REBT:		I, II, III and IV
Type of tests according to EN 61643-11:		Type 1 + 2 + 3
Nominal voltage:	U_n	230 V_{AC}
Maximum continuous operating voltage:	U_c	275 V_{AC}
Nominal frequency:		50 – 60 Hz
Maximum operating current:	I_L	63 A
Nominal discharge current (8/20 µs wave):	I_n	50 kA
Impulse current per pole (10/350 µs wave):	I_{imp}	50 kA
Protection level:	U_p	900 V
Combined wave voltage:	$U_{o.c.}$	6 kV
Residual voltage with 6 kV/3 kA combination wave:		700 V
Response time:	t_r	< 25 ns
Working temperature:	ϑ	-40 °C to +70 °C
Protector location:		Outdoor
Type of connection:		Series (two ports)
No. of poles:		2
Dimensions:		460 x 340 x 160 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 °C according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATBARRIER series

> ATBARRIER MF

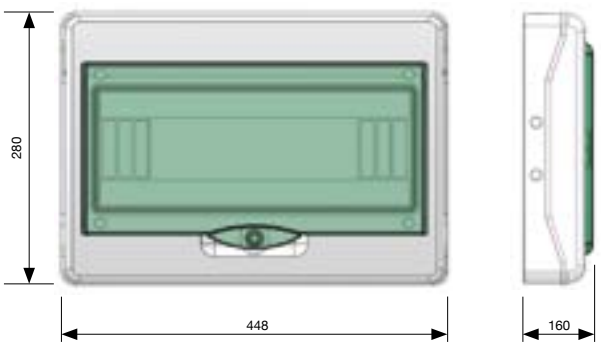
Coordinated protection for power supply single-phase lines

> TECHNICAL DATASHEET

Reference:		**AT-8125**
Protection categories according to the REBT:		I, II, III and IV
Type of tests according to EN 61643-11:		Type 1 + 2 + 3
Nominal voltage:	U_n	230 V_{AC}
Maximum continuous operating voltage:	U_c	275 V_{AC}
Nominal frequency:		50 – 60 Hz
Maximum operating current:	I_L	63 A
Nominal discharge current (8/20 µs wave):	I_n	50 kA
Impulse current per pole (10/350 µs wave):	I_{imp}	50 kA
Protection level:	U_p	1200 V
Combined wave voltage:	$U_{o.c.}$	6 kV
Response time:	t_r	< 25 ns
Working temperature:	ϑ	-40 ºC to +70 ºC
Protector location:		Outdoor
Type of connection:		Series (two ports)
No. of poles:		2
Dimensions:		280 x 448 x 160 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 ºC according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATBARRIER series

> ATBARRIER MM

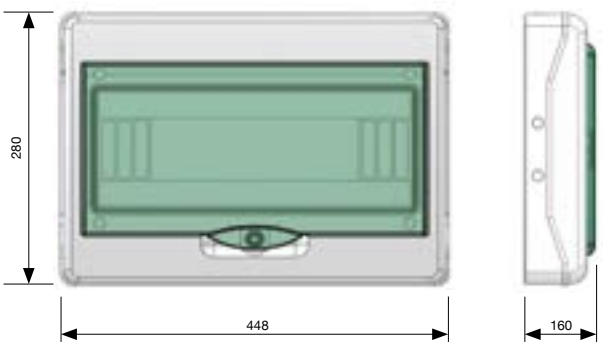
Coordinated protection for power supply single-phase lines

> TECHNICAL DATASHEET

Reference:		**AT-8118**
Protection categories according to the REBT:		I, II, III and IV
Type of tests according to EN 61643-11:		Type 1 + 2
Nominal voltage:	U_n	230 V_{AC}
Maximum continuous operating voltage:	U_c	275 V_{AC}
Nominal frequency:		50 – 60 Hz
Maximum operating current:	I_L	63 A
Nominal discharge current (8/20 µs wave):	I_n	50 kA
Impulse current per pole (10/350 µs wave):	I_{imp}	50 kA
Protection level:	U_p	1400 V
Response time:	t_r	< 25 ns
Working temperature:	ϑ	-40 °C to +70 °C
Protector location:		Outdoor
Type of connection:		Series (two ports)
No. of poles:		2
Dimensions:		280 x 448 x 160 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 ºC according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATBARRIER series

> ATBARRIER TFF

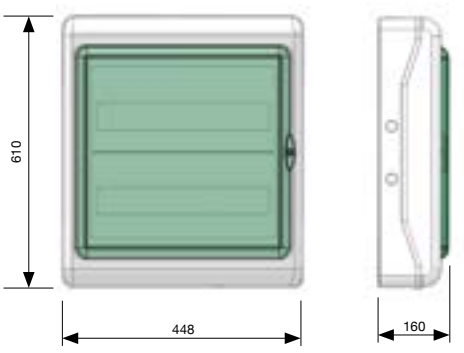
Coordinated protection for power supply three-phase lines

> TECHNICAL DATASHEET

Reference:		**AT-8134**
Protection categories according to the REBT:		I, II, III and IV
Type of tests according to EN 61643-11:		Type 1 + 2 + 3
Nominal voltage:	U_n	400 V_{AC} (L-L) 230 V_{AC} (L-GND)
Maximum continuous operating voltage:	U_c	460 V_{AC} (L-L) 275 V_{AC} (L-GND)
Nominal frequency:		50 – 60 Hz
Maximum operating current:	I_L	63 A
Nominal discharge current (8/20 µs wave):	I_n	50 kA
Impulse current per pole (10/350 µs wave):	I_{imp}	50 kA
Protection level:	U_p	900 V
Combined wave voltage:	$U_{o.c.}$	6 kV
Residual voltage with 6 kV/3 kA combination wave:		700 V
Response time:	t_r	< 25 ns
Working temperature:	ϑ	-40 ºC to +70 ºC
Protector location:		Outdoor
Type of connection:		Series (two ports)
No. of poles:		4
Dimensions:		610 x 448 x 160 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 ºC according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATBARRIER series

> ATBARRIER TF

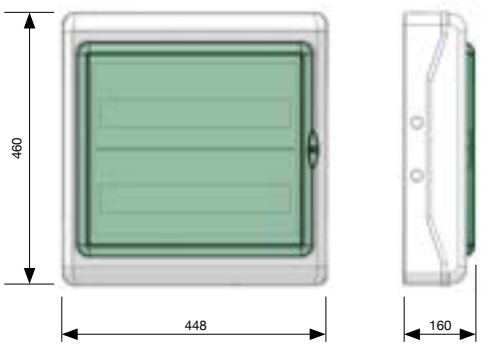
Coordinated protection for power supply single-phase lines

> TECHNICAL DATASHEET

Reference:		**AT-8141**
Protection categories according to the REBT:		I, II, III and IV
Type of tests according to EN 61643-11:		Type 1 + 2 + 3
Nominal voltage:	U_n	400 V_{AC} (L-L) 230 V_{AC} (L-GND)
Maximum continuous operating voltage:	U_c	460 V_{AC} (L-L) 275 V_{AC} (L-GND)
Nominal frequency:		50 – 60 Hz
Maximum operating current:	I_L	63 A
Nominal discharge current (8/20 µs wave):	I_n	50 kA
Impulse current per pole (10/350 µs wave):	I_{imp}	50 kA
Protection level:	U_p	1200 V
Combined wave voltage:	$U_{o.c.}$	6 kV
Response time:	t_r	< 25 ns
Working temperature:	ϑ	-40 ºC to +70 ºC
Protector location:		Outdoor
Type of connection:		Series (two ports)
No. of poles:		4
Dimensions:		460 x 448 x 160 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 ºC according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION OF POWER SUPPLY LINES

> ATBARRIER series

> ATBARRIER TM

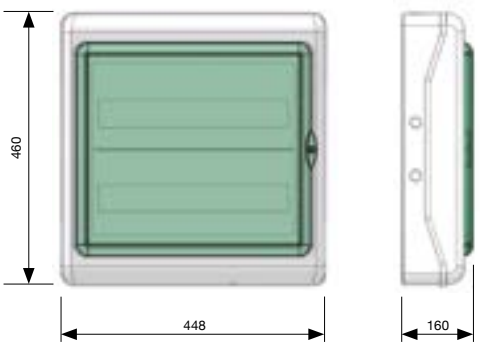
Coordinated protection for power supply three-phase lines

> TECHNICAL DATASHEET

Reference:		**AT-8121**
Protection categories according to the REBT:		I, II, III and IV
Type of tests according to EN 61643-11:		Type 1 + 2
Nominal voltage:	U_n	400 V_{AC} (L-L) 230 V_{AC} (L-GND)
Maximum continuous operating voltage:	U_c	460 V_{AC} (L-L) 275 V_{AC} (L-GND)
Nominal frequency:		50 – 60 Hz
Maximum operating current:	I_L	63 A
Nominal discharge current (8/20 µs wave):	I_n	50 kA
Impulse current per pole (10/350 µs wave):	I_{imp}	50 kA
Protection level:	U_p	1400 V
Response time:	t_r	< 25 ns
Working temperature:	ϑ	-40 ºC to +70 ºC
Protector location:		Outdoor
Type of connection:		Series (two ports)
No. of poles:		4
Dimensions:		460 x 448 x 160 mm
Fixing:		Wall or vertical support
Box material:		Self-extinguishing, insulating
IP Code:		IP65 according to IEC 60.529
Insulation:		Double (class II)
Fire resistance:		650 ºC according to IEC 60695-2-1
Impact protection:		IK09 according to EN 50.102
Connections L/N/G:		25 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION OF SPECIAL EQUIPMENT POWER SUPPLY

The different power supply protector series focus on AC power supply systems for different voltages. However, there is a lot of equipment which is supplied by special generators, such as batteries or solar cells with different types of voltages (continuous, pulses etc.) and a wide range of different characteristics regarding current, frequency, number of wires etc.

Very often this equipment is located in areas which are difficult to access, in usual storm areas and carrying out very important functions such as telecommunications, forest vigilance, environmental control etc. The protection of this type of equipment not only prevents destruction but also it being moved for repair, as well as interruption of the services they carry out.

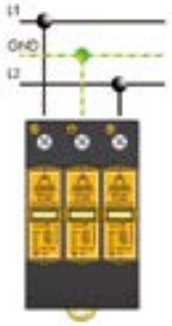
> ATPV series

Protection for photovoltaic installations.

ATPV series protectors are designed for maximum protection of photovoltaic cells and all of their integrated elements, such as the inverter.

They are made up of zinc oxide varistors adjusted to the specific voltage of each electrical installation to be protected.

ATPV surge protection devices are to be installed **in parallel** with the supply line, without altering its operation under normal conditions.



> ATVOLT series

Coordinated protection for DC supply lines.

ATVOLT series protectors have several uses in this kind of equipment thanks to the flexibility of their design and connectors. These protection devices protect two pairs of wires with different protection stages which are internally coordinated. ATVOLT series contains a wide range of voltages. They are mainly used for DC supply lines of tens of volts.

They are installed in series with the line and they are able to continuously withstand currents ranging up to several amperes without significant line losses or consumption.

They withstand the secondary effects of lightning and power switching surges. They react to voltage impulses in a few nanoseconds, thus achieving a very low residual voltage, protecting even highly sensitive equipment.

> PROTECTION OF SPECIAL EQUIPMENT POWER SUPPLY

> ATVOLT P series

Protection for DC supply lines.

ATVOLT P series protectors protect the same equipment as the ATVOLT series but since these are installed **in parallel**, they do not have any limitation for current consumption. Each one protects a pair of wires, leaving a low residual voltage. They are mainly used for DC supply lines of tens of volts.

They withstand the secondary effects of lightning and power switching surges. They react to voltage impulses in a few nanoseconds, thus achieving a very low residual voltage, protecting even highly sensitive equipment.

> ATCOMBO series

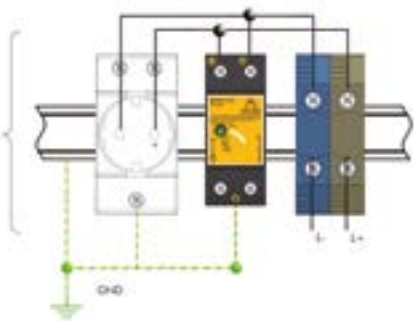
Protection cabinets with Schuko connection.

ATCOMBO series protectors gather a power supply protector such as ATVOLT or ATCOVER, along with a Schuko socket in a single, small cabinet in order to facilitate connections.

They are especially recommended for telecommunication stations or similar installations, where the use of moving equipment is very common and there are adverse weather conditions.

The protectors and accessories are supplied in a closed, robust box, easy to open for connecting equipment and with all of the internal connections already done.

ATCOMBO



> PROTECTION OF SPECIAL EQUIPMENT POWER SUPPLY

> ATPV series

> ATPV

Protection for photovoltaic installations

> **AT-8901 ATPV**: for overvoltages induced by photovoltaic installations

Effective protection of the photovoltaic installations and every element that could be integrated in the installation, such as the voltage inverter.

Tested and certified as a **type 2** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT.

- Made up of zinc oxide varistors adjusted to the specific voltage of the electrical installation to be protected. They are able to **protect inverters with an open input voltage of 1000 V_{DC}**.
- Short response time.
- Do not produce deflagration.
- Protection with removable modules.
- They do not cause any interruption to the power supply.
- Thermodynamic control device, mechanical warning and remote alarm. When the warning light is yellow, the cartridge is in good condition. If not, replace.

They are installed **in parallel** with the line, without affecting its operation in normal conditions.

The **ATPV series** includes removable modules that can be replaced in the event of a breakdown or fault without needing to disconnect the wiring.

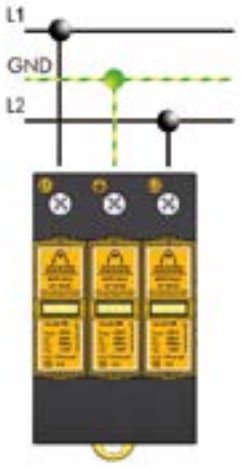
ATPV series protectors have been tested in **official and independent laboratories,** obtaining their characteristics according to relevant standards (shown in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

Installations based on **photovoltaic panels** are more prone to suffering the effects of overvoltages due to being installed outdoors.

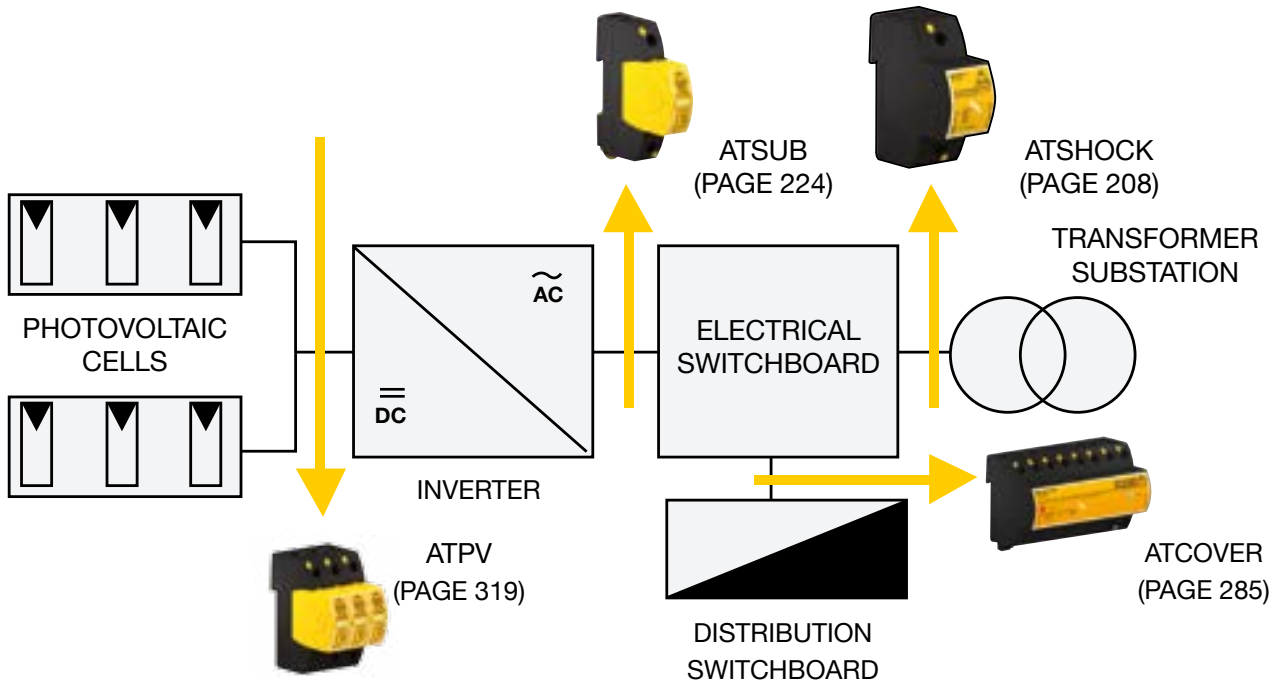
> INSTALLATION

They must be installed i**n parallel** with the direct current (DC) line, connected to positive and negative line/s and the ground.
A fuses or circuit breaker must be present upstream. They will be disconnected during installation for safety purposes. Installation should be carried out **without power running through the line**.



> PROTECTION OF SPECIAL EQUIPMENT POWER SUPPLY

> ATPV series



The electrical installation should be protected as follows:

- An ATPV protector should be installed on the continuous part of the inverter.
- A medium protection based in the ATSUB series must be placed in order to protect the main switchboards from the installation process.
- If generated power is used for local needs, an ATCOVER series protector must be placed in the distribution board in order to prevent high residual voltages.
- If generated power is to export to the electrical network through a transformer substation, ATSHOCK should be used in order to prevent transient overvoltages in the line.

> PROTECTION OF SPECIAL EQUIPMENT POWER SUPPLY

> ATPV series

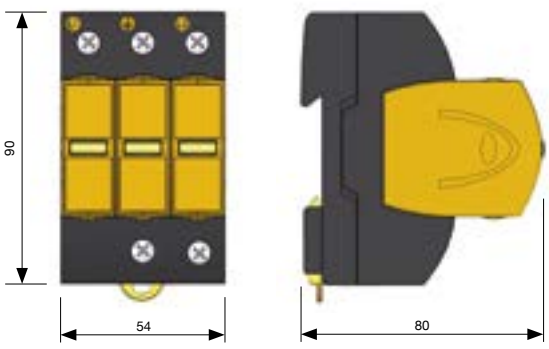
> ATPV

> TECHNICAL DATASHEET

Reference:		**AT-8901**
Type of tests according to EN 61643-11:		Type 2
Maximum continuous operating voltage:	U_c	1000 V_{DC}
Nominal discharge current (8/20 µs wave):	I_n	20 kA
Maximum discharge current per pole (8/20 µs wave):	I_{max}	40 kA
Protection level, 8/20 µs wave at I_n:	$U_p(I_n)$	4 kV
Protection level 5 kA; 8/20 µs wave:		3.5 kV
Response time:	t_r	< 25 ns
Backup fuse(1):		125 A gL/gG
Maximum short-circuit current:		25 kA (for maximum fuse)
Working temperature:	ϑ	-40 ºC to +70 ºC
Protector location:		Indoor
Type of connection:		Parallel (one port)
Number of poles:		3
Dimensions:		54 x 90 x 80 mm (3 modules DIN 43880)
Fixing:		DIN Rail
Enclosure material:		Polyamide
Enclosure protection:		IP20
Insulation resistance:		> 10^{14} Ω
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)
Connections L/N/G:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2
Certificated tests according to: UNE-EN 61643-11 Complies with requirements of: UL 1449 Relevant standards: UNE 21186, NF C 17-102, IEC 62305		

(1) Required in cases where there is higher nominal current installed upstream from the protector

> DIMENSIONS (mm)



> ACCESSORIES

> AT-8906 ATPV Mod.: I_{max} 40 kA / U_c 500 V_{DC}

> PROTECTION OF SPECIAL EQUIPMENT POWER SUPPLY

> ATPV series

> ATPV3

> TECHNICAL DATASHEET

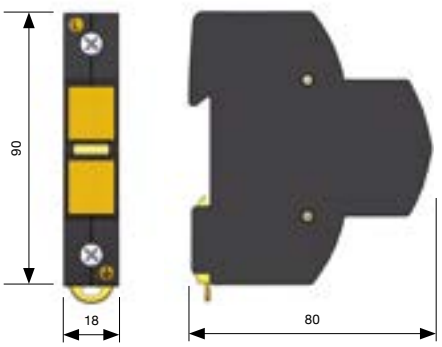
Reference:		**AT-8905**
Maximum continuous operating voltage:	U_c	950 V_{DC}
Nominal discharge current (8/20 µs wave):	I_n	20 kA
Maximum current (8/20 µs wave):	I_{max}	40 kA
Protection level:	U_p	2600 V
Response time:	t_r	< 25 ns
Backup fuse(1):		125 A gL/gG
Maximum short-circuit current:		25 kA (for maximum fuse)
Working temperature:	ϑ	-40 °C to +70 °C
Protector location:		Indoor
Type of connection:		Parallel (one port)
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)
Fixing:		DIN Rail
Enclosure material:		Polyamide
Enclosure protection:		IP20
Insulation resistance:		> 10^{14} Ω
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)
L/N/T connections:		Min/Max multi-stranded section: 4 / 35 mm² Min/Max single-stranded section: 1 / 35 mm²

Tests certified according to standards: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required in cases where there is higher nominal current installed upstream from the protector

> INSTALLATION

> DIMENSIONS (mm)



> PROTECTION OF SPECIAL EQUIPMENT POWER SUPPLY

> ATVOLT series

> ATVOLT

Coordinated direct current power supply for overvoltage protection devices

> **AT-8505**: ATVOLT 5: 5 V_{DC} lines
> **AT-8512**: ATVOLT 12: 12 V_{DC} lines
> **AT-8515**: ATVOLT 15: 15 V_{DC} lines
> **AT-8524**: ATVOLT 24: 24 V_{DC} lines
> **AT-8530**: ATVOLT 30: 30 V_{DC} lines
> **AT-8548**: ATVOLT 48: 48 V_{DC} lines
> **AT-8560**: ATVOLT 60: 60 V_{DC} lines
> **AT-8580**: ATVOLT 80: 80 V_{DC} lines
> **AT-8510**: ATVOLT 110: 110 V_{DC} lines

> AT-3501: RF SPD TESTER: Radiofrequency SPD tester

Tested and certified as a **type 3** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

- Protection in common and differential mode is advisable for this type of line.
- Includes removable module that can be replaced in the event of a breakdown or fault without needing to disconnect the wiring. The power supply is not interrupted when replacing the module.
- It has a radiofrequency receptor in order to carry out maintenance using only an emitter kit. When the RF SPD Tester is applied and the protector is working, the LED flickers green. If the cartridge is damaged, the LED does not light up.
- Wide variety of protectors for different working voltages.
- It remains inactive in normal conditions, without affecting normal operation of the line and or producing leakages.
- Discharge takes place in an internal encapsulated element, with no external flash.
- Low residual voltage for all operating voltages.
- Very fast response time.
- Mechanical connection of conductors using screws, in order to absorb a higher amount of overvoltage.

ATVOLT protectors have been tested and certified in **official and independent laboratories,** obtaining their characteristics according to relevant standards (related in the table).

Effective protection for **DC supply lines** in modules containing **medium and tight coordinated protection** for one pair of wires.

> INSTALLATION

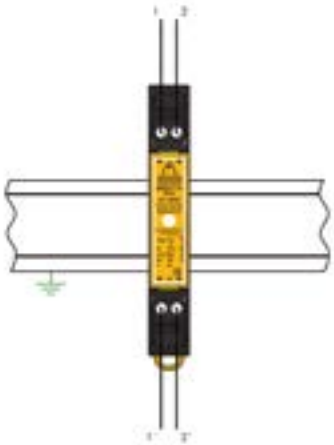
ATVOLT surge protection devices are to be installed **in series** with the DC supply line, cutting the cables and connecting the positive and negative terminals to the corresponding connectors. It is very important to pay close attention to these connections, since a wrong connection could cause short-circuits in the power supply.

It is also essential to correctly connect the input and output terminals. Otherwise the protector components will not work properly.

It is essential to connect the DIN rail to the earth termination system, where the current associated with the overvoltage will have to be channelled.

ATVOLT protectors should preferably be installed **as close to the equipment as possible.**

The power should be disconnected during protector installation.



Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> PROTECTION OF SPECIAL EQUIPMENT POWER SUPPLY

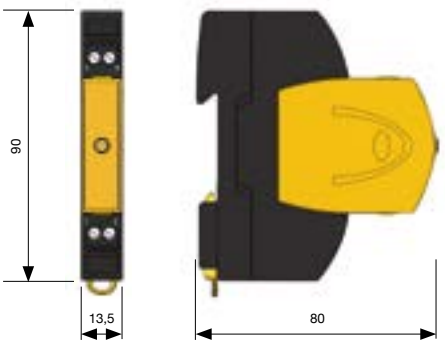
> ATVOLT series

> TECHNICAL DATASHEET

Reference:		ATVOLT 5 **AT-8505**	ATVOLT 12 **AT-8512**	ATVOLT 15 **AT-8515**	ATVOLT 24 **AT-8524**	ATVOLT 30 **AT-8530**
Protection categories according to the REBT:		I, II, III, IV				
Type of tests according to EN 61643-11:		Type 3				
Nominal voltage:	U_n	5 V_{DC}	12 V_{DC}	15 V_{DC}	24 V_{DC}	30 V_{DC}
Maximum continuous operating voltage:	U_c	7 V_{DC}	15 V_{DC}	18 V_{DC}	31 V_{DC}	37 V_{DC}
Maximum operating current:	I_L	3 A				
Nominal discharge current per pole (8/20 µs):	I_n	5 kA				
Combined wave voltage:	$U_{o.c.}$	10 kV				
Protection level at I_n: 8/20 µs wave	$U_p(I_n)$	100 V			120 V	150 V
Response time:	t_r	< 10 ns				
Working temperature:	ϑ	-40 ºC to +70 ºC				
Protector location:		Indoor				
Type of connection:		Series (two ports)				
No. of poles:		2				
Dimensions:		13.5 x 90 x 80 mm (0.75 modules DIN 43880)				
Fixing:		DIN Rail				
Enclosure material:		Polyamide				
Enclosure protection:		IP20				
Insulation resistance:		> 10^{14} Ω				
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)				
Connections:		4 mm^2 maximum section				

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> ACCESSORIES

> AT-8506: ATVOLT 5 Mod.: 5 V_{DC} lines
> AT-8513: ATVOLT 12 Mod.: 12 V_{DC} lines
> AT-8516: ATVOLT 15 Mod.: 15 V_{DC} lines
> AT-8525: ATVOLT 24 Mod.: 24 V_{DC} lines
> AT-8531: ATVOLT 30 Mod.: 30 V_{DC} lines

> PROTECTION OF SPECIAL EQUIPMENT POWER SUPPLY

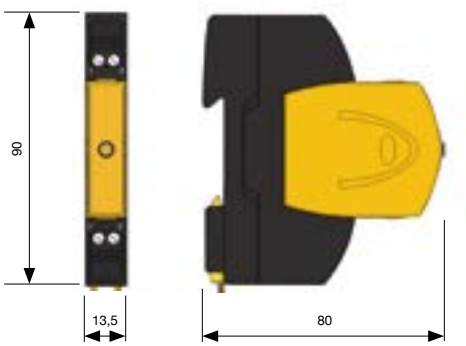
> ATVOLT series

> TECHNICAL DATASHEET

Reference:		ATVOLT 48 **AT-8548**	ATVOLT 60 **AT-8560**	ATVOLT 80 **AT-8580**	ATVOLT 110 **AT-8510**
Protection categories according to the REBT:		I, II, III, IV			
Type of tests according to EN 61643-11:		Type 3			
Nominal voltage:	U_n	48 V_{DC}	60 V_{DC}	80 V_{DC}	110 V_{DC}
Maximum continuous operating voltage:	U_c	65 V_{DC}	72 V_{DC}	96 V_{DC}	132 V_{DC}
Maximum operating current:	I_L	3 A			
Nominal discharge current per pole (8/20 µs):	I_n	5 kA			
Combined wave voltage:	$U_{o.c.}$	10 kV			
Protection level for I_n (8/20 µs wave):	$U_p(I_n)$	240 V	300 V	400 V	
Response time:	t_r	< 10 ns			
Working temperature:	ϑ	-40 °C to +70 °C			
Protector location:		Indoor			
Type of connection:		Series (two ports)			
No. of poles:		2			
Dimensions:		13.5 x 90 x 80 mm (0.75 modules DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Insulation resistance:		> 10^{14} Ω			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections:		4 mm^2 maximum section			

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> ACCESSORIES

> AT-8550: ATVOLT 48 Mod.: 48 V_{DC} lines
> AT-8561: ATVOLT 60 Mod.: 60 V_{DC} lines
> AT-8581: ATVOLT 80 Mod.: 80 V_{DC} lines
> AT-8511: ATVOLT 110 Mod.: 110 V_{DC} lines

> PROTECTION OF SPECIAL EQUIPMENT POWER SUPPLY

> ATVOLT P series

> ATVOLT P

DC power supply protector

> **AT-8590: ATVOLT P5**: 5 V_{DC} lines
> **AT-8514: ATVOLT P12**: 12 V_{DC} lines
> **AT-8526: ATVOLT P24**: 24 V_{DC} lines
> **AT-8549: ATVOLT P48**: 48 V_{DC} lines

Tested and certified as a **type 2** protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

- Wide variety of protectors for different operating voltages.
- It remains inactive in normal conditions, without affecting normal line operation.
- Discharge takes place in an internal encapsulated element with no external flash.
- Mechanical connection of conductors using screws, in order to absorb a higher amount of overvoltage.
- Possibility of connection to M5 fork terminal.
- Quick response.

ATVOLT P protectors have been tested and certified in **official and independent laboratories,** obtaining their characteristics according to relevant standards (related in the table).

Effective protection for **DC supply lines** in modules containing **medium protection** for one pair of wires.

> INSTALLATION

ATVOLT P surge protection devices are to be installed **in parallel** connected to positive and negative lines and to the ground. It can be installed as the only protection or in combination with other protectors that withstand higher discharge currents. In this case, it is necessary for both to be separated by at least 10 metres of cable or, if this is not possible, by an ATLINK decoupling inductor in order to achieve **correct coordintation between them.**

The lower terminal must be connected to the earth termination system, where the associated overvoltage current will be channelled.

ATVOLT P protectors should preferably be installed **as close to the equipment as possible.**

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> PROTECTION OF SPECIAL EQUIPMENT POWER SUPPLY

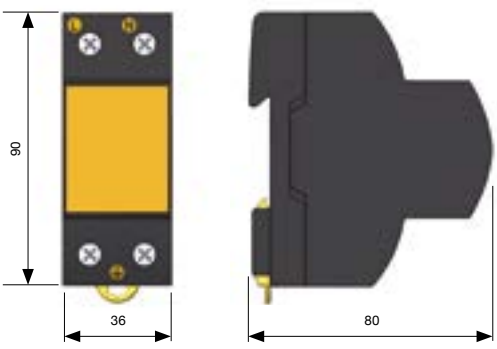
> ATVOLT P series

> TECHNICAL DATASHEET

Reference:		ATVOLT P5 **AT-8590**	ATVOLT P12 **AT-8514**	ATVOLT P24 **AT-8526**	ATVOLT P48 **AT-8549**
Protection categories according to the REBT:		I, II, III, IV			
Type of tests according to EN 61643-11:		Type 2+3			
Nominal voltage:	U_n	5 V_{DC}	12 V_{DC}	24 V_{DC}	48 V_{DC}
Maximum continuous operating voltage:	U_c	7 V_{DC}	15 V_{DC}	31 V_{DC}	65 V_{DC}
Nominal discharge current per pole (8/20 µs):	I_n	5 kA			
Maximum discharge current per pole (8/20 µs wave):	I_{max}	10 kA			
Combined wave voltage:	$U_{o.c}$	6 kV			
Protection level for I_n (8/20 µs wave):	$U_p(I_n)$	500 V	570 V	630 V	730 V
Response time:	t_r	< 25 ns			
Working temperature:	ϑ	-40 ºC to +70 ºC			
Protector location:		Indoor			
Type of connection:		Parallel (one port)			
No. of poles:		2			
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Insulation resistance:		> 10^{14} Ω			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections:		Min/Max multi-stranded section: 4 / 35 mm^2 Min/Max single-stranded section: 1 / 35 mm^2			

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION OF SPECIAL EQUIPMENT POWER SUPPLY

> ATCOMBO series

> ATCOMBO

Protection of power supply lines with Schuko base

> **AT-8113 ATCOMBO 230**: 230 V_{AC} lines
> **AT-8115 ATCOMBO 130**: 130 V_{AC} lines
> **AT-9320 ATCOMBO 12**: 12 V_{DC} lines
> **AT-9325 ATCOMBO 24**: 24 V_{DC} lines
> **AT-9326 ATCOMBO 48**: 48 V_{DC} lines

- Contains the protectors with lower residual voltage (ATCOVER, ATVOLT).
- Compact box, fully wired and easy to install.
- Discharge takes place in an internal encapsulated element with no external flash.
- It remains inactive in normal conditions, without affecting normal operation of the line and or producing leakages.
- Can be coordinated with other SPDs such as ATSHOCK, ATSHIELD and ATSUB series.
- Both common and differential protection.
- No interruptions in power supply, thus preventing data loss and other inconveniences for the user.
- Wide variety of protectors for different working voltages.
- Mechanical connection of conductors using screws, in order to absorb a higher amount of overvoltage.

The protectors in the ATCOMBO series have been tested in **official and independent laboratories,** obtaining their characteristics according to relevant standards.

ATCOMBO series are power supply protection boxes with specific Schuko sockets to facilitate equipment connection.

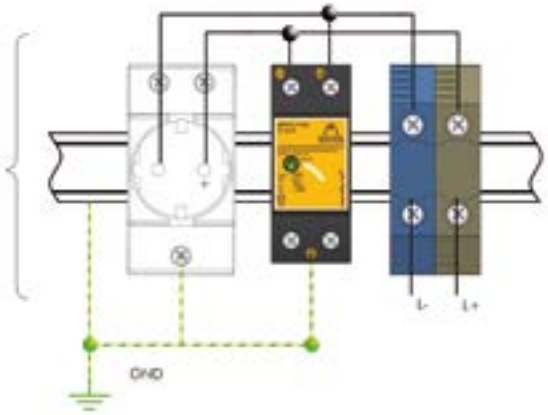
> INSTALLATION

ATCOMBO boxes are to be installed in **in parallel** with the low voltage line, connected to line/s, neutral and ground. **Fuses or circuit breakers must be present upstream.** They will be disconnected during installation for operator safety.

Installation is recommended where **direct lightning currents** could penetrate and very sensitive equipment is connected, without enough space between the coarse and tight protection.

Special care should be taken when there is an **ATCOMBO box containing ATVOLT protectors,** since the polarity could be altered.

ATCOMBO



Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> PROTECTION OF SPECIAL EQUIPMENT POWER SUPPLY

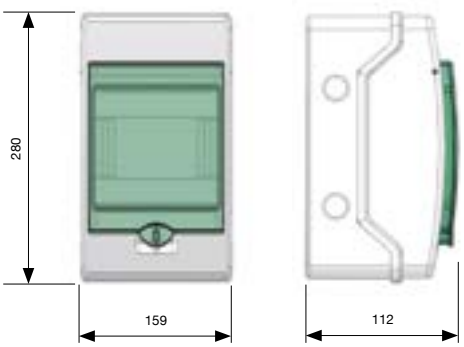
> ATCOMBO series

> TECHNICAL DATASHEET

Reference:		ATCOMBO 230 **AT-8113**	ATCOMBO 130 **AT-8115**	ATCOMBO 12 **AT-9320**	ATCOMBO 24 **AT-9325**	ATCOMBO 48 **AT-9326**
Protection categories according to the REBT:		I, II, III, IV				
Type of tests according to EN 61643-11:		1 + 2 + 3		2 + 3		
Nominal voltage:	U_n	230 V_{AC} (50 Hz)	130 V_{AC} (50 Hz)	12 V_{DC}	24 V_{DC}	48 V_{DC}
Maximum continuous operating voltage:	U_c	275 V_{AC} (50 Hz)	145 V_{AC} (50 Hz)	15 V_{DC}	31 V_{DC}	65 V_{DC}
Nominal discharge current per pole (8/20 µs wave):	I_n	10 kA		5 kA		
Maximum discharge current per pole (8/20 µs wave):	I_{max}	30 kA		10 kA		
Impulse current per pole (10/350 µs wave):	I_{imp}	6 kA		-		
Protection level for I_n (8/20 µs wave):	$U_p(I_n)$	900 V	700 V	570 V	630 V	730 V
Combined wave voltage:	$U_{o.c.}$	6 kV				
Response time:	t_r	< 25 ns				
Working temperature:	ϑ	-40 °C to +70 °C				
Dimensions:		200 x 267 x 112 mm		280 x 159 x 112 mm		
Protector location:		Outdoor				
Type of connection:		Parallel (one port)				
No. of poles:		2				
Fixing:		Wall or vertical support				
Box material:		Self-extinguishing, insulating				
IP Code:		IP65 according to IEC 60.529				
Insulation:		Double (class II)				
Fire resistance:		650 °C according to IEC 60695-2-1				
Impact protection:		IK09 according to EN 50.102				
Connections:		25 mm² maximum section		4 mm² maximum section		

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> POWER SUPPLY PROTECTION FOR AREAS WITH LOW OVERVOLTAGES

This protection is especially designed for working in coordination with the power supply protection already seen in previous sections. Usually, we talk about tight protection, whereas in other sections we referred to coarse or medium protection.

This aims to protect equipment that is more sensitive to overvoltages (computer systems, measurement or electronic equipment etc.) and designed for the end user.

It is also the most flexible since it allows protection for both installations (distribution board) and workstations or a particular piece of equipment.

Aplicaciones Tecnológicas protectors display coordinated protection of the complete electrical installation from the mains to the end user equipment, leaving protection levels around its maximum working voltage.

> ATSOCKET series

Protectors for indoor power supply installation.

> ATPLUG series

Protectors for already installed power supply sockets.

> POWER SUPPLY PROTECTION FOR AREAS WITH LOW OVERVOLTAGES

> ATSOCKET series

> ATSOCKET

Indoor protector for power supply lines

> **AT-9501 ATSOCKET**: Single-phase protection. I_n = 3 kA
> **AT-9505 ATSOCKET 5 kA**: Single-phase protection. I_n = 5 kA

Its small size allows its fitting close to the voltage sockets that will be used by customers.

It contains effective protection against transient overvoltages for single-phase power supply lines. **Tight** protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

Type 2 and 3 protectors according to EN 61643-11 and GUIA-BT-23 from REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

- Can be coordinated with other protectors such as those from the ATSHOCK, ATSHIELD, ATSUB and ATCOVER series.
- Short response time.
- Do not produce deflagration.
- They do not cause any interruption to the power supply.
- Small size modular protection.
- Thermodynamic control device and sounding alarm (only AT-9501).

ATSOCKET series protectors have been tested in **official and independent laboratories** obtaining their characteristics according to applicable standards (shown in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

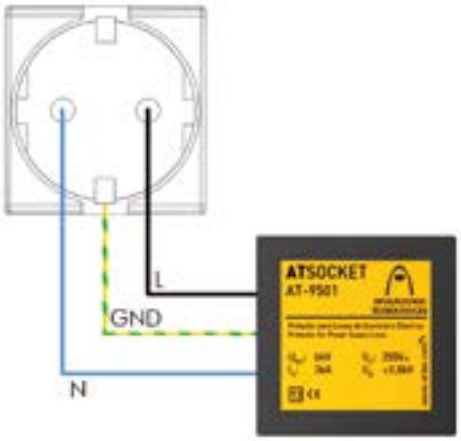
This protector is designed for its connection inside the cable channels that feed the sockets. **Especially designed for outdoor and street lighting**.

> INSTALLATION

To be installed **in parallel** with the low voltage power supply line, with connections to phase to be protected, neutral and ground.

Installation should be carried out **without power running through the line**.

Its use is recommended in systems where equipment sensitive to overvoltages is installed (computers, printers, servers etc.) and always coordinated with type 1 or 2 protectors.



> POWER SUPPLY PROTECTION FOR AREAS WITH LOW OVERVOLTAGES

> ATSOCKET series

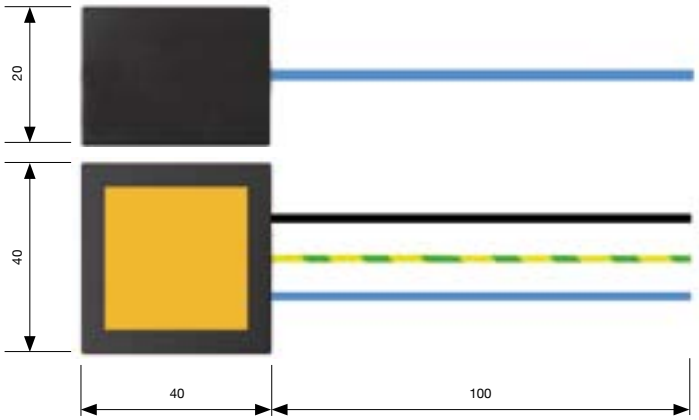
> ATSOCKET

> TECHNICAL DATASHEET

Reference:		ATSOCKET **AT-9501**	ATSOCKET 5 kA **AT-9505**
Protection categories according to the REBT:		I, II, III and IV	
Type of tests according to EN 61643-11:		Type 3	Type 2 + 3
Nominal voltage:	U_n	230 V_{AC}	
Maximum continuous operating voltage:	U_c	275 V_{AC}	400 V_{AC}
Nominal frequency:		50 – 60 Hz	
Nominal discharge current (8/20 µs wave):	I_n	3 kA	5 kA
Maximum discharge current (8/20 µs wave):	I_{max}	-	15 kA
Combined wave voltage:	$U_{o.c.}$	6 kV	10 kV
Protection level for I_n (8/20 µs wave):	$U_p(I_n)$	800 V	1400 V
Response time:	t_r	< 10 ns	
Working temperature:	ϑ	-40 ºC to +70 ºC	
Dimensions:		40 x 40 x 20 mm	
Protector location:		Indoor	
Type of connection:		Parallel (one port)	phase in series / neutral in parallel
No. of poles:		2	
Enclosure material:		ABS	
Enclosure protection:		IP20	
Insulation resistance:		> 10^{14} Ω	
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)	
Connections L/N/G:		Section 1.5 mm^2 Length 100 mm	

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> POWER SUPPLY PROTECTION FOR AREAS WITH LOW OVERVOLTAGES

> ATPLUG series

> ATPLUG

Electrical plug-in protector

> **AT-9601 ATPLUG**: Single-phase line protection for Schuko type plug.

It contains effective protection against transient overvoltages for single-phase power supply lines. **Tight** protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

Its installation is simple and intuitive, complementing the load to be protected regardless of where it is placed.

Type 3 protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

- Can be coordinated with other ATSHOCK, ATSHIELD, ATSUB and ATCOVER series protectors.
- Short response time.
- Do not produce deflagration.
- No interruptions in power supply at any time.
- Thermodynamic control device and visual alarm. When the protector is OK, the green light is illuminated. When there is a failure, the light turns off.

ATPLUG series protectors have been tested in **official and independent laboratories,** obtaining their characteristics according to relevant standards (shown in the table).

This SPD is plugged directly in the same socket as the load to be protected.

> INSTALLATION

To be installed **in parallel** with the loads plugged to the charges that want to be protected.

Its use is recommended in systems where equipment sensitive to overvoltages is installed (computers, printers, servers etc.) and always coordinated with type 1 or 2 protectors.

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> POWER SUPPLY PROTECTION FOR AREAS WITH LOW OVERVOLTAGES

> ATPLUG series

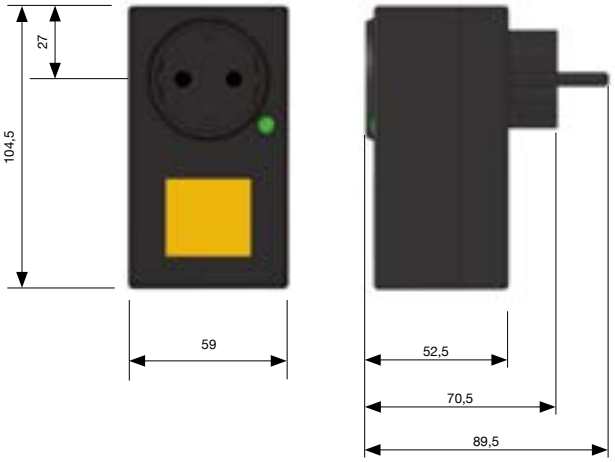
> ATPLUG

> TECHNICAL DATASHEET

Reference:		ATPLUG **AT-9601**
Protection categories according to the REBT:		I, II, III and IV
Type of tests according to EN 61643-11:		Type 3
Nominal voltage:	U_n	230 V_{AC}
Maximum continuous operating voltage:	U_c	275 V_{AC}
Nominal frequency:		50 - 60Hz
Nominal discharge current (8/20 µs wave):	I_n	3 kA
Combined wave voltage:	$U_{o.c.}$	6 kV
Protection level for I_n (8/20 µs wave):	$U_p(I_n)$	800 V
Response time:	t_r	< 10 ns
Working temperature:	ϑ	-40 °C to +70 °C
Dimensions:		105 x 90 x 59 mm
Protector location:		Outdoor
Type of connection:		Parallel (one port)
No. of poles:		2
Enclosure material:		ABS
Enclosure protection:		IP20
Insulation resistance:		> 10^{14} Ω
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> POWER SUPPLY PROTECTION FOR AREAS WITH LOW OVERVOLTAGES

> ATPLUG series

> ATPLUG 130V

Electrical plug-in protector

> **AT-9602 ATPLUG 130V**: Single-phase line protection for type B NEMA 5 plug.

It contains effective protection against transient overvoltages for single-phase power supply lines. **Tight** protection according to the cascade protection recommended in the Spanish Low Voltage Regulations (REBT ITC23).

Its installation is simple and intuitive, complementing the load to be protected regardless of where it is placed.

Type 3 protector according to the standard EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

- Can be coordinated with other ATSHOCK, ATSHIELD, ATSUB and ATCOVER series protectors.
- Short response time.
- Do not produce deflagration.
- No interruptions in power supply at any time.
- Thermodynamic control device and visual alarm. When the protector is OK, the green light is illuminated. When there is a failure, the light turns off.

ATPLUG series protectors have been tested in **official and independent laboratories,** obtaining their characteristics according to relevant standards (shown in the table).

This SPD is plugged directly in the same socket as the load to be protected.

> INSTALLATION

To be installed **in parallel** with the loads plugged to the charges that want to be protected.

Its use is recommended in systems where equipment sensitive to overvoltages is installed (computers, printers, servers etc.) and always coordinated with type 1 or 2 protectors.

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> POWER SUPPLY PROTECTION FOR AREAS WITH LOW OVERVOLTAGES

> ATPLUG series

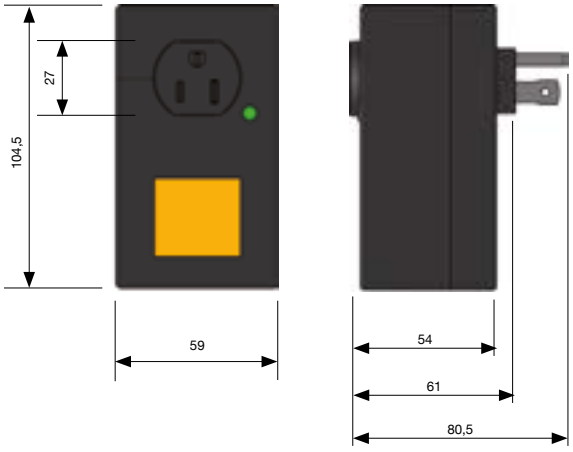
> ATPLUG 130V

> TECHNICAL DATASHEET

Reference:		ATPLUG **AT-9602**
Protection categories according to the REBT:		I, II, III and IV
Type of tests according to EN 61643-11:		Type 3
Nominal voltage:	U_n	130 V_{AC}
Maximum continuous operating voltage:	U_c	170 V_{AC}
Nominal frequency:		50 - 60 Hz
Nominal discharge current (8/20 µs wave):	I_n	3 kA
Combined wave voltage:	$U_{o.c.}$	6 kV
Protection level for I_n (8/20 µs wave):	$U_p(I_n)$	800 V
Response time:	t_r	< 10 ns
Working temperature:	ϑ	-40 °C to +70 °C
Dimensions:		105 x 80 x 59 mm
Protector location:		Outdoor
Type of connection:		Parallel (one port)
No. of poles:		2
Enclosure material:		ABS
Enclosure protection:		IP20
Insulation resistance:		> 10^{14} Ω
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)

Certificated tests according to: UNE-EN 61643-11
Complies with requirements of: UL 1449
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

Surges often enter structures via telephone and data lines, thus affecting the equipment. Just like power supply lines, they can cover large distances and connect very sensitive electronic equipment. Besides, telephone and data lines usually drive very low currents and reach the most fragile components. In any electronic machine it is easy to see that the electrical power supply area is made up of more robust elements, while data communication lines directly connect to integrated circuits, other electronic components through the printed board thin tracks. Surges can cause severe damage in these tracks and components, deteriorating or destroying them and also affecting the data they store.

Telephone lines connect not only phone terminals but also more important and sensitive equipment, such as faxes and modems, inside and outside computers.

Furthermore, one of the consequences of the global use of the internet is that many machines (PLCs, electrical household appliances etc.) activate through the data line (home automation). This gives rise to the appearance of a new trend which consists of designing all kinds of devices for controlling electronic equipment from remote distances. This process often means the multiplication of cross-connections and wiring between devices that are placed in separate buildings or with different earthing systems. The risk of overvoltages damaging the equipment then increases considerably, causing great financial loss not only due to the equipment damage but also the delay or cancellation of the processes and the services they should provide. Protecting communication lines against overvoltages can prevent all these problems.

Data and telephone lines require a previous study of the systems to be protected. Telecommunications is a field in constant evolution, where high precision is required and many different procedures exist. Each transmission protocol has its own working voltage, type of connection, pin-out, etc. All of this data should be known before designing an overvoltage protection strategy which, firstly, does not affect the user and, secondly, is effective against transient overvoltages.

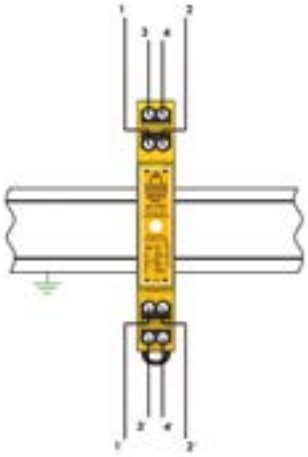
Aplicaciones Tecnológicas, S.A. supplies specific protectors for the most common working conditions. Besides, being manufacturers, we can develop new devices for new types of telecommunication that appear on the market. Our protectors usually have screw-in terminals which are able to withstand greater overvoltages than standard connectors (RJ11, RJ45 and DB9).

Telephone lines connect not only phone terminals but also more important and sensitive equipment, such as faxes and modems, inside and outside computers.

> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

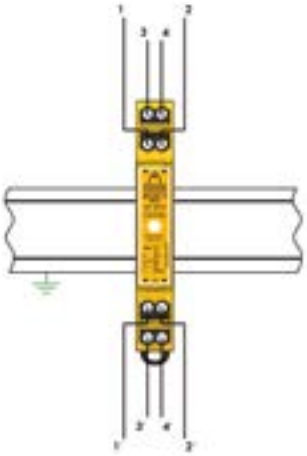
> ATFONO series

Protection of telephone lines (analogue, ADSL, RDSI).



> ATLINE series

Data line protection with a wide range of working voltages.



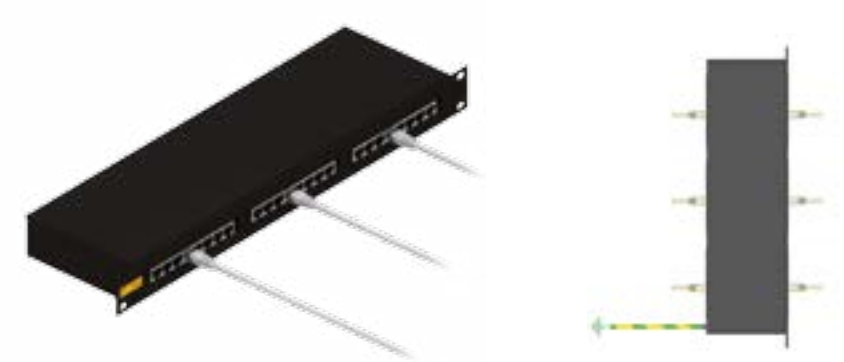
> ATLAN series

Protectors for RJ45 computer lines and internal network (switches, hubs).

> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> ATLAN 24/16/8 series

Computer network overvoltage protection for rack.



> ATLAN 12/8/4 CAT6 series

Computer network overvoltage protection for rack with category 6 wiring.

> ATDB9 series

Protection of data lines and communication buses with type DB9 connector.

> ATFREQ series

Coaxial cable protectors (TV, CCTV and high frequency signals).

> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> ATFONO series

> ATFONO

Modular protector against overvoltages for telephone lines for DIN rail

> **AT-9101 ATFONO**: for two pairs of telephone lines.

> AT-3501: RF SPD TESTER: Radiofrequency SPD tester

Effective protection for **analogical and ADSL telephone lines** in modules containing **coordinated protection for 2 pairs of wires.**

- Both common and differential protection recommended for this type of line.
- Connects up to 2 pairs of lines that are very small in size (0.75 DIN modules).
- Protection for telephone lines and also for the digital and analogical equipment connected to these lines (fax, modem, etc).
- Includes removable module that can be replaced in the event of a breakdown or fault without needing to disconnect the wiring. The power supply is not interrupted when replacing the module.
- It has a radiofrequency receptor in order to carry out maintenance using only an emitter kit. When the RF SPD tester is applied and the protector is working, the LED flickers green. If the cartridge is damaged, the LED does not light up.
- Earthing system is introduced through a metal sheet opposite to the fixing on the DIN rail.
- In normal conditions, it remains inactive without affecting line operation or producing any leakages.
- Discharge takes place in an internal encapsulated element with no external flash.
- Very fast response time.
- Conductors are connected using screws, which enable them to absorb a greater amount of the overvoltage.

The ATFONO protector has been tested in **official and independent laboratories**, obtaining their characteristics according to relevant standards (shown in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

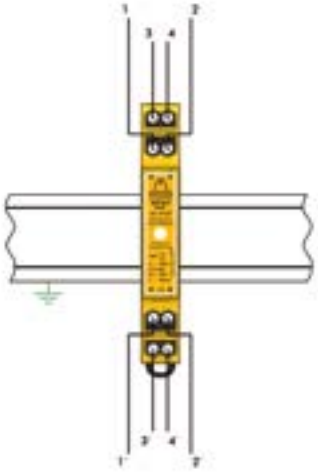
> INSTALLATION

ATFONO protectors are to be installed **in series** with the telephone line, at the point where the line **enters the building**, always respecting the telephone company indications.

When the 2 pieces of equipment to be protected are placed in **different buildings and interlinked,** the protection device should be placed both where the line goes into and out of the buildings.

The **recommended procedure** for installation is the following:

1. Cut the telephone cable.
2. Insert the telephone ends into the connectors. Carefully check that the input and output connections are correctly placed.
3. Connect the DIN rail to the earth terminal, since the overvoltage will be diverted to this element.



> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

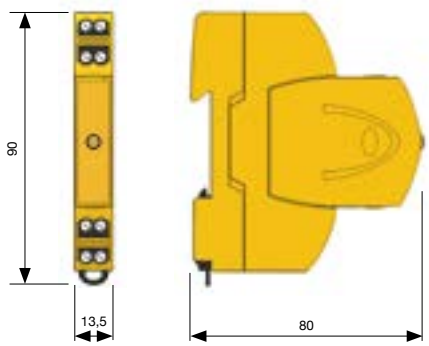
> ATFONO series

> TECHNICAL DATASHEET

Reference:		ATFONO **AT-9101**
Nominal voltage:	U_n	130 V_{DC}
Maximum continuous operating voltage:	U_c	220 $V_{AC, DC}$
Nominal discharge current per line C2 4 kV (1.2/50 µs) / 2 kA (8/20 µs):	$I_n(C_2)$	2 kA
Total nominal discharge current C2 4 kV (1.2/50 µs) / 2 kA (8/20 µs):		8 kA
Protection level:	U_p	270 V
Maximum operating current:	I_L	360 mA
Series resistance:	R_s	15 Ω
Response time:	t_r	< 10 ns
Working temperature:	ϑ	-40 °C to +70 °C
Protector location:		Indoor
Type of connection:		Series (two ports)
No. of poles:		4
Dimensions:		13.5 x 90 x 80 mm (0.75 modules DIN 43880)
Fixing:		DIN Rail
Enclosure material:		Polyamide
Enclosure protection:		IP20
Insulation resistance:		> 10^{14} Ω
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)
Connections:		4 mm^2 maximum section

Certificated tests according to: UNE-EN 61643-21
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> ACCESSORIES

> AT-9107: ATFONO Mod.: Telephone lines up to 220 V_{AC}

> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> ATFONO series

> ATFONO RJ11

Protector for telephone lines with RJ11 connection

> **AT-9104 ATFONO RJ11**: for telephone lines with RJ11 connection type.

ATFONO RJ11 is a protector with **RJ11 input and output** connectors, able to withstand nominal discharge currents of 2 kA for each line.

- Both common and differential protection recommended for this type of line.
- Protection for telephone lines and also for the digital and analogical equipment connected to these lines (fax, modem, etc).
- In normal conditions, it remains inactive without affecting line operation or producing any leakages.
- Discharge takes place in an internal encapsulated element with no external flash.
- Very fast response time.
- Includes 20 cm cable with RJ11 connector.

The ATFONO RJ11 protector has been tested in **official and independent laboratories,** obtaining their characteristics according to relevant standards (shown in the table).

Effective protection for **telephone lines with RJ11** connectors in modules with **tight protection.**

> INSTALLATION

It is recommended that installation is carried out **as close as possible to the equipment**. A telephone cable with a RJ11 connector has 4 wires. The ATFONO RJ11 protects these two pairs of wires **in series**.

For full protection, it must be coordinated with an ATFONO protector at the main line input.

When the 2 devices to be protected are placed in **different buildings and intercommunicated,** protectors should be placed on both sides of the line.

The **recommended procedure** for installation is the following:

1. Insert the protector between the cable with RJ11 connector and the equipment to be protected.
2. Bond the protector to earth through the provided 'faston' type connector.

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

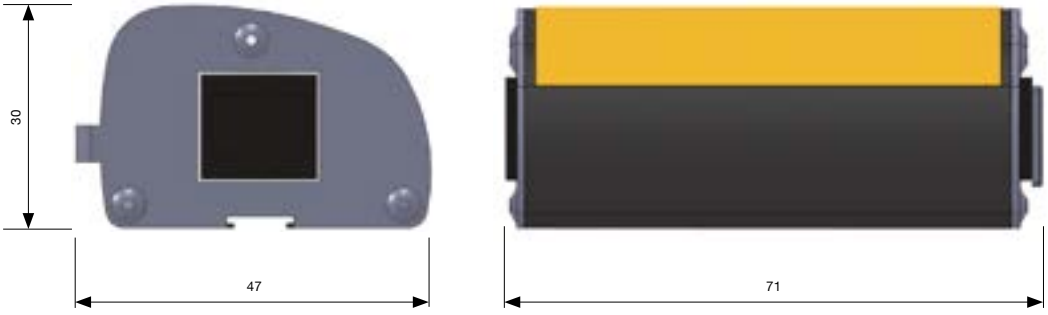
> ATFONO series

> TECHNICAL DATASHEET

Reference:		ATFONO RJ11 **AT-9104**
Nominal voltage:	U_n	130 V_{DC}
Maximum continuous operating voltage:	Uc	220 $V_{AC, DC}$
Nominal discharge current per line C2 4 kV (1.2/50 µs) / 2 kA (8/20 µs):	I_n(C2)	2 kA
Protection level:	U_p	270 V
Maximum operating current:	I_L	300 mA
Series resistance:	R_s	15 Ω
Response time:	t_r	< 10 ns
Working temperature:	ϑ	-40 ºC to +70 ºC
Protector location:		Indoor
Type of connection:		Series (two ports)
No. of pairs protected:		2 pairs
Dimensions:		68 x 47 x 30 mm
Enclosure material:		Aluminium
Enclosure protection:		IP20
Input / output connector:		RJ11 / RJ11
Earthing system:		6 mm faston

Certificated tests according to: UNE-EN 61643-21
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> ATFONO series

> ATFONO RJ45

Protector for telephone lines with RJ45 connection

> **AT-9108 ATFONO RJ45**: for telephone lines with RJ45 type connection.

Effective protection for telephone lines with RJ45 connectors in modules with **tight protection**.

The ATFONO RJ45 is a protector with **RJ45 input and output connectors,** able to withstand nominal discharge currents of 2 kA for each line.

- Both common and differential protection recommended for this type of line.
- Protection for telephone lines and also for the digital and analogical equipment connected to these lines (fax, modem, etc).
- In normal conditions, it remains inactive without affecting line operation or producing any leakages.
- Discharge takes place in an internal encapsulated element with no external flash.
- Very fast response time.
- Includes 50 cm cable with RJ45 connector.

The ATFONO RJ45 protector has been tested in **official and independent laboratories,** obtaining their characteristics according to relevant standards (shown in the table).

Effective protection for **telephone lines with RJ45** connectors in modules with **tight protection.**

> INSTALLATION

It is recommended that installation is carried out **as close as possible to the equipment**. A telephone cable with a RJ45 connector has 4 wires. The ATFONO RJ45 protects these two pairs of wires in series.

For full protection, it must be coordinated with an ATFONO protector at the main line input.

When the 2 devices to be protected are placed in **different buildings and intercommunicated,** protectors should be placed on both sides of the line.

The **recommended procedure** for installation is the following:

1. Insert the protector between the cable with RJ45 connector and the equipment to be protected.
2. Bond the protector to the ground using the 'faston' type connector provided.

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

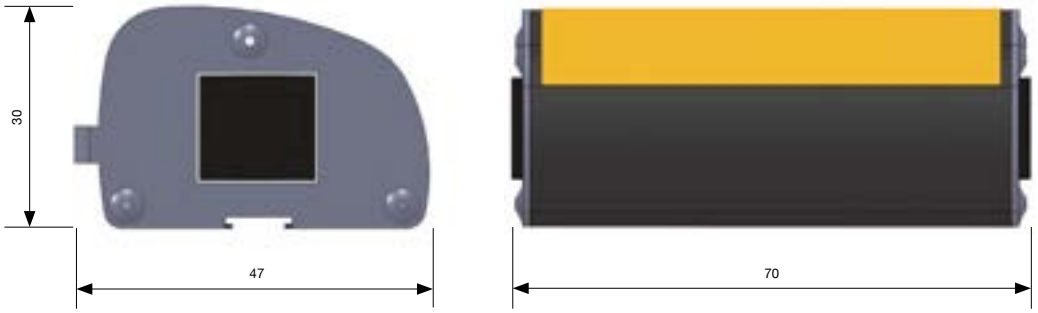
> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> ATFONO series

> TECHNICAL DATASHEET

Reference:		ATFONO RJ45 **AT-9108**
Nominal voltage:	U_n	130 V_{DC}
Maximum continuous operating voltage:	U_c	220 $V_{AC, DC}$
Nominal discharge current per line C2 4 kV (1.2/50 µs) / 2 kA (8/20 µs):	I_n(C2)	2 kA
Protection level:	U_p	270 V
Maximum operating current:	I_L	300 mA
Series resistance:	R_s	15 Ω
Response time:	t_r	< 10 ns
Working temperature:	ϑ	-40 ºC to +70 ºC
Protector location:		Indoor
Type of connection:		Series (two ports)
No. of pairs protected:		2 pairs
Dimensions:		68 x 47 x 30 mm
Enclosure material:		Aluminium
Enclosure protection:		IP20
Input / output connector:		RJ45 / RJ45 shielded
Earthing system:		6 mm faston
Certificated tests according to: UNE-EN 61643-21 Relevant standards: UNE 21186, NF C 17-102, IEC 62305		

> DIMENSIONS (mm)



> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> ATFONO series

> ATFONO KRONE / R&M

Protector for telephone lines for KRONE or Reichle & De-Massari connections with earthing terminal

> **AT-9105 ATFONO R&M1**: coordinated protection for telephone lines connected to Reichle & De-Massari connections.

> **AT-9106 ATFONO R&M2**: tight protection for telephone lines with Reichle & De-Massari connections.

> **AT-9109 ATFONO KRONE**: coordinated protection for telephone lines connected to Reichle & De-Massari connections.

This is a modular and removable plug-in protector, able to withstand nominal discharge nominal currents of 5 kA for each line.

- Protection for telephone lines and also for the digital and analogical equipment connected to these lines (fax, modem, etc).
- Compact, removable and small in size.
- In normal conditions, it remains inactive without affecting line operation or producing any leakages.
- Discharge takes place in an internal encapsulated element with no external flash.
- Very fast response time.
- It has a testing system in the front part to check the protector's status.
- The earthing system is introduced through a slot connected to the earthing terminal tab of the Reichle & De-Massari or Krone connection.

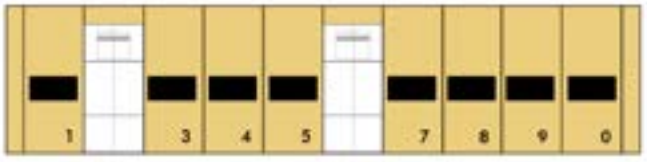
This protector has been tested in **official and independent laboratories**, obtaining their characteristics according to relevant standards (shown in the table).

Effective protection for **telephone lines with KRONE or Reichle & De-Massari connections** in modules with **medium and tight coordinated protection** for 1 pair of wires.

> INSTALLATION

ATFONO R&M / KRONE is to be installed **in series** with the telephone line, on the input connection line, always respecting the indications from the telephone company.

When the 2 devices to be protected are placed in **different buildings and interlinked,** protectors should be placed on both sides of the line.



Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

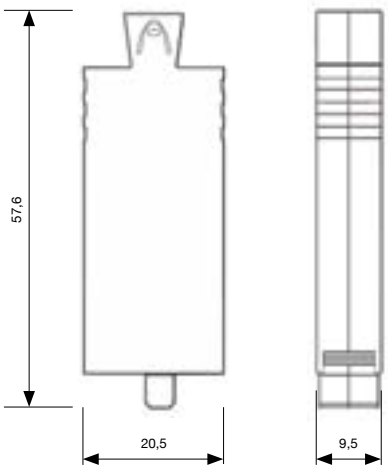
> ATFONO series

> TECHNICAL DATASHEET

Reference:		ATFONO R&M1 **AT-9105**	ATFONO R&M2 **AT-9106**	ATFONO KRONE **AT-9109**
Nominal voltage:	U_n	110 V_{DC}		
Maximum continuous operating voltage:	U_c	180 V_{DC}		
Nominal discharge current (8/20 µs wave):	I_n	5 kA	100 A	5 kA
Protection level for I_n (8/20 µs wave):	U_p	390 V		300 V
Maximum operating current:	I_L	100 mA		
Response time:	t_r	< 10 ns		
Working temperature:	ϑ	-40 °C to +70 °C		
Protector location:		Indoor		
Type of connection:		Series (two ports)		
No. of pairs protected:		1 pair		
Dimensions:		58 x 21 x 10 mm		
Enclosure material:		Polyamide		
Enclosure protection:		IP20		
Insulation resistance:		> 10^{14} Ω		
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)		

Certificated tests according to: UNE-EN 61643-21
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> ATLINE series

> ATLINE

Modular overvoltage protector for data lines for DIN rail

- > **AT-9205 ATLINE 5**: 5 V_{DC} lines
- > **AT-9212 ATLINE 12**: 12 V_{DC} lines
- > **AT-9215 ATLINE 15**: 15 V_{DC} lines
- > **AT-9224 ATLINE 24**: 24 V_{DC} lines
- > **AT-9230 ATLINE 30**: 30 V_{DC} lines
- > **AT-9248 ATLINE 48**: 48 V_{DC} lines
- > **AT-9260 ATLINE 60**: 60 V_{DC} lines
- > **AT-9280 ATLINE 80**: 80 V_{DC} lines
- > **AT-9210 ATLINE 110**: 110 V_{DC} lines

Effective protection for **data lines**, in modules with **medium and tight coordinated** protection for two pair of lines.

- > Protection for data lines and the digital or analogical equipment connected to them (computers, PLCs, load cells etc.).
- > Wide variety of protectors for different working voltages.
- > Both common and differential protection recommended for this type of line.
- > Connects up to two pairs of lines that are very small in size (0.75 DIN modules).
- > Includes removable module that can be replaced in the event of a breakdown or fault without needing to disconnect the wiring. The power supply is not interrupted when replacing the module.
- > It has a radiofrequency receptor in order to carry out maintenance using only an emitter kit. When the RF SPD Tester is applied and the protector is working, the LED flickers green. If the cartridge is damaged, the LED does not light up.
- > Earthing system is introduced through a metal sheet opposite to the fixing on the DIN rail.
- > In normal conditions, it remains inactive without affecting line operation or producing any leakages.
- > Discharge takes place in internal encapsulated elements with no external flash.
- > Low residual voltage for all operating voltages.
- > Very fast response time.
- > Mechanical connection of conductors using screws, in order to absorb a higher amount of overvoltage.

ATLINE protectors have been tested in **official and independent laboratories,** obtaining their characteristics according to relevant standards (shown in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

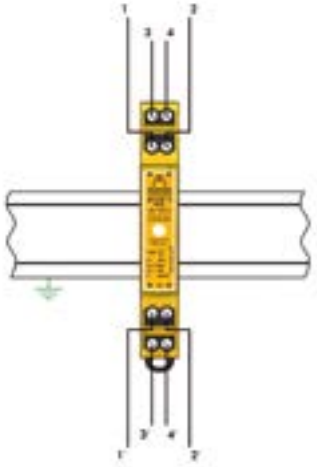
> INSTALLATION

It is recommended that installation is carried out **as close as possible to the equipment**. One communication cable or data line may contain several wires. Each ATLINE can protect up to four of these wires **in series**. It is very important to know **the working voltage, current and function of each wire precisely** in order to select the proper protector.

When the 2 devices to be protected are placed in **different buildings and interlinked,** protectors should be placed on both sides of the line.

The recommended installation procedure is the following:

1. Cut the data cable.
2. Insert the cable ends into the connectors. Carefully check that the input and output connections are correctly placed.
3. Connect the DIN rail to the earth terminal, since the overvoltage will be diverted to this element.



> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

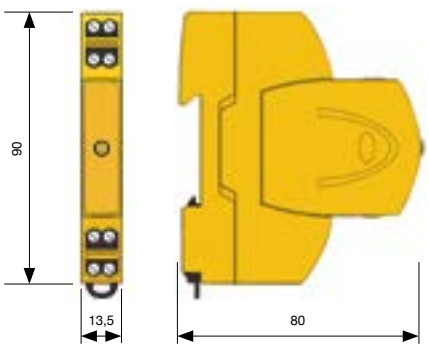
> ATLINE series

> TECHNICAL DATASHEET

Reference:		ATLINE5 **AT-9205**	ATLINE12 **AT-9212**	ATLINE15 **AT-9215**	ATLINE24 **AT-9224**	ATLINE30 **AT-9230**
Nominal voltage:	U_n	5 V_{DC}	12 V_{DC}	15 V_{DC}	24 V_{DC}	30 V_{DC}
Maximum continuous operating voltage:	U_c	7 $V_{AC, DC}$	15 $V_{AC, DC}$	18 $V_{AC, DC}$	31 $V_{AC, DC}$	37 $V_{AC, DC}$
Nominal discharge current per line C2 4 kV (1.2/50 µs) / 2 kA (8/20 µs):	I_n(C2)	2 kA				
Total nominal discharge current C2 4 kV (1.2/50 µs) / 2 kA (8/20 µs):		8 kA				
Protection level (1.2/50 µs):	U_p	66 V			70 V	
Nominal current:	I_n	360 mA				
Series resistance:	R_s	15 Ω				
Response time:	t_r	< 10 ns				
Protector location:		Indoor				
Type of connection:		Series (two ports)				
No. of poles:		4				
Working temperature:	ϑ	-40 ºC to +70 ºC				
Dimensions:		13.5 x 90 x 80 mm (0.75 modules DIN 43880)				
Fixing:		DIN Rail				
Enclosure material:		Polyamide				
Enclosure protection:		IP20				
Insulation resistance:		> 10^{14} Ω				
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)				
Connections:		4 mm^2 maximum section				

Certificated tests according to: UNE-EN 61643-21
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

DIMENSIONS (mm)



> ACCESSORIES

> AT-9206 ATLINE 5 Mod.: 5V_{DC} lines
> AT-9213 ATLINE 12 Mod.: 12V_{DC} lines
> AT-9216 ATLINE 15 Mod.:15V_{DC} lines
> AT-9225 ATLINE 24 Mod.:24V_{DC} lines
> AT-9231 ATLINE 30 Mod.:30V_{DC} lines

> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

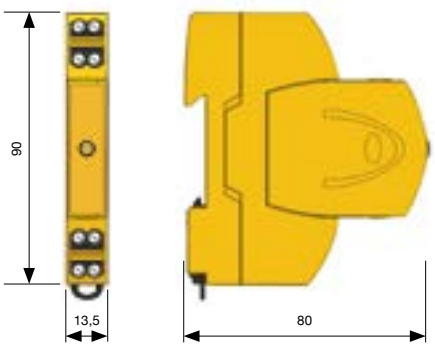
> ATLINE series

> TECHNICAL DATASHEET

Reference:		ATLINE48 **AT-9248**	ATLINE60 **AT-9260**	ATLINE80 **AT-9280**	ATLINE110 **AT-9210**
Nominal voltage:	U_n	48 V_{DC}	60 V_{DC}	80 V_{DC}	110 V_{DC}
Maximum continuous operating voltage:	U_c	65 $V_{AC, DC}$	72 $V_{AC, DC}$	96 $V_{AC, DC}$	132 $V_{AC, DC}$
Nominal discharge current per line C2 4 kV (1.2/50 µs) / 2 kA (8/20 µs):	I_n(C2)	2 kA			
Total nominal discharge current C2 4 kV (1.2/50 µs) / 2 kA (8/20 µs):		8 kA			
Protection level (1.2/50 µs):	U_p	100 V	120 V	140 V	160 V
Nominal current:	I_n	360 mA			
Series resistance:	R_s	15 Ω			
Response time:	t_r	< 10 ns			
Protector location:		Indoor			
Type of connection:		Series (two ports)			
No. of poles:		4			
Working temperature:	ϑ	-40 °C to +70 °C			
Dimensions:		13.5 x 90 x 80 mm (0.75 modules DIN 43880)			
Fixing:		DIN Rail			
Enclosure material:		Polyamide			
Enclosure protection:		IP20			
Insulation resistance:		> 10^{14} Ω			
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)			
Connections:		Maximum section 4 mm^2			

Certificated tests according to: UNE-EN 61643-21
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> ACCESSORIES

> AT-9249 ATLINE 48 Mod.:48 V_{DC} lines
> AT-9261 ATLINE 60 Mod.:60 V_{DC} lines
> AT-9281 ATLINE 80 Mod.:80 V_{DC} lines
> AT-9211 ATLINE 110 Mod.:110 V_{DC} lines

> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> RF SPD TESTER

Radiofrequency test device for transient overvoltage protectors for data & communication and DC power supply lines

> **AT-3501 RF SPD TESTER**

RF SPD TESTER is a radiofrequency portable device which checks the status of the removable modules for transient overvoltage protectors in the ATFONO (data lines), ATLINE (telephone lines) and ATVOLT (DC power supply lines) series.

How it works:

Pressing the test button, the RF SPD TESTER sends out a signal to the surge protector circuit. If the protector's LED flickers at the same time as the checking LED, then the module is working properly. When the LED does not light up, the cartridge is damaged and must be replaced as soon as possible to prevent imminent failure in the protection system.

Compatible with:

- > ATLINE series
- > ATFONO series
- > ATVOLT series

Fast and simple checks for effective overvoltage protection system maintenance.

Benefits

Easy and fast test: it is only necessary to bring the RF SPD TESTER to the removable module and press the test button.

No electrical contacts required.

The modules in the protector do not need to be removed or disconnected.

If the indications of this datasheet are not fulfilled during the use or installation of the SPDs, the protection assured by this device could be endangered.

> TECHNICAL DATASHEET

Reference:	RF SPD TESTER **AT-3501**
Dimensions:	150 x 90 x 30 mm
Weight:	200 g
Operating voltage:	9 V_{DC}
Battery type:	PP3
Low battery warning:	Yes
Working temperature:	-10 ºC to +60 ºC

> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> ATLAN series

> ATLAN

Individual protector for computer networks

> **AT-2107 ATLAN 100 BASE-T**: individual network SPD with speed of 100 Mbit/s.

> **AT-2204 ATLAN 1000 BASE-T POE**: individual network SPD with speed of 1 Gbit/s Power Over Ethernet type.

> **AT-2207 ATLAN 1000 BASE-T**: individual network SPD with speed of 1 Gbit/s.

ATLAN is a protector with **RJ45 input and output**, able to withstand current up to 2 kA per line.

It is available in different voltages and data transmission speeds.

It is designed to individually protect every individual piece of equipment connected to the computer network.

The **1000 BASE-T** version is designed for equipment which transmits a **large amount of data** (workstations, graphic stations, servers etc.)

Includes 50 cm cable with RJ45 connector.

ATLAN have been tested in **official and independent laboratories,** obtaining their characteristics according to relevant standards (shown in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

ATLAN protectors are especially designed to **prevent failures in data transfer between equipment within the same network**. They protect the electronic circuit inputs of the network cards against damage due to transient currents.

> INSTALLATION

Protection should be installed **as close as possible to the equipment.** A UTP cable with a RJ45 connector has 8 wires. ATLAN protects 4 pairs (8 wires) **in series.**

If there are two pieces of equipment located in **separate buildings but linked together**, the protection must be installed on both sides of the line.

The **recommended procedure** for installation is the following:

1. Insert the protector between the cable with RJ45 connector and the equipment to be protected.
2. Bond the protector to the ground using the 'faston' type connector provided.

> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

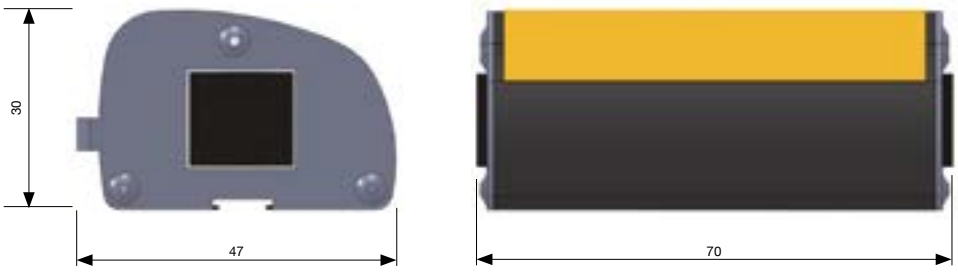
> ATLAN series

> TECHNICAL DATASHEET

Reference:		ATLAN 100 BASE-T **AT-2107**	ATLAN 1000 BASE-T POE **AT-2204**	ATLAN 1000 BASE-T **AT-2207**
Maximum transfer speed:		100 Mbit/s	1000 Mbit/s	1000 Mbit/s
Nominal voltage:	U_n	5 V_{DC}	48 V_{DC}	5 V_{DC}
Maximum continuous operating voltage:	U_c	6 V_{DC}	60 V_{DC}	6 V_{DC}
Nominal discharge current per line C2 4 kV (1.2/50 µs) / 2 kA (8/20 µs):	I_n(C2)	2 kA		
Protection level:	U_p	100 V	200 V	100 V
Maximum operating current:	I_L	300 mA		
Series resistance:	R_s	15 Ω		
Response time:	t_r	< 10 ns		
Working temperature:	ϑ	-40 ºC to +70 ºC		
Protector location:		Indoor		
Type of connection:		Series (two ports)		
No. of pairs protected:		4 pairs		
Dimensions:		68 x 47 x 30 mm		
Enclosure material:		Aluminium		
Enclosure protection:		IP20		
Input / output connector:		RJ45 / RJ45 shielded		
Earthing system:		6 mm faston		

Certificated tests according to: UNE-EN 61643-21
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> ATLAN series

> ATLAN 1000 BASE-T CAT6

Individual protector for computer networks with category 6 cables.

> **AT-2213 ATLAN 1000 BASE-T CAT6**: individual network SPD with category 6 cables.

> **AT-2210 ATLAN 1000 BASE-T CAT6 POE**: individual POE (Power Over Ethernet) network SPD with category 6 cables.

ATLAN 1000 BASE-T CAT6 is a protector with **RJ45 crimped input cable and RJ45 output connector,** able to withstand current up to 2 kA for each line with a transfer speed of 250 MHz.

It is especially designed to individually protect every piece of equipment connected to a 1000 BASE-T computer network with category 6 wiring which **transmits a large amount of data** (workstations, graphic stations, servers etc.)

Includes 50 cm category 6 cable already crimped.

ATLAN CAT6 have been tested in **official and independent laboratories,** obtaining their characteristics according to relevant standards (shown in the table).

ATLAN protectors are especially designed to **prevent failures in data transfer between equipment within the same network**. They protect the electronic circuit inputs of the network cards against damage due to transient currents.

> INSTALLATION

Protection should be installed **as close as possible to the equipment**. A cable with RJ45 connector has 8 wires. ATLAN protects 4 pairs (8 wires) **in series**.

If there are two pieces of equipment located in **separate buildings but linked together**, the protection must be installed on both sides of the line.

The **recommended procedure** for installation is the following:

1. Insert the protector between the cable with RJ45 connector and the equipment to be protected.
2. Bond the protector to the ground using the 'faston' type connector provided.

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

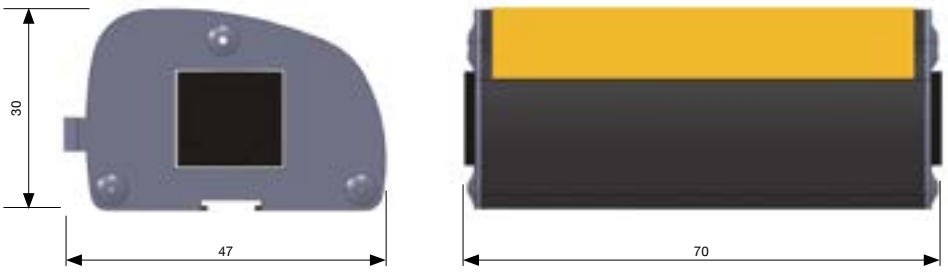
> ATLAN series

> TECHNICAL DATASHEET

Reference:		ATLAN 1000 BASE-T CAT6 **AT-2213**	ATLAN 1000 BASE-T CAT6 POE **AT-2210**
Maximum transfer speed:		1000 Mbit/s	
Nominal voltage:	U_n	5 V_{DC}	48 V_{DC}
Maximum continuous operating voltage:	U_c	25 V_{DC}	60 V_{DC}
Nominal discharge current per line C2 4 kV (1.2/50 µs) / 2 kA (8/20 µs):	I_n(C2)	2 kA	
Protection level:	U_p	150 V	250 V
Maximum operating current:	I_L	300 mA	
Series resistance:	R_s	11 Ω	
Response time:	t_r	< 10 ns	
Working temperature:	ϑ	-40 ºC to +70 ºC	
Protector location:		Indoor	
Type of connection:		Series (two ports)	
No. of pairs protected:		4 pairs	
Dimensions:		68 x 47 x 30 mm	
Enclosure material:		Aluminium	
Enclosure protection:		IP20	
Input / output connector:		Crimped cable / RJ45	
Earthing system:		6 mm faston	

Certificated tests according to: UNE-EN 61643-21
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> ATLAN series

> ATLAN-C8

Protector against overvoltages for 8 computer lines in one box

> **AT-2221 ATLAN-C 8**: protector ready for 8 local network lines.

ATLAN-C 8 is a protector for **eight line protection,** four pairs protected per line. This is done with a printed circuit board with **RJ45 input/output connectors**, able to withstand current up to 2 kA for every line and with a transfer speed of Gbits/s.

It is especially designed to protect equipment which requires a high internet connection speed, such as the PCs from a cyber place.

Includes eight 50 cm cables with RJ45 connector.

ATLAN-C 8 have been tested in **official and independent laboratories,** obtaining their characteristics according to relevant standards (shown in the table).

ATLAN protectors are especially designed to **prevent failures in data transfer between equipment within the same network**. They protect the electronic circuit inputs of the network cards against damage due to transient currents.

> INSTALLATION

Protection should be installed **as close as possible to the equipment**.

If there are two pieces of equipment located in **separate buildings but linked together**, the protection must be installed on both sides of the line.

The **recommended procedure** for installation is the following:

1. Insert the protector between the cable with RJ45 connector and the equipment to be protected.
2. Bond the cabinet ground to the ground marked on the chassis.

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

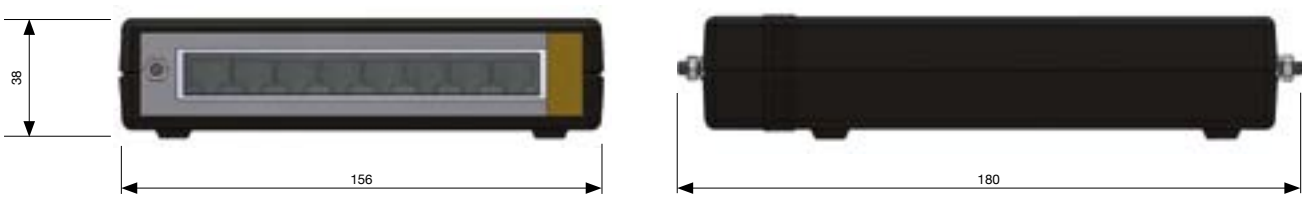
> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> ATLAN series

> TECHNICAL DATASHEET

Reference:		ATLAN-C 8 **AT-2221**
Maximum transfer speed:		1000 Mbit/s
Nominal voltage:	U_n	5 V_{DC}
Maximum continuous operating voltage:	U_c	6 V_{DC}
Nominal discharge current per line C2 4 kV (1.2/50 µs) / 2 kA (8/20 µs):	I_n(C2)	2 kA
Protection level:	U_p	100 V
Maximum operating current:	I_L	300 mA
Series resistance:	R_s	15 Ω
Response time:	t_r	< 10 ns
Working temperature:	ϑ	-40 ºC to +70 ºC
Protector location:		Indoor
Type of connection:		Series (two ports)
No. of pairs protected:		8 x 4 pairs
Dimensions:		180 x 156 x 38 mm
Enclosure material:		Polyamide
Enclosure protection:		IP20
Insulation resistance:		> 10^{14} Ω
Self-extinguishing enclosure:		V-0 Type according to UNE-EN 60707 (UL94)
Input / output connector:		RJ45 / RJ45
Earthing system:		M5 screw
Certificated tests according to: UNE-EN 61643-21 Relevant standards: UNE 21186, NF C 17-102, IEC 62305		

> DIMENSIONS (mm)



> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> ATLAN 24/16/8 series

> ATLAN 24/16/8

Protector for computer network rack

> **AT-2206 ATLAN 8**: protector in rack for 8 network lines.

> **AT-2209 ATLAN 16**: protector in rack for 16 network lines.

> **AT-2208 ATLAN 24**: protector in rack for 24 network lines.

> **AT-2224 ATLAN 8 POE:** protector in rack for 8 POE (Power over Ethernet) network lines.

> **AT-2225 ATLAN 16 POE:** protector in rack for 16 POE (Power over Ethernet) network lines.

> **AT-2223 ATLAN 24 POE:** protector in rack for 24 POE (Power over Ethernet) network lines.

ATLAN protectors are especially designed to prevent failures in data transfer between equipment within the same network. They protect the electronic circuit inputs of the network cards against damage due to transient currents.

ATLAN 24/16/8 is an SPD for **24, 16 and 8 lines** protection with four pairs protected per line. This is done using a printed circuit board with RJ45 input/output connectors, able to withstand current up to 2 kA for each line and with a transfer speed of Gbits/s.

It is especially designed to be inserted into a rack and protect computer network distribution cabinets. Due to its high transfer speed, it is suitable for networks **transferring a large amount of data** (servers, workstations, graphic stations etc)

Includes 50 cm output cables with RJ45 connector.

ATLAN 24/16/8 have been tested in **official and independent laboratories,** obtaining their characteristics according to relevant standards (shown in the table).

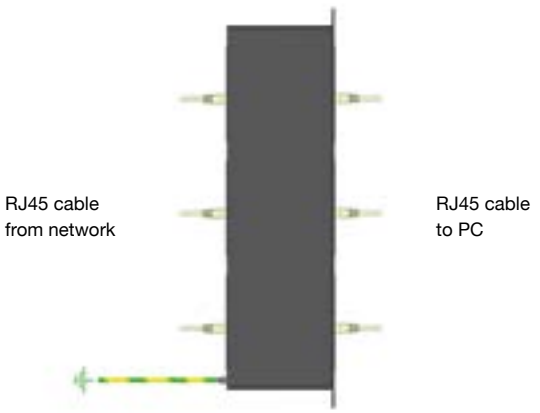
> INSTALLATION

Protection should be installed **as close as possible to the equipment**. In this particular case, we're talking about switches and hubs.

If there are two pieces of equipment located in **separate buildings but linked together**, the protection must be installed on both sides of the line.

The **recommended procedure** for installation is the following:

1. Screw the protectors onto the 19" rack for computer network distribution.
2. Run the network distribution lines from the hub or switch to the protector.
3. Bond the rack ground to the ground marked in the box chassis.



Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

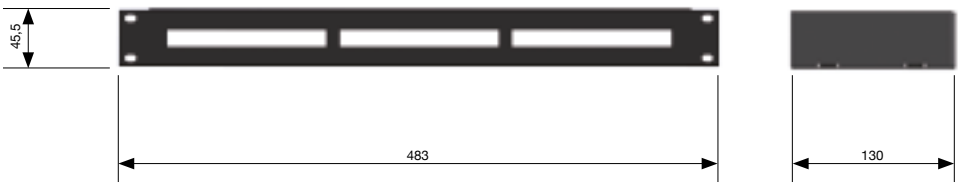
> ATLAN 24/16/8 series

> TECHNICAL DATASHEET

Reference:		ATLAN 8 **AT-2206**	ATLAN 16 **AT-2209**	ATLAN 24 **AT-2208**	ATLAN 8 POE **AT-2224**	ATLAN 16 POE **AT-2225**	ATLAN 24 POE **AT-2223**
Maximum transfer speed:		1000 Mbit/s					
Nominal voltage:	U_n	5 V_{DC}			48 V_{DC}		
Maximum continuous operating voltage:	U_c	6 V_{DC}			60 V_{DC}		
Nominal discharge current for line C2 4 kV (1.2/50 µs) / 2 kA (8/20 µs):	I_n(C2)	2 kA					
Protection level:	U_p	100 V			200 V		
Maximum operating current:	I_L	300 mA					
Series resistance:	R_s	15 Ω					
Response time:	t_r	< 10 ns					
Working temperature:	ϑ	-40 °C to +70 °C					
Protector location:		Indoor					
Type of connection:		Series (two ports)					
No. of pairs protected:		8 x 4 pairs	16 x 4 pairs	24 x 4 pairs	8 x 4 pairs	16 x 4 pairs	24 x 4 pairs
Dimensions:		483 x 150 x 44 mm					
Enclosure material:		Steel					
Enclosure protection:		IP20					
Input / output connector:		RJ45 / RJ45 shielded					
Earthing system:		M5 screw					

Certificated tests according to: UNE-EN 61643-21
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> ACCESSORIES

> **ATLAN 8 PCB – AT-2215**
Printed Circuit Board for ATLAN 24/16/8. Protects 8 lines.

> **ATLAN 8 PCB POE – AT-2231**
Printed Circuit Board for ATLAN 24/16/8 POE. Protects 8 lines.

> **ATLAN 8/24 – AT-2201**
Metal panel where up to 3 ATLAN 8 PCB modules can be fitted. To be mounted on 19" computer racks.

> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> ATLAN 12/8/4 CAT6 series

> ATLAN 12/8/4 CAT6

Protector for computer network rack with category 6 wiring

- **AT-2217 ATLAN 4 CAT6**: protector in rack for 4 network category 6 lines.
- **AT-2212 ATLAN 8 CAT6**: protector in rack for 8 network category 6 lines.
- **AT-2211 ATLAN 12 CAT6**: protector in rack for 12 network category 6 lines.
- **AT-2226 ATLAN 4 CAT6 POE:** protector in rack for 4 POE (Power Over Ethernet) network category 6 lines.
- **AT-2227 ATLAN 8 CAT6 POE:** protector in rack for 8 POE (Power Over Ethernet) network category 6 lines.
- **AT-2228 ATLAN 12 CAT6 POE:** protector in rack for 12 POE (Power Over Ethernet) network category 6 lines.

ATLAN protectors are especially designed to **prevent failures in data transfer between equipment within the same network**. They protect the electronic circuit inputs of the network cards against damage due to transient currents.

ATLAN 12/8/4 is an SPD for **12, 8 and 4 protected lines**, with four pairs protected per line. This is done with a printed circuit board with **crimped input cable and RJ45 output connector**, able to withstand current up to 2 kA for each line and with a transfer speed of 250 MHz.

It is especially designed to be inserted into a rack and protect computer network distribution cabinets. Due to its high transfer speed, it is suitable for networks **transferring a large amount of data** (servers, workstations, graphic stations etc.)

Includes 50 cm category 6 output cable already crimped.

The ATLAN 12/8/4 CAT6 protector has been tested and certified in **official and independent laboratories,** obtaining their characteristics according to relevant standards (shown in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

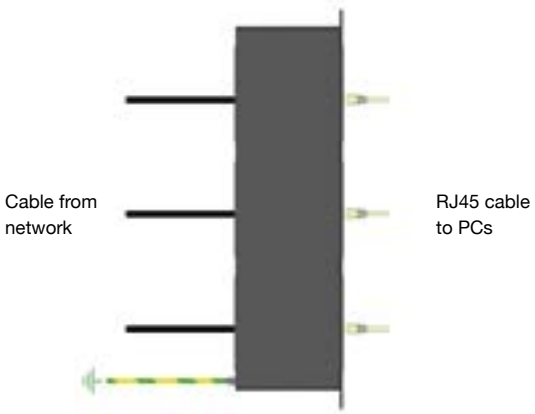
> INSTALLATION

Protection should be installed **as close as possible to the equipment**. In this particular case, we're talking about switches and hubs.

If there are two pieces of equipment located in **separate buildings but linked together**, the protection must be installed on both sides of the line.

The **recommended procedure** for installation is the following:

1. Screw the protectors onto the 19" rack for computer network distribution.
2. Run the network distribution lines from the hub or switch to the protector.
3. Bond the rack ground to the ground marked in the box chassis.



> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

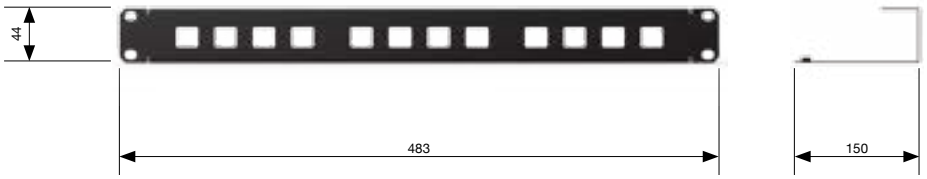
> ATLAN 12/8/4 CAT6 series

> TECHNICAL DATASHEET

Reference:		ATLAN 4 CAT6 **AT-2217**	ATLAN 8 CAT6 **AT-2212**	ATLAN 12 CAT6 **AT-2211**	ATLAN 4 CAT6 POE **AT-2226**	ATLAN 8 CAT6 POE **AT-2227**	ATLAN 12 CAT6 POE **AT-2228**
Maximum transfer speed:		1000 Mbit/s					
Nominal voltage:	U_n	5 V_{DC}			48 V_{DC}		
Maximum continuous operating voltage:	U_c	25 V_{DC}			60 V_{DC}		
Nominal discharge current for line C2 4 kV (1.2/50 µs) / 2 kA (8/20 µs):	I_n(C2)	2 kA					
Protection level:	U_p	150 V			250 V		
Maximum operating current:	I_L	300 mA					
Series resistance:	R_s	15 Ω					
Response time:	t_r	< 10 ns					
Working temperature:	ϑ	-40 ºC to +70 ºC					
Protector location:		Indoor					
Type of connection:		Series (two ports)					
No. of pairs protected:		4 x 4 pairs	8 x 4 pairs	12 x 4 pairs	4 x 4 pairs	8 x 4 pairs	12 x 4 pairs
Dimensions:		483 x 150 x 44 mm					
Enclosure material:		Steel					
Enclosure protection:		IP20					
Input / output connector:		Crimped connector / RJ45					
Earthing system:		M5 screw					

Certificated tests according to: UNE-EN 61643-21
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> DIMENSIONS (mm)



> ACCESSORIES

> **AT-2222 ATLAN 4 PCB CAT6:** Printed Circuit Board for replacing ATLAN 12/8/4 series. Protects 4 CAT6 lines.

> **AT-2230 ATLAN 4 PCB CAT6 POE:** Printed Circuit Board for replacing ATLAN 12/8/4 POE series. Protects 4 CAT6 POE lines.

> **AT-2229 ATLAN 4/12:** Metal panel where up to 3 ATLAN 4 PCB CAT6 modules can be fitted. To be mounted on 19" computer racks.

> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> ATDB9 series

> ATDB9

Individual overvoltage protector for type DB9 data lines

> **AT-2300 ATDB9**: individual protector with DB9 type connector for data lines.

ATDB9 protectors are especially designed to **prevent failures in data transfer between equipment with type DB9 or SUB-D9 connectors.**

They are specially design for type **RS-232, RS-485, TTL** communications and type **Profibus, CAN, I2C and SPI** buses.

ATDB9 is a screened protector with **SUB-D9 input and output connectors,** able to withstand current of 2 kA for each line.

ATDB9 have been tested in **official and independent laboratories,** obtaining their characteristics according to relevant standards (shown in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

It is recommended that installation is carried out **as close as possible to the equipment**. SUB-D9 connector has 9 wires. The ATDB9 protects these 9 wires in series.

If there are two pieces of equipment located in **separate buildings but linked together**, the protection must be installed on both sides of the line.

The **recommended procedure** for installation is the following:

1. Insert the protector between the communication cable with DB9 connector and the equipment to be protected.
2. Bond the protector to the ground using the 'faston' type connector provided.

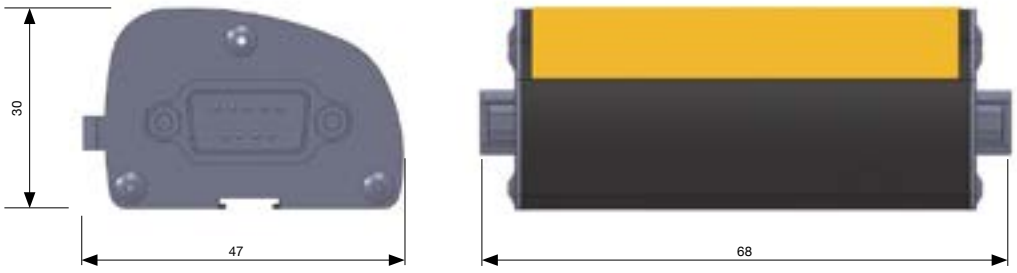
> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> ATDB9 series

> TECHNICAL DATASHEET

Reference:		**AT-2300**
Nominal voltage:	Un	12 V_{DC}
Maximum continuous operating voltage:	U_c	15 V_{DC}
Nominal discharge current per line C2 4 kV (1.2/50 µs) / 2 kA (8/20 µs):	I_n(C2)	2 kA
Protection level:	U_p	80 V
Maximum operating current:	I_L	300 mA
Series resistance:	R_s	15 Ω
Response time:	t_r	< 10 ns
Working temperature:	ϑ	-40 °C to +70 °C
Protector location:		Indoor
Type of connection:		Series (two ports)
No. of wires protected:		9 wires
Dimensions:		68 x 47 x 30 mm
Enclosure material:		Aluminium
Enclosure protection:		IP20
Input / output connector:		DB9 / DB9
Earthing system:		6 mm faston
Certificated tests according to: UNE-EN 61643-21 Relevant standards: UNE 21186, NF C 17-102, IEC 62305		

> DIMENSIONS (mm)



> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> ATFREQ series

> ATFREQ

Overvoltage protection devices for coaxial cables

- **AT-2102 ATFREQ-50UHF**: UHF type 50 W protector.
- **AT-2103 ATFREQ-F**: F type 50 W protector.
- **AT-2104 ATFREQ-TV**: TV type 50 W protector.
- **AT-2105 ATFREQ-50BNC015**: BNC type 50 W protector 0.15 dB.
- **AT-2106 ATFREQ-50N**: N type 50 W protector.
- **AT-2108 ATFREQ-400BNC015**: BNC type 400 W protector 0.15 dB.
- **AT-2109 ATFREQ-400UHF**: UHF type 400 W protector.
- **AT-2110 ATFREQ-7/16**: 7/16 type 900 W protector.
- **AT-2111 ATFREQ-400N**: N type 400 W protector.
- **AT-2115 ATFREQ-50BNC:** BNC type 50 W protector.
- **AT-2117 ATFREQ-50SMA:** SMA type 50 W protector.
- **AT-2118 ATFREQ-400BNC**: BNC type 400 W protector.
- **AT-2119 ATFREQ-6G:** N type 6 GHz protector.
- **AT-2120 ATFREQ-75BNC:** BNC type 75 Ω protector.
- **AT-2121 ATFREQ-1200UHF:** UHF type 1200 W protector.
- **AT-2123 ATFREQ-50TNC:** TNC type 50 W protector.
- **AT-2126 ATFREQ-6GSMA:** SMA type 6 GHz protector.

Due to their location, **aerials** are one of the most exposed elements to lightning discharges. Even when an external lightning protection system exists, the discharge secondary effects can affect the television and radiofrequency signals.

ATFREQ surge protection devices **protect the signal cable**, channelling the induced and conducted surges to ground, thus preventing damage to the communication and TV equipment and the connected devices (DVD, video, decoders, home cinemas etc.)

Effective protection against transitory overvoltages by means of **gas discharge tubes** able to withstand up to **10 kA**.

- Optimum coupling with imperceptible losses.
- Small attenuation in the signal even for very high frequencies.
- Short response time.
- Do not produce deflagration.
- Small size.
- Specific connectors for each application.

ATFREQ protectors have been tested in **official and independent laboratories,** obtaining their characteristics according to relevant standards (shown in the table).

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

> INSTALLATION

ATFREQ SPDs are designed to be placed in series with the aerial signal cable. It should be installed **as close as possible to the equipment** to be protected.

Each protector has two coaxial connectors and one earthing terminal. We supply SPDs with the most widely used coaxial connectors **(BNC, UHF, N, F, TV, 7/16)** and male/female adapters to be directly inserted into any connection.

It is important to point out that ATFREQ protects the signal coaxial cable coming from the aerial, not the power supply. Power supply should be protected using specific SPDs such as ATSUB, ATCOVER, ATSHOCK, ATSHIELD or ATVOLT.

Connection to earth is carried out using a M5 screw placed to one side of the SPD. The earth connection must be as direct as possible, using a proper terminal and cable.

> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> ATFREQ series

> TECHNICAL DATASHEET

Reference	Name (ATFREQ-)	Connector	Frequency range	Attenuation	Impedance	Exchanged power	DC sparkover voltage	M-F Coupling
AT-2104	TV	TV	0 - 1 GHz	< 1.2 dB	75 Ω	50 W	90 V	Included
AT-2103	SAT	F (sat.)	0 - 2 GHz	< 0.5 dB	75 Ω	50 W	90 V	Included
AT-2105	50BNC015	BNC	0 - 1 GHz	< 0.15 dB	50 Ω	50 W	90 V	Included
AT-2115	50BNC	BNC	0 - 1 GHz	< 0.2 dB	50 Ω	50 W	90 V	Included
AT-2120	75BNC	BNC	0 - 1 GHz	< 0.2 dB	75 Ω	50 W	90 V	Included
AT-2108	400BNC015	BNC	0 - 1 GHz	< 0.15 dB	50 Ω	400 W	250 V	Included
AT-2118	400BNC	BNC	0 - 1 GHz	< 0.2 dB	50 Ω	400 W	250 V	Included
AT-2123	50TNC	TNC	0 - 2.6 GHz	< 0.2 dB	50 Ω	50 W	90 V	AT-2770
AT-2106	50N	N	0 - 3 GHz	< 0.15 dB	50 Ω	50 W	90 V	Included
AT-2111	400N	N	0 - 3 GHz	< 0.15 dB	50 Ω	400 W	250 V	Included
AT-2119	6G	N	0 - 5.8 GHz	< 0.2 dB	50 Ω	50 W	90 V	Included
AT-2117	50SMA	SMA	0 - 1 GHz	< 0.2 dB	50 Ω	50 W	90 V	Included
AT-2126	6GSMA	SMA	0 - 5.8 GHz	< 0.2 dB	50 Ω	50 W	90 V	Included
AT-2102	50	UHF	0 - 3 GHz	< 0.3 dB	50 Ω	50 W	90 V	AT-2750
AT-2109	400	UHF	0 - 3 GHz	< 0.3 dB	50 Ω	400 W	250 V	AT-2750
AT-2121	1200	UHF	0 - 3 GHz	< 0.3 dB	50 Ω	1200 W	250 V	AT-2750
AT-2110	900	7/16	0.9 - 2.6 GHz	< 0.3 dB	50 Ω	900 W	600 V	AT-2760

> COMMON CHARACTERISTICS

Maximum current:	I_{max}	10 kA (8/20 µs)
Working temperature:	ϑ	-55 °C to +85 °C
Response time:	t_r	< 100 ns
Enclosure material:		Stainless steel
Enclosure protection:		IP20

Tests certified according to standards: UNE-EN 61643-21
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> ATFREQ series

> ATFREQ 12 BNC

Surge protection devices for coaxial cable rack

> **AT-2218 ATFREQ12 BNC**: protector in rack for 12 telecommunication lines

ATFREQ 12 BNC is a protector ready for **12 lines protection in a 19" rack.** Each device integrated into this rack, has two BNC type female coaxial connectors and a ground connection (includes adapter to allow connection from female to male).

ATFREQ SPDs are designed to be placed in series with the aerial signal cable. It should be installed **as close as possible to the equipment** to be protected.

It is designed to be inserted into a rack and protect data network cabinets. Due to its high transfer speed, it is suitable for networks **transferring a large amount of data** (aerials, wave amplifiers, wave distributors etc.).

Connection to earth is carried out using a M5 screw placed to one side of the SPD. The connection must be as direct as possible, using a suitable ring terminal and cable.

ATFREQ 12 BNC have been tested in **official and independent laboratories**, obtaining their characteristics according to relevant standards (shown in the table).

> INSTALLATION

Protection should be installed **as close as possible to the equipment.** In this particular case, we are talking about aerials, amplifiers and distributors.

If there are two pieces of equipment located in **separate buildings but linked together**, the protection must be installed on both sides of the line.

The **recommended procedure** for installation is the following:

1. Place the 19" rack inside the cabinet.
2. Lay cables from the aerial or element to be protected up to the back end of the machine.
3. The protected outlet must be at the front of the rack.
4. Bond the cabinet ground to the ground marked in the box.

Connection to earth is a must. Earthing in the whole installation must be bonded either directly or by a spark gap and resistance should be lower than 10 Ω.
If the indications on this datasheet are not fulfilled during use or installation of the protectors, the protection provided by this device could be compromised.

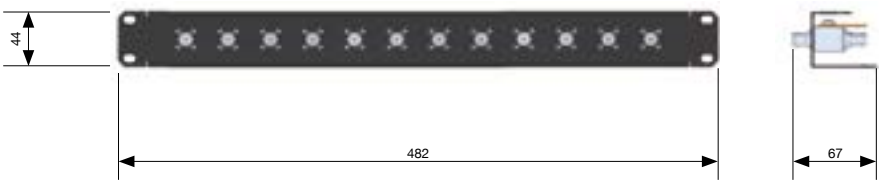
> PROTECTION FOR DATA AND TELECOMMUNICATION LINES

> ATFREQ series

> TECHNICAL DATASHEET

Reference:		ATFREQ 12 BNC **AT-2218**
Frequency range:		0 - 1 GHz
Attenuation:		< 0.15 dB
Maximum continuous operating voltage:	U_c	70 V_{DC}
Nominal discharge current for line C2 10 kV (1.2/50 µs) / 5 kA (8/20 µs:	I_n(C2)	5 kA
Maximum discharge current (8/20 µs wave)	I_{max}	10 kA
DC Sparkover voltage:		90 V
Exchanged power:		50 W
Impedance:	Z	50 Ω
Response time:	t_r	< 100 ns
Working temperature:	ϑ	-40 ºC to +70 ºC
Protector location:		Indoor
Type of connection:		Series
No. of protections:		12
Dimensions:		482 x 67 x 44 mm
Enclosure material:		Steel
Enclosure protection:		IP20
Input / output connector:		BNC
Earthing system:		M5 screw
Certificated tests according to: UNE-EN 61643-21 Relevant standards: UNE 21186, NF C 17-102, IEC 62305		

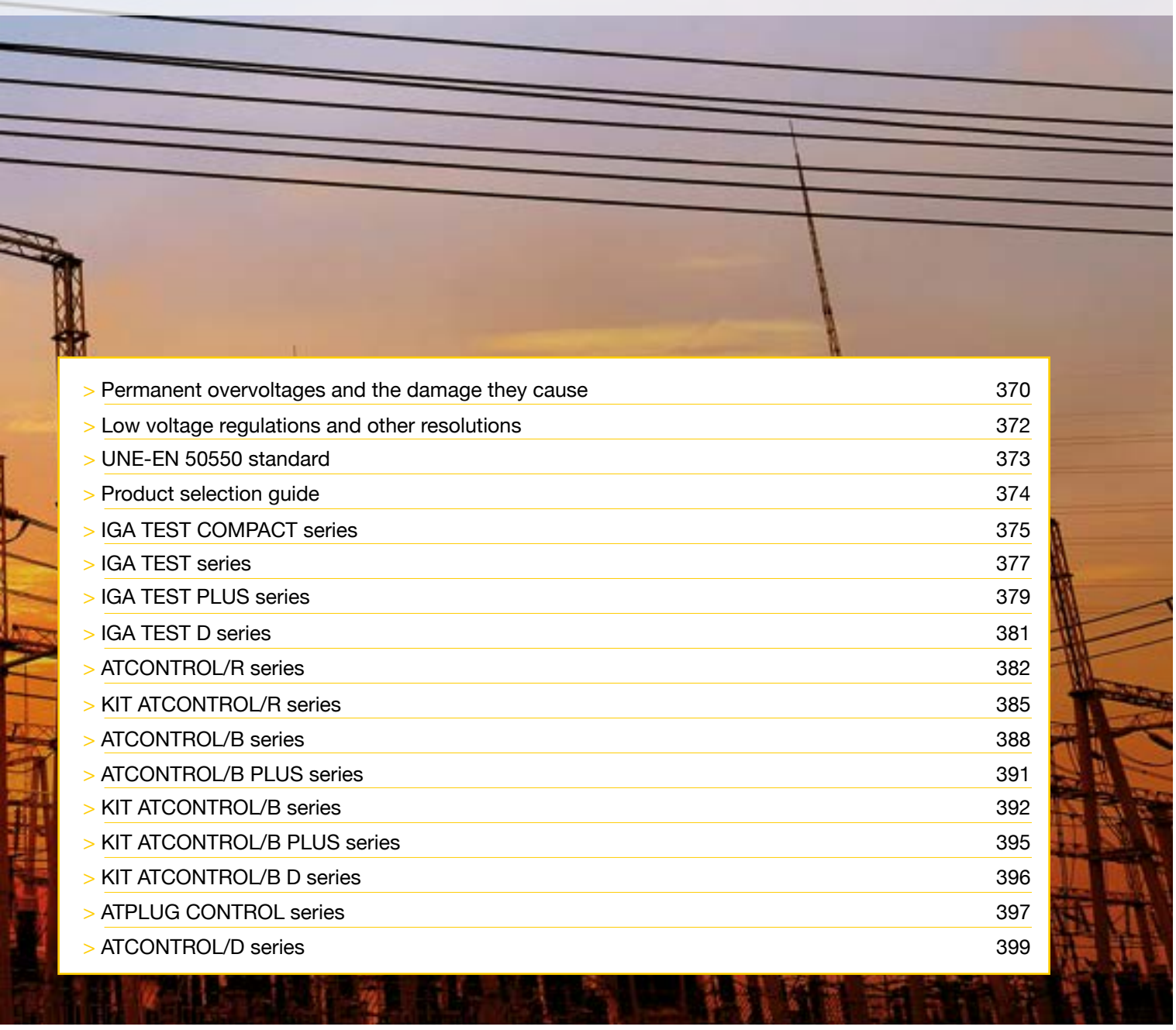
> DIMENSIONS (mm)



PERMANENT

6

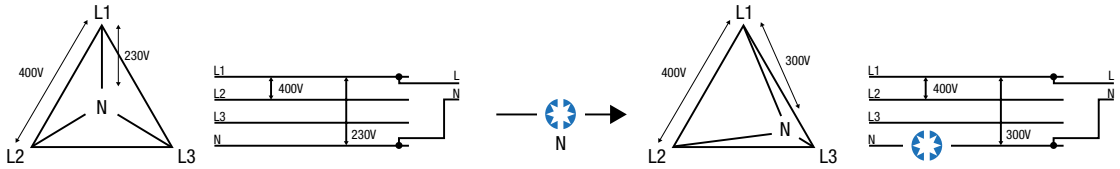
OVERVOLTAGES



> PERMANENT OVERVOLTAGES AND THE DAMAGE THEY CAUSE

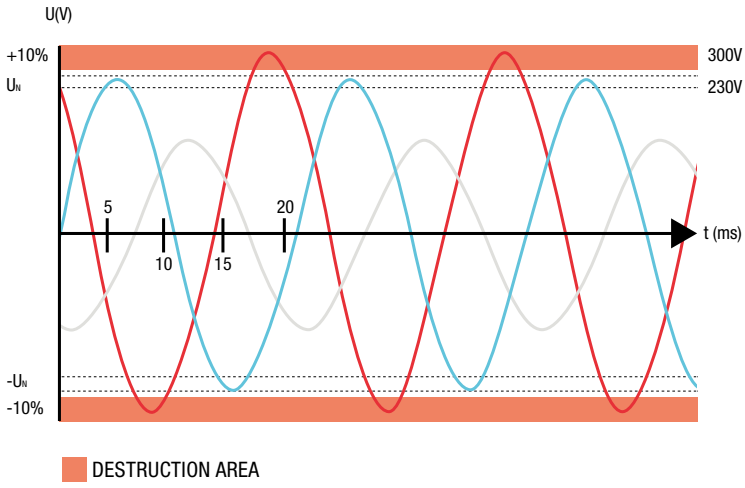
Permanent or temporary overvoltages are increases in potential of over 10 % of the nominal value of the power supply, which remain for several cycles or even permanently.

They are a result of phase decompensation, which is usually caused by the neutral conductor breaking, its faulty connection or faults in transformer centres:



NORMAL POWER SUPPLY NETWORK STATUS

FAULTY NEUTRAL



In order to protect equipments against the effects that these overvoltages may cause, Power Frequency Overvoltage Protectors (POP) must be installed, which disconnect the installation from the power supply network.

Network disconnection can happen in two ways:

> By means of a mains protection device. This device could be a main circuit breaker or a residual current device and must include a shunt release. Reclosing is done manually.

> Self-reclosing device. This device could be a contactor and is very useful in second residences, public lighting and, generally speaking, in non-assisted areas.

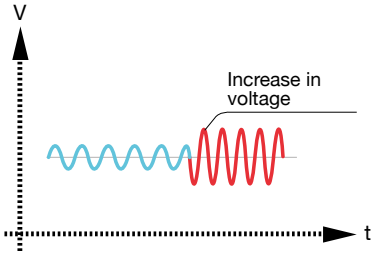
Permanent, temporary or power frequency overvoltages are those that last a relatively long time (several cycles) and may cause damage to the installation and the electrical equipment.

DESTRUCTIVE EFFECTS

Equipment destruction
Fire
Explosion in classified areas
Equipment overheating
Decrease in service life
Power supply interruption

USUAL CAUSES

Faulty neutral connection
Drop in power consumption



> PERMANENT OVERVOLTAGES AND THE DAMAGE THEY CAUSE

> LOW VOLTAGE REGULATIONS AND OTHER RESOLUTIONS

Protection against overvoltages is mandatory according to Article 16.3 of the Spanish Low Voltage Electrotechnical Regulations (REBT). It has usually been interpreted as applying to transient overvoltages given the part of the Regulations where they appear (ITC-BT-23). However, the articles of these Regulations refer to both transient and permanent overvoltages.

> Spanish Low Voltage Regulations 2002. Article 16.3. Receiver installations.

"Protection systems for low voltage indoor or receiver electrical installations should prevent the effects of overcurrents and overvoltages which could arise for various reasons, thereby safeguarding the materials and equipment from the actions and effects of external agents".

Furthermore, since 2005 several regional governments in Spain have approved the individual standards of the power supply companies, which already include the following:

In Andalusia and the Canary Islands, the use of protection devices for transient and permanent overvoltages is already prescribed.

In Catalonia and Aragon, protection devices for permanent and transient overvoltages are mandatory, amongst other things, according to ITC-BT-23.

Other regional governments are also in the process of approving these specific standards.

> The Official Gazette of the Regional Government of Andalusia (BOJA). No. 109 (June 2005). Page 72.

DECISION taken on 5th May 2005 by the Directorate General of Industry, Energy and Mines, whereby the specific standards and the safety and technical conditions of the power supply company Endesa Distribución, S.L.U., are approved in the autonomous community of Andalusia.

2005 Specific standards and safety and technical conditions of SEVILLANA ENDESA. Chapter II. Power supply service entrance and low voltage networking installations. Article 8.2. Composition and characteristics of the distribution boards:

“General and individual protection and control devices will, as a minimum, involve:

- A main circuit breaker…
- A residual current device…
- An all-pole circuit breaker...
- Protectors against overvoltages where, according to article 16.3 of the REBT, the consumer can choose any device with autorecloser when service conditions have returned to normal.”

> Distribution Technical Handbook MT 2.80.12 for IBERDROLA networking installations.

Transient overvoltage protection is to be installed in the distribution board, according to ITC-BT-23 and GUÍA-BT-23 from the REBT. Optionally, the board can also include protection against temporary or permanent overvoltages, with autorecloser recommended.

> Technical Handbook for ENDESA low voltage internal electrical installations

The clause about Meter Centralisation Units indicates that Type 1 surge protectors should be installed, either with multi-polar or single-polar devices. Their minimum impulse current Iimp should be 25 kA between line and neutral and 100 kA between neutral and earth, with a protection level Up $\leq$ 1,5 kV.

Protection against permanent and transient overvoltages should be installed in the Distribution Board.

> Official Gazette of the Regional Government of Aragon (BOA). No. 6 (December 2009).

ORDER of the 23rd of December 2009, of the Department of Industry, Trade and Tourism, approving the low voltage installation Particular Specifications about of the power supply companies working in the territory of Aragon under the mark ERZ Endesa.

ERZ Endesa particular technical standards (Chapter 3.9.2 Protection and control devices):

“In order to avoid the effects of overvoltages at the installation, the following devices will be installed:

- A main circuit breaker…
- Protectors against permanent overvoltages (mandatory).
- Protectors against transient overvoltages according to TC-BT-23.
- A residual current device…
- An all-pole circuit breaker …”

> Official Gazette of the Canary Islands Regional Government. No. 81 (April 2010).

The specific standards for Unelco Endesa networking installations will be mandatory in the territory of the Canary Islands.

Section 12 of the Specific Standards, ‘General Protection and Control Devices’, states the following:

"A protection device against transient and permanent overvoltages will be mandatory, whereby the consumer may choose any devices with autorecloser when service conditions have returned to normal".

> Official Gazette of Extremadura (DOE) Regional Government. No. 236 (December 2014).

Three months after publication of this standard, the new low voltage receiver installations registered in this Administration will need to be protected against both temporary and transient overvoltages, according to GUÍA-BT-23 from the REBT.

For installations existing prior to publication of this standard, it will also be applicable if said installations undergo major reforms or contract more power.

> UNE-EN 50550 STANDARD

This standard applies to power frequency overvoltage protection devices (hereafter referred to as “POP”) for household and similar uses intended to be used in combination with a main protective device being either a circuit breaker or a residual current circuit breaker.

These devices intended to mitigate the effects of power frequency overvoltages between phase and neutral conductor (e.g. caused by loss of neutral conductor in the three phase supply upstream the POP) for downstream equipment.

POP EN 50550

The characteristics and requirements specified by this standard for POP devices are the following:

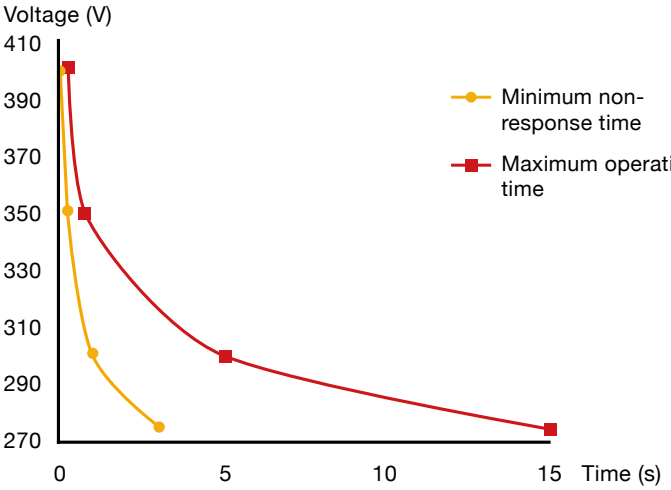
> The POP, the shunt release, if applicable, and the main protection device must be from the same manufacturer or brand to ensure correct operation.

> The protection conductor of the installation cannot be live when the POP is operating.

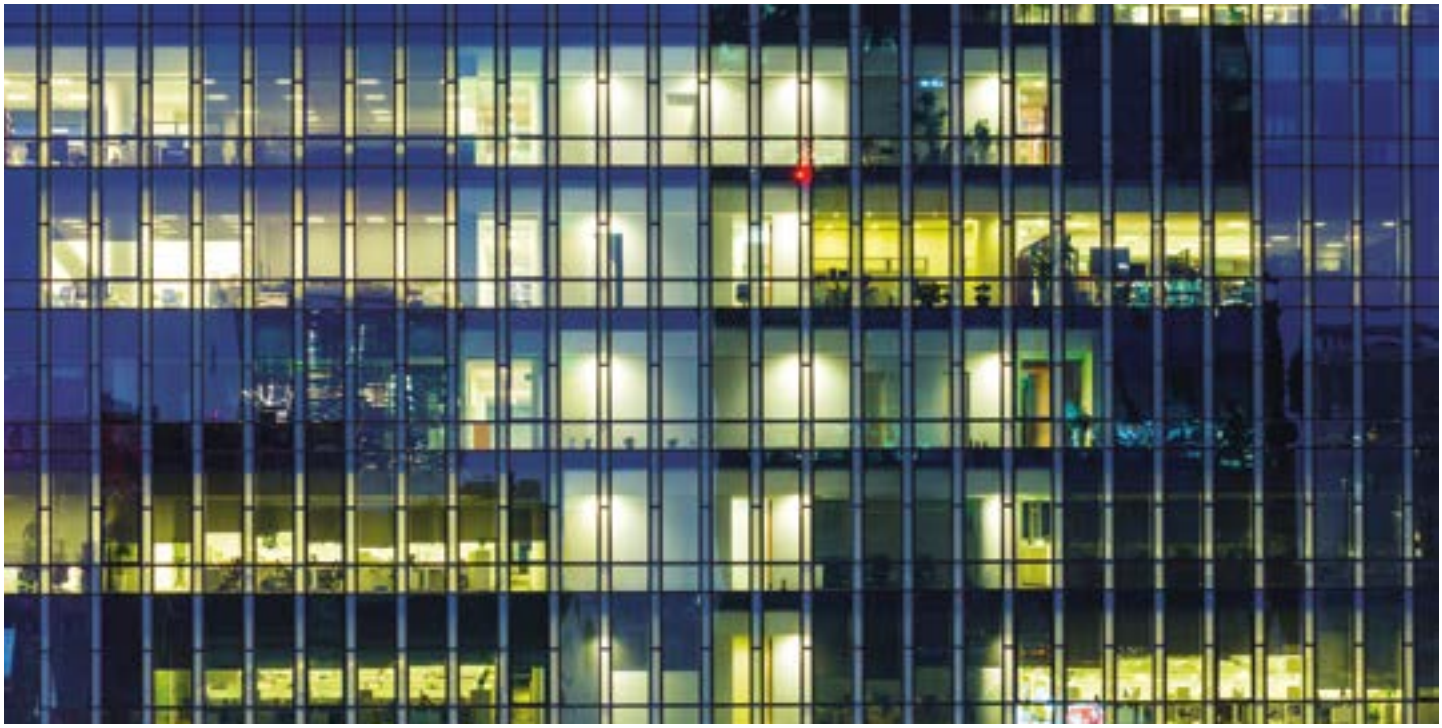
> The POP shall not create or simulate a fault current to operate the MPD.

> It shall be connected either to the MPDs input terminals only or to its output terminals only, but not to both.

> It must meet the following tripping curve:



Voltage	Maximum time	Minimum time
275 V	15.00 s	3.00 s
300 V	5.00 s	1.00 s
350 V	0.75 s	0.25 s
400 V	0.20 s	0.07 s



> SELECTION GUIDE

Is transient overvoltage included?

Yes

Is main protective device included?

Yes

	Single-phase	Three-phase
Self-reclosing	 **KIT ATCONTROL/R PT-M** AT-8756/AT-8757	 **KIT ATCONTROL/R PT-T** AT-8754/AT-8755
Non self-reclosing	 **IGA TEST COMPACT M** AT-8951, AT-8952, AT-8954, AT-9070/AT-9075	 **IGA TEST COMPACT T** AT-8950, AT-8953, AT-8955, AT-9081, AT-9095/AT-9099
	 **KIT ATCONTROL/B PT-M** AT-8711/AT-8715	 **KIT ATCONTROL/B PT-T** AT-8716/AT-8720

No

Shunt release	 **ATCONTROL/R PT-M** AT-8704	 **ATCONTROL/B PT-M 1DIN** AT-8880	 **ATCONTROL/B PT-T** AT-8702
Contactor	 **ATCONTROL/R PT-M** AT-8758	 **ATCONTROL/R PT-M 1DIN** AT-8764	 **ATCONTROL/R PT-T** AT-8770

No

Is main protective device included?

Yes

Self-reclosing	 **KIT ATCONTROL/R P-M** AT-8750/AT-8751	 **KIT ATCONTROL/R P-T** AT-8752/AT-8753
Non self-reclosing	 **IGATEST M** AT-9000/AT-9005, AT-9052/AT-9054	 **IGATEST T** AT-9006/AT-9010, AT-9055/AT-9058

No

Shunt release	 **ATCONTROL/B P-M** AT-8703	 **ATCONTROL/B P-M 1DIN** AT-8881	 **ATCONTROL/R P-T** AT-8701
Contactor	 **ATCONTROL/R P-M** AT-8759	 **ATCONTROL/R P-M 1DIN** AT-8763	 **ATCONTROL/R P-T** AT-8760

> IGA TEST COMPACT series

> IGA TEST COMPACT M

Compact single-phase transient and temporary overvoltage protector with integrated miniature circuit breaker

POP
EN 50550

IGA TEST COMPACT protectors cut off the power supply when they detect a permanent overvoltage, (for example, a fault in the neutral), thus protecting the equipment installed downstream.

To restore the main circuit breaker, it is necessary to reconnect the protective coil in advance using the RESET button.

Moreover, **IGA TEST COMPACT** protectors also actuate when they detect a transient overvoltage, driving the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as a **type 2** protector in **official and independent laboratories** according to standards UNE-EN 61643-11 and GUÍA-BT-23 from the REBT.

It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the warning light is green, the protector is in good condition. If not, replace.

The integrated MCB is available for the most usual nominal currents: 6, 10, 16, 20, 25, 32, 40, 50 and 63 A.

> INSTALLATION

They must be installed **in series** with the low voltage line, between the Power Control Circuit Breaker (ICP) and the Residual Current Device (ID), thereby connecting it to earth.

Installation should be carried out **without power running through the line**.

The protector is formed by a protective coil for permanent overvoltage that includes a transient overvoltage protector, together with a miniature circuit breaker (MCB).

> TECHNICAL DATASHEET

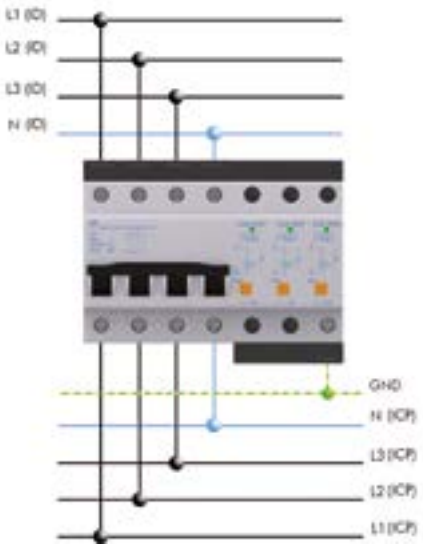
		IGA TEST COMPACT M 6 / 10 / 16 / 20 / 25 / 32 / 40 / 50 / 63								
Reference:		AT-8954	AT-8952	AT-8951	AT-9070	AT-9071	AT-9072	AT-9073	AT-9074	AT-9075
Nominal current:		6 A	10 A	16 A	20 A	25 A	32 A	40 A	50 A	63 A
Nominal voltage:	U_n	230 V_{AC}								
Maximum overvoltage:		400 V_{AC}								
Actuation voltage:	U_a	265 - 280 V_{AC}								
Actuation time:		@275 V → 8 - 10 s / @400 V → 0.1 - 0.2 s								
Maximum short-circuit current:		6 kA								
Test type according to UNE-EN 61643-11:		Type 2								
Nominal Discharge Current:	I_n	5 kA								
Maximum current:	I_{max}	15 kA								
Protection level:	U_p	1.5 kV								
Dimensions:		51 x 81 x 65 mm (3 modules DIN 43880)								
Cable range:		Minimum / Maximum section: 1.5 / 16 mm^2								
Tests certified according to standards: UNE-EN 60898, UNE-EN 50550, UNE-EN 61643-11										

> IGA TEST COMPACT series

> IGA TEST COMPACT T

Compact three-phase protector against transient and permanent overvoltages with integrated miniature circuit breaker

POP
EN 50550



IGA TEST COMPACT protectors cut off the power supply when they detect a permanent overvoltage, (for example, a fault in the neutral), thus protecting the equipment installed downstream.

To restore the main circuit breaker, it is necessary to reconnect the protective coils in advance using the RESET buttons. Reclosing will always be carried out from the most external coil to the one closest to the MCB.

Moreover, **IGA TEST COMPACT** protectors also actuate when they detect a transient overvoltage, driving the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as a **type 2** protector in **official and independent laboratories** according to standards UNE-EN 61643-11 and GUÍA-BT-23 from the REBT.

It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the warning light is green, the protector is in good condition. If not, replace.

The integrated MCB is available for the most usual nominal currents: 6, 10, 16, 20, 25, 32, 40, 50 and 63 A.

> INSTALLATION

They must be installed **in series** with the low voltage line, between the Power Control Circuit Breaker (ICP) and the Residual Current Device (ID), thereby connecting it to earth.

Installation should be carried out **without power running through the line**.

The protector is formed by protective coils for permanent protection which include protection against transient overvoltages and are linked to a miniature circuit breaker (MCB).

> TECHNICAL DATASHEET

Reference:		IGA TEST COMPACT T 6 / 10 / 16 / 25 / 32 / 40 / 50 / 63								
		AT-8955	**AT-8953**	**AT-8950**	**AT-9081**	**AT-9095**	**AT-9096**	**AT-9097**	**AT-9098**	**AT-9099**
Nominal current:		6 A	10 A	16 A	20 A	25 A	32 A	40 A	50 A	63 A
Nominal voltage:	U_n	230 V_{AC}								
Maximum overvoltage:		400 V_{AC}								
Actuation voltage:	U_a	265 - 280 V_{AC}								
Actuation time:		@275 V → 8 - 10 s / @400 V → 0.1 - 0.2 s								
Maximum short-circuit current:		6 kA								
Test type according to UNE-EN 61643-11:		Type 2								
Nominal Discharge Current:	I_n	5 kA								
Maximum current:	I_{max}	15 kA								
Protection level:	U_p	1.5 kV								
Dimensions:		123 x 81 x 65 mm (7 modules DIN 43880)								
Cable range:		Minimum / Maximum section: 1.5 / 16 mm^2								
Tests certified according to standards: UNE-EN 60898, UNE-EN 50550, UNE-EN 61643-11										

> IGA TEST series

> IGA TEST M

Compact single-phase protector against permanent overvoltages with integrated miniature circuit breaker

POP
EN 50550

IGA TEST protectors actuate when they detect a permanent overvoltage (for example, a fault in the neutral), protecting the equipment installed downstream.

To restore the main circuit breaker, it is necessary to reconnect the protective coil in advance using the RESET button.

IGA TEST permanent overvoltage protectors can be used together with **ATSUB-D** transient overvoltage protectors.

The integrated MCB is available for the most usual nominal currents: 6, 10, 16, 20, 25, 32, 40, 50 and 63 A.

> INSTALLATION

They must be installed **in series** with the low voltage line, between the power control circuit breaker (ICP) and the residual current device (ID).

Installation should be carried out **without power running through the line**.

The protective coil must be installed between the line and the neutral, which connects to the residual current breaker (ID).

The protector is formed by a protective coil for permanent overvoltage linked to a miniature circuit breaker (MCB).

> TECHNICAL DATASHEET

Reference:		IGA TEST M 6 **AT-9052**	IGA TEST M 10 **AT-9000**	IGA TEST M 16 **AT-9053**	IGA TEST M 20 **AT-9054**	IGA TEST M 25 **AT-9001**	IGA TEST M 32 **AT-9002**	IGA TEST M 40 **AT-9003**	IGA TEST M 50 **AT-9004**	IGA TEST M 63 **AT-9005**
Nominal current:		6 A	10 A	16 A	20 A	25 A	32 A	40 A	50 A	63 A
Nominal voltage:	U_n	230 V_{AC}								
Maximum overvoltage:		400 V_{AC}								
Actuation voltage:	U_a	265 - 280 V_{AC}								
Actuation time:		@275 V_{AC} → 8 - 10 s / @400 V_{AC} → 0.1 - 0.2 s								
Maximum short-circuit current:		6 kA								
Dimensions:		51 x 81 x 65 mm (3 modules DIN 43880)								
MCB cable range:		Minimum / Maximum section: 1.5 / 25 mm^2								
Cable range:		Minimum / Maximum section: 1.5 / 2.5 mm^2 (single-stranded) or 4 mm^2 (multi-stranded)								

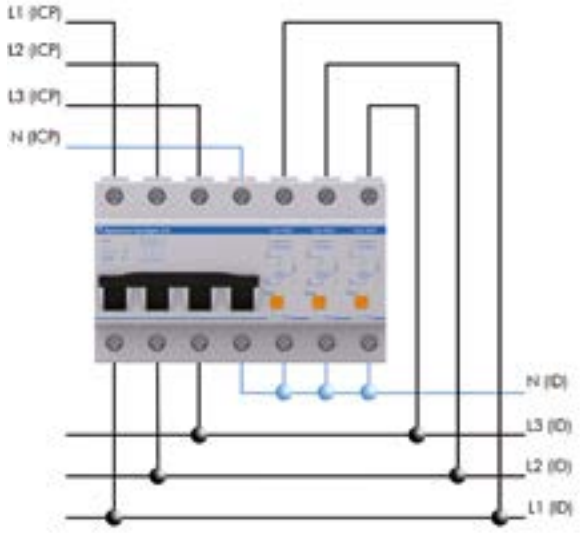
Tests certified according to standards: UNE-EN 50550, UNE-EN 60898

> IGA TEST series

> IGA TEST T

Three-phase protector against permanent overvoltages with integrated miniature circuit breaker

POP
EN 50550



IGA TEST series protectors cut off the power supply when they detect a permanent overvoltage (for example, a fault in the neutral), thus protecting the equipment installed downstream.

To restore the main circuit breaker, it is necessary to reconnect the protective coils in advance using the RESET buttons. Reclosing will always be carried out from the most external coil to the one closest to the MCB.

IGA TEST permanent overvoltage protectors can be used together with ATSUB-D transient overvoltage protectors.

The integrated MCB is available for the most usual nominal currents: 6, 10, 16, 20, 25, 32, 40, 50 and 63 A.

> INSTALLATION

They must be installed **in series** with the low voltage line, between the power control circuit breaker (ICP) and the residual current device (ID).

Installation should be carried out **without power running through the line**.

The protective coils are to be installed between the lines connected to the residual current breaker and the neutral.

The protector is formed by protective coils for permanent overvoltage linked to a miniature circuit breaker (MCB).

> TECHNICAL DATASHEET

Reference:		IGA TEST T 6 **AT-9055**	IGA TEST T 10 **AT-9056**	IGA TEST T 16 **AT-9057**	IGA TEST T 20 **AT-9058**	IGA TEST T 25 **AT-9006**	IGA TEST T 32 **AT-9007**	IGA TEST T 40 **AT-9008**	IGA TEST T 50 **AT-9009**	IGA TEST T 63 **AT-9010**
Nominal current:		6 A	10 A	16 A	20 A	25 A	32 A	40 A	50 A	63 A
Nominal voltage:	U_n	230 V_{AC}								
Maximum overvoltage:		400 V_{AC}								
Actuation voltage:	U_a	265 - 280 V_{AC}								
Actuation time:		@275 V_{AC} → 8 - 10 s / @400 V_{AC} → 0.1 - 0.2 s								
Maximum short-circuit current:		6 kA								
Dimensions:		123 x 81 x 65 mm (7 modules DIN 43880)								
MCB cable range:		Minimum / Maximum section: 1.5 / 25 mm^2								
Coil cable range:		Minimum / Maximum section: 1.5 / 2.5 mm^2 (single-stranded) or 4 mm^2 (multi-stranded)								

Tests certified according to standards: UNE-EN 50550, UNE-EN 60898

> IGA TEST PLUS series

> IGA TEST M PLUS

Single-phase protector against permanent overvoltages and undervoltages with integrated miniature circuit breaker

POP
EN 50550

IGA TEST PLUS series protectors cut off the power supply when they detect a permanent overvoltage or undervoltage, (for example, a fault in the neutral), thus protecting the equipment installed downstream.

To restore the main circuit breaker, it is necessary to reconnect the protective coil in advance using the RESET button.

IGA TEST PLUS protectors against permanent overvoltages can be installed together with **ATSUB-D** transient overvoltage protectors.

The integrated MCB is available for the most usual nominal currents: 25, 32, 40, 50 and 63 A.

> INSTALLATION

They must be installed **in series** with the low voltage line, between the power control circuit breaker (ICP) and the residual current device (ID).

Installation should be carried out **without power running through the line**.

The protective coil must be installed between the line and the neutral, which connects to the residual current breaker (ID).

The protector is formed by a protective coil for permanent overvoltages linked to a miniature circuit breaker (MCB).

> TECHNICAL DATASHEET

Reference:		IGA TEST M 25 PLUS **AT-9031**	IGA TEST M 32 PLUS **AT-9032**	IGA TEST M 40 PLUS **AT-9033**	IGA TEST M 50 PLUS **AT-9034**	IGA TEST M 63 PLUS **AT-9035**
Nominal current:		25 A	32 A	40 A	50 A	63 A
Nominal voltage:	U_n	230 V_{AC}				
Maximum overvoltage:		400 V_{AC}				
Minimum operating voltage:		60 V_{AC}				
Actuation voltage:	U_a	265 - 280 V_{AC} / 195 - 210 V_{AC}				
Actuation time:		@275 V_{AC} → 8-10 s / @400 V_{AC} → 0,1-0,2 s @200 V_{AC} → 0,8 s / @80 V_{AC} → 0,2 s				
Maximum short-circuit current:		6 kA				
Dimensions:		51 x 81 x 65 mm (3 modules DIN 43880)				
MCB cable range:		Minimum / Maximum section: 1.5 / 25 mm^2				
Coil cable range:		Minimum / Maximum section: 1.5 / 2.5 mm^2 (single-stranded) or 4 mm^2 (multi-stranded)				

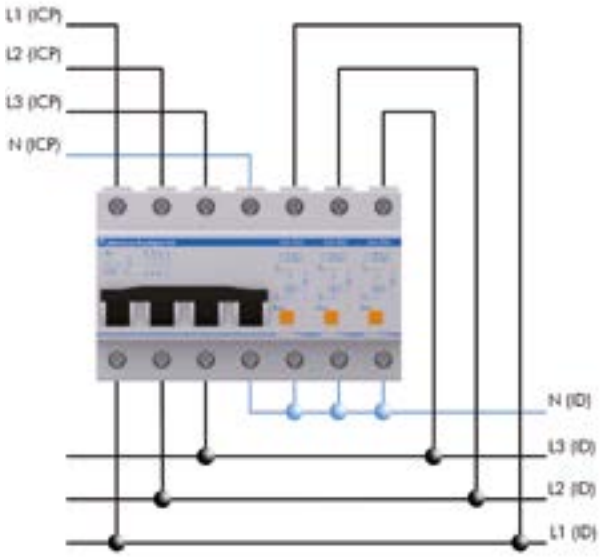
Tests certified according to standards: UNE-EN 60898, UNE-EN 50550

> IGA TEST PLUS series

> IGA TEST T PLUS

Three-phase permanent overvoltage and undervoltage protector with integrated miniature circuit breaker

POP
EN 50550



IGA TEST PLUS series protectors cut off the power supply when they detect a permanent overvoltage or undervoltage, (for example, a fault in the neutral), thus protecting the equipment installed downstream.

To restore the main circuit breaker, it is necessary to reconnect the protective coils in advance using the RESET buttons. Reclosing will always be carried out from the most external coil to the one closest to the MCB.

IGA TEST permanent overvoltage protectors can be used together with ATSUB-D transient overvoltage protectors..

The integrated MCB is available for the most usual nominal currents: 25, 32, 40, 50 and 63 A.

> INSTALLATION

They must be installed **in series** with the low voltage line, between the power control circuit breaker (ICP) and the residual current device (ID).

Installation should be carried out **without power running through the line**.

The protective coils are to be installed between the lines connected to the residual current breaker and the neutral.

The protector is formed by protective coils for permanent overvoltages linked to a miniature circuit breaker (MCB).

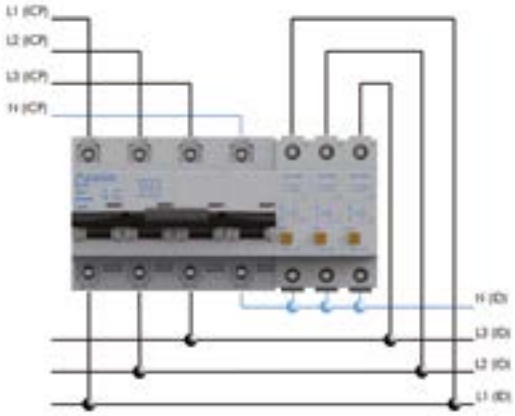
> TECHNICAL DATASHEET

Reference:		IGA TEST T 25 PLUS **AT-9036**	IGA TEST T 32 PLUS **AT-9037**	IGA TEST T 40 PLUS **AT-9038**	IGA TEST T 50 PLUS **AT-9039**	IGA TEST T 63 PLUS **AT-9040**
Nominal current:		25 A	32 A	40 A	50 A	63 A
Nominal voltage:	U_n	230 V_{AC}				
Maximum overvoltage:		400 V_{AC}				
Minimum operating voltage:		60 V_{AC}				
Actuation voltage:	U_a	265 - 280 V_{AC} / 195 - 210 V_{AC}				
Actuation time:		@275 V_{AC} → 8-10 s / @400 V_{AC} → 0,1-0,2 s @200 V_{AC} → 0,8 s / @80 V_{AC} → 0,2 s				
Maximum short-circuit current:		6 kA				
Dimensions:		123 x 81 x 65 mm (7 modules DIN 43880)				
MCB cable range:		Minimum / Maximum section: 1.5 / 25 mm^2				
Coil cable range:		Minimum / Maximum section: 1.5 / 2.5 mm^2 (single-stranded) or 4 mm^2 (multi-stranded)				
Tests certified according to standards: UNE-EN 50550, UNE-EN 60898						

> IGA TEST D series

> IGA TEST T D

Three-phase permanent overvoltage protector with integrated D curve main circuit breaker



IGA TEST D series protectors cut off the power supply when they detect a permanent overvoltage (for example, a fault in the neutral), thus protecting the equipment installed downstream.

To restore the main circuit breaker, it is necessary to reconnect the protective coils in advance using the RESET buttons. Reclosing will always be carried out from the most external coil to the one closest to the MCB.

IGA TEST PLUS protectors against permanent overvoltages can be installed together with **ATSUB-D** transient overvoltage protectors.

The integrated D curve MCB is available in the most usual nominal currents: 63, 80, 100 and 125 A.

> INSTALLATION

They must be installed **in series** with the low voltage line, between the power control circuit breaker (ICP) and the residual current device (ID).

Installation should be carried out **without power running through the line**.

The protective coil must be installed between the line and the neutral, which connects to the residual current breaker (ID).

The protector is formed by a protective coils for permanent overvoltages linked to a D curve main circuit breaker (MCB).

> TECHNICAL DATASHEET

Reference:		IGA TEST T 63 D **AT-9076**	IGA TEST T 80 D **AT-9077**	IGA TEST T 100 D **AT-9078**	IGA TEST T 125 D **AT-9079**
Nominal current:		63 A	80 A	100 A	125 A
Nominal voltage:	U_n	230 V_{AC}			
Maximum overvoltage:		400 V_{AC}			
Actuation voltage:	U_a	265 - 280 V_{AC}			
Actuation time:		@275 V_{AC} → 8-10 s / @400 V_{AC} → 0,1-0,2 s			
Maximum short-circuit current:		10 kA			
Dimensions:		160 x 81 x 65 mm (9 modules DIN 43880)			
MCB cable range:		Minimum / Maximum section: 1.5 / 25 mm^2			
Coil cable range:		Minimum / Maximum section: 1.5 / 2.5 mm^2 (single-stranded) or 4 mm^2 (multi-stranded)			

Tests certified according to standards: UNE-EN 60898, UNE-EN 50550

> ATCONTROL/R series

> ATCONTROL/R P(T)-M

Self-configurable self-reclosing permanent and transient overvoltage protector for single-phase power supply lines

> PERMANENT OVERVOLTAGES

ATCONTROL/R P series protectors actuate when they detect a permanent overvoltage by tripping the connected contactor (normally open) (S1, S2). This contactor disconnects the line, thus protecting any equipment installed downstream. When the permanent overvoltage comes to a halt, the protector reconnects the contactor.

The warning system for permanent overvoltages consists of two luminous indicators: green (correct power supply) and red (overvoltage). It has a test button to check that installation has been executed correctly.

> TRANSIENT OVERVOLTAGES

ATCONTROL/R PT protectors also actuate when they detect a transient overvoltage, diverting the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as a **type 2** protector in **official and independent laboratories** according to standards UNE-EN 61643-11 and GUÍA-BT-23 from the REBT. Appropriate for category I, II, III and IV equipment according to REBT (ITC-BT-23).

It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the warning is yellow, the protector is in good condition. If not, replace.

> INSTALLATION

They must be installed **in parallel** with the low voltage supply line, downstream from the main circuit breaker, connected to the phase, neutral and ground. The contactor should be installed in series with the low voltage supply line, downstream from the protector. Installation should be carried out without power in the line.

Connect the S1 and S2 terminals to the contactor, always without voltage.

This protector is self-configurable. It automatically detects the voltage and programmes the permanent overvoltage limits.

> TECHNICAL DATASHEET

Reference:		ATCONTROL/R P-M **AT-8759**	ATCONTROL/R PT-M **AT-8758**
Nominal voltage:	U_n	120 or 230 V_{AC}	
Maximum overvoltage:	U_c	400 V_{AC}	
Actuation voltage:	U_a	150 or 275 V_{AC}	
Actuation time:		@150 V_{AC} → 3 - 5 s / @230 V_{AC} → 0.1 - 0.2 s @275 V_{AC} → 3 - 5 s / @400 V_{AC} → 0.1 - 0.2 s	
Test type according to UNE-EN61643-11:		-	Type 2
Nominal discharge current (8/20 µs wave):	I_n	-	5 kA
Maximum discharge current (8/20 µs wave):	I_{max}	-	15 kA
Protection level (wave 1.2/50 µs):	U_p	-	1.1 kV
Backup fuse(1):		-	80 A gL/gG
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)	
S1, S2 cable range:		Maximum section: 1.5 mm²	
Protector cable range:		Minimum / Maximum section: 2.5 / 35 mm²	
Tests certified according to standards: UNE-EN 61643-11 Relevant standards: UNE 21186, NF C 17-102, IEC 62305			

(1) Required when there is no equal or less nominal current protection installed upstream from the protector.

> ATCONTROL/R series

> ATCONTROL/R P(T)-M 1DIN

Self-configurable self-reclosing permanent and transient overvoltage protector for single-phase power supply lines

> PERMANENT OVERVOLTAGES

ATCONTROL/R P-M 1DIN series protectors actuate when they detect a permanent overvoltage, tripping the connected contactor (normally open) (S1, S2). This contactor disconnects the line, thus protecting any equipment installed downstream. When the permanent overvoltage comes to a halt, the protector reconnects the contactor.

The warning system for permanent overvoltages consists of two luminous indicators: green (correct power supply) and red (overvoltage). It has a test button to check that installation has been executed correctly.

> TRANSIENT OVERVOLTAGES

ATCONTROL/R PT-M 1DIN protectors also actuate when they detect a transient overvoltage, driving the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as a **type 2** protector in **official and independent laboratories** according to standards UNE-EN 61643-11 and GUÍA-BT-23 from the REBT. Appropriate for category I, II, III and IV equipment according to REBT (ITC-BT-23).

It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the warning light is red, replace the protector.

> INSTALLATION

They must be installed **in parallel** with the low voltage supply line, downstream from the MCB, connected to the phase, neutral and ground. The contactor should be installed **in series** with the low voltage supply line, downstream from the protector. Installation should be carried out without power in the line.

Connect the S1 and S2 terminals to the contactor, always without voltage.

This protector is self-configurable. It automatically detects the voltage and programmes the permanent overvoltage limits.

> TECHNICAL DATASHEET

Reference:		ATCONTROL/R P-M 1DIN **AT-8763**	ATCONTROL/R PT-M 1DIN **AT-8764**
Nominal voltage:	U_n	120 or 230 V_{AC}	
Maximum overvoltage:	U_c	400 V_{AC}	
Actuation voltage:	U_a	150 or 275 V_{AC}	
Actuation time:		@150 V_{AC} → 3 - 5 s / @230 V_{AC} → 0.1 - 0.2 s @275 V_{AC} → 3 - 5 s / @400 V_{AC} → 0.1 - 0.2 s	
Test type according to UNE-EN61643-11:		-	Type 2
Nominal discharge current (8/20 µs wave):	I_n	-	5 kA
Maximum discharge current (8/20 µs wave):	I_{max}	-	15 kA
Protection level (wave 1.2/50 µs):	U_p	-	1.1 kV
Backup fuse(1):		-	80 A gl/gG
Dimensions:		18 x 90 x 80 mm (2 modules DIN 43880)	
S1, S2 cable range:		Maximum section: 2.5 mm^2	
Protector cable range:		Maximum section: 6 mm^2	
Tests certified according to standards: UNE-EN 61643-11 Relevant standards: UNE 21186, NF C 17-102, IEC 62305			

(1) Required when there is no equal or less nominal current protection installed upstream from the protector.

> ATCONTROL/R series

> ATCONTROL/R P(T)-T

Self-configurable self-reclosing permanent and transient overvoltage protector for three-phase power supply lines

> PERMANENT OVERVOLTAGES

ATCONTROL/R P series protectors actuate when they detect a permanent overvoltage by tripping the connected contactor (normally open) (S1, S2). This contactor disconnects the line, thus protecting any equipment installed downstream. When the permanent overvoltage comes to a halt, the protector reconnects the contactor.

The warning system for permanent overvoltages consists of two luminous indicators: green (correct power supply) and red (overvoltage). It has a test button to check that installation has been executed correctly.

> TRANSIENT OVERVOLTAGES

ATCONTROL/R PT protectors also actuate when they detect a transient overvoltage, diverting the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as a **type 2** protector in **official and independent laboratories** according to standards UNE-EN 61643-11 and GUÍA-BT-23 from the REBT. Appropriate for category I, II, III and IV equipment according to REBT (ITC-BT-23).

It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the warning is yellow, the protector is in good condition. If not, replace.

> INSTALLATION

They must be installed **in parallel** with the low voltage supply lines, downstream from the MCB, connected to the phase, neutral and ground. The contactor should be installed **in series** with the low voltage supply lines, downstream from the protector. Installation should be carried out without power in the line.

Connect the S1 and S2 terminals to the contactor, always without voltage.

This protector is self-configurable. It automatically detects the voltage and programmes the permanent overvoltage limits.

> TECHNICAL DATASHEET

Reference:		ATCONTROL/R P-T **AT-8760**	ATCONTROL/R PT-T **AT-8770**
Nominal voltage:	U_n	120 or 230 V_{AC}	
Maximum overvoltage:	U_c	400 V_{AC}	
Actuation voltage:	U_a	150 or 275 V_{AC}	
Actuation time:		@150 V_{AC} → 3 - 5 s / @230 V_{AC} → 0.1 - 0.2 s @275 V_{AC} → 3 - 5 s / @400 V_{AC} → 0.1 - 0.2 s	
Test type according to UNE-EN61643-11:		-	Type 2
Nominal discharge current (8/20 µs wave):	I_n	-	15 kA
Maximum discharge current (8/20 µs wave):	I_{max}	-	40 kA
Protection level (wave 1.2/50 µs):	U_p	-	1.4 kV
Backup fuse(1):		-	80 A gL/gG
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)	
S1, S2 cable range:		Maximum section: 1.5 mm^2	
Protector cable range:		Minimum / Maximum section: 2.5 / 35 mm^2	
Tests certified according to standards: UNE-EN 61643-11 Relevant standards: UNE 21186, NF C 17-102, IEC 62305			

(1) Required when there is no equal or less nominal current protection installed upstream from the protector.

> KIT ATCONTROL/R series

> KIT ATCONTROL/R P(T)-M

Complete kit including self-reclosing single-phase permanent and transient overvoltage protector and contactor

POP
EN 50550

> PERMANENT OVERVOLTAGES

ATCONTROL/R P series protectors actuate when they detect a permanent overvoltage by tripping the connected contactor (normally open) (S1, S2). This contactor disconnects the line, thus protecting any equipment installed downstream. When the permanent overvoltage comes to a halt, the protector reconnects the contactor.

The warning system for permanent overvoltages consists of two luminous indicators: green (correct power supply) and red (overvoltage). It has a test button to check that installation has been executed correctly.

> TRANSIENT OVERVOLTAGES

ATCONTROL/R PT protectors also actuate when they detect a transient overvoltage, diverting the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as a **type 2** protector in **official and independent laboratories** according to standards UNE-EN 61643-11 and GUÍA-BT-23 from the REBT. Appropriate for category I, II, III and IV equipment according to REBT (ITC-BT-23).

It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the warning is yellow, the protector is in good condition. If not, replace.

> INSTALLATION

It is to be installed **in parallel** with the low voltage supply line, downstream from the main circuit breaker (IGA), connected to line, neutral and ground. The contactor should be installed **in series** with the low voltage supply line, downstream from the protector. Installation should be carried out without power in the line.

Connect the S1 and S2 terminals to the contactor, always without voltage.

> TECHNICAL DATASHEET

Reference:		KIT ATCONTROL/R P-M 20 **AT-8750**	KIT ATCONTROL/R P-M 63 **AT-8751**	KIT ATCONTROL/R PT-M 20 **AT-8756**	KIT ATCONTROL/R PT-M 63 **AT-8757**
Nominal current:		Up to 20 A	Up to 63 A	Up to 20 A	Up to 63 A
Nominal voltage:	U_n	230 V_{AC}			
Maximum overvoltage:	U_c	400 V_{AC}			
Actuation voltage:	U_a	275 V_{AC}			
Actuation time:		@275 V_{AC} → 3 - 5 s / @400 V_{AC} → 0.1 - 0.2 s			
Test type according to UNE-EN61643-11:		-		Type 2	
Nominal discharge current (8/20 µs wave):	I_n	-		5 kA	
Maximum discharge current (8/20 µs wave):	I_{max}	-		15 kA	
Protection level (wave 1.2/50 µs):	U_p	-		1.1 kV	
Contactor dimensions:		18 x 81 x 65 mm (1 module DIN 43880)	36 x 81 x 65 mm (2 modules DIN 43880)	18 x 81 x 65 mm (1 module DIN 43880)	36 x 81 x 65 mm (2 modules DIN 43880)
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)			
Contactor cable range:		Minimum / Maximum section: 1 / 6 mm^2	Minimum / Maximum section: 1 / 16 mm^2	Minimum / Maximum section: 1 / 6 mm^2	Minimum / Maximum section: 1 / 16 mm^2
S1, S2 cable range:		Minimum / Maximum section: 1 / 1.5 mm^2			
Protector cable range:		Minimum / Maximum section: 2.5 / 35 mm^2			

Tests certified according to standards: UNE-EN 50550, UNE-EN 61643-11
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> KIT ATCONTROL/R series

> KIT ATCONTROL/R P(T)-M 1DIN

Complete kit including self-reclosing single-phase permanent and transient overvoltage protector and contactor

POP
EN 50550

> PERMANENT OVERVOLTAGES

ATCONTROL/R P-M 1DIN series protectors actuate when they detect a permanent overvoltage, tripping the connected contactor (normally open) (S1, S2). This contactor disconnects the line, thus protecting any equipment installed downstream. When the permanent overvoltage comes to a halt, the protector reconnects the contactor.

The warning system for permanent overvoltages consists of two luminous indicators: green (correct power supply) and red (overvoltage). It has a test button to check that installation has been executed correctly.

> TRANSIENT OVERVOLTAGES

The **ATCONTROL/R PT-M 1DIN** protectors also actuate when they detect a transient overvoltage, driving the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as a **type 2** protector in **official and independent laboratories** according to standards UNE-EN 61643-11 and GUÍA-BT-23 from the REBT. Appropriate for category I, II, III and IV equipment according to REBT (ITC-BT-23).

It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the warning light is red, replace the protector.

> INSTALLATION

It is to be installed **in parallel** with the low voltage supply line, downstream from the main circuit breaker (IGA), connected to lines, neutral and ground. The contactor should be installed **in series** with the low voltage supply line, downstream from the protector. Installation should be carried out without power in the line.

Connect the S1 and S2 terminals to the contactor, always without voltage.

> TECHNICAL DATASHEET

Reference:		KIT ATCONTROL/R P-M 1DIN 20 **AT-8767**	KIT ATCONTROL/R P-M 1DIN 63 **AT-8768**	KIT ATCONTROL/R PT-M 1DIN 20 **AT-8769**	KIT ATCONTROL/R PT-M 1DIN 63 **AT-8771**
Nominal current:		Up to 20 A	Up to 63 A	Up to 20 A	Up to 63 A
Nominal voltage:	U_n	230 V_{AC}			
Maximum overvoltage:	U_c	400 V_{AC}			
Actuation voltage:	U_a	275 V_{AC}			
Actuation time:		@275 V_{AC} → 3 - 5 s / @400 V_{AC} → 0.1 - 0.2 s			
Test type according to UNE-EN61643-11:		-		Type 2	
Nominal discharge current (8/20 µs wave):	I_n	-		5 kA	
Maximum discharge current (8/20 µs wave):	I_{max}	-		15 kA	
Protection level (wave 1.2/50 µs):	U_p	-		1.1 kV	
Contactor dimensions:		18 x 81 x 65 mm (1 module DIN 43880)	36 x 81 x 65 mm (2 modules DIN 43880)	18 x 81 x 65 mm (1 module DIN 43880)	36 x 81 x 65 mm (2 modules DIN 43880)
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)			
Contactor cable range:		Minimum / Maximum section: 1 / 6 mm^2	Minimum / Maximum section: 1 / 16 mm^2	Minimum / Maximum section: 1 / 6 mm^2	Minimum / Maximum section: 1 / 16 mm^2
S1, S2 cable range:		Minimum / Maximum section: 1 / 2.5 mm^2			
Protector cable range:		Minimum / Maximum section: 1 / 6 mm^2			

Tests certified according to standards: UNE-EN 50550, UNE-EN 61643-11
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> KIT ATCONTROL/R series

> KIT ATCONTROL/R P(T)-T

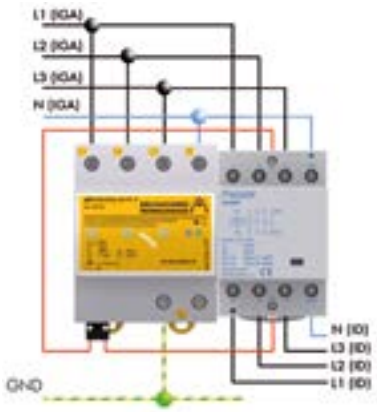
Complete kit including self-reclosing three-phase permanent and transient overvoltage protector and contactor

POP
EN 50550

> PERMANENT OVERVOLTAGES

ATCONTROL/R P series protectors actuate when they detect a permanent overvoltage by tripping the connected contactor (normally open) (S1, S2). This contactor disconnects the line, thus protecting any equipment installed downstream. When the permanent overvoltage comes to a halt, the protector reconnects the contactor.

The warning system for permanent overvoltages consists of two luminous indicators: green (correct power supply) and red (overvoltage). It has a test button to check that installation has been executed correctly.



> TRANSIENT OVERVOLTAGES

ATCONTROL/R PT protectors also actuate when they detect a transient overvoltage, diverting the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as a **type 2** protector in **official and independent laboratories** according to standards UNE-EN 61643-11 and GUÍA-BT-23 from the REBT. Appropriate for category I, II, III and IV equipment according to REBT (ITC-BT-23).

It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the warning is yellow, the protector is in good condition. If not, replace.

> INSTALLATION

It is to be installed **in parallel** with the low voltage supply line, downstream from the main circuit breaker (IGA), connected to lines, neutral and ground. The contactor should be installed **in series** with the low voltage supply line, downstream from the protector. Installation should be carried out without power in the line.

Connect the S1 and S2 terminals to the contactor, always without voltage.

> TECHNICAL DATASHEET

Reference:		KIT ATCONTROL/R P-T 25 **AT-8752**	KIT ATCONTROL/R P-T 63 **AT-8753**	KIT ATCONTROL/R PT-T 25 **AT-8754**	KIT ATCONTROL/R PT-T 63 **AT-8755**
Nominal current:		Up to 25 A	Up to 63 A	Up to 25 A	Up to 63 A
Nominal voltage:	U_n	230 V_{AC}			
Maximum overvoltage:	U_c	400 V_{AC}			
Actuation voltage:	U_a	275 V_{AC}			
Actuation time:		@275 V_{AC} → 3 - 5 s / @400 V_{AC} → 0.1 - 0.2 s			
Test type according to UNE-EN61643-11:		-		Type 2	
Nominal discharge current (8/20 µs wave):	I_n	-		15 kA	
Maximum discharge current (8/20 µs wave):	I_{max}	-		40 kA	
Protection level (wave 1.2/50 µs):	U_p	-		1.4 kV	
Contactor dimensions:		36 x 81 x 65 mm (2 modules DIN 43880)	54 x 81 x 65 mm (3 modules DIN 43880)	36 x 81 x 65 mm (2 modules DIN 43880)	54 x 81 x 65 mm (3 modules DIN 43880)
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)			
Contactor cable range:		Minimum / Maximum section: 1 / 10 mm^2	Minimum / Maximum section: 1 / 16 mm^2	Minimum / Maximum section: 1 / 10 mm^2	Minimum / Maximum section: 1 / 16 mm^2
S1, S2 cable range:		Minimum / Maximum section: 1 / 1.5 mm^2			
Protector cable range:		Minimum / Maximum section: 2.5 / 35 mm^2			

Tests certified according to standards: UNE-EN 50550, UNE-EN 61643-11
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> ATCONTROL/B Series

> ATCONTROL/B P(T)-M

Self-configurable single-phase permanent and transient overvoltage protector

> PERMANENT OVERVOLTAGES

ATCONTROL/B PT-M protector trips the connected shunt release (S1, S2) when it detects a permanent overvoltage. The shunt release causes the circuit breaker linked to trip, protecting the equipment installed downstream.

The warning system for permanent overvoltages consists of two luminous indicators: green (correct power supply) and red (overvoltage). It has a test button to check that installation has been executed correctly.

> TRANSIENT OVERVOLTAGES

The **ATCONTROL/B PT-M** protectors also actuate when they detect a transient overvoltage, driving the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as a **type 2** protector in **official and independent laboratories** according to standards UNE-EN 61643-11 and GUÍA-BT-23 from the REBT. Appropriate for category I, II, III and IV equipment according to REBT (ITC-BT-23).

It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the warning is yellow, the protector is in good condition. If not, replace.

> INSTALLATION

Installation should be carried out **without power running through the line**. They must be installed **in parallel** with the low voltage supply line, downstream from the circuit breaker, and connected to line, neutral and ground. Connect the S1 and S2 terminals, always without voltage, to the shunt release acting on the circuit breaker.

This protector is self-configurable. It automatically detects the voltage and programmes the permanent overvoltage limits.

> TECHNICAL DATASHEET

Reference:		ATCONTROL/B P-M **AT-8703**	ATCONTROL/R PT-M **AT-8704**
Nominal voltage:	U_n	120 or 230 V_{AC}	
Maximum overvoltage:	U_c	400 V_{AC}	
Actuation voltage:	U_a	150 - 275 V_{AC}	
Actuation time:		@150 V_{AC} → 3 - 5 s / @230 V_{AC} → 0.1 - 0.2 s @275 V_{AC} → 3 - 5 s / @400 V_{AC} → 0.1 - 0.2 s	
Nominal voltage for the shunt release:		110 - 415 V_{AC} / 110 - 250 V_{DC}	
Test type according to UNE-EN 61643-11:		-	Type 2
Nominal discharge current (8/20 µs wave):	I_n	-	5 kA
Maximum discharge current (8/20 µs wave):	I_{max}	-	15 kA
Protection level (wave 1.2/50 µs):	U_p	-	1.1 kV
Backup fuse(1):		-	80 A gL/gG
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)	
S1, S2 cable range:		Maximum section: 1.5 mm^2	
Cable range:		Minimum / Maximum section: 2.5 / 35 mm^2	

Tests certified according to standards: UNE-EN 61643-11
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required when there is no equal or less nominal current protection installed upstream from the protector.

> ATCONTROL/B Series

> ATCONTROL/B P(T)-M 1DIN

Self-configurable single-phase permanent and transient overvoltage protector

> PERMANENT OVERVOLTAGES

ATCONTROL/B PT-M 1DIN protector actuates when it detects a permanent overvoltage, tripping the shunt release (S1, S2). The shunt release causes the m circuit breaker to trip, protecting the equipment installed downstream.

The warning system for permanent overvoltages consists of two luminous indicators: green (correct power supply) and red (overvoltage). It has a test button to check that installation has been executed correctly.

> TRANSIENT OVERVOLTAGES

ATCONTROL/B PT-M 1DIN protector also actuates when it detects a transient overvoltage, driving the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as a **type 2** protector in **official and independent laboratories** according to standards UNE-EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for categories I, II, III and IV equipment according to ITC-BT-23 from the REBT.

It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the warning light is red, replace the protector.

> INSTALLATION

Installation should be carried out **without power running through the line**. They must be installed **in parallel** with the low voltage supply line, downstream from the linked circuit breaker, connected to line, neutral and ground. Connect the S1 and S2 terminals, always without voltage, to the shunt release acting on the circuit breaker.

This protector is self-configurable. It automatically detects the voltage and programmes the permanent overvoltage limits.

> TECHNICAL DATASHEET

Reference:		ATCONTROL/B P-M 1DIN **AT-8881**	ATCONTROL/B PT-M 1DIN **AT-8882**
Nominal voltage:	U_n	120 or 230 V_{AC}	
Maximum overvoltage:	U_c	400 V_{AC}	
Actuation voltage:	U_a	150 - 275 V_{AC}	
Actuation time:		@150 V_{AC} → 3 - 5 s / @230 V_{AC} → 0.1 - 0.2 s @275 V_{AC} → 3 - 5 s / @400 V_{AC} → 0.1 - 0.2 s	
Nominal voltage for the shunt release:		110 - 415 V_{AC} / 110 - 250 V_{AC}	
Test type according to UNE-EN 61643-11:		-	Type 2
Nominal discharge current (8/20 µs wave):	I_n	-	5 kA
Maximum discharge current (8/20 µs wave):	I_{max}	-	15 kA
Protection level (wave 1.2/50 µs):	U_p	-	1.1 kV
Backup fuse(1):		-	80 A gL/gG
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)	
S1, S2 cable range:		Maximum section: 2.5 mm^2	
Cable range:		Maximum section: 6 mm^2	

Tests certified according to standards: UNE-EN 61643-11
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required when there is no equal or less nominal current protection installed upstream from the protector.

> ATCONTROL/B Series

> ATCONTROL/B P(T)-T

Self-configurable three-phase permanent and transient overvoltage protector

> PERMANENT OVERVOLTAGES

ATCONTROL/B PT-T series protectors trip the connected shunt release (S1, S2) when they detect a permanent overvoltage. The shunt release causes the circuit breaker to trip, protecting the equipment installed downstream.

The warning system for permanent overvoltages consists of two luminous indicators: green (correct power supply) and red (overvoltage). It has a test button to check that installation has been executed correctly.

> TRANSIENT OVERVOLTAGES

The **ATCONTROL/B PT-T** protector also actuates when it detects a transient overvoltage, driving the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as a **type 2** protector in **official and independent laboratories** according to standards UNE-EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for categories I, II, III and IV equipment according to ITC-BT-23 from the REBT.

It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the warning is yellow, the protector is in good condition. If not, replace.

> INSTALLATION

The power should be **disconnected** during the installation of the SPD. They must be installed **in parallel** with the low voltage supply line, downstream from the associated circuit breaker, and connected to lines, neutral and ground. Connect the S1 and S2 terminals, always without voltage, to the shunt release acting on the circuit breaker.

This protector is self-configurable. It automatically detects the voltage and programmes the permanent overvoltage limits.

> TECHNICAL DATASHEET

Reference:		ATCONTROL/B P-T **AT-8701**	ATCONTROL/B PT-T **AT-8702**
Nominal voltage:	U_n	120 or 230 V_{AC}	
Maximum overvoltage:	U_c	400 V_{AC}	
Actuation voltage:	U_a	150 or 275 V_{AC}	
Actuation time:		@150 V_{AC} → 3 - 5 s / @230 V_{AC} → 0.1 - 0.2 s @275 V_{AC} → 3 - 5 s / @400 V_{AC} → 0.1 - 0.2 s	
Nominal voltage for the shunt release:		110 - 415 V_{AC} / 110 - 250 V_{DC}	
Type of tests according to UNE- EN 61643-11:		-	Type 2
Nominal current (8/20 µs wave):	I_n	-	15 kA
Maximum discharge current (8/20 µs wave):	I_{max}	-	40 kA
Protection level (wave 1.2/50 µs):	U_p	-	1.4 kV
Backup fuse(1):		-	80 A gL/gG
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)	
S1, S2 cable range:		Maximum section: 1.5 mm^2	
Cable range:		Minimum / Maximum section: 2.5 / 35 mm^2	

Tests certified according to standards: UNE-EN 61643-11
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required when there is no equal or less nominal current protection installed upstream from the protector.

> ATCONTROL/B PLUS series

> ATCONTROL/B P(T)-T PLUS

Self-configurable three-phase permanent and transient overvoltage and undervoltage protector

> PERMANENT OVERVOLTAGES

The **ATCONTROL/B** series protectors trip the connected shunt release (S1, S2) when they detect a permanent overvoltage or undervoltage. The shunt release causes the circuit breaker to trip, protecting the equipment installed downstream.

The warning system for permanent overvoltages and undervoltages consists of two indicator lights: green (correct power supply) and red (overvoltage). It has a test button to check that installation has been executed correctly.

> TRANSIENT OVERVOLTAGES

The **ATCONTROL/B** protectors also actuate when they detect a transient overvoltage, driving the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as **type 2 protector** in official and independent laboratories, according to standards UNE-EN 61643-11 and GUÍA-BT-23 from REBT. Suitable for **categories I, II, III** and **IV** equipment according to ITC-BT-23 from the REBT.

It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the warning is yellow, the protector is in good condition. If not, replace.

> INSTALLATION

Installation should be carried out without power in the line. They must be installed in parallel with the low voltage supply line, downstream from the associated circuit breaker, and connected to lines, neutral and ground. Connect the S1 and S2 terminals, always without voltage, to the shunt release acting on the circuit breaker.

This protector is self-configurable. It automatically detects the voltage and programmes the permanent overvoltage limits.

> TECHNICAL DATASHEET

Reference:		ATCONTROL/B P-T PLUS **AT-8761**	ATCONTROL/B PT-T PLUS **AT-8762**
Nominal voltage:	U_n	120 or 230 V_{AC}	
Maximum overvoltage:	U_c	400 V_{AC}	
Actuation voltage:	U_a	150 or 275 V_{AC}	
Actuation time:		@150 V_{AC} → 3 - 5 s / @230 V_{AC} → 0.1 - 0.2 s @100 V_{AC} → 3 - 5 s / @80 V_{AC} → 0.1 - 0.2 s @275 V_{AC} → 3 - 5 s / @400 V_{AC} → 0.1 - 0.2 s @200 V_{AC} → 3 - 5 s / @80 V_{AC} → 0.1 - 0.2 s	
Nominal voltage for the shunt release:		110 - 415 V_{AC} / 110 - 250 V_{DC}	
Type of tests according to UNE- EN 61643-11:		-	Type 2
Nominal current (8/20 µs wave):	I_n	-	15 kA
Maximum discharge current (8/20 µs wave):	I_{max}	-	40 kA
Protection level (wave 1.2/50 µs):	U_p	-	1.4 kV
Backup fuse(1):		-	80 A gL/gG
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)	
S1, S2 cable range:		Maximum section: 1.5 mm^2	
Cable range:		Minimum / Maximum section: 2.5 / 35 mm^2	

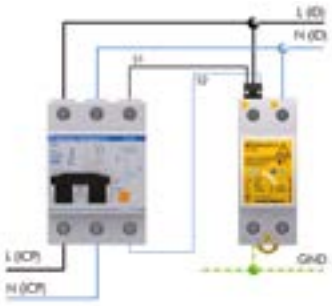
Tests certified according to standards: UNE-EN 61643-11
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required when there is no equal or less nominal current protection installed upstream from the protector.

> KIT ATCONTROL/B series

> KIT ATCONTROL/B PT-M

Complete kit including self-configurable single-phase permanent and transient overvoltage protector, shunt release and circuit breaker



> PERMANENT OVERVOLTAGES

ATCONTROL/B series protectors trip the connected shunt release (S1, S2) when they detect a permanent overvoltage. The shunt release causes the circuit breaker to trip, protecting the equipment installed downstream.

The warning system for permanent overvoltages consists of two luminous indicators: green (correct power supply) and red (overvoltage). It has a test button to check that installation has been executed correctly.

> TRANSIENT OVERVOLTAGES

The **ATCONTROL/B** protectors also actuate when they detect a transient overvoltage, driving the current to earth and reducing the voltage to a level that does not damage the connected equipment. Tested and certified as **type 2** protector in official and independent laboratories according to the standard UNE-EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III** and **IV** equipment according to ITC-BT-23 from the REBT.

It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the warning is yellow, the protector is in good condition. If not, replace.

> INSTALLATION

They must be installed **in parallel** with the low voltage supply line, downstream from the circuit breaker included in the kit, and connected to line, neutral and ground. Installation should be carried out **without power running through the line**.

The circuit breaker must be installed **in series** with the low voltage line, between the power control breaker (ICP) and the residual current breaker (ID). Connect the S1 and S2 terminals, always without voltage, to the shunt release included in the kit.

This protector is self-configurable. It automatically detects the voltage and programmes the permanent overvoltage limits.

> TECHNICAL DATASHEET

		KIT ATCONTROL/B PT-M (6 / 10 / 16 / 20 / 25 / 32 / 40 / 50 / 63)								
Reference:		**AT-8723**	**AT-8724**	**AT-8725**	**AT-8726**	**AT-8711**	**AT-8712**	**AT-8713**	**AT-8714**	**AT-8715**
Nominal current:		6 A	10 A	16 A	20 A	25 A	32 A	40 A	50 A	63 A
Nominal voltage:	U_n	120 or 230 V_{AC}								
Maximum overvoltage:	U_c	400 V_{AC}								
Actuation voltage:	U_a	150 or 275 V_{AC}								
Actuation time:		@150 V_{AC} → 3 - 5 s / @230 V_{AC} → 0.1 - 0.2 s @275 V_{AC} → 3 - 5 s / @400 V_{AC} → 0.1 - 0.2 s								
Nominal voltage for the shunt release:		110 - 415 V_{AC} / 110 - 250 V_{DC}								
Maximum short-circuit current:		6 kA								
Test type according to UNE-EN61643-11:		Type 2								
Protection categories according to the REBT:		I, II, III, IV								
Nominal discharge current (8/20 µs wave):	I_n	5 kA								
Maximum discharge current (8/20 µs wave):	I_{max}	15 kA								
Protection level (wave 1.2/50 µs):	U_p	1.1 kV								
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)								
Dimensions MCB+ shunt release:		51 x 81 x 65 mm (3 modules DIN 43880)								
MCB cable range:		Minimum / Maximum section: 1.5 / 25 mm^2								
Coil cable range:		Minimum / Maximum section: 1.5 / 2.5 mm^2 (single-stranded) or 4 mm^2 (multi-stranded)								
Protector cable range:		Minimum / Maximum section: 2.5 / 35 mm^2								

Tests certified according to standards: UNE-EN 50550, UNE-EN 61643-11, UNE-EN 60898
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> KIT ATCONTROL/B series

> KIT ATCONTROL/B PT-M 1DIN

Complete kit including self-configurable single-phase permanent and transient overvoltage protector, shunt release and circuit breaker

POP
EN 50550

> PERMANENT OVERVOLTAGES

ATCONTROL/B 1DIN series protectors trip the connected shunt release (S1, S2) when they detect a permanent overvoltage. The shunt release causes the circuit breaker to trip, protecting the equipment installed downstream.

The warning system for permanent overvoltages consists of two luminous indicators: green (correct power supply) and red (overvoltage). It has a test button to check that installation has been executed correctly.

> TRANSIENT OVERVOLTAGES

The **ATCONTROL/B 1DIN** protectors also actuate when they detect a transient overvoltage, driving the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as **type 2 protector** in **official and independent laboratories,** according to standard UNE-EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV** equipment according to the ITC-BT-23 from the REBT.

It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the warning light is red, replace protector.

> INSTALLATION

They must be installed **in parallel** with the low voltage supply line, downstream from the circuit breaker included in the kit, and connected to line, neutral and ground. Installation should be carried out **without power running through the line**.

The circuit breaker must be installed **in series** with the low voltage line, between the power control breaker (ICP) and the residual current breaker (ID). Connect the S1 and S2 terminals, always without voltage, to the shunt release included in the kit.

This protector is self-configurable. It automatically detects the voltage and programmes the permanent overvoltage limits.

> TECHNICAL DATASHEET

Reference:		KIT ATCONTROL/B PT-M 1DIN (6 / 10 / 16 / 20 / 25 / 32 / 40 / 50 / 63)								
		AT-8887	**AT-8888**	**AT-8889**	**AT-8890**	**AT-8891**	**AT-8883**	**AT-8884**	**AT-8885**	**AT-8886**
Nominal current:		6 A	10 A	16 A	20 A	25 A	32 A	40 A	50 A	63 A
Nominal voltage:	U_n	120 or 230 V_{AC}								
Maximum overvoltage:	U_c	400 V_{AC}								
Actuation voltage:	U_a	150 or 275 V_{AC}								
Actuation time:		@150 V_{AC} → 3 - 5 s / @230 V_{AC} → 0.1 - 0.2 s @275 V_{AC} → 3 - 5 s / @400 V_{AC} → 0.1 - 0.2 s								
Nominal voltage for the shunt release:		110 - 415 V_{AC} / 110 - 250 V_{AC}								
Maximum short-circuit current:		6 kA								
Test type according to UNE-EN61643-11:		Type 2								
Protection categories according to the REBT:		I, II, III, IV								
Nominal discharge current (8/20 µs wave):	I_n	5 kA								
Maximum discharge current (8/20 µs wave):	I_{max}	15 kA								
Protection level (wave 1.2/50 µs):	U_p	1.1 kV								
Dimensions:		18 x 90 x 80 mm (1 module DIN 43880)								
Dimensions MCB+ shunt release:		51 x 81 x 65 mm (3 modules DIN 43880)								
MCB cable range:		Minimum / Maximum section: 1.5 / 25 mm^2								
Coil cable range:		Minimum / Maximum section: 1.5 / 2.5 mm^2 (single-stranded) or 4 mm^2 (multi-stranded)								
Protector cable range:		Maximum section: 6 mm^2								

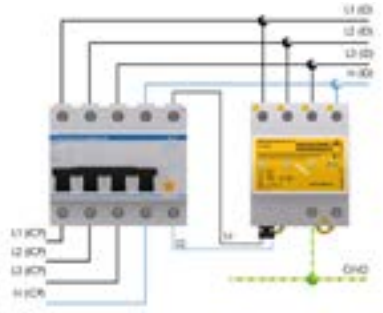
Tests certified according to standards: UNE-EN 50550, UNE-EN 61643-11, UNE-EN 60898
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> KIT ATCONTROL/B series

> KIT ATCONTROL/B PT-T

Complete kit which includes self-configurable three-phase protector against permanent and transient overvoltages, shunt release and circuit breaker

POP
EN 50550



> PERMANENT OVERVOLTAGES

ATCONTROL/B series protectors trip the connected shunt release (S1, S2) when they detect a permanent overvoltage. The shunt release causes the circuit breaker to trip, protecting the equipment installed downstream.

The warning system for permanent overvoltages consists of two luminous indicators: green (correct power supply) and red (overvoltage). It has a test button to check that installation has been executed correctly.

> TRANSIENT OVERVOLTAGES

ATCONTROL/B series protectors trip the connected shunt release (S1, S2) when they detect a transient overvoltage, driving the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as **type 2** protector **in official** and **independent laboratories,** according to standard UNE-EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III** and **IV** equipment according to standard ITCBT-23 from the REBT. It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the warning is yellow, the protector is in good condition. If not, replace.

> INSTALLATION

They must be installed **in parallel** with the low voltage supply line, downstream from the circuit breaker included in the kit, and connected to lines, neutral and ground. Installation should be carried out **without power running through the line**.

The circuit breaker must be installed in series with the low voltage line, between the power control breaker (ICP) and the residual current breaker (ID). Connect the S1 and S2 terminals, always without voltage, to the shunt release included in the kit.

This protector is self-configurable. It automatically detects the voltage and programmes the permanent overvoltage limits.

> TECHNICAL DATASHEET

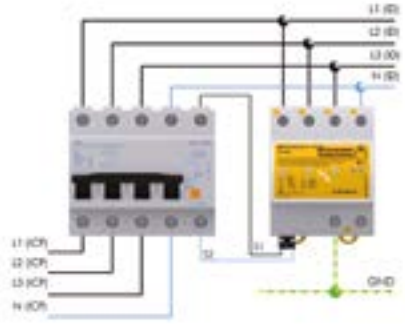
Reference:		KIT ATCONTROL/B PT-T (6 / 10 / 16 / 20 / 25 / 32 / 40 / 50 / 63)								
		AT-8727	**AT-8728**	**AT-8729**	**AT-8730**	**AT-8716**	**AT-8717**	**AT-8718**	**AT-8719**	**AT-8720**
Nominal current:		6 A	10 A	16 A	20 A	25 A	32 A	40 A	50 A	63 A
Nominal voltage:	U_n	120 or 400 V_{AC}								
Maximum overvoltage:	U_c	400 V_{AC}								
Actuation voltage:	U_a	150 or 275 V_{AC}								
Actuation time:		@150 V_{AC} → 3 - 5 s / @230 V_{AC} → 0.1 - 0.2 s @275 V_{AC} → 3 - 5 s / @400 V_{AC} → 0.1 - 0.2 s								
Nominal voltage for the shunt release:		110 - 415 V_{AC} / 110 - 250 V_{DC}								
Maximum short-circuit current:		6 kA								
Test type according to UNE-EN61643-11:		Type 2								
Protection categories according to the REBT:		I, II, III, IV								
Nominal discharge current (8/20 µs wave):	I_n	15 kA								
Maximum discharge current (8/20 µs wave):	I_{max}	40 kA								
Protection level (wave 1.2/50 µs):	U_p	1.4 kV								
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)								
Dimensions MCB+ shunt release:		88 x 81 x 65 mm (5 modules DIN 43880)								
MCB cable range:		Minimum / Maximum section: 1.5 / 25 mm^2								
Coil cable range:		Minimum / Maximum section: 1.5 / 2.5 mm^2 (single-stranded) or 4 mm^2 (multi-stranded)								
Protector cable range:		Minimum / Maximum section: 2.5 / 35 mm^2								

Tests certified according to standards: UNE-EN 50550, UNE-EN 61643-11, UNE-EN 60898
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> KIT ATCONTROL/B PLUS series

> KIT ATCONTROL/B PT-T PLUS

Complete kit including self-configurable three-phase permanent and transient overvoltage and undervoltage protector, shunt release and circuit breaker



> PERMANENT OVERVOLTAGES

ATCONTROL/B series protectors trip the connected shunt release (S1, S2) when they detect a permanent overvoltage. The shunt release causes the circuit breaker to trip, protecting the equipment installed downstream.

The warning system for permanent overvoltages consists of two luminous indicators: green (correct power supply) and red (overvoltage). It has a test button to check that installation has been executed correctly.

> TRANSIENT OVERVOLTAGES

ATCONTROL/B series protectors trip the connected shunt release (S1, S2) when they detect a transient overvoltage, driving the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as **type 2** protector **in official** and **independent laboratories,** according to standard UNE-EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III** and **IV** equipment according to standard ITCBT-23 from the REBT.

It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the warning is yellow, the protector is in good condition. If not, replace.

> INSTALLATION

They must be installed **in parallel** with the low voltage supply line, downstream from the circuit breaker included in the kit, and connected to lines, neutral and ground. Installation should be carried out **without power running through the line**.

The circuit breaker must be installed in series with the low voltage line, between the power control breaker (ICP) and the residual current breaker (ID). Connect the S1 and S2 terminals, always without voltage, to the shunt release included in the kit.

This protector is self-configurable. It automatically detects the voltage and programmes the permanent overvoltage limits.

> TECHNICAL DATASHEET

		KIT ATCONTROL/B PT-T (25 / 32 / 40 / 50 / 63) PLUS				
Reference:		**AT-8776**	**AT-8777**	**AT-8778**	**AT-8779**	**AT-8780**
Nominal current:		25 A	32 A	40 A	50 A	63 A
Nominal voltage:	U_n	230 V_{AC} - 400 V_{AC} (L-L)				
Maximum overvoltage:	U_c	400 V_{AC}				
Actuation voltage:	U_a	150 or 275 V_{AC} / 100 or 200 V_{AC}				
Actuation time:		@150 V_{AC} → 3 - 5 s / @230 V_{AC} → 0.1 - 0.2 s @100 V_{AC} → 3 - 5 s / @80 V_{AC} → 0.1 - 0.2 s @275 V_{AC} → 3 - 5 s / @400 V_{AC} → 0.1 - 0.2 s @200 V_{AC} → 3 - 5 s / @80 V_{AC} → 0.1 - 0.2 s				
Nominal voltage for the shunt release:		110 - 415 V_{AC} / 110 - 250 V_{DC}				
Maximum short-circuit current:		6 kA				
Test type according to UNE-EN61643-11:		Type 2				
Nominal discharge current (8/20 µs wave):	I_n	15 kA				
Maximum discharge current (8/20 µs wave):	I_{max}	40 kA				
Protection level (wave 1.2/50 µs):	U_p	1.4 kV				
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)				
Dimensions MCB+ shunt release:		88 x 81 x 65 mm (5 modules DIN 43880)				
MCB cable range:		Minimum / Maximum section: 1.5 / 25 mm^2				
Coil cable range:		Minimum / Maximum section: 1.5 / 2.5 mm^2 (single-stranded) or 4 mm^2 (multi-stranded)				
Protector cable range:		Minimum / Maximum section: 2.5 / 35 mm^2				

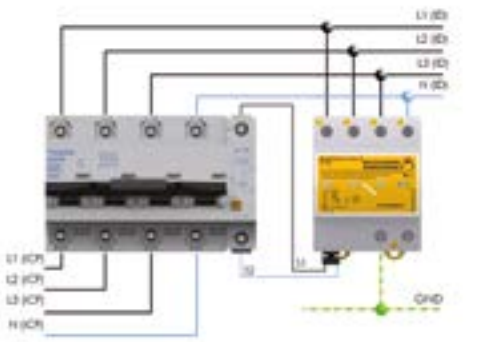
Tests certified according to standards: UNE-EN 50550, UNE-EN 61643-11, UNE-EN 60898
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> KIT ATCONTROL/B D series

> KIT ATCONTROL/B PT-T D

Complete kit including self-configurable three-phase permanent and transient overvoltage protector, shunt release and D curve circuit breaker.

POP
EN 50550



> PERMANENT OVERVOLTAGES

ATCONTROL/B PT-T series protectors trip the connected shunt release (S1, S2) when they detect a permanent overvoltage. The shunt release causes the circuit breaker to trip, protecting the equipment installed downstream.

The warning system for permanent overvoltages consists of two luminous indicators: green (correct power supply) and red (overvoltage). It has a test button to check that installation has been executed correctly.

> TRANSIENT OVERVOLTAGES

ATCONTROL/B PT-T protectors also actuate when they detect a transient overvoltage, driving the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as a **type 2** protector in **official and independent laboratories** according to standards UNE-EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for categories I, II, III and IV equipment according to ITC-BT-23 from the REBT.

It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the warning is yellow, the protector is in good condition. If not, replace.

> INSTALLATION

They must be installed in parallel with the low voltage supply line, downstream from the circuit breaker included in the kit, and connected to lines, neutral and ground. Installation should be carried out without power in the line.

The circuit breaker must be installed in series with the low voltage line, between the power control breaker (ICP) and the residual current breaker (ID). Connect the S1 and S2 terminals, always without voltage, to the shunt release included in the kit.

This protector is self-configurable. It automatically detects the voltage and programmes the permanent overvoltage limits.

> TECHNICAL DATASHEET

		KIT ATCONTROL/B PT-T (63 / 80 / 100 / 125) D			
Reference:		**AT-8796**	**AT-8797**	**AT-8798**	**AT-8799**
Nominal current:		63 A	80 A	100 A	125 A
Nominal voltage:	U_n	120 or 400 V_{AC}			
Maximum overvoltage:	U_c	400 V_{AC}			
Actuation voltage:	U_a	150 or 275 V_{AC}			
Actuation time:		@150 V_{AC} → 3 - 5 s / @230 V_{AC} → 0.1 - 0.2 s @275 V_{AC} → 3 - 5 s / @400 V_{AC} → 0.1 - 0.2 s			
Maximum short-circuit current:		10 kA			
Test type according to UNE-EN61643-11:		Type 2			
Nominal discharge current (8/20 µs wave):	I_n	15 kA			
Maximum discharge current (8/20 µs wave):	I_{max}	40 kA			
Protection level (wave 1.2/50 µs):	U_p	1.4 kV			
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)			
Dimensions MCB+ shunt release:		124 x 81 x 65 mm (7 modules DIN 43880)			
MCB cable range:		Minimum / Maximum section: 1.5 / 35 mm^2			
Coil cable range:		Minimum / Maximum section: 1.5 / 2.5 mm^2 (single-stranded) or 4 mm^2 (multi-stranded)			
Protector cable range:		Minimum / Maximum section: 2.5 / 35 mm^2			

Tests certified according to standards: UNE-EN 50550, UNE-EN 61643-11, UNE-EN 60898
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> ATPLUG CONTROL series

> ATPLUG CONTROL

Plug-in single-phase self-reclosing permanent and transient overvoltage and undervoltage protector.

POP
EN 50550

> PERMANENT OVERVOLTAGES

ATPLUG CONTROL series protectors actuate when they detect a permanent overvoltage or low voltage, disconnecting the power to the outlet. This SPD is plugged directly in the same socket as the load to be protected. When the permanent overvoltage or low voltage come to a halt, the protector reconnects the power supply to the load.

The warning system for permanent overvoltages consists of two luminous indicators: green (correct power supply) and red (overvoltage). It has a test button to check that installation has been executed correctly.

> TRANSIENT OVERVOLTAGES

ATPLUG ATCONTROL protectors also actuate when they detect a transient overvoltage, driving the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as a **type 3** protector in **official and independent laboratories** according to standards UNE-EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the green pilot light is lit up, the protector is in good working condition. If not, replace.

> INSTALLATION

To be installed with the loads plugged to the charges that want to be protected.

Its use is recommended in systems where overvoltage sensitive equipments are installed (computers, printers, servers, etc.) and always coordinated with protector type 1 or 2.

> TECHNICAL DATASHEET

Reference:		ATPLUG CONTROL **AT-9608**
Nominal voltage:	U_n	230 V_{AC}
Maximum overvoltage:	U_c	400 V_{AC}
Actuation time:		@275 V_{AC} → 3 - 5 s / @400 V_{AC} → 0.1 - 0.2 s @200 V_{AC} → 3 - 5 s / @80 V_{AC} → 0.1 - 0.2 s
Test type according to UNE-EN61643-11:		Type 3
Nominal discharge current (8/20 µs wave):	I_n	3 kA
Combined wave tension:	$U_{o.c.}$	6 kV
Protection level (wave 1.2/50 µs):	U_p	800 V
Dimensions:		105 x 90 x 59 mm

Tests certified according to standards: UNE-EN 50550, UNE-EN 61643-11, UNE-EN 60898
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> ATPLUG CONTROL series

> ATPLUG CONTROL 120 V

Plug-in single-phase self-reclosing permanent and transient overvoltage and undervoltage protector.

POP
EN 50550

> PERMANENT OVERVOLTAGES

ATPLUG CONTROL series protectors actuate when they detect a permanent overvoltage or low voltage, disconnecting the power to the outlet. This SPD is plugged directly in the same socket as the load to be protected. When the permanent overvoltage or low voltage come to a halt, the protector reconnects the power supply to the load.

The warning system for permanent overvoltages consists of two luminous indicators: green (correct power supply) and red (overvoltage). It has a test button to check that installation has been executed correctly.

> TRANSIENT OVERVOLTAGES

ATPLUG ATCONTROL protectors also actuate when they detect a transient overvoltage, driving the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as **type 3 protector** in **official and independent laboratories,** according to the standard UNE-EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III and IV equipment** according to the REBT.

It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the green pilot light is lit up, the protector is in good working condition. If not, replace.

> INSTALLATION

To be installed with the loads plugged to the charges that want to be protected.

Its use is recommended in systems where overvoltage sensitive equipments are installed (computers, printers, servers, etc.) and always coordinated with protector type 1 or 2.

> TECHNICAL DATASHEET

Reference:		ATPLUG CONTROL 120 V **AT-9609**
Nominal voltage:	U_n	120 V_{AC}
Maximum overvoltage:	U_c	230 V_{AC}
Actuation time:		@150 V_{AC} → 3 - 5 s / @230 V_{AC} → 0.1 - 0.2 s @100 V_{AC} → 3 - 5 s / @80 V_{AC} → 0.1 - 0.2 s
Test type according to UNE-EN61643-11:		Type 3
Nominal discharge current (8/20 µs wave):	I_n	3 kA
Combined wave tension:	$U_{o.c.}$	6 kV
Protection level (wave 1.2/50 µs):	U_p	800 V
Dimensions:		105 x 90 x 59 mm

Tests certified according to standards: UNE-EN 50550, UNE-EN 61643-11, UNE-EN 60898
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

> ATCONTROL/D series

> ATCONTROL/D M

Self-configurable single-phase permanent and transient overvoltage protector actuating on a 30 mA residual current breaker

> PERMANENT OVERVOLTAGES

ATCONTROL/D protectors actuate when they detect a permanent overvoltage, generating a pulse to earth that trips the associated residual current device, thereby protecting the equipment installed downstream.

The warning system for permanent overvoltages consists of two luminous indicators: green (correct power supply) and red (overvoltage). It has a test button to check that installation has been executed correctly.

> TRANSIENT OVERVOLTAGES

The **ATCONTROL/D PT-M** protector also actuates when it detects a transient overvoltage driving the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as a **type 2** protector in **official and independent laboratories** according to standards UNE-EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for categories I, II, III and IV equipment according to ITC-BT-23 from the REBT.

It has a thermodynamic control device that disconnects from the electrical network in case of deterioration, and also a warning system for transient overvoltages. When the warning is yellow, the protector is in good condition. If not, replace.

> INSTALLATION

They must be installed in parallel with the low voltage supply line, downstream from the associated residual current breaker, and connected to line, neutral and ground. Installation should be carried out without power in the line.

This protector is self-configurable. It automatically detects the voltage and programmes the permanent overvoltage limits.

> TECHNICAL DATASHEET

Reference:		ATCONTROL/D P-M **AT-8707**	ATCONTROL/D PT-M **AT-8708**
Nominal voltage:	U_n	120 or 230 V_{AC}	
Maximum overvoltage:	U_c	400 V_{AC}	
Actuation voltage:	U_a	150 or 275 V_{AC}	
Actuation time:		@150 V_{AC} → 3 - 5 s / @230 V_{AC} → 0.1 - 0.2 s @275 V_{AC} → 3 - 5 s / @400 V_{AC} → 0.1 - 0.2 s	
Differential sensitivity:		30 mA	
Type of tests according to UNE-EN 61643-11:		-	Type 2
Nominal discharge current (8/20 µs wave):	I_n	-	5 kA
Maximum discharge current (8/20 µs wave):	I_{max}	-	15 kA
Protection level (wave 1.2/50 µs):	U_p	-	1.1 kV
Backup fuse(1):		-	80 A gL/gG
Dimensions:		36 x 90 x 80 mm (2 modules DIN 43880)	
Cable range:		Minimum / Maximum section: 2.5 / 35 mm^2	

Tests certified according to standards: UNE-EN 61643-11
Relevant standards: UNE 21186, NF C 17-102, IEC 62305

(1) Required when there is no equal or less nominal current protection installed upstream from the protector.

> ATCONTROL/D series

> ATCONTROL/D T

Self-configurable three-phase permanent and transient overvoltage protector, actuating on a 30 mA residual current breaker

> PERMANENT OVERVOLTAGES

ATCONTROL/D series protectors actuate whenever they detect a permanent overvoltage, generating a pulse to earth that trips the associated residual current device, thereby protecting the equipment installed downstream.

The warning system for permanent overvoltages consists of two luminous indicators: green (correct power supply) and red (overvoltage). It has a test button to check that installation has been executed correctly.

> TRANSIENT OVERVOLTAGES

ATCONTROL/D PT-T protectors also actuate when they detect a transient overvoltage driving the current to earth and reducing the voltage to a level that does not damage the connected equipment.

Tested and certified as **type 2 protectors** in **official** and **independent laboratories** according to regulations UNE-EN 61643-11 and GUÍA-BT-23 from the REBT. Suitable for **categories I, II, III** and **IV** equipment according to ITC-BT-23 from the REBT.

They have a thermodynamic device that disconnects from the electrical network in case of deterioration, as well as a warning system for transient overvoltages. When the warning is yellow, the protector is in good condition. If not, replace.

> INSTALLATION

They must be installed in parallel with the low voltage supply line, downstream from the residual current device, and connected to lines, neutral and ground. Installation should be carried out without power running through the line.

These protectors are self-configurable. They automatically detect the voltage and programme the permanent overvoltage limits they are to use.

> TECHNICAL DATASHEET

Reference:		ATCONTROL/D P-T **AT-8705**	ATCONTROL/D PT-T **AT-8706**
Nominal voltage:	U_n	120 or 230 V_{AC}	
Maximum overvoltage:	U_c	400 V_{AC}	
Actuation voltage:	U_a	150 or 275 V_{AC}	
Actuation time:		@150 V_{AC} → 3 - 5 s / @230 V_{AC} → 0.1 - 0.2 s @275 V_{AC} → 3 - 5 s / @400 V_{AC} → 0.1 - 0.2 s	
Differential sensitivity:		30 mA	
Type of tests according to UNE-EN 61643-11:		-	Type 2
Nominal discharge current (8/20 µs wave):	I_n	-	15 kA
Maximum discharge current (8/20 µs wave):	I_{max}	-	40 kA
Protection level (wave 1.2/50 µs):	U_p	-	1.4 kV
Backup fuse(1):		-	80 A gL/gG
Dimensions:		72 x 90 x 80 mm (4 modules DIN 43880)	
Cable range:		Minimum / Maximum section: 2.5 / 35 mm^2	
Tests certified according to standards: UNE-EN 61643-11 Relevant standards: UNE 21186, NF C 17-102, IEC 62305			

(1) Required when there is no equal or less nominal current protection installed upstream from the protector.

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