



TSLPRO®

TSTLP®



Advanced Lightning and Surge Protection Product Catalogue 2017-08

Start Future From Safety

www.tslpro.com



✓ Company Profile ★★★★★

TS Lightning Protection Co., Limited

Guangzhou TS Lightning Protection Equipment Co., Limited (ISO9001:2008, # 10131630Q)

We, approved by ISO9001:2008, belonging to the Group of TSTLP® & TSLPRO® are one of the leading **manufacturers** specializing in lightning & surge protection field and enjoy high reputation among our distributors & customers worldwide, especially our featured TSTLP ESE Lightning Conductor.

Like a good team, we're composed of Departments of General Management, Sales Marketing, Technical Designing & Production, all of which are doing GOOD performance. And Our staffs & workers are well-trained and company provides them additional welfare for their excellent performance, which make them feel like working at home and HAPPY !

Our main product line includes:

A: TSTLP® E.S.E. Air Terminals

B: Smart Lightning Counters

C: Power Surge Protection Devices

D: Data Surge Protection Devices

Patent Rights, Authorized Test Certificates/Reports from ACCREDITED BUREAUS / Laboratories HOME & OVERSEAS (like ilac-MRA, ENAC,CMA,CAL, CE, CPRL...) are available for most of our TSTLP® brand lightning protection devices.

We not only pay attention to manufacturing standardization, but also focus on finished products' quality in detail,all products must be tested for times from components to finished products by our ADVANCED test equipment, like signal loop test, sparking test to ensure safety and customers' satisfaction. And we have regular stock for our popular products so that delivery are expected to be short (FACTS PROVED THAT WE'RE RELIABLE MANUFACTURERS). Further more, we're willing to design or make the product as per customers' requirement within the scope of our ability, to maximumly satisfy customers is our consistent working attitude,either quality or service.

INNOVATION IS THE CORNERSTONE OF OUR DEVELOPMENT.

We sincerely INVITE competent customers to become our distributors for WIN-WIN cooperation, either country or district.



✓ Part of Company/Factory Album

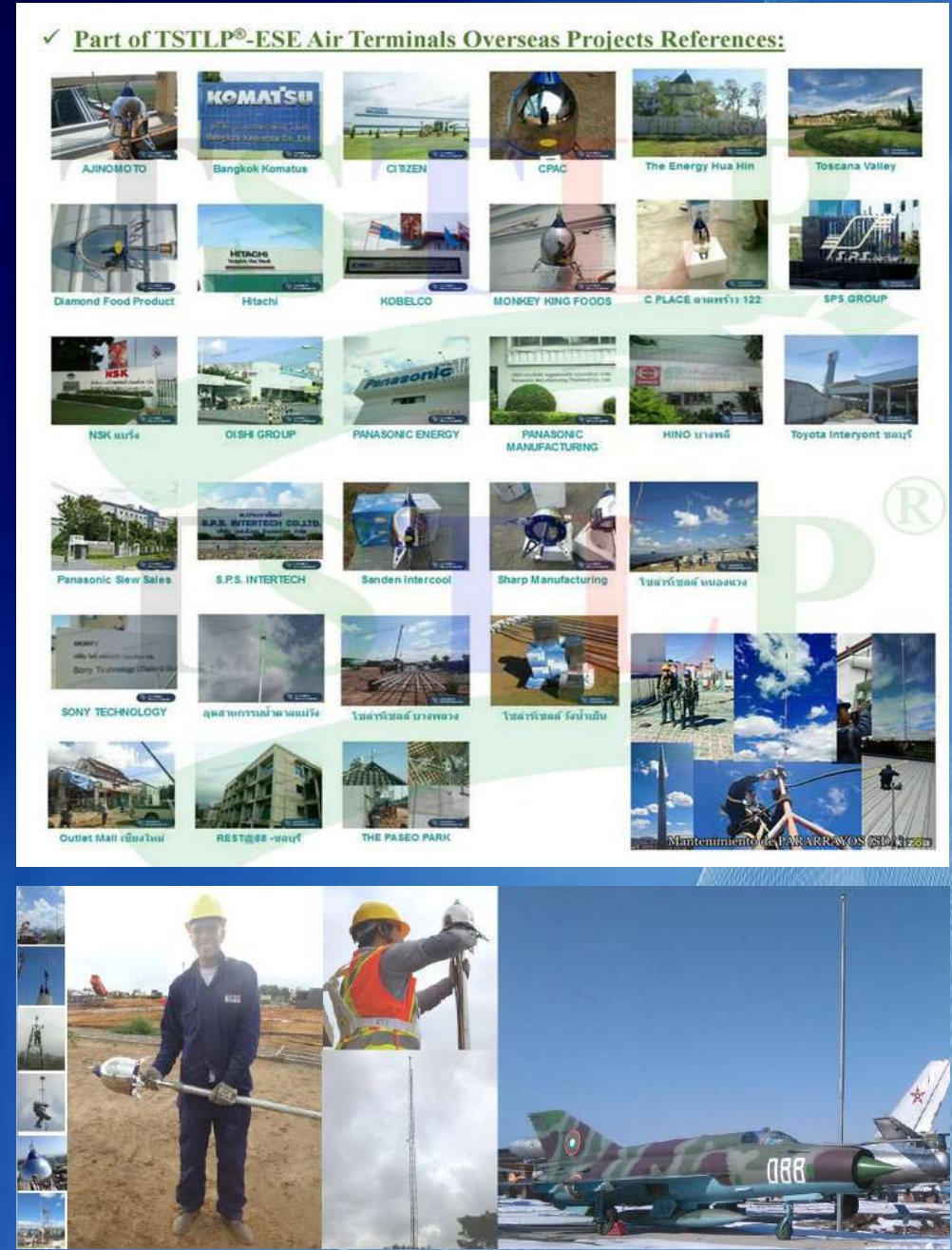




✓ Part of Company Certificates(Test Reports)



✓ Part of TSTLP-ESE Air Terminal Overseas Projects Installation Photos



Company Profile, Product Summary & Foreword		Page	02 ~ 18
Direct Lightning Protection System			
Early Streamer Emission Air Terminal & Tester			19 ~ 22
Lightning Surge Counter			23 ~ 26
Earthing Accessories			27 ~ 33
Power Supply System			
Type 1+2 Lightning Current and Surge Arrester Type 1 Lightning Current Arrester			34 ~ 40
Type 1 Surge Arrester			41 ~ 46
Type 2 Surge Arrester			47 ~ 52
Type 3 Surge Arrester, Alarm Device			53 ~ 56
Information Technology (IT) System			
Data & Control Surge Arrester			57 ~ 62
LSA-PLUS System Surge Arrester			63
RJ11/RJ45 Surge Arrester			64 ~ 73
D-SUB Surge Arrester			74 ~ 75
BNC Surge Arrester			76 ~ 81
Surveillance Surge Arrester			76 ~ 81
TV, Antenna & Explosion-proof Surge Arrester			82 ~ 84

- **Lightning Protection System Products**
- ✓ **TSTLP® Direct Lightning Protection (ESE TERMINAL, TESTER, COUNTER, EARTHING MATERIAL)**

- ✓ **TSTLP® Power Range Over-Voltage Surge Protection (T1+2, T1, T2, T3 SPD)**

- ✓ **TSTLP® Signal Range Surge Protection (DATA, NETWORK, CCTV, PHONE, ANTENNA...SPD)**



The necessity of surge & lightning protection

Each year there are million and million of lightning strikes all over the world.

The enormous energy of lightnings have inflicted huge damages to property and also endanger human lives, to avoid these damages, surge protective devices should be installed figure from different institution

Sources of surge

Lightning strike includes direct lightning strike, close lightning strike and distant lightning strike (Fig.2). The amplitudes and energy of the impulse currents and voltages generated are especially dangerous to the electronic system to be protected.

Due to the existence of the earthing resistance, a direct or close lightning strike may cause a high voltage drop from earthing resistance to the distance surrounding, this is a great threat to the electrical & electronic equipment in the building. Besides the high voltage drop at the earthing resistance, the induction of the electromagnetic wave caused by the lightning will also produce surges to the system & equipment (Fig.3: 1c).

Distant lightning strike is that the strike point is at a distance from the protected devices, or striking at the high voltage overhead lines and its vicinity, or the lightning discharge between the clouds (Fig.3: 2a,2b,2c).

Surge caused by switching operation

- Open or close electrical circuit on inductive load (e.g. Transformer, magnetic core, motor)
- Ignition or interruption of electric arc (e.g. arc welding Device)
- Operation of circuit breaker

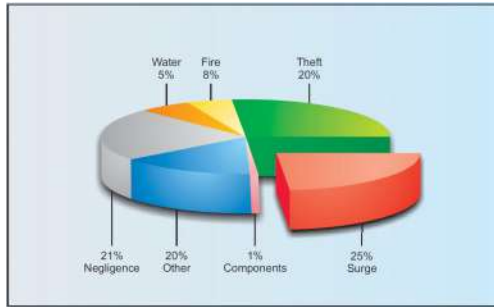


Fig.1 Reason of electronic equipment breakdown,an average figure from different institution

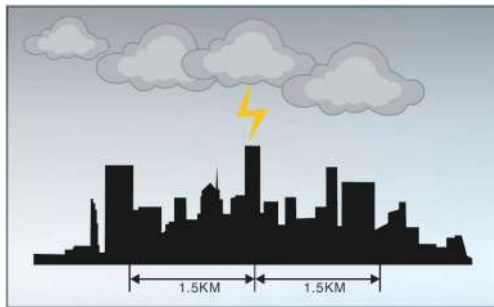


Fig 2 :Damages could occur in a radius of 1.5KM

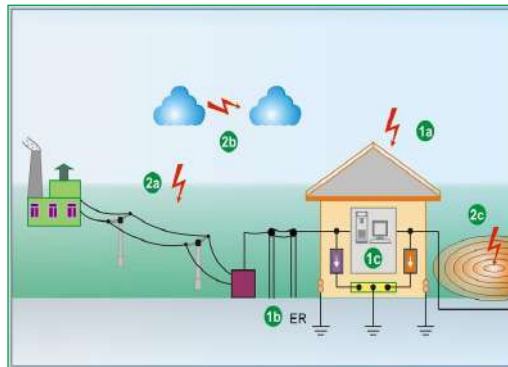


Fig.3 Sources of surge and lightning discharge

Direct or close lightning strike

Lightning strike at external lightning protection system,such as a process control system (industrial installation), cables etc.

- 1a system,such as a process control system (industrial installation), cables etc.
- 1b Voltage drop at the earthing resistance ER caused by lightning current.
- 1c Inductive surge voltage in close loop.

Distant lightning strike

- 2a Strike in distant overhead lines.
- 2b Inductive lightning impulse waves and surges on overhead lines caused by cloud-to-cloud lightning.
- 2c Effected field caused by the lightning

Lightning discharge

All conductors may conduct lightning current(Fig.4).

Such as:

1. Power supply lines
2. Data lines
3. Air termination devices (or earthing system)
4. Antennas

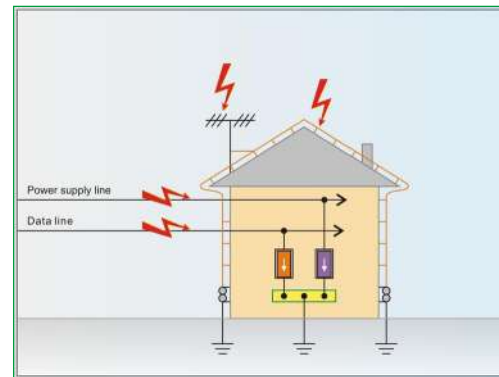


Fig.4 All conductors may conduct lightning current

Step voltage

When lightning occurs, the adjacent trees could become a conductor for lightning current, if the lightning strikes the trees, a huge voltage difference will be formed around the trees because of the large current. If a man's feet standing on the ground separately, a deadly step voltage difference U_0 will develop, this voltage difference could be life threatening (Fig.5).

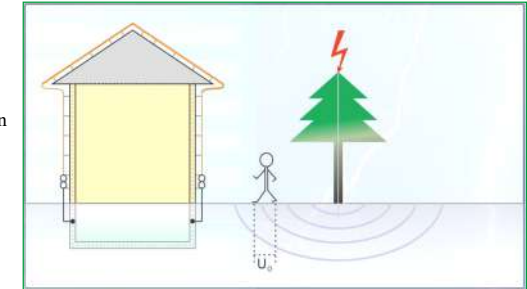


Fig.5 Step voltage

Lightning protection system

Lightning protection system is consisted of: external lightning protection and internal lightning protection.

External lightning protection includes:

- * Air termination device (lightning rod, belt and grid);
- * Down conductor;
- * Earthing system

Internal lightning protection includes:

- * Shielding;
- * Equipotential bonding;
- * SPD installation

● External Lightning Protection Mainly Protects Building & Structure

● Internal Lightning & Surge Protection Mainly Protects Electronic Equipment



SPD standards	Series	Specification
IEC 61643-1	Power Supply	Performance & Test
IEC 61643-21	Signal & Telecom	Performance & Test
IEC 61643-12	Power Supply	Installation
IEC 61643-22	Signal & Telecom	Installation

Lightning protection zones

Lightning protection zones concept based on EMC including the following parts(Fig.7 & 8):

- * External lightning protection (air-termination system, down-conductor system, earthing);
- * Lightning equipotential bonding;
- * Space shield;
- * Surge protection for power supply system and IT system.

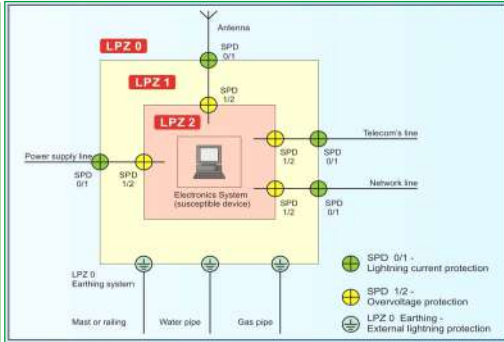
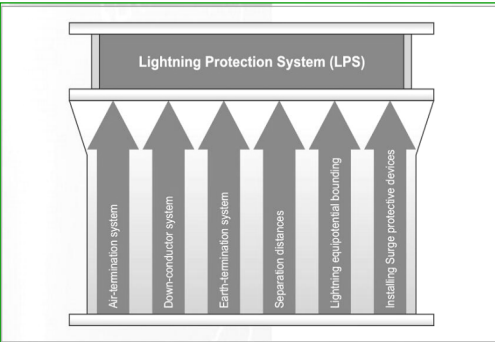


Fig.6 Lightning protection system

Fig.7 Lightning protection Common Sense

Definition of lightning protection zones

LPZ 0_A Zone where the threat is due to the direct lightning flash and the full lightning electromagnetic field. The internal systems may be subjected to full or partial lightning surge currents.

LPZ 0_B Zone protected against direct lightning flashes but where the threat is the full lightning electromagnetic field. The internal systems may be subjected to partial lightning surge currents.

LPZ 1 Zone where the surge current is limited by current sharing and by SPDs at the boundary. Spatial shielding may attenuate the lightning electromagnetic field.

LPZ 2...n Zone where the surge current may be further limited by current sharing and by additional SPDs at the boundary. Additional spatial shielding may be used to further attenuate the

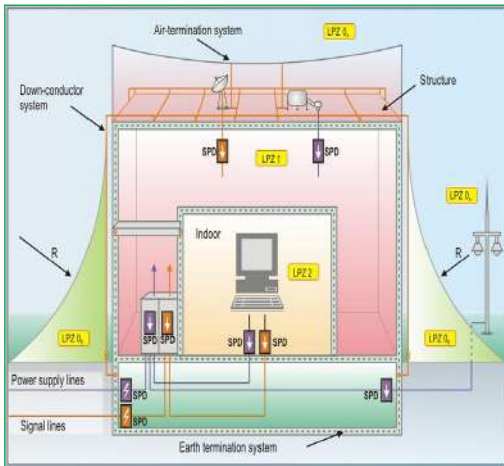


Fig.8 Lightning protection zones

Air-termination systems (Rolling sphere)

The rolling sphere method: supposed a sphere with radius R, L, rolling along the protected object, the sphere touches the air termination device and the ground at spot A and B, the sphere un-touched area ABC is the protected area by this air-termination device(Fig.9 & 11).

The rolling sphere radius defined as below (according to IEC 61643-1):

Lightning protection class	Radius R (m)
Class I building/structure	20
Class II building/structure	30
Class III building/structure	45
Class IV building/structure	60

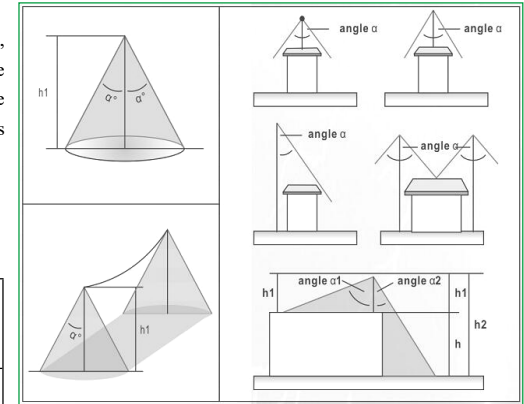


Fig.10 Protective angle method for air rod

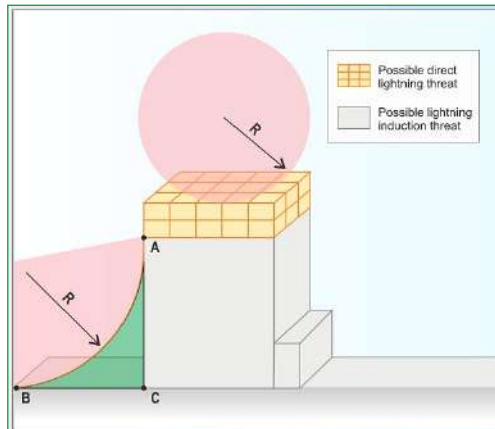


Fig.9 Air-termination system (Rolling sphere)

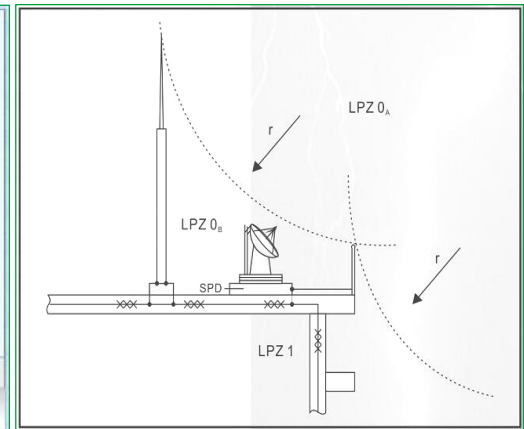


Fig.11 SPD for interconnected LPZ



External lightning protection system

External lightning protection system is consisted of: air-termination devices, down conductors and earthing system.

Mesh protection is widely used in lightning protection system. If the height of building is larger than rolling sphere's both the lightning rod for the air-termination system & lightning mesh should be applied.

Lightning protection class	Mesh size (m)
Class I building/structure	5 x 5
Class II building/structure	10 x 10
Class III building/structure	15 x 15
Class IV building/structure	20 x 20

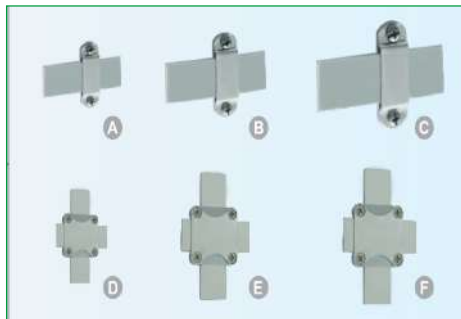


Fig.13 Conductor Fastener

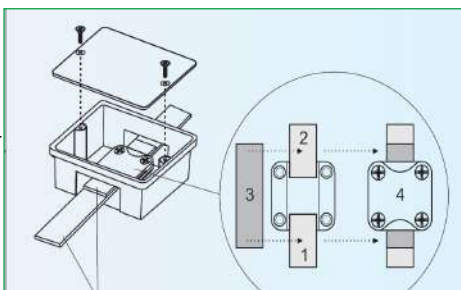


Fig.14 Earthing Inspection Housing

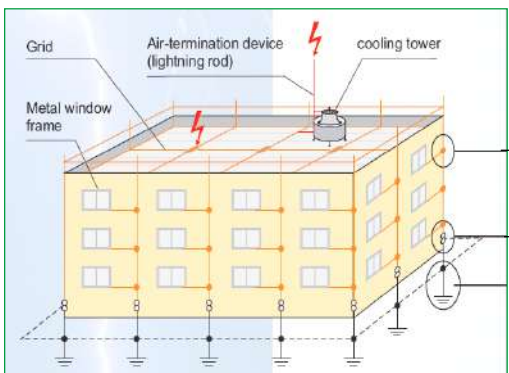


Fig.12 External lightning protection equipotential bonding

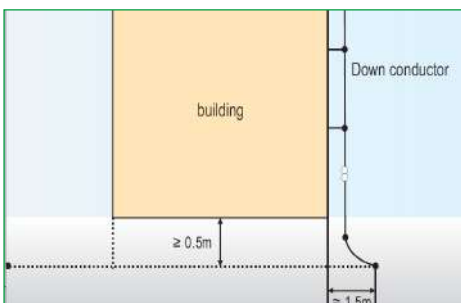


Fig.15 Down Conductor Earthing System

Equipotential bonding

Steel reinforcement rods in a concrete building will serve very well as equipotential bonding conductors, therefore in the process of building works, systematic bonding of these reinforcing rods are vitally important (Fig.16).

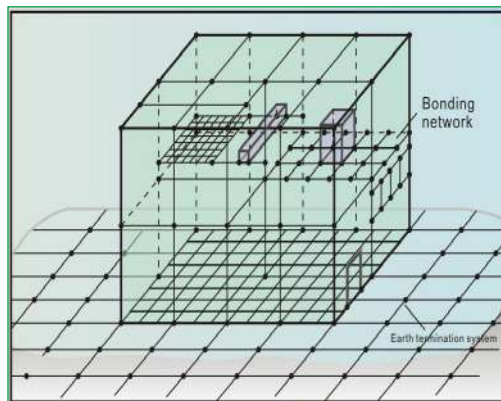


Fig.16 Equipotential Bonding Network in a Structure or Building

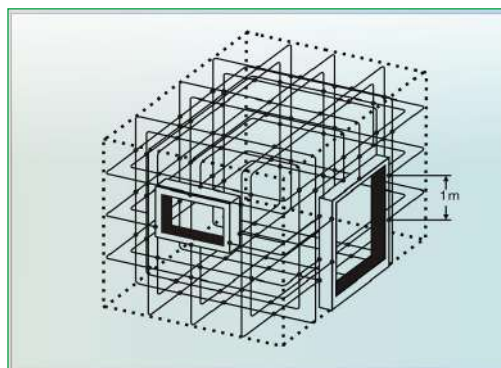


Fig.17: shielded cage for lightning protection

Faraday cages & down conductors

Once the concrete reinforcement rods are bonded together, they will serve as faraday cages & down conductors and integrated into the lightning protection system (Fig.18).

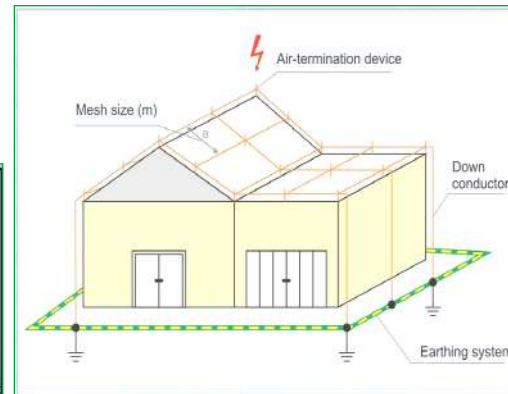


Fig.18 External lightning mesh protection

Electromagnetic field at lightning current

In order to avoid interference of the strong electromagnetic field, power supply lines and data lines should be laid as far as possible from the lightning down conductors (Fig.19).

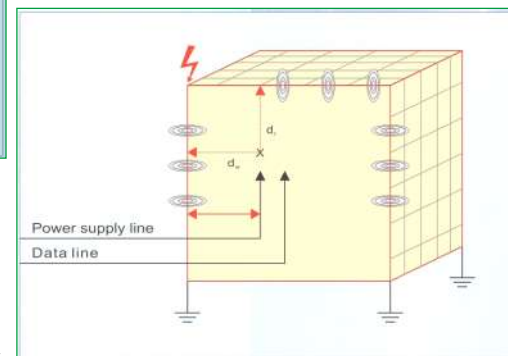


Fig.19 Electromagnetic field at lightning current



Isolated air-termination rod

To orderly discharge lightning current, we can use isolated air

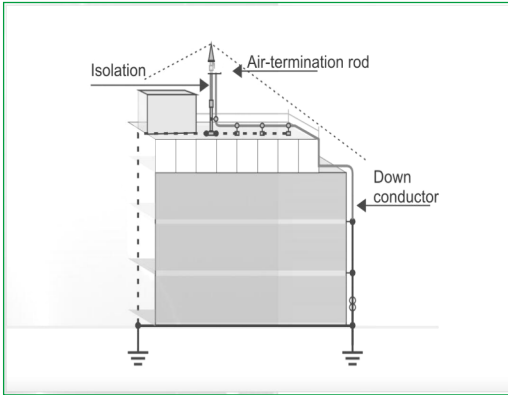


Fig.20 Surge protection for terminal devices

Shield connection for signal lines

If a shielded cable is laid between two lightning protection systems, both ends of the cable shield should be earthed directly, (shown as Fig.21)

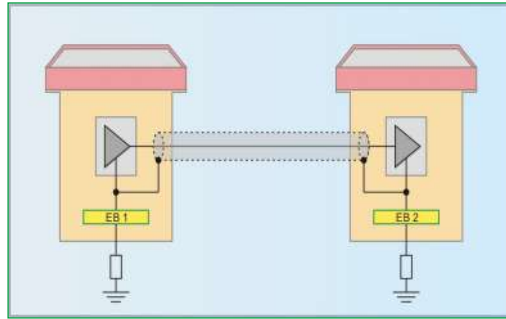


Fig.21 Shield connection at both ends by direct earthing

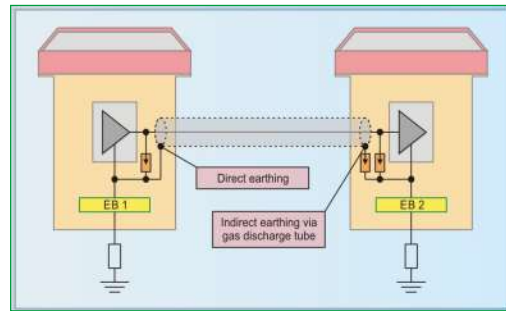


Fig.22 Shield connection by direct or indirect earthing

Direct & indirect earthing

If the distance between two lightning protection systems is too far, the earth voltage potential of these two systems may not be the same, this will lead to equalizing current develop in the cable shield. In order to avoid this phenomenon, one end of the cable shield should be earthed directly, and the other end earthed via a gas discharge tube indirectly. (shown as Fig.22)

Thus, if there is no lightning current, the electrical connection between the cable shield and the earthing system is open, equalizing current will not develop. If the lightning occurs, the gas discharge tube will be activated, make both ends of the cable shield earthed (also Fig.23).

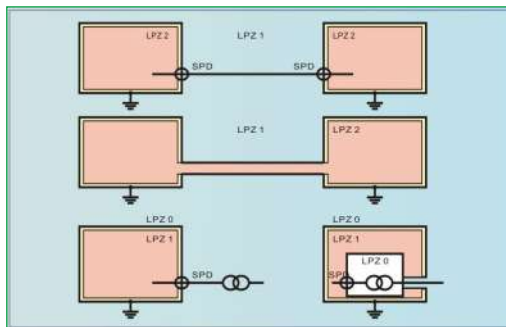


Fig.23 Shielding is part of surge protection

Birds standing on High Voltage Lines

Due to the fact that the bird body has achieved a single high voltage (equal potential), therefore, no harm will come to the birds (Fig.24).

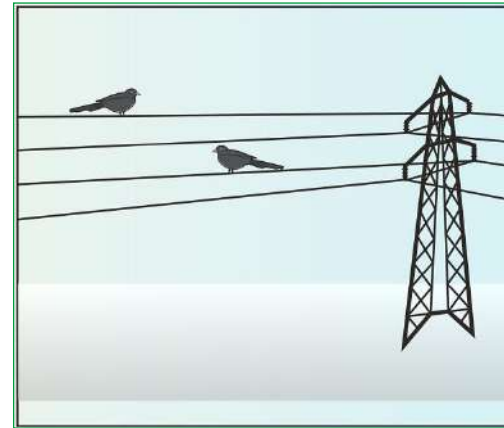


Fig.24 Birds standing on high voltage power lines

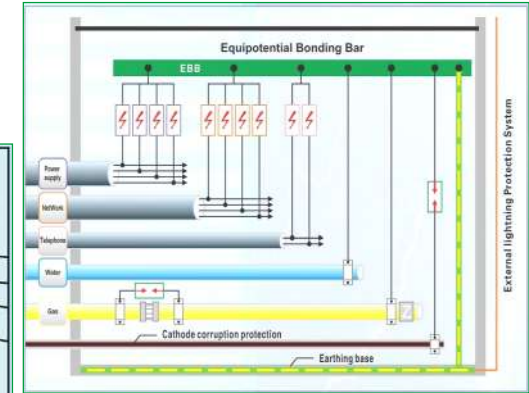


Fig.25 Lightning & equipotential bonding

Surge protection for computer devices (equipotential principle)

All conductors which are connected to the computer equipment should be installed with surge protective devices, if and when the lightning strikes (or over current), the over voltage will be equally distributed to all connecting points, i.e. U_s, U_s, U_s , i.e. Equipotential.

Lightning & equipotential bonding

In order to eliminate the destructive potential difference caused by the lightning current, all the power supply lines, signal lines and the metal pipes through the boundary between outdoor and indoor should be connected to an equipotential bonding bar via surge protective devices or by conductors directly (Fig.25).

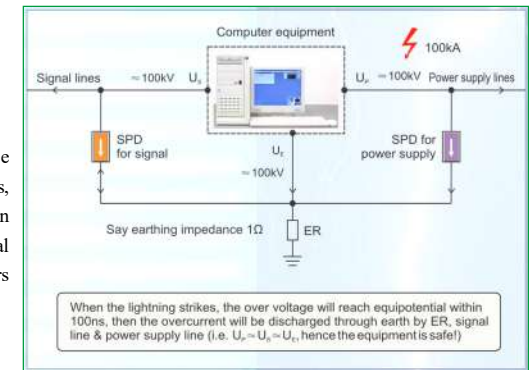


Fig.26 Surge protection for terminal devices

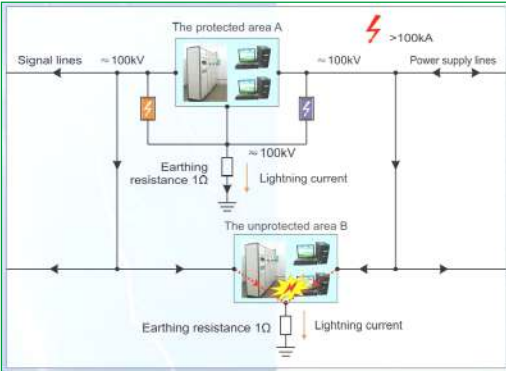


Fig.27 Path of lightning current discharging

The protected area & the unprotected area

Thanks to the equipotential connection, the lightning current will not pass through the protected area A. But as for the unprotected area B, the devices in it will be damaged because of the large potential difference(Fig.27).

Using the same principle

We can connect all conductors (i.e. data lines, power supply lines, antenna) via SPDs to earth to achieve equal potential, during lightning strikes or surges(Fig.28).

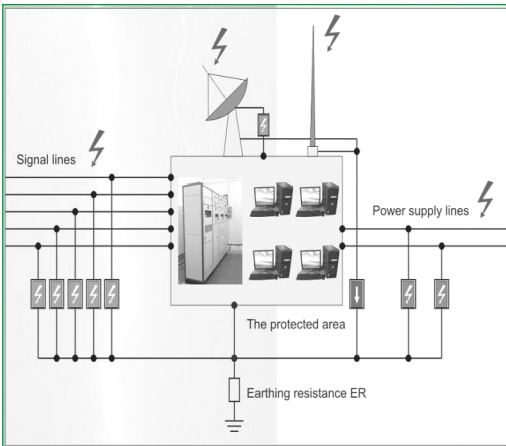


Fig.28 Surge protection

Voltage Potential Equipotential bonded protection

When lightning occurs, if all conductors are equipotential bonded indoor(as Fig.29), a man's instantaneous voltage potential will increase or decrease along with the ground voltage potential without him noticing the difference.

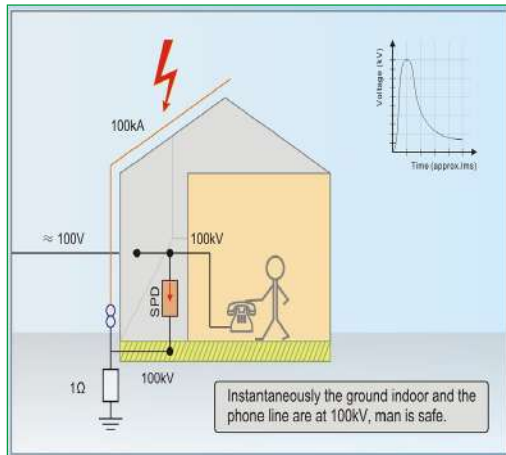


Fig.29 Equipotential bonded protection

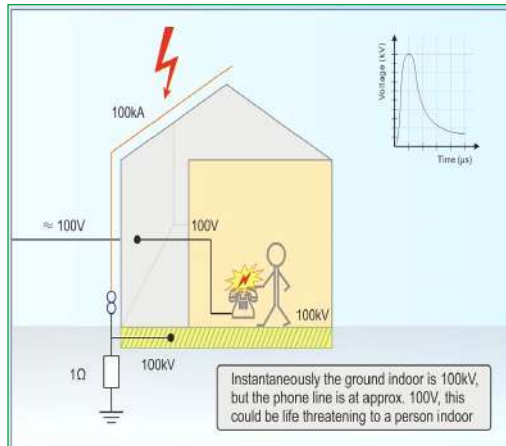


Fig.30 No equipotential bonded protection

What is the Surge Protective Device (SPD)

Surge Protective Devices, are very fast switches, able to switch on in the order of nano-second (say 1ns to 100ns). During over voltages, these switches have rather low impedance able to conduct large current, when switched on. In normal voltage SPDs have very high impedance, i.e.Switched off(Fig.31).

Type	Response time (say ~)	Range of discharge current (say~)	Waveform
Semiconductor	1ns	1kA	8/20μs
Varistor	25ns	20kA	8/20μs
Spark gap	100ns	100kA	10/350μs

Fig.31 Parts used in SPD

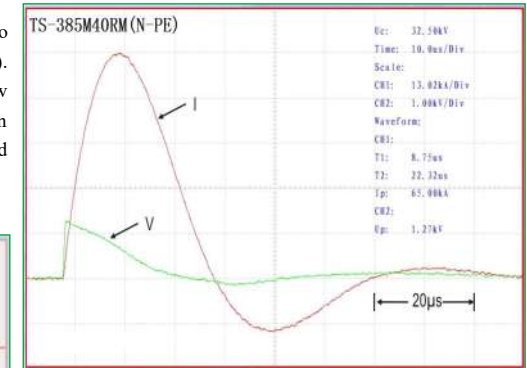


Fig.33 Behavior of a sparkgap

For sparkgap, although it takes about 100ns to respond, but once a sparkgap achieved a conduction breakthrough at U_p , the voltage will quickly drop to approx 50V, but still able to conduct large current (Fig.33)

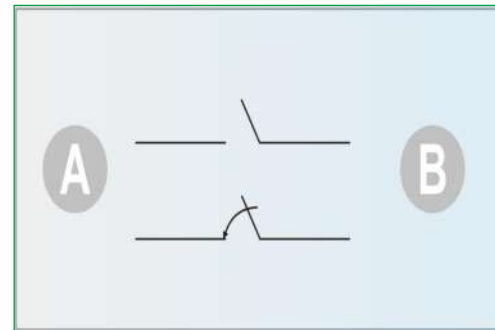


Fig.32 SPD as a switch

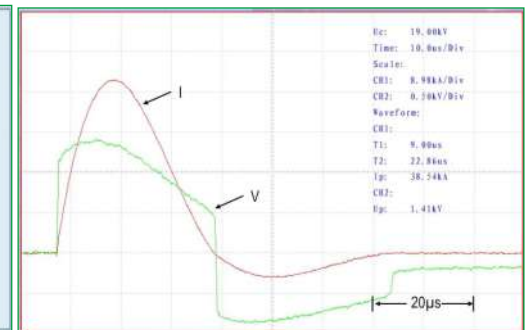


Fig.34 Behavior of a varistor

SPD is a low impedance bidirectional switch, when between & has a high voltage (say larger than U_p). will switch on. When between & has a normal voltage say at U_c , is opened circuit(Fig.32).

For varistor, a varistor starts to conduct current at relatively large voltages, and this large voltages will maintain throughout the whole cycle of current conduction (Fig.34)



10/350μs and 8/20μs waveform lightning current

10/350μs waveform impulse current is defined as the test current for direct lightning strike, as for devices that are not subjected to direct lightning strike, we can use 8/20μs test waveform(Fig.35).

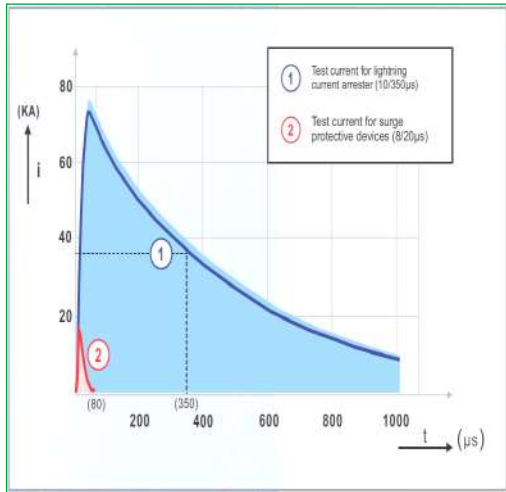


Fig.35 10/350μs and 8/20μs impulse wave test current

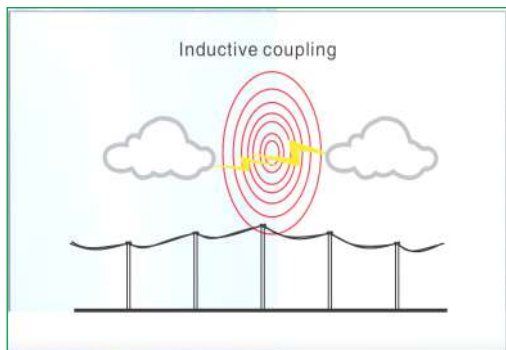


Fig.36 Inductive coupling

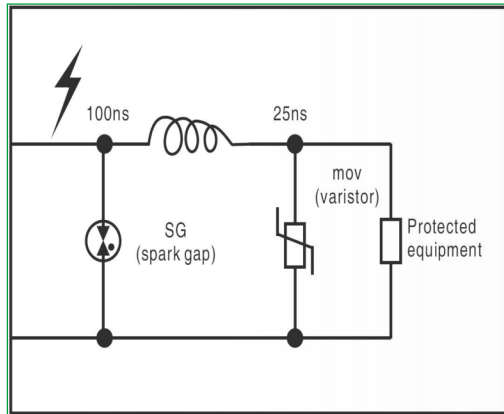
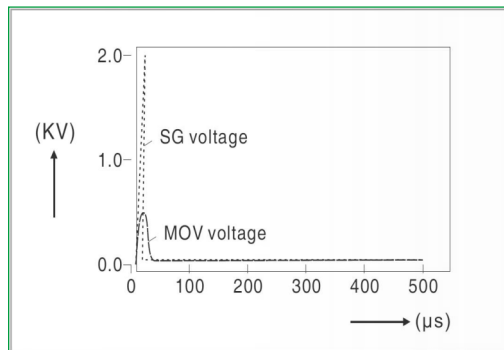
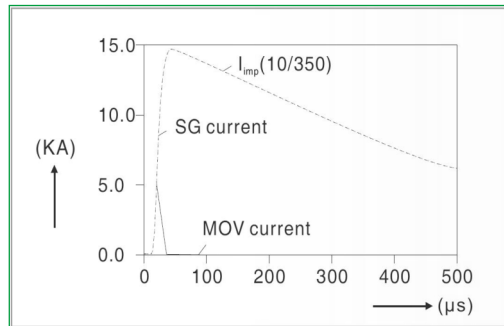


Fig.37: Advantages of Surge protection by two stages



Why spark-gap can discharge high current 10/350μs waveform impulse & varistor can't

Generally, a varistor can not endure 10/350μs waveform impulse, because of its high voltage drop during discharging impulse current.

Varistor test current (Fig.38)

A 385V/40kA varistor, while discharging 3kA impulse current, its protection voltage is 1.1kV, causing about 1342.77J energy dissipation.

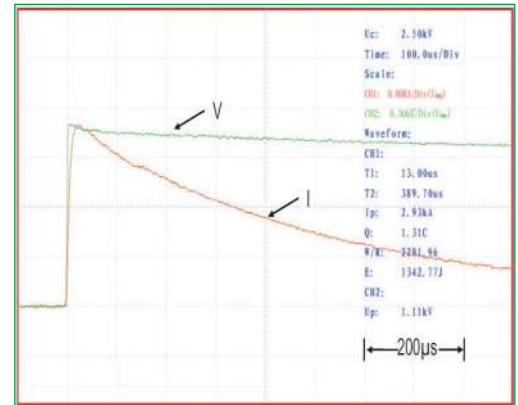


Fig.38 Varistor test current

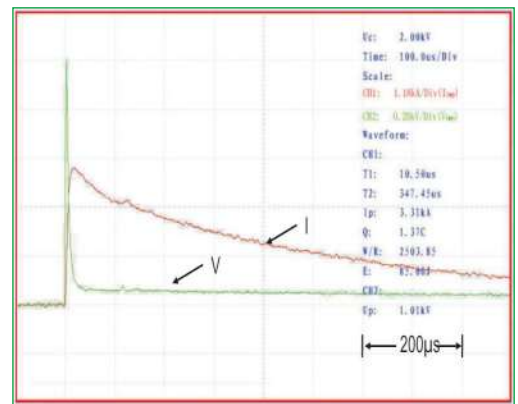


Fig.39 Spark-gap test current 10KA(10/μs350)

Spark-gap test current

However, for a spark-gap, also discharging 3kA impulse current, but its protection voltage is 50V during 99% of the whole discharging period, causing only about 85J energy dissipation(Fig.39).

Therefore, if discharging impulse current increases to 10kA, the varistor will cause energy dissipation up to $1.2kV \times \frac{1}{2} \times 10kA \times 0.001s \approx 6000J$, and this energy will damage the varistor. But for spark-gap, just causing energy dissipation of approx. $0.07kV \times \frac{1}{2} \times 10kA \times 0.001s \approx 350J$, this energy will not lead to a spark-gap damage

In-built protection of Electrical & Electronic products

Most products are hardened with a degree of built-in protection for surges, these protection ranging from approx. a thousand volts to several thousand volts(Fig.40).

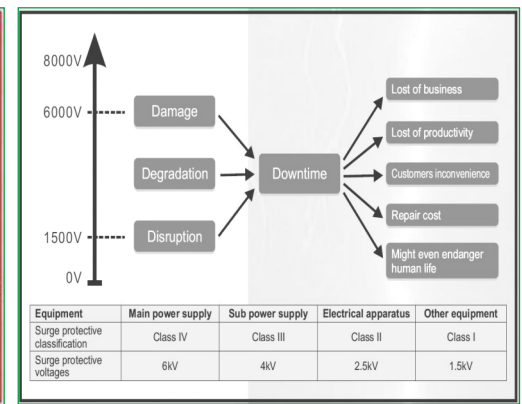


Fig.40 The problems that surges cause to electronic equipment



Comparison of wiring in parallel and in series Parallel connection

When the lightning current flows through the SPD, it will cause a voltage drop U_{SPD} , additionally the lines connected to the SPD on both SPD sides will also cause a voltage U_1 and U_2 , therefore, the total voltage U_1 & U_2 drop of the equipment to be protected $U=U_1+U_{SPD}+U_2$. Assumed lightning current ranges 20kA ~ 80kA, the length of the lines connect to the SPD on both sides is $L_1+L_2=1m$, say the inductivity of conductor is approx. $1\mu H/m$.

$$\begin{aligned}
 U &= U_1 + U_2 + U_{SPD} = L_1 \frac{di}{dt} + L_2 \frac{di}{dt} + U_{SPD} \\
 &= (L_1 + L_2) \frac{di}{dt} + U_{SPD} \\
 &= 1 \times \frac{d(20kA \sim 80kA)}{dt} + U_{SPD} \\
 &= (2 \sim 8)kV + 1.2kV \\
 &= 3.2 \sim 9.2kV
 \end{aligned}$$

Series connection

When the lightning current flows through the SPD, it will cause a voltage drop U_{SPD} , because of the V-shape connection, the total voltage drop of the equipment to be protected $U=U_{SPD}$ (Fig.42 & 43).

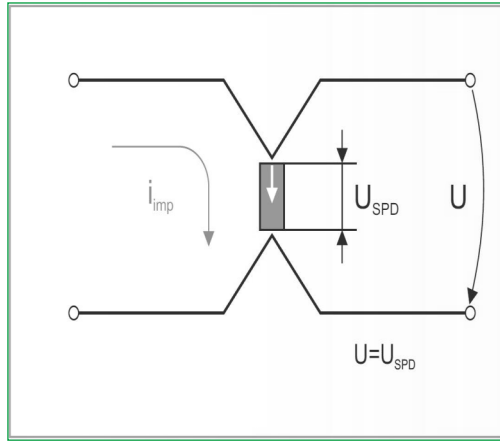


Fig.42 SPD in series connection

Therefore, the total voltage drop of the equipment to be protected is higher than the voltage protection level of the SPD, this situation will likely cause the equipment damage (Fig.41).

By the above comparison, wiring in series (V-shape) will make the voltage drop the same for the equipment to be protected and the voltage protection level of the SPD. The disadvantage of series connection is supply current limitation.

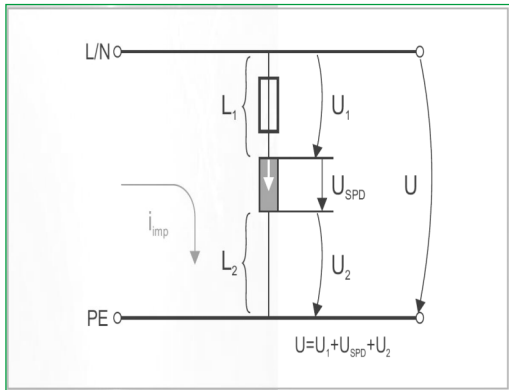


Fig.41 SPD in parallel connection

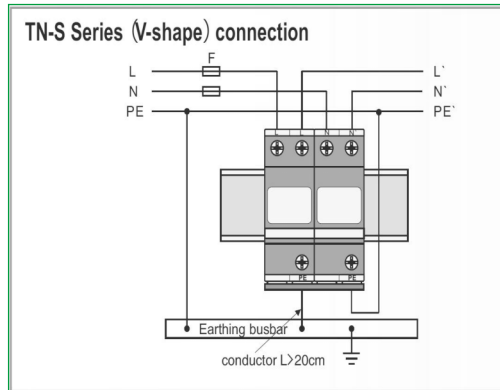


Fig.43 TN-S Series

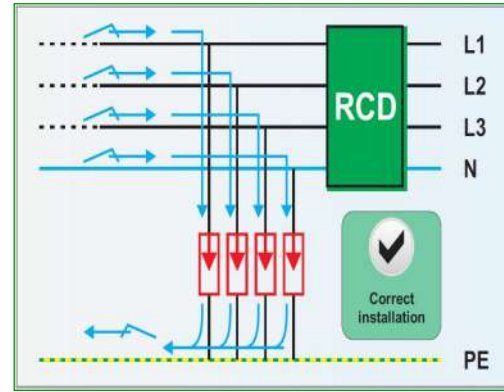


Fig.44 Correct installation

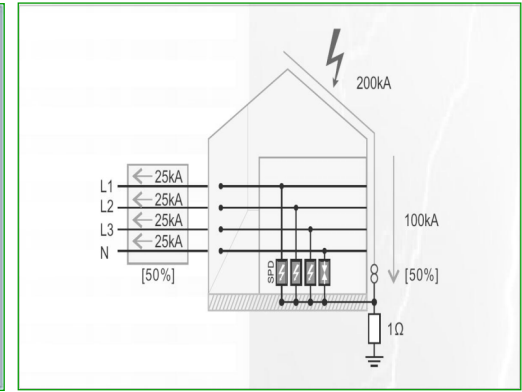


Fig.46 Lightning current discharge

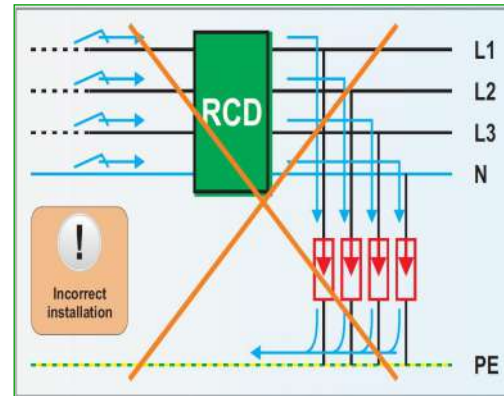


Fig.45 Incorrect installation

Lightning current discharge

According to IEC 61643-1, the highest test lightning current is likely to be below 200kA. When the highest lightning current strikes the air termination device of a building, 50% of the lightning currents will be led to earth by down conductor, and the rest 50% will flow out of the building through the incoming cables. As for a TN-C-S power supply system, there are four cables, each cable will distribute 25kA current.

Therefore a surge protective device has 25kA (10/350μs) discharge current capability is enough for most power supply application (Fig.46).

Correct installation of SPD

SPD should be installed at the upstream of RCD (residual current device) of main circuit, because otherwise (Fig.44 & 45):

1. When the SPD is activated, it will discharge current to earth, the current will be interpreted as leakage current by the RCD, this will lead to an erroneous trigger by RCD, and affects the normal power supply.
2. On the other hand, if the SPD installed at the downstream of RCD, when lightning or surge occurs, the huge current will pass through the RCD, result in mechanical damage to RCD because of the strong current.

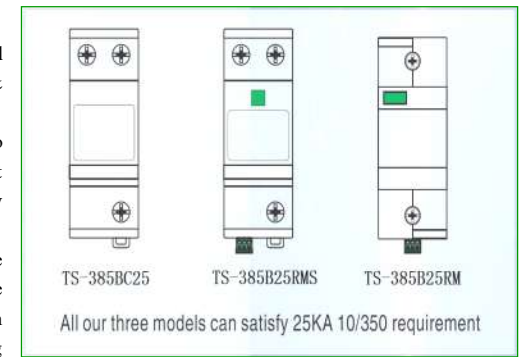


Fig.47 25KA 10/350μs products

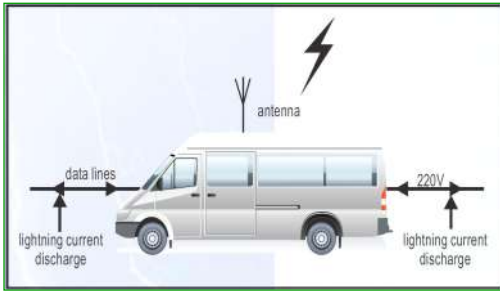


Fig.48 Earthing requirement for surge protection

International Electrical Regulation requires earthing resistance should be less than 10Ω

But for surge protection, we could do it without earth connection totally, for example, a military communication vehicle, when in depot connected with data lines & power lines, provided the vehicle is equal potentially bonded, it will have good lightning surge protection too(Fig.48).

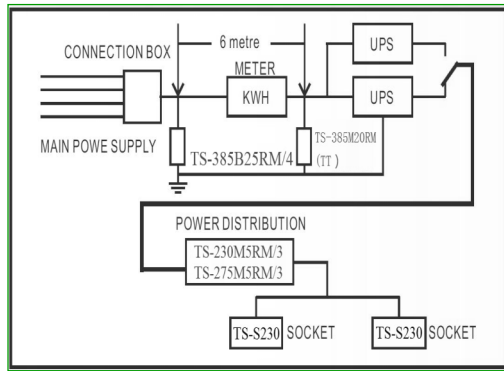


Fig.50 Surge protection for power supply system

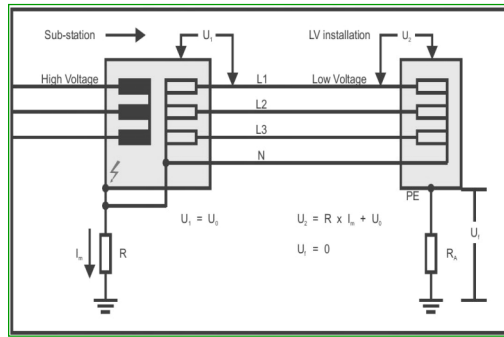


Fig.51 TT System: Temporary over-voltages, 1200V / 200ms, 335V/5s

It is allowed by the Electrical Authority during faulty condition, that TT system could have temporary over-voltage by 1200V / 200ms or 335Volt / 5s. Therefore we have "3+1" solution for TT system SPD(Fig.48 & 51).

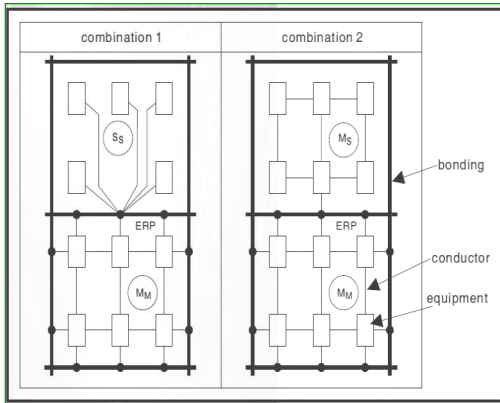


Fig.49 Equipment Bonding & Earthing

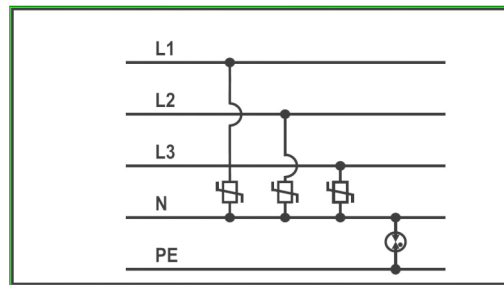


Fig.52 "3+1"TT system

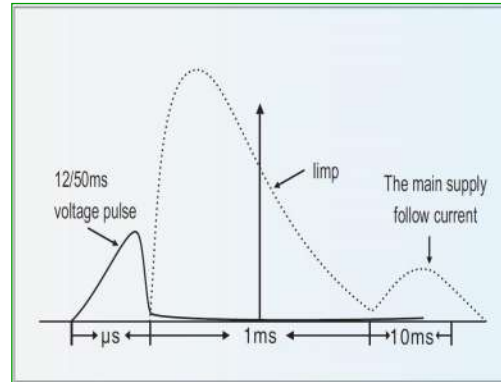


Fig.53 Follow current extinguishing capability

After a sparkgap has conducted impulse current, if the sparkgap is connected to main power, the follow current from this main (220V) could flow through the sparkgap and created a short circuit. Therefore it is vitally important to extinguish this follow current otherwise if the follow current continues to flow freely, it will turn off the circuit breaker at the upstream causing a break in the main power supply.

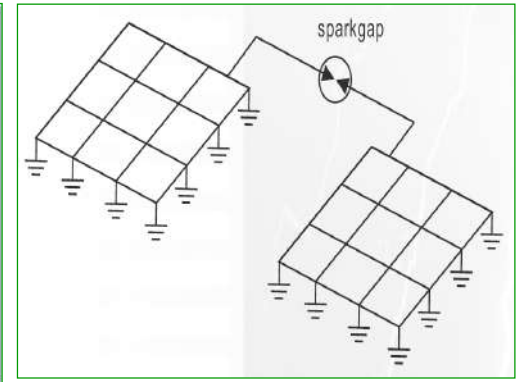


Fig.55 Separated Earthing

This is not recommended for surge protection in a protected unit cell, for e.g. in a building. As for electrical regulation, separated earthing is also not safe for human beings. But sometimes for some technical requirement such as noise reduction purposes, we can see occasionally separated earthing practices.

To reduce the potential difference between the two separated earths, we can connect a sparkgap in between, therefore, during a lightning strike, the sparkgap will conduct & maintain equipotential.

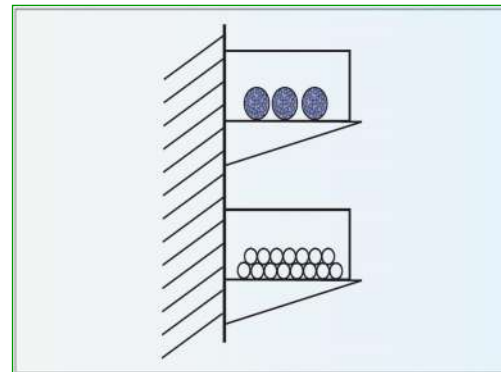


Fig.54 For Surge Protection Purposes

To reduce power cables interference ideally is to separate power cables and signal cables into different cable trays.

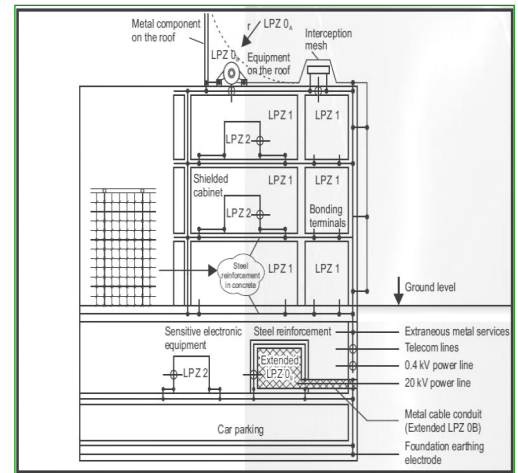
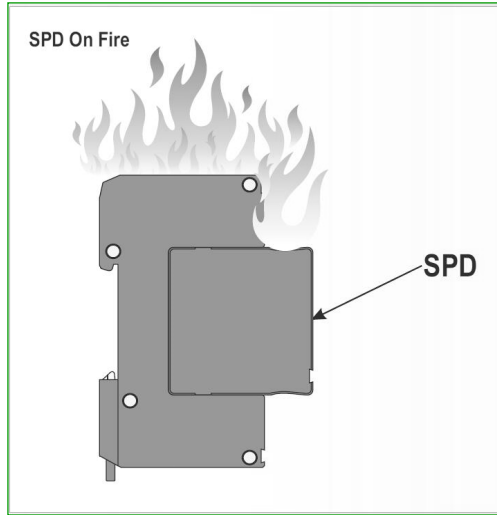
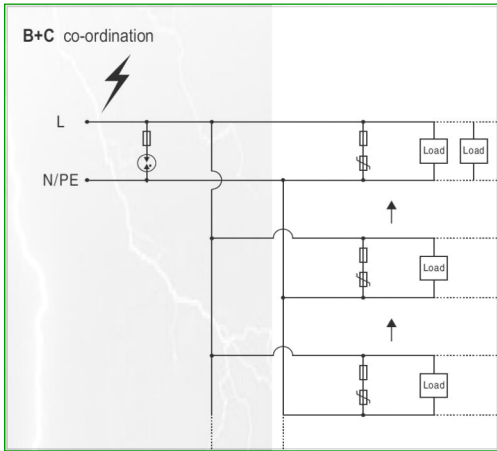


Fig.56 Equipotential Bonding Protection System



In reality:

When lightning strikes the power lines, all the class C varistors will be activated (25ns), discharging current to the N/PE, and these current will be superimposed on each other & created a much larger summation of current, hence these current will create a large voltage drop between L & N/PE & trigger the Class B SPD(100ns).

Fig.57 Why power SPD requires Fuse or Circuit breaker at the upstream of main supply.

Due to the fact that most of our SPDs have plastic housing and parts, in the event of a SPD short-circuited or overloaded, large amount of heat will be dissipated, the plastic housing or parts might become distorted, this might prevent the releasing mechanism to operate as SPD original design, and fail to disconnect from the main power. Therefore for double safety reason, additionally at the power SPD upstream we also installed a fuse or circuit breaker.

Cost of surge protection

If surge protection is planned & designed before a building is erected, the cost is really quite small. General consensus is less than 3% of the total building cost.

Who needs lightning & surge protection?

Any organization who uses complex electronic equipment & instruments, for example, Computers, Medical equipment, Communication equipment etc. etc. Additionally these organizations also can not effort to have stoppages for days, hours, minutes or even seconds.

Cost of interference due to surge damages

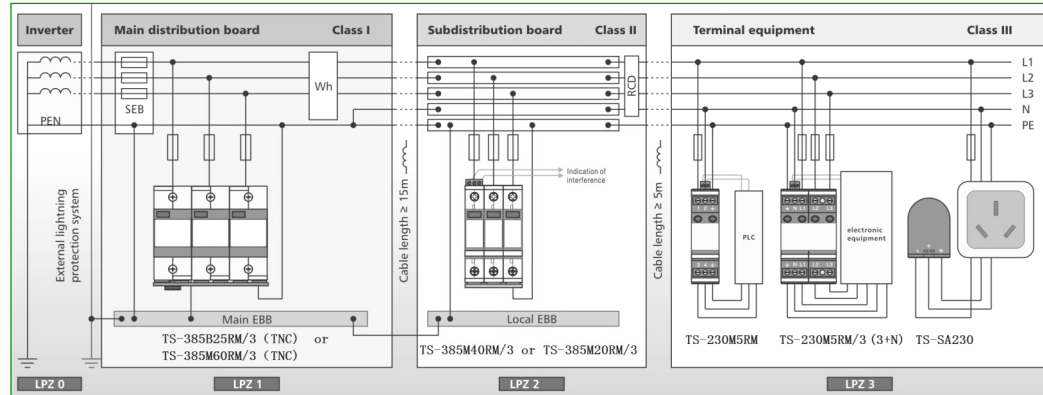
- Losses can not be measured by repair & replacement cost of equipment.
- Losses mainly come from lost of business & disruption, these types of losses could be ten to hundred times the repair & replacement cost.

Customers for surge protective devices (SPDs)

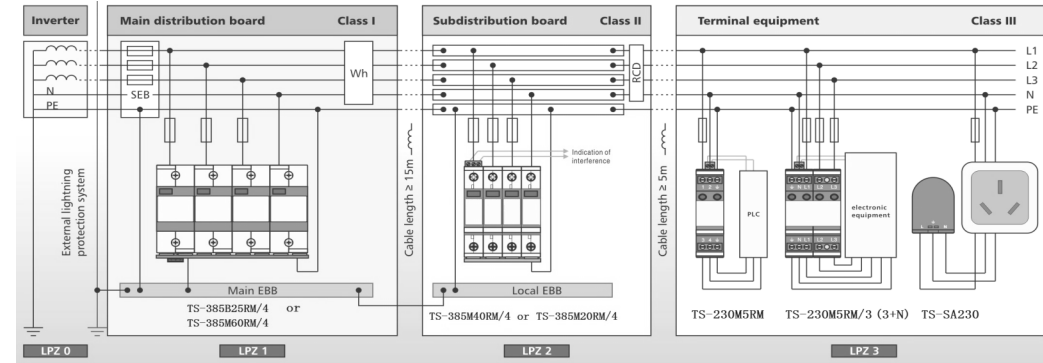
Banks, Stock Exchanges, Airports, Seaports, Hospitals, Mobile Phone Station Fixed Line Telephone Exchanges, Schools, Universities, Government offices, Military & Police, Emergency Services, Factories & offices, Industries, Shops, Restaurants, Roads & Bridges, Traffic Lights, Railway, House & Building, TV & Radio, Electrical Utility, etc.

Surge Protective Devices for Power Supply System Protection

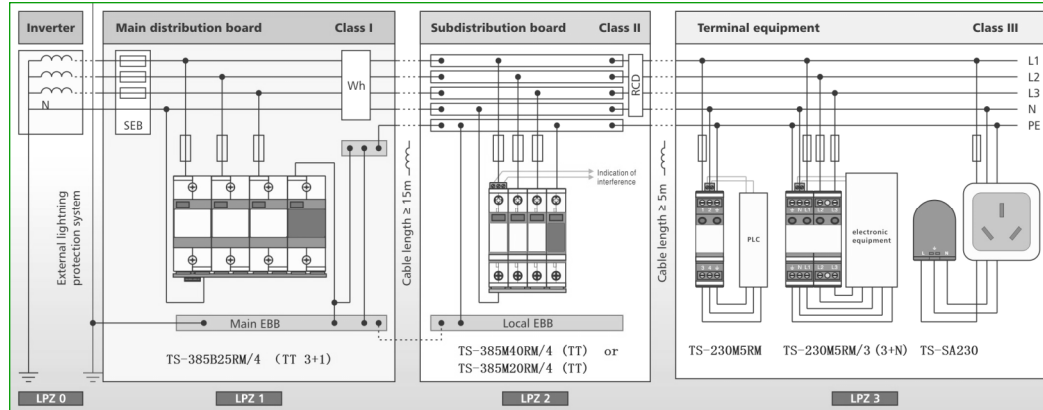
Power Surge Arrester for TN-C Power Supply System as below:

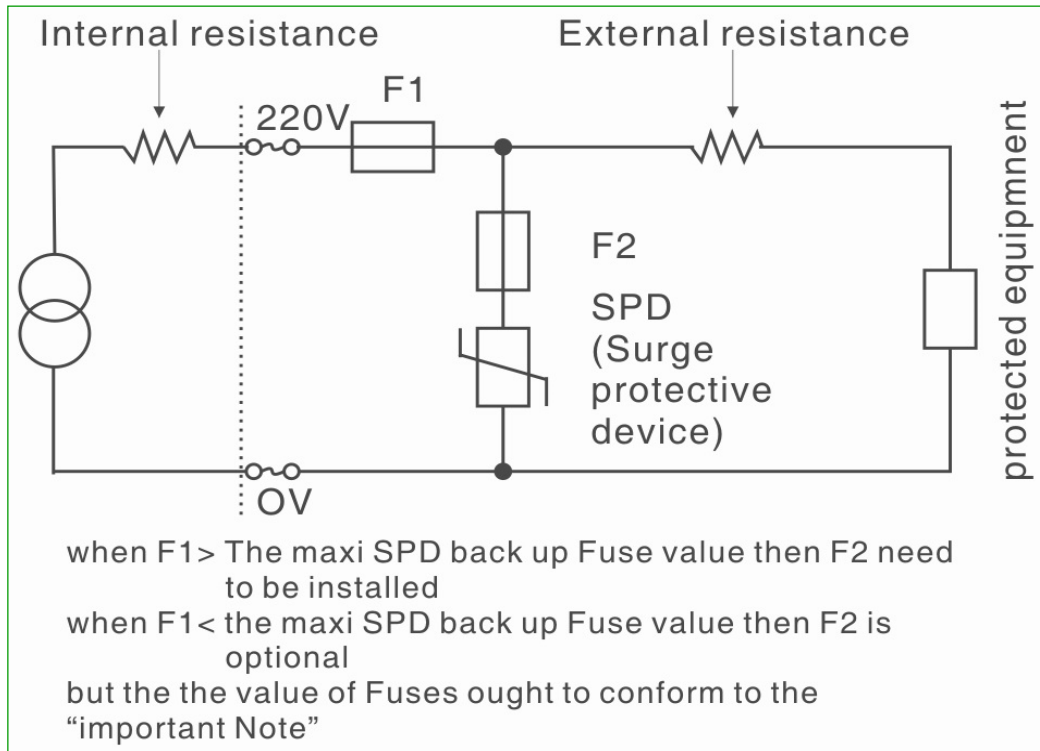


Power Surge Arrester for TN-S Power Supply System as below:



Power Surge Arrester for TT Power Supply System as below:



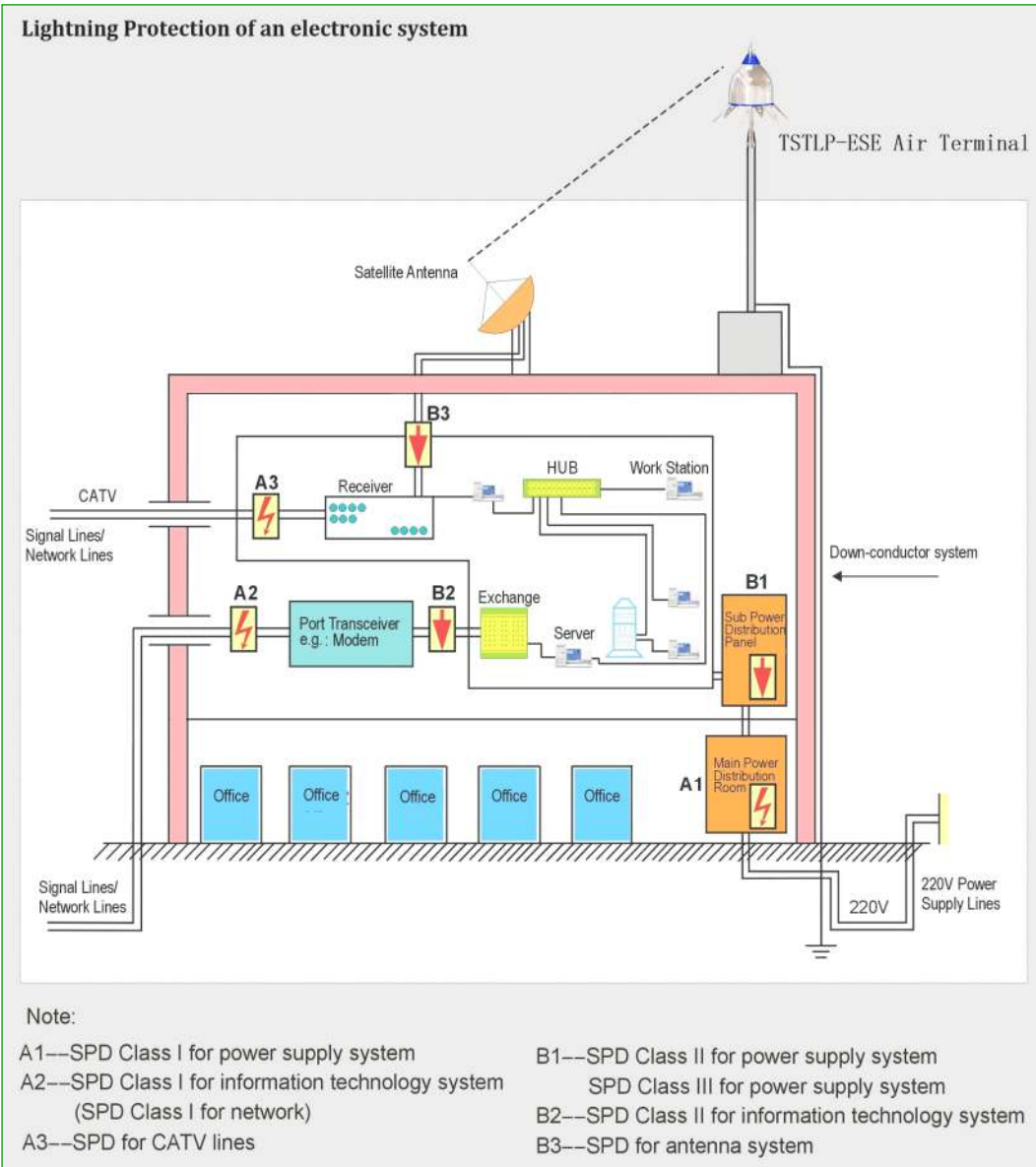


IMPORTANT NOTE:

The device may only be connected and installed by an electrically skilled person conforming to National Standards and safety regulations. Fuse must be installed at the upstream of the SPD or the lightning arrester for power supply system to make sure that the protected system has double protection. The value of the fuse used in a SPD system should be conformed to:

1. The value of the fuse should not be larger than the max. withstand capacity of the SPD's backup fuse value.
2. Under the status of the max. current in the power supply & close loop circuit available current, the fuse should be able to disconnect when overloaded or short-circuited.
3. Taken (1) & (2) into consideration, the fuse should be able to conduct the maximum surge discharge of the SPD.

Some fuse & circuit breaker manufacturers can quote/have quoted 8/20μs and/or 10/350μs current specification, therefore, installers can specify the type accordingly with the SPD current requirement.

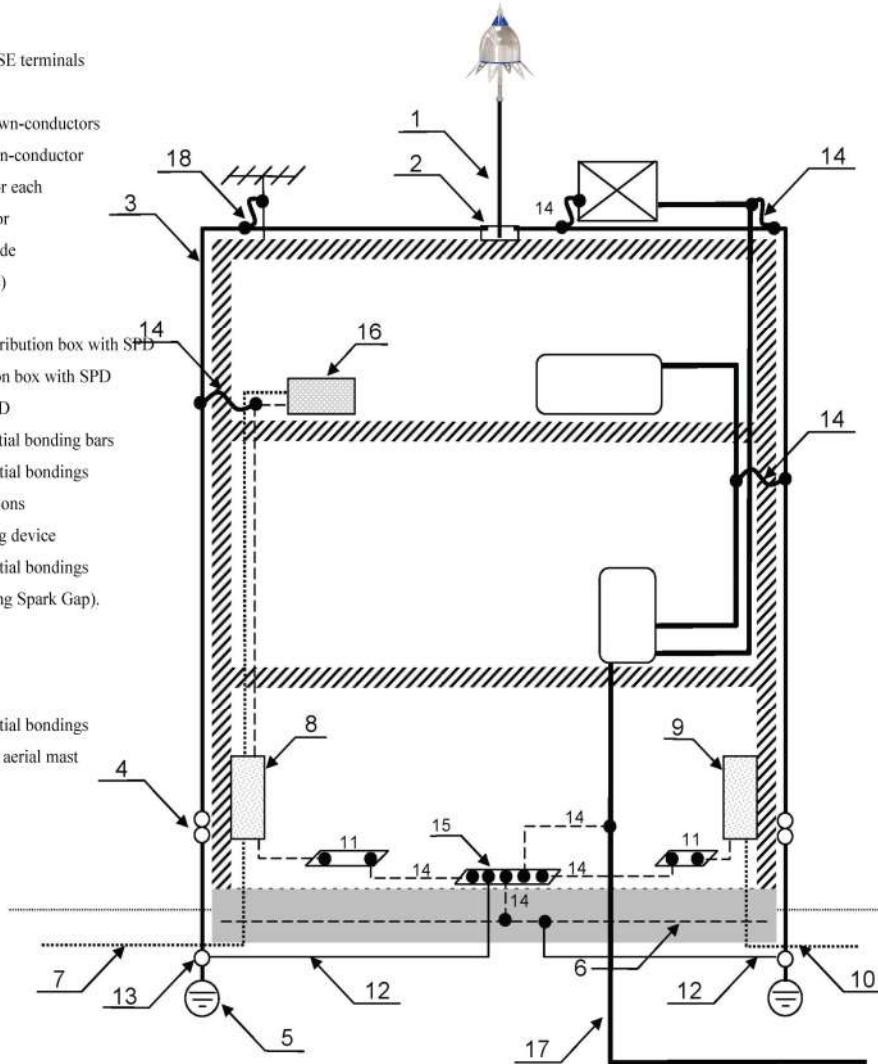




Components of the lightning protection system

Key :

- 1- One or more TSTLP® ESE terminals
- 2- Connection component
- 3- One or more specific down-conductors
- 4- A test joint for each down-conductor
- 5- One earth termination for each specific down-conductor
- 6- Foundation earth electrode (earthing of the structure)
- 7- Electric power cable
- 8- Main electric power distribution box with SPD
- 9- Main telecom distribution box with SPD
- 10- Telecom cable with SPD
- 11- One or more equipotential bonding bars
- 12- One or more equipotential bondings between earth terminations
- 13- Disconnectable bonding device
- 14- One or more equipotential bondings (direct or via an Isolating Spark Gap).
- 15- Main earthing bar
- 16- Electric equipment
- 17- Metallic pipe
- 18- One or more equipotential bondings through a spark gap for aerial mast



Definition of ESE Air Terminal & SPDs

- 1, **coordinated SPD protection**
 - set of SPDs properly selected, coordinated and correctly installed to reduce failures of electrical and electronic systems
- 2, **current impulse (Iimp)**
 - peak value (Ipeak) defined by charge Q and specific energy W/R.
- 3, **dangerous event**
 - lightning flash to the object to be protected or near the object to be protected
- 4, **dangerous sparking**
 - electrical discharge due to lightning which causes physical damage inside the structure to be protected.
- 5, **down-conductor**
 - part of the Lightning Protection System intended to conduct the lightning current from ESEAT to the earth termination system.
- 6, **early streamer emission air terminal (ESEAT)**
 - air terminal generating a streamer earlier than a simple rod air terminal when compared in the same conditions.
NOTE – An early streamer emission air terminal is made up of a striking point, an emission device, a fixing element and a connection to the down conductors.
- 7, **early streamer emission lightning protection system (ESE System)**
 - complete system based on one or more ESEAT and all elements to safely conduct lightning to earth in order to protect a structure, facility or open area against direct lightning impact.
NOTE – It comprises both internal and external lightning protection system.
- 8, **earth termination system**
 - part of an external ESE System which is intended to conduct and disperse lightning current into the earth.
- 9, **electrical system**
 - system incorporating low voltage power supply components and ducts
- 10, **electronic system**
 - system incorporating sensitive electronic components such as communication equipment, computers, control and instrumentation systems, radio systems, power electronic installations
- 11, **equipotential bonding**
 - bonding to the ESESystem of separated conductive parts (see 5.5) of an installation, by direct connections or via surge protective devices, to reduce potential differences caused by lightning current.
- 12, **equipotential bonding main bar**
 - a bar used to connect the natural components, ground conductors, earth conductors, screens, shields and conductors protecting telecommunication cables or other ones, to the lightning protection system.
- 13, **equivalent collection area of a structure Ad**
 - a flat ground surface subjected to the same number of lightning strikes as the structure under consideration.



14, ESE AT efficiency (ΔT)

- difference expressed in micro-seconds between the emission time of an ESEAT and an SRAT measured in a laboratory under the conditions defined in this standard.

15, external ESE System isolated from the structure to be protected

- LPS with an air-termination system and down-conductor system positioned in such a way that the path of the lightning current has no contact with the structure to be protected
NOTE: In an isolated LPS, dangerous sparks between the LPS and the structure are avoided.

16, external ESE System not isolated from the structure to be protected

- LPS with an air-termination system and down-conductor system positioned in such a way that the path of the lightning current can be in contact with the structure to be protected

17, failure of electrical and electronic systems

- permanent damage of electrical and electronic systems due to LEMP

18, failure current (I_a)

- minimum peak value of lightning current that will cause damages

19, injuries to living beings

- injuries, including loss of life, to people or to animals due to touch and step voltages caused by lightning

20, interconnected reinforcing steel

- Steel work within a concrete structure which is considered to provide an electrically continuity.

21, internal systems

- electrical and electronic systems within a structure

22, isolating Spark Gap (ISG)

- component with discharge distance for isolating electrically conductive installation parts.

NOTE In the event of a lightning strike, the installation parts are temporary connected conductively as the result of response of the discharge.

23, lightning electromagnetic impulse (LEMP)

- electromagnetic effects of lightning current

NOTE It includes conducted surges as well as radiated impulse electromagnetic field effects.

24, LEMP protection measures system (LPMS)

- complete system of protection measures for internal systems against LEMP

25, lightning ground flash density N_g

- is the number of lightning flashes per km² per year. This value is available from ground flash location networks

26, lightning flash near an object

- lightning flash striking close enough to an object to be protected that it may cause dangerous over voltages

27, lightning flash to an object

- lightning flash striking an object to be protected

28, lightning flash to earth

- atmospheric originated electrical discharge between cloud and earth consisting of one or more arcs

29, lightning protection level (LPL)

- number related to a set of lightning current parameter values relevant to the probability that the associated maximum and minimum design values will not be exceeded in naturally occurring lightning
NOTE Lightning protection level is used to design protection measures according to the relevant appropriate set of lightning current parameters.

30, lightning protection zone (LPZ)

- zone where the lightning electromagnetic environment is defined
NOTE The zone boundaries of an LPZ are not necessarily physical ones (e.g. walls, floor and ceiling).

31, loss (LX)

- mean amount of loss (humans and goods) consequent to a specified type of damage due to a dangerous event, relative to the value (humans and goods) of the object to be protected

32, natural component

- conductive element located outside the structure, sunk in the walls or located inside a structure and which may be used to supplement the ESE System down conductors.
NOTE – For the protection with ESE ATs, natural components may complement but never be the only down conductor except in the case of complete metallic structures.

33, node

- point on a service line at a which surge propagation can be assumed to be neglected
NOTE Examples of nodes are a connection of a HV/LV transformer, a multiplexer on a telecommunication line or SPD installed along a line.

34, Frequency of dangerous events due to flashes to a structure (ND)

- expected average annual number of dangerous events due to lightning flashes to a structure

35, Frequency of dangerous events due to flashes to a service (NL)

- expected average annual number of dangerous events due to lightning flashes to a service

36, Frequency of dangerous events due to flashes near a structure (NM)

- expected average annual number of dangerous events due to lightning flashes near a structure

37, Frequency of dangerous events due to flashes near a service (NI)

- expected average annual number of dangerous events due to lightning flashes near a service

38, object to be protected

- structure or service to be protected against the effects of lightning
NOTE A structure to be protected may be a part of a larger structure

39, physical damage

- damage to a structure (or to its content) or to a service due to mechanical, thermal, chemical or explosive effects of lightning.

**40, pipes**

- piping intended to convey a fluid into or out of a structure, such as gas pipe, water pipe, oil pipe

41, probability of damage (PX)

- probability that a dangerous event will cause damage to or in an object to be protected

42, protected area

- zone protected by an early streamer emission lightning protection system.

43, protection measures

- measures to be adopted to the object to be protected, in order to reduce the risk

44, reference simple rod air terminal (SRAT)

- geometrical shape metal rod defined in this standard to be used as a reference.

45, rated impulse withstand voltage level (UW)

- impulse withstand voltage assigned by the manufacturer to the equipment or to a part of it, characterizing the specified withstand capability of its insulation against over-voltages

NOTE For the purposes of this standard, only withstand voltage between live conductors and earth is considered.

46, risk (R)

- value of probable average annual loss (humans and goods) due to lightning, relative to the total value (humans and goods) of the object to be protected

47, risk component (RX)

- partial risk depending on the source and the type of damage

48, rural environment

- area showing a low density of buildings.

NOTE 'Countryside' is an example of a rural environment.

49, separation distance

- distance between two conductive parts at which no dangerous sparking can occur.

50, specific down conductor

- Down conductor complying with EN 50164-2 but being not a natural component of the structure

51, striking point

- point where a lightning stroke contacts the earth, a structure or a lightning protection system.

52, structures with risk of explosion

- structures containing solid explosive materials or hazardous zones as defined in accordance with IEC 60079-10 and IEC 61241-10

NOTE For the purposes of the risk assessment of this standard, only structures with hazardous zones type 0 or containing solid explosive materials are considered.

53, structures dangerous for the environment

- structures which may cause biological, chemical and radioactive emission as a consequence of lightning (such as chemical, petrochemical, nuclear plants, etc).

54, suburban environment

- area showing a medium density of buildings

NOTE 'Town outskirts' is an example of a suburban environment.

55, surge

- transient wave appearing as over voltage and/or over currents caused by LEMP

NOTE Surges caused by LEMP can arise from (partial) lightning currents, from induction effects into installation loops and as remaining threats downstream from SPD.

56, surge protective device (SPD)

- device intended to limit transient over voltages and drain away surge currents. It contains at least one non-linear component

57, telecommunication lines

- transmission medium intended for communication between equipment that may be located in separate structures, such as phone line and data line

58, test joint

- joint designed and placed to facilitate electrical testing and measurement of ESESystem components.

59, tolerable risk (RT)

- maximum value of the risk which can be tolerated for the object to be protected

60, atmospheric originated transient surge voltage

- short-time over voltage – not longer than few milliseconds - oscillatory or not, usually strongly damped.

61, urban environment

- area showing a high density of populated buildings and tall buildings

NOTE 'Town centre' is an example of an urban environment.

62, zone of a structure (Zs)

- part of a structure showing homogeneous characteristics where only one set of parameters is involved in evaluating one risk component



Technical Parameter of SPD

1) Nominal voltage [U_n]

- The nominal voltage of the system to be protected, for ac voltages it is indicated as rms value.

2) Rated voltage [U_c]

- The maximum continuous voltage which may apply on the SPD terminals during the non-conductive state, & also the state to be returned to after surge discharges.

3) Nominal current [I_L]

- The highest permissible operational current which may be permanently conducted by the load terminals.

4) Nominal discharge current [I_n]

- The maximum peak current of 8/20 μ s waveform, which may be conducted for many events through the SPD terminals.

5) Max. discharge current [I_{max}]

- The maximum peak value of surge current 8/20 μ s, which can be discharged safely by the SPD.

6) Lightning impulse current [I_{imp}]

- A simulated lightning current of 10/350 μ s waveform, which lightning protective devices can discharge for several times without damage to itself.

7) Voltage protection level [U_p]

- The instantaneous maximum peak voltage across the SPD terminals during the surge current discharge.

8) Follow current extinguishing capability [I_f]

- The maximum rms main follow current (brought on by the surge current discharge), which may be extinguished by the SPD at

the presence of U_c .

9) Short-circuit withstand capability

- With upstream backup fuse, the maximum short-circuit current which the SPD can withstand.

10) Combined impulse [U_{oc}]

- It is generated by a hybrid generator (1.2/50 μ s, 8/20 μ s) with a virtual impedance of 2 Ω , the open-circuit voltage of the generator is defined as U_{oc} , it is mainly used for SPDs Class III.

11) Operating temperature range [T_u] (Nominal temperature range)

- The temperature range where the devices can be normally used.

12) Response time [t_A]

- Response time mainly characterizes the response performance of the surge protective devices. The response times could change within a certain limits, depending on the steepness du/dt of the impulse voltage or di/dt of the impulse current.

13) Data transmission speed [V_s]

- It indicates how many bytes are transmitted at one second (unit: bps), it is the reference value for selecting the correct SPD at data transmission system, and is determined by the transmission mode. The data transmission speed is deduced by the frequency bandwidth, in the information system the theoretical relation between the transmission and the frequency bandwidth is: $V_s=2fG$ ($V_s=1.25fG$ in practical application)

14) Bandwidth [f_G]

- Bandwidth defines the frequency-against performance of a SPD, bandwidths are frequencies causing an insertion loss (a_E) of 3dB under certain condition.

15) Return loss [a_R]

- Return loss indicates at high-frequency applications, forward & reflective ratio of the wave at the protective device.

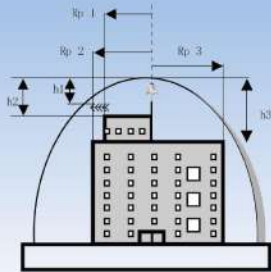
16) Insertion loss [a_E]

- Insertion loss is defined by the relation of the voltage value before and after the insertion of the SPD at a given frequency.

● Personal lightning protection – When lightning occurs

1. Stay indoors and close the doors and windows. If you are working outdoors, you should take shelter under a building.
2. Do not use TV, music center etc. Without lightning protective devices. Do not touch the water taps. If it is not equipotential bonded.
3. Keep away from conductor or similar metal devices, such as antenna, water pipe, steel grid, metal door and window, external walls of buildings. Unless they are all equipotential bonded.
4. Do not use telephone, if it is not protected for lightning strike.
5. Keep away from water or other open ground and look for a shelter. Do not swim or do other sports in the water, and do not play ball games outdoors.
6. Do not stand at the top of mountain or building. Do not touch other object with good electrical conductivity.
7. Do not deal with the flammable material in the open container.
8. Keep away from the trees and masts when you are in the wilderness.
9. Do not hold an umbrella or golf clubs across your shoulders in open ground.
10. Do not ride a motorcycle or a bicycle in open ground, especially in wet weather.

Installation procedure for TSTLP® ESE Air Terminal is governed by latest French standard NF C 17-102 and follows a series of simple rules catering for all types of structure;
(Referring to installation stated in French standard NF C 17-102_2011)



- ① TSTLP® ESE air terminal
- ② Elevation pole
- ③ Copper conductor
- ④ Copper clamp
- ⑤ Lightning counter
- ⑥ Test clamp
- ⑦ Protection sheath
- ⑧ Earth clamp
- ⑨ Inspection housing
- ⑩ Copper earthing
- ⑪ Rod to conductor clamp
- ⑫ Earth rod

Additional protection against direct lightning strike for the highest 20% of the structure height for buildings greater than 60 m or any point above 120 m, using TSTLP® ESE Air Terminal or any other means must be implemented at each façade wall according to a valid standard. Furthermore a minimum of 4 down conductors, interconnected by a ring conductor when applicable, shall be used, distributed along the perimeter and if possible at each angle of the building.

NOTE : in general the risk due to the lateral flashes is low because only a few percent of all flashes to tall structures will be to the side and moreover their parameters are a lot lower than those of flashes to the top of structures.



● **Lightning Protection System Products**

✓ **TSTLP® Direct Lightning Protection (ESE TERMINAL, TESTER, COUNTER, EARTHING MATERIAL)**



✓ **TSTLP® Power Range Over-Voltage Surge Protection (T1+2, T1, T2, T3 SPD)**



✓ **TSTLP® Signal Range Surge Protection (DATA, NETWORK, CCTV, PHONE, ANTENNA...SPD)**



NF C 17-102:2011 & UNE 21.186:2011

CPRI & CE

Compliant



TSTLP® (having its own factory) is one of the TOP brands specializing in lightning & surge protection field around the world, especially UPDATED TSTLP® Early Streamer Emission Air Terminal according to international most popular standards for structural lightning protection.

Key Benefits:

- ✓ Series **PATENTED** models offering customized solutions for each project.
- ✓ Successfully Tested according to NF C 17-102:2011 Annexe C as well as UNE 21.186:2011 Paragraph C at Accredited High-Voltage Laboratories in SPAIN & SHANGHAI (Test Reports with IEC-MRA, ENAC, CAL & CMA marks) to ensure your full satisfaction. Meanwhile CPRI Test Report & CE certificate available.
- ✓ TSTLP® ESE air terminal only becomes active when electrical field intensity rises (lightning discharge likely), TSTLP® ESE air terminal presents no danger to the site.
- ✓ Fully reliability, even in extreme climatic conditions.
- ✓ Robust to withstand multiple lightning strikes.
- ✓ ISO9001:2008 Manufacturing Process.



TSTLP® ESE TESTER



PORTABLE TSTLP® ESE TESTER



TSTLP® SMT-ESE30

Patent No. ZL 2013 3 0019136.3



TSTLP® SMT-ESE40

Patent No. ZL 2013 3 0032034.5



TSTLP® SMT-ESE50

Patent No. ZL 2013 3 0019139.7

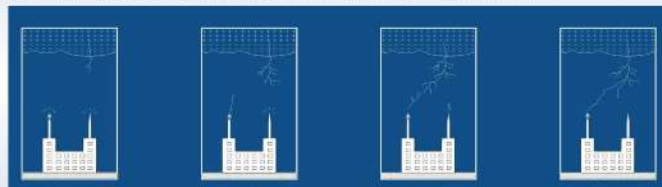


TSTLP® SMT-ESE60

Patent No. ZL 2013 3 0019138.2

- 1. The IONIZATION SYSTEM IS CHARGED** - via the lower electrodes using the ambient electrical field (several thousand volts/meter when storms are approaching), which means TSTLP® Air Terminal is a fully autonomous system requiring no external power supply.
- 2. ACTIVATING THE NEW TSTLP® TECHNOLOGY** - Whilst dynamically assessing the development of the surrounding electrical field, the TSTLP® detects the appearance of downward leaders. This innovative and patented TSTLP® system is then activated to neutralize the space charges, which naturally occur around the air terminal. The TSTLP® Air Terminal is ready to operate in an optimal environment
- 3. CONTROLLING THE IONIZATION PROCESS** - The ambient electrical field increases rapidly when a discharge is imminent and a downward leader descends from cloud to ground. This triggers the ionization process, using a spark ionization system between the upper electrodes and the central tip. The TSTLP® Air Terminal reacts at the precise moment, when the risk of lightning discharge is imminent.
- 4. EARLY TRIGGERING OF THE UPWARD LEADER** - The controlled ionization process and the new TSTLP® technology guarantee the triggering of an upward leader ahead of any other protruding point within the area to be protected making the TSTLP® Air Terminal be the preferential point of impact for the lightning discharge and provides the structure with maximum protection.

Comparing TSTLP® E.S.E air terminal with ordinal air terminal.

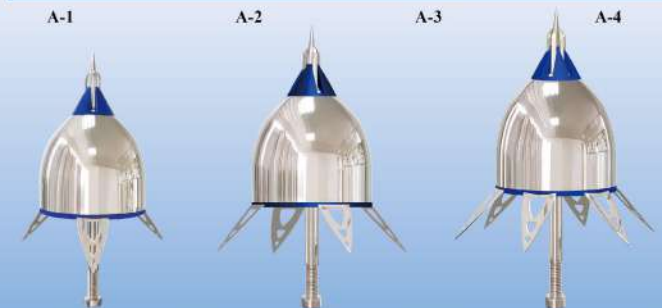


A-1

A-2

A-3

A-4



TSTLP® Model	SMT-ESE60	SMT-ESE50	SMT-ESE40	SMT-ESE30
Patent N°	2013300191382	2013300191397	2013300320345	2013300191363
Efficiency (AE)	60µs	50µs	40µs	30µs
Standard Deviation ESE - Single Rod σ	$\sigma_{min} = 0.4 \text{ m/s}$	$\sigma_{min} = 0.5 \text{ m/s}$	$\sigma_{min} = 0.55 \text{ m/s}$	$\sigma_{min} = 0.6 \text{ m/s}$
Lightning current withstanding test Imp	100kA (normative test at 10-35µs waveform as standard negatives)			
Lightning current withstanding Imp	≥ 200kA (10-350 µs)			
Capacity against wind speed	≥ 40 m/s			
Dimension (length)	408mm		418 mm	
Approx net weight	4.0 kg	3.8 kg	3.5 kg	3.0 kg
Enclosure material	Stainless Steel (Superior Quality)			
Test standards	NFC 17-102: 2011 Annexe C; IEC 60099-4; EN 60060-1:2010;		UNE 21.186:2011 Paragraph C; IEC 60060-1:2010 Part 1; GB/T 116927.1-2011 Part 1.	



Size(mm)

Protection Radius.

The protection radius of TSTLP® ESE Air Terminal is related to its height (h) relative to the surface to be protected, to its efficiency and to the selected protection level

$$R_p(h) = \sqrt{(2r-h)h + \Delta(2r + \Delta)} \quad \text{for } h \geq 5 \text{ m; and } R_p = h \times R_p(5)/5 \quad \text{for } 2 \text{ m} \leq h < 5 \text{ m}$$

R_p (h) (m): is the protection radius at a given height h

h (m) : is the height of the ESE air terminal tip over the horizontal plane through the furthest point of the object to be protected

r (m) : 20m for protection level I

30m for protection level II

45m for protection level III

60m for protection level IV

$$\Delta (m) = \Delta T \times 10^5$$

Field experience has proved that Δ is equal to the efficiency obtained during the ESE Air Terminal evaluation tests

Protection Level	Level I (99% D=20M)				Level II (97% D=30M)				Level III (91% D=45M)				Level IV (84% D=60M)			
	SMT-ESE		SMT-ESE		SMT-ESE		SMT-ESE		SMT-ESE		SMT-ESE		SMT-ESE			
TSTLP® Model	30	40	50	60	30	40	50	60	30	40	50	60	30	40	50	60
(ΔT)	30µs	40µs	50µs	60µs	30µs	40µs	50µs	60µs	30µs	40µs	50µs	60µs	30µs	40µs	50µs	60µs
h (m)	Radius Protection (m)															
2	19	23	27	32	22	26	30	34	25	30	34	39	28	34	38	43
3	29	35	41	47	33	39	46	52	38	45	52	58	43	50	57	64
4	38	46	54	63	44	52	61	69	50	60	69	78	57	67	76	86
5	48	58	68	79	55	65	76	86	63	75	86	97	71	84	95	107
6	48	58	69	79	55	66	76	87	64	76	87	97	72	84	96	107
8	49	59	69	79	56	66	77	87	65	77	87	98	73	86	97	108
10	49	59	69	79	57	67	77	88	66	77	88	99	75	87	98	109
12	49	59	70	80	57	68	78	88	67	78	89	100	76	88	99	110
20	50	60	70	80	59	69	79	89	71	81	92	102	81	92	102	113
30	/	/	/	/	60	70	80	90	73	84	94	104	85	95	106	116
45	/	/	/	/	/	/	/	/	75	85	95	105	89	99	109	119
60	/	/	/	/	/	/	/	/	/	/	/	/	90	100	110	120



Golden Smart TSTLP® ESE Tester

❖ **INTRODUCTION:** Golden Smart TSTLP® ESE tester is designed to check that the main functions of the upgraded TSTLP® ESE lightning rods are working properly and that none of the vital components is damaged (Results are given by both **Green/Red light** and **ringing WARNING signal**).

❖ INTERFACE ILLUSTRATION & SIZE



Product Photo (FRONT)

Product Size: 113 mm * 84 mm * 28 mm (L*W*H)

FRONT Interface			BACK Interface		
TEST	Test Button	P	Power Indication Lamp	SWITCH	Power Switch Button
		T	Test Indication Lamp	CHARGE	Power Port
		UP-OK	Upper Electrode Indication Lamp	Output +	+5VDC Power Output
			OK Indication Lamp	Output -	-5VDC Power Output
		LOW-OK	Lower Electrode Indication Lamp		
			OK Indication Lamp		
		DEF	Faulty Indication Lamp		

❖ HOW TO TEST

Below test, make sure making correct connection:

- 1: Connecting the tester with Power by the Power adapter (110V/220V/230V - 9V) or with 9V Portable Power Source.
- 2: Insert the alligator clips into **OUTPUT** terminals (+/- could be exchanged)
- 3: Clamp the **one alligator** to the central rod of the TSTLP® ESE terminal

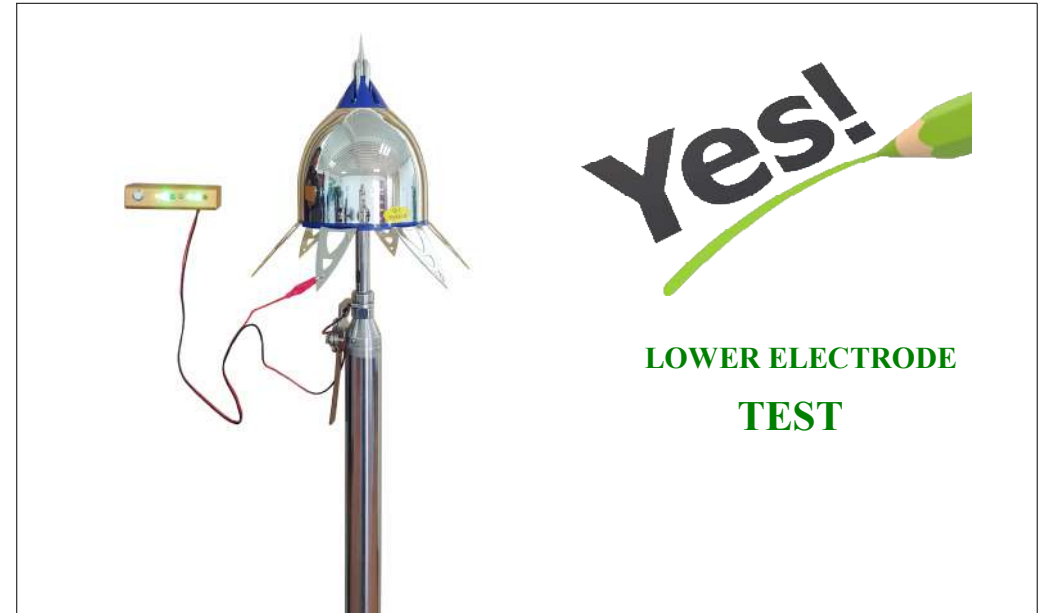
✓ **LOW ELECTRODES TEST:**

After above **1,2,3 connection**, clamp **THE OTHER ALLIGATOR** to **one** of the lower electrodes of the TSTLP® ESE terminal, press button **SWITCH**, Power Indication Lamp's on, press **T**, it's working OK if **T & LOW-OK** indication lamps' on, which makes long-voice. It's faulty if **DEF** indication lamp's on, which makes several short-noise. Repeat same operation steps to rest lower electrodes till finished.

✓ **UPPER ELECTRODES TEST:**

After above **1,2,3 connection**, clamp **THE OTHER ALLIGATOR** to **one** of the upper electrodes of the TSTLP® ESE terminal, press **T**, it's working OK if **T & UP-OK** indication lamps' on, which makes long-voice. It's faulty if **DEF** indication lamp's on, which makes several short-noise. Repeat same operation steps to rest upper electrodes till finished.

❖ TEST PHOTOS FOR REFERENCE:



**LOWER ELECTRODE
TEST**



**UPPER ELECTRODE
TEST**



■ **Portable Smart TSTLP® ESE Tester**

❖ **INTRODUCTION:** Portable Smart TSTLP® ESE tester is designed to check that the main functions of the upgraded TSTLP® ESE lightning rods are working properly and that none of the vital components is damaged (Results are given by both **Green/Red light** and **ringing WARNING signal**).

❖ **INTERFACE ILLUSTRATION & SIZE**

Product Photo (FRONT)				Product Photo (SIDE)	
Product Size: 130 mm*95 mm*53 mm					
FRONT Interface			SIDE Interface		
TEST	Test Button	P	Power Indication Lamp	SWITCH	Power Switch Button
		T	Test Indication Lamp	CHARGE	Power Recharge Terminal
		UP-OK	Upper Electrode Indication Lamp	Output +	+5VDC Power Output
			OK Indication Lamp	Output -	-5VDC Power Output
		LOW-OK	Lower Electrode Indication Lamp		
			OK Indication Lamp		
		DEF	Faulty Indication Lamp		

❖ **HOW TO TEST**

Below test, make sure making correct connection:

- 1: Connecting the tester with Power by the Power adapter (110V/220V/230V - 9V) or with 9V Portable Power Source(**No need connection to the power if after charging (full)---Portable**).
- 2: Insert the alligator clips into **OUTPUT** terminals (+/- could be exchanged)
- 3: Clamp the **one alligator** to the central rod of the TSTLP® ESE terminal

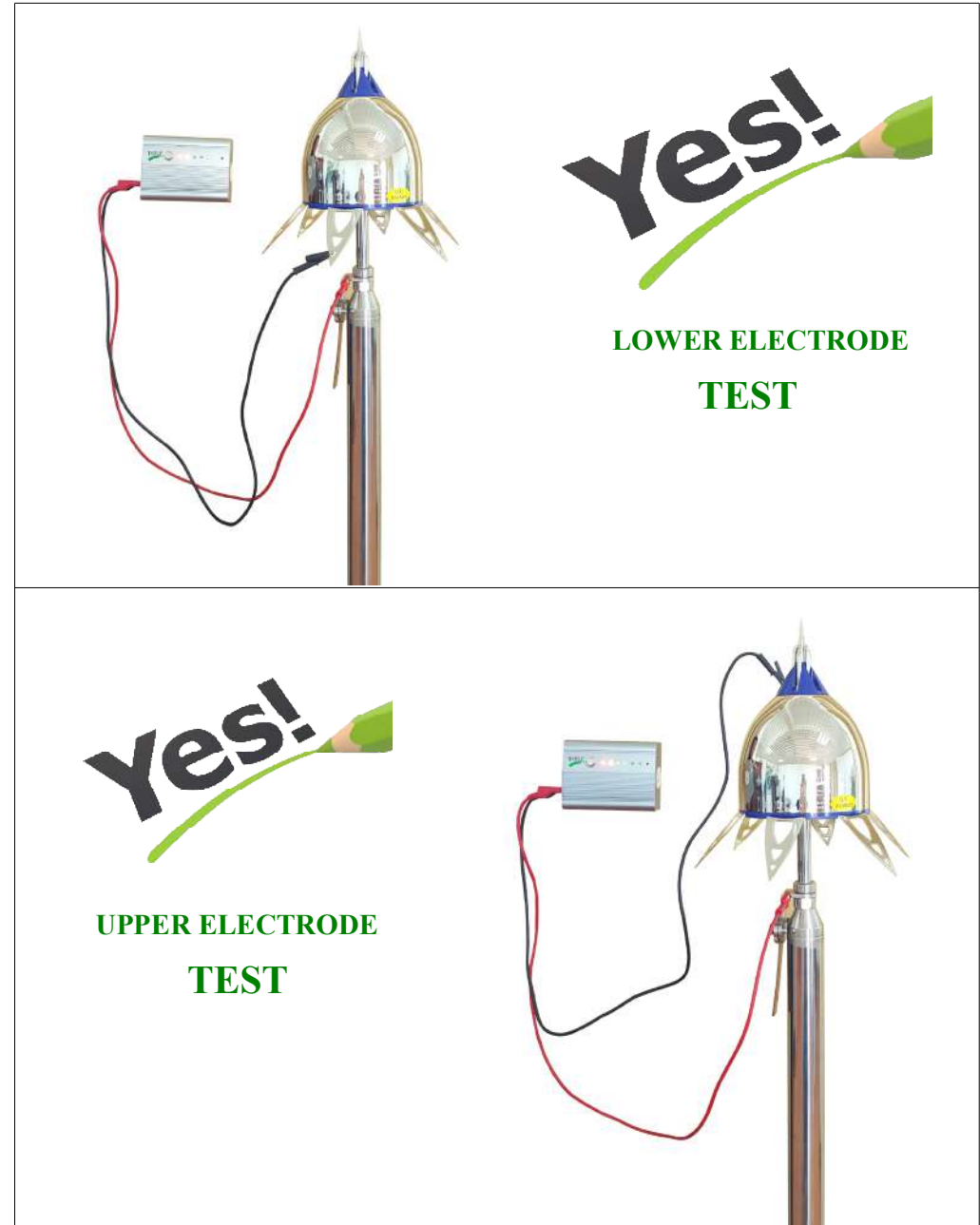
✓ **LOW ELECTRODES TEST:**

After above **1,2,3** connection, clamp **THE OTHER ALLIGATOR** to **one** of the lower electrodes of the TSTLP® ESE terminal, press button **SWITCH**, Power Indication Lamp's on, press **T**, it's working OK if **T & LOW-OK** indication lamps' on,which makes long-voice. It's faulty if **DEF** indication lamp's on,which makes several short-noise. Repeat same operation steps to rest lower electrodes till finished.

✓ **UPPER ELECTRODES TEST:**

After above **1,2,3** connection, clamp **THE OTHER ALLIGATOR** to **one** of the upper electrodes of the TSTLP® ESE terminal, press **T**, it's working OK if **T & UP-OK** indication lamps' on,which makes long-voice. It's faulty if **DEF** indication lamp's on,which makes several short-noise. Repeat same operation steps to rest upper electrodes till finished.

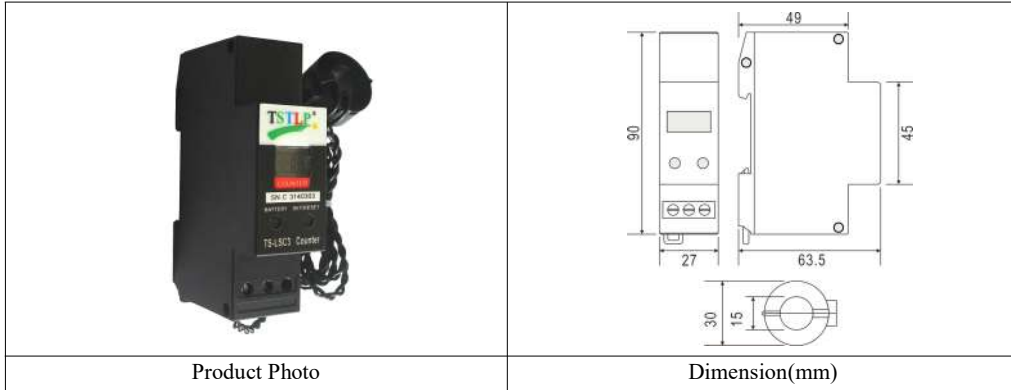
❖ **TEST PHOTOS FOR REFERENCE:**





■ TSTLP®/TS-LSC3 Lightning Surge Counter

- ❖ **INTRODUCTION:** TS-LSC3 lightning surge counter is designed for easy mounting on a down conductor to effectively count the number of lightning strikes captured by the TSTLP® E.S.E Air Terminals or Surge Protectors. TS-LSC3 measures lightning strikes by the induction of current and does NOT require the use of any external power source.



❖ TECHNICAL DATA

TSTLP® Model Nr	TS-LSC3
Power Supply	3V battery, Type CR123A, Exchangeable
Min count current	> 1KA, rise time 8~10 μ s
Sequence of impulse	> 1s
LCD indicator	3-digit(0~999)
Inductive line	1m long Twisted-pair
Service life of battery	\geq 2 years (Do NOT pull the Insulated part before use)
Enclosure material	Black thermoplastic, UL94-V0
Installation	Mount on 35mm Din rail or inside waterproof box
Dimension	1.5 mods
Compliance	CE(EMC, LVD)

❖ MAIN CHARACTER

- ✓ 3-digit Display (0~999).
- ✓ Inductive loop (feed through with the earthing line of surge protective devices or lightning rod)
- ✓ Press the button “BATTERY” continuously, if display “HI”, it means the battery’s power is adequate, If display “LO”, meaning that the battery’s power is inadequate, the battery should be replaced.

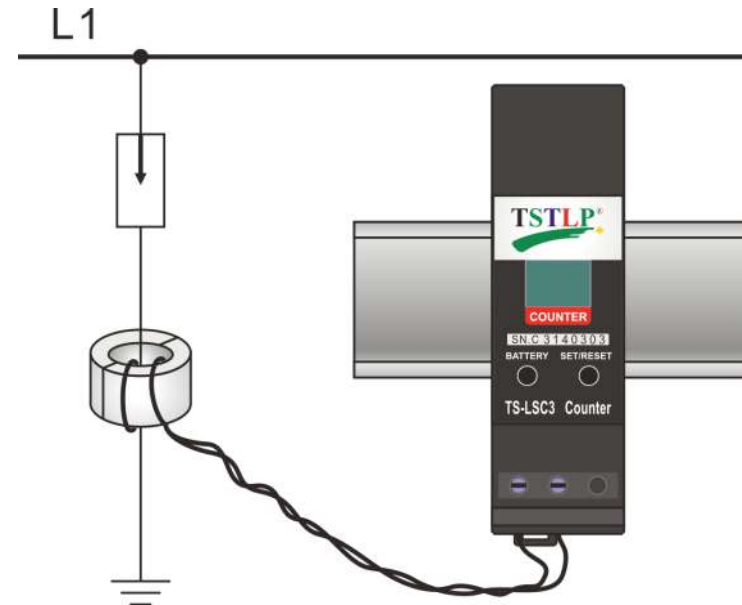
INSTALLATION INSTRUCTION

TS-LSC3 should be installed at a position along the down conductor(or PE Line) length where it can be accessed easily for inspection. Typically TS-LSC3 should be installed approximately 2 m from ground level or alternatively within the earth pit at the lower termination point of the down conductor(copper cable).

When installing the TSTLP® Lightning Surge Counters the following should be considered:

- TS-LSC3 should be mounted away from areas where damage may occur due to theft, vandalism or nearby operations.
- TS-LSC3 can be enclosed in a security enclosure but the display should be kept visible to allow for the checking of recorded strikes.

INSTALLATION DIAGRAM FOR REFERENCE



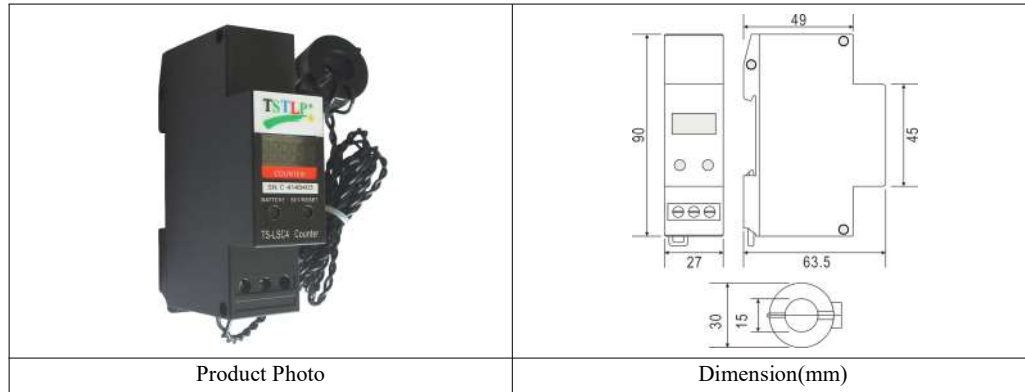
WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



■ TSTLP® 4-digit Lightning Surge Counter

- ❖ **INTRODUCTION:** TS-LSC4 lightning surge counter is designed for easy mounting on a down conductor to effectively count the number of lightning strikes captured by the TSTLP® E.S.E Air Terminals or Surge Protectors. TS-LSC4 measures lightning strikes by the induction of current and does NOT require the use of any external power source.



❖ TECHNICAL DATA

TSTLP® Model Nr	TS-LSC4
Power Supply	3V battery, Type CR123A, Exchangeable
Min count current	> 1KA, rise time 8~10 μ s
Sequence of impulse	> 1s
LCD indicator	4-digit(0~9999)
Inductive line	1m long Twisted-pair
Service life of battery	\geq 2 years (Do NOT pull the Insulated part before use)
Enclosure material	Black thermoplastic, UL94-V0
Installation	Mount on 35mm Din rail or inside waterproof box
Dimension	1.5 mods
Compliance	CE(EMC, LVD)

❖ MAIN CHARACTER

- ✓ 4-digit Display (0~9999)
- ✓ Inductive loop (feed through with the earthing line of surge protective devices or lightning rod)
- ✓ Press the button “BATTERY” continuously, if display “HI”, it means the battery’s power is adequate, If display “LO”, meaning that the battery’s power is inadequate, the battery should be replaced

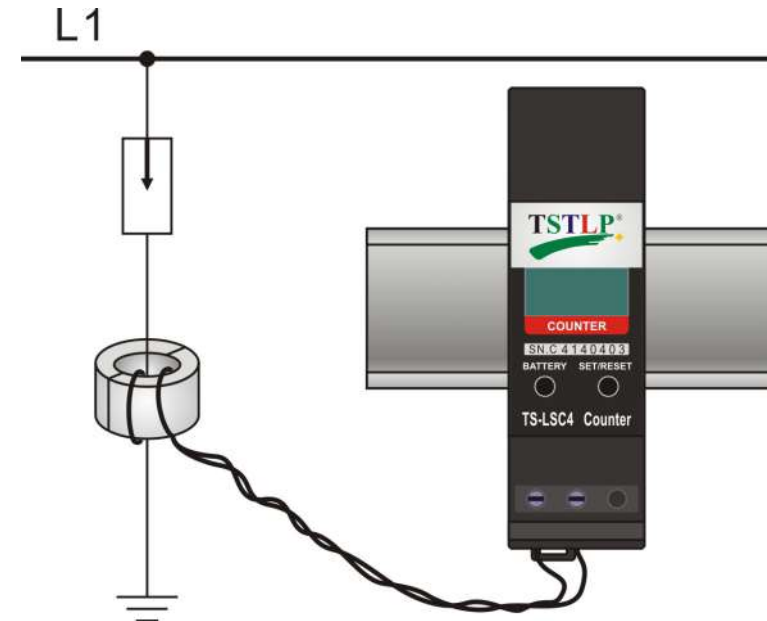
INSTALLATION INSTRUCTION

TS-LSC4 should be installed at a position along the down conductor(or PE Line) length where it can be accessed easily for inspection. Typically TS-LSC4 should be installed approximately 2 m from ground level or alternatively within the earth pit at the lower termination point of the down conductor(copper cable).

When installing the TSTLP® Lightning Surge Counters the following should be considered:

- TS-LSC4 should be mounted away from areas where damage may occur due to theft, vandalism or nearby operations.
- TS-LSC4 can be enclosed in a security enclosure but the display should be kept visible to allow for the checking of recorded strikes.

INSTALLATION DIAGRAM FOR REFERENCE



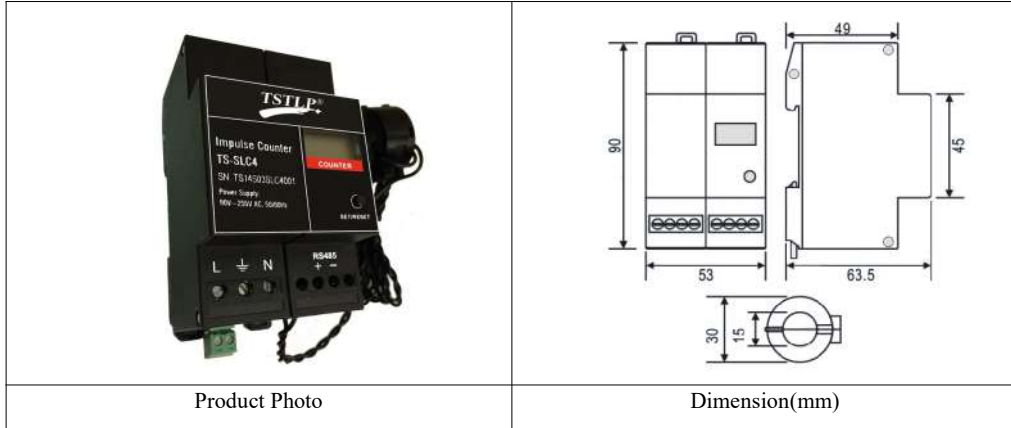
WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



TSTLP®/TS-SLC4 lightning Impulse Counter & Faults Reporter

INTRODUCTION: TS-SLC4 lightning impulse counter is designed for counting the number of current discharged by surge protective devices to earth. The unit is equipped with an RM (Remote) input port, to detect any changes from the surge protective devices RM terminal, and remote location, distance approx. 300m maximum. as well as being able to communicate via RS485 the number of impulse counter recorded, and remote control for set and reset operation.



❖ TECHNICAL DATA

TSTLP® Model Num	TS-SLC4
Power Supply	AC 90V-255V, 50Hz/60Hz
Min count current	> 1KA, rise time 8~10µs
Sequence of impulse	> 1s
LCD indicator	4-digit(0~9999)
RS485 interface	RS485 remote communication display & control
Inductive line	1m long Twisted-pair
Enclosure material	Black thermoplastic, UL94-V0
Working Temperature	-10 °C ~ +50 °C
Installation	Mount on 35mm Din Rail or inside waterproof box
Dimension	53*63.5*90mm (L*W*H mm)
Compliance	CE (EMC, LVD)

❖ MAIN CHARACTER

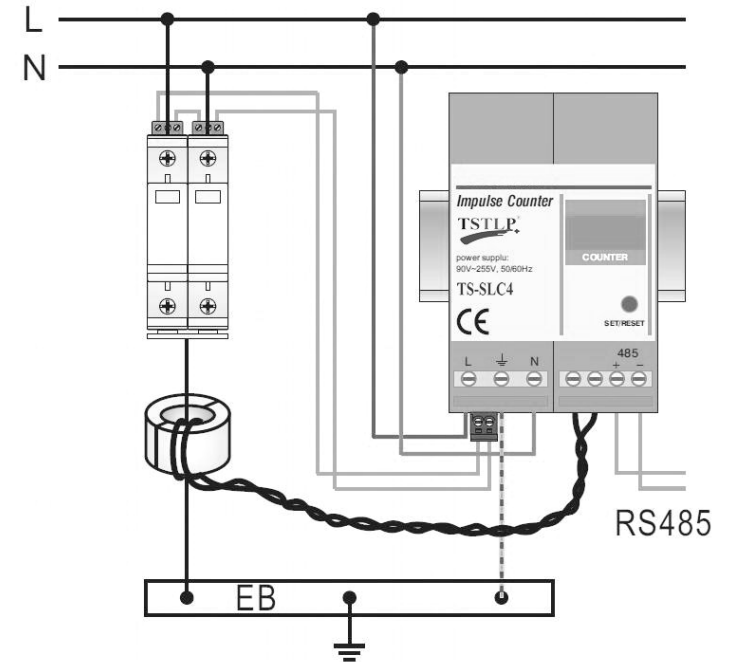
- ✓ 4 digits LCD display, with set and reset function
- ✓ RS485 remote communication function
- ✓ 3 standard module width
- ✓ Inductive loop (feed through with the earthing line of surge arresters)
- ✓ 1m long inductive twisted pair

INSTALLATION INSTRUCTION

When installing the TSTLP® Lightning Event Counters the following should be considered:

- TS-SLC4 should be mounted away from areas where damage may occur due to theft, vandalism or nearby operations.
- TS-SLC4 can be enclosed in a security enclosure but the display should be kept visible to allow for the checking of recorded strikes.

INSTALLATION DIAGRAM FOR REFERENCE



WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



■ TSTLP®/TS-SLC3D Lightning Event Counter

INTRODUCTION: Advanced TSTLP® TS-SLC3D lightning event counter (7-digit display) is designed for easy mounting on a down conductor (Earthing Line) to effectively count the times of lightning/surge current discharged by E.S.E Air Terminal or surge protector, recording exact DATE & TIME. And it does NOT require the use of any external power source.



❖ TECHNICAL DATA

TSTLP® Model Nr	TS-SLC3D
Power Supply	3V battery, Type CR123A, Exchangeable
Min count current	> 1KA, rise time 8~10μs
Sequence of impulse	> 1s
LCD indicator	7-digit(0~9999999)
Record	Recording exact DATE & TIME
Inductive line	1m long Twisted-pair
Service life of battery	≥ 1.5 years (Do NOT pull the Insulated part before use)
Enclosure material	Black thermoplastic, UL94-V0
Installation	Mount on 35mm Din rail or inside waterproof box
Dimension	2.2 standard module width
Working temperature	-10°C ~ +55°C
Relative humidity	≤95% (25°C)
Compliance	CE(EMC, LVD)

❖ MAIN CHARACTER

- ✓ 7-digit Display (0~9999999)
- ✓ Inductive loop (feed through with the earthing cable of ESE air terminal / surge protective devices)
- ✓ Powered by replaceable 3V Lithium battery, 0.96 inches, 128*64 resolution OLED display.
- ✓ TS-SLC3D Smart counter could not only count TIMES stricken by lightning/surge, but also could record exact date & time stricken by lightning/surge.

INSTALLATION INSTRUCTION

1. There is an insulated transparent tape attached to the battery, pull the tape "Battery on PULL" before installation to ensure the power supply works smoothly.
2. Open the inductive ring and hitch around the earthing wire, then fix the SPD on the 35mm DIN rail. As show in the following installation diagram.
3. Fault resolution: when the product indicates default, still reset or even no indication, open the bottom enclosure, unplug the internal battery for about 5 minutes and then assemble it back, pay attention to the battery and its holder's positive(+) and negative (-) accordingly. In this condition, it will display and work normally then do the reset (for test).

TS-SLC3D should be installed at a position along the down conductor (or PE Line) length where it can be accessed easily for inspection. Typically TS-SLC3D should be installed approximately 2 m from ground level or alternatively within the earth pit at the lower termination point of the down conductor (copper cable).

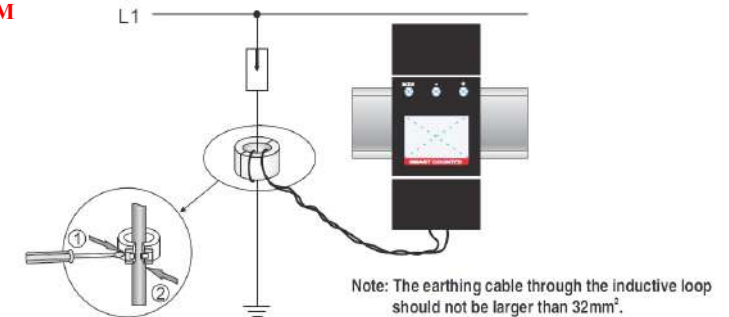
When installing the TSTLP® Lightning Event Counters the following should be considered:

- TS-SLC3D should be mounted away from areas where damage may occur due to theft, vandalism or nearby operations.
- TS-SLC3D can be enclosed in a security enclosure but the display should be kept visible to allow for the checking of recorded strikes.

❖ TIME DIRECTION:

- 1) **Normal display:** Year/Month/Date, Hour/Minute/Second & Times.
- 2) On normal display status, press the button "M" to enter into setting mode.
- 3) After entering into the setting mode, press the button "M" to convert to the digit which is to be set, at this time, the digit is flashing, press the button "+" in 3 seconds to clear to zero.
- 4) On normal display status, press the button "-" to enter into history counting mode where date & time record can be checked to view the recent 50 times, press the button "+" to change another display.
- 5) **Power-saving mode:** on display status, it will enter into power-saving mode if there is no operation in 6 to 10 seconds, press the button "M" to return to normal mode.

INSTALLATION DIAGRAM FOR REFERENCE


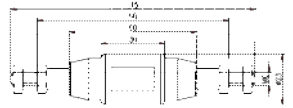
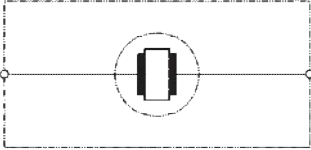

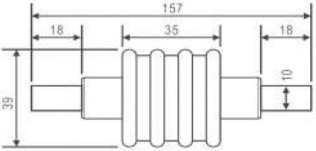
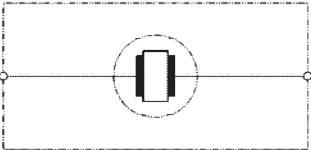


WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



- **TSTLP® Isolating Spark Gaps for lightning equipotential bonding, especially for the separated earthing systems.**

		
TS-DG100 Product Photo	TS-DG100 Dimension(mm)	TS-DG100 BCD
		
TS-ISG25 Product Photo	TS-ISG25 Dimension(mm)	TS-ISG25 BCD

❖ **TECHNICAL DATA**

Model	TS-ISG25	TS-DG100
Lightning impulse current (10/350 μs) [Iimp]	25KA	/
Nominal discharge current (8/20 μs) [In]	100 KA	100KA
Rated power-frequency withstand voltage (50 Hz) [UW/AC]	300 V	300V
100% Lightning impulse sparkover voltage [Urimp]	≤ 1.5 kV	≤ 4 kV
Power frequency sparkover voltage (50 Hz) [Uaw]	≤ 400 V	≤ 2.5 kV
Operating temperature range [TU]	-40°C...+80°C	
Relative Humidity	≤ 95% (25 ⁰ C)	
Degree of protection	IP 65	
Enclosure material	Red/ Orange Thermoplastic UL94-V0	
Connection	Rd 10 mm	
Material (connection)	Cu	
Compliance	CE(EMC, LVD)	

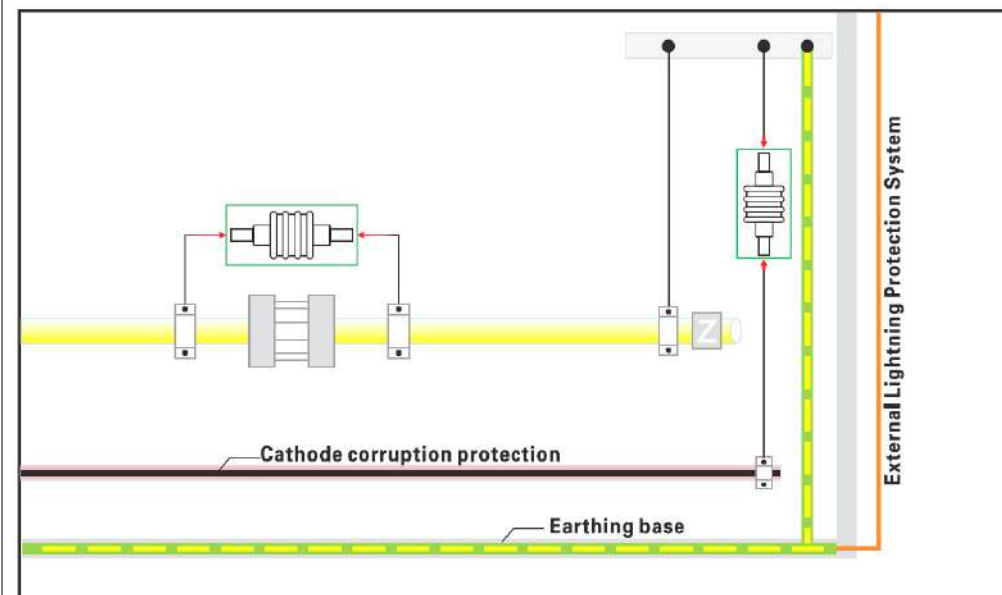
❖ **MAIN CHARACTER**

- ✓ M10mm copper terminal
- ✓ For mounting in-door & out-doors, in damp rooms as well as underground installation
- ✓ High discharge current

INSTALLATION INSTRUCTION

TS-ISG25 & TS-DG100 is applied for in-doors & out-doors, in damp rooms as well as underground installation.

TS-ISG25 INSTALLATION DIAGRAM




WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.
3. For safety, all adjacent system should be connected together with no separation what so ever; If separated earthing system, there's always a risk of potential difference between earthing systems.




■ Earthing Conductors


1. Bare Copper Stranded Cables / Yellow/Green PVC insulated copper cables

	Cross sectional area	Strand No./diameter	Weight/M	Remark
	16mm ²	7/Φ1.68mm	0.14/0.17kgs	<ul style="list-style-type: none"> Material:Oxygen-free copper can supply tinned cable also Length as request
	25mm ²	7/Φ2.11mm	0.22/0.2558kgs	
	35mm ²	7/Φ2.49mm	0.306/0.356kgs	
	50mm ²	7/Φ2.97mm	0.438/0.498kgs	
	70mm ²	19/Φ2.14mm	0.618/0.698kgs	
	95mm ²	19/Φ2.49mm	0.838/0.938kgs	
	120mm ²	19/Φ2.80mm	1.057/1.177kgs	
	150mm ²	37/Φ2.25mm	1.34/1.49kgs	
	185mm ²	37/Φ2.49mm	1.65/1.83kgs	
240mm ²	37/Φ2.84mm	2.14/2.37kgs		
300mm ²	61/Φ2.49mm	3.564/3.854kgs		

2. Copper Tape

	Dimensions	Cross sectional area	Weight/M	Remark
	20 x3mm	60mm ²	0.54kgs	<ul style="list-style-type: none"> Material:Oxygen-free copper
	25 x3mm	75mm ²	0.675kgs	
	25 x4mm	100mm ²	0.893kgs	
	30 x4mm	120mm ²	1.072kgs	
	30 x5mm	150mm ²	1.34kgs	
	40 x4mm	160mm ²	1.43kgs	
	40 x5mm	200mm ²	1.786kgs	
	50 x5mm	250mm ²	2.233kgs	
50 x6mm	300mm ²	2.679kgs		


3. Bare(Cu/Steel) Bimetallic cable/ Yellow/Green PVC insulated(Cu/Steel) Bimetallic Cable- Galvanized technics

	Cross sectional area	Strand No./diameter	Weight/M	Remark
	16mm ²	7/Φ1.70mm	0.126/0.156kgs	<ul style="list-style-type: none"> General packing:100meters voltage Grade of insulator:450/75V
	25mm ²	7/Φ2.14mm	0.193/0.228kgs	
	35mm ²	7/Φ2.5mm	0.273/0.323kgs	
	50mm ²	19/Φ1.80mm	0.384/0.444kgs	
	70mm ²	19/Φ2.10mm	0.523/0.603kgs	
	95mm ²	19/Φ2.50mm	0.742/0.842kgs	
	120mm ²	37/Φ2.03mm	0.930/1.050kgs	
	150mm ²	37/Φ2.30mm	1.02/1.17kgs	
185mm ²	37/Φ2.50mm	1.446/1.63kgs		


4. Copper Cald Steel Wire

	Diameter	Meter	Weight/M	Remark
	Φ8mm	6mm	0.43kgs	<ul style="list-style-type: none"> Thickness of copper layer>0.5mm Packing: 10pcs/Bundle
	Φ10mm	6mm	0.66kgs	
	Φ12mm	6mm	0.95kgs	
	Φ14mm	6mm	1.28kgs	

5. Copper Cald Steel tape(flat)

	Dimensions	Meter	Weight/M	Remark
	6 x14mm	6mm	0.68kgs	<ul style="list-style-type: none"> Thickness of copper layer>0.5mm Packing 10pcs/Bundle
	6 x20mm	6mm	0.96kgs	
	7 x22mm	6mm	1.24kgs	
	7 x27mm	6mm	1.51kgs	
	7 x32mm	6mm	1.79kgs	
	7 x37mm	6mm	2.07kgs	
	8 x37mm	6mm	2.37kgs	


6. Zinc Casted Steel

	Meter	Outer diameter	Remark
	6mm	16mm	<ul style="list-style-type: none"> Zinc thickness> 1mm
	2.5mm	24mm	
	2.5mm	43mm	




■ Earthing Accessories and Others


❖ U-Bolt Rod to Cable Clamp

	Model(s)	Diameter	Conductor size	Technics
	107-1	Φ14.2mm-17.2mm	16-70mm ²	Brass
	107-2	Φ18mm-25mm	70~185mm ²	Copper


❖ Cruciform Clamp

	Model(s)	Diameter	Conductor size	Conductor Size	(N.W)	Material
	106	Φ14.2mm	16-70mm ²	25x3mm 25x4mm	0.23kg	Brass
	106	Φ17.2mm	16-70mm ²	25x3mm 25x4mm	0.26kg	Brass


❖ Square Conductor Clamp

	Model(s)	Nominal area	Dimensions	(N.W)	Technics
	123-120120	120/120mm ²	540x540mm	0.316kg	Cast Brass
	123-12070	120/70mm ²	540x540mm	0.313kg	Cast Brass
	123-7070	70/70mm ²	540x540mm	0.31kg	Cast Brass


❖ DC Tape Clip

	Model(s)	Dimensoin	(N.W)	Technics
	122-1	25x3mm 25x4mm	0.078kg	Cast Brass


❖ Square Tape Clamp

	Model(s)	Dimensoin	(N.W)	Technics
	122-2	25x3mm 25x4mm	0.182kg	Cast Brass


❖ Heavy Duty Cast Cable Saddle

	Model(s)	Dimensoin	(N.W)	Technics
	125-1	50mm ²	0.122kg	Cast Brass
	125-2	70mm ²	0.126kg	Cast Brass
	125-3	95mm ²	0.130kg	Cast Brass

❖ Back Plate Holdfast Stem


	Model(s)	Length	(N.W)	Technics
	125	100mm	0.126kg	Cast Brass

❖ Earth Points


	Model(s)	Dimensoin	(N.W)	Technics
	118-1	80.8 (L) x41.6(W)x77.4(H)mm	0.246kg	Brass
	118-2	63.5 (L) x63.5(W)x77.7(H)mm	0.31kg	Brass
	118-3C	63.5 (L) x63.5(W)x77.7(H)mm	0.318kg	Copper




❖ **Earth Bar**

	Model(s)	Dimension	No.of hole	Material	Remark
	108-1	500 x 5 x 50mm	8	Copper tinned	Could do as request
	108-2	420 x 5 x 75mm	10	Copper tinned	
	108-3	420 x 5 x 75mm	12	Copper tinned	


❖ **Bolt Rod to Cable Clamp**

	Model(s)	Diameter	Conductor size	(N.W)	Material
	102-2	Φ12.7mm	16-50mm ²	0.036kg	Brass


❖ **Bolt Rod to Cable Clamp**

	Model(s)	Diameter	Conductor size	(N.W)	Material
	102-3	Φ16mm	16-70mm ²	0.06kg	Brass
	102-3Z	Φ16mm	16-70mm ²	0.03kg	Zinc


❖ **Bolt Rod to Cable Clamp**

	Model(s)	Diameter	Conductor size	(N.W)	Material
	102-4	Φ14.2mm	16-70mm ²	0.48kg	Brass


❖ **Bolt Rod to Cable Clamp**

	Model(s)	Diameter	Conductor size	(N.W)	Material
	109	Φ16-18mm	16-70mm ²	0.05kg	Brass


❖ **Bolt Rod to Cable Clamp**

	Model(s)	Diameter	Conductor size	(N.W)	Material
	113	Φ14.2mm	16-70mm ²	0.11kg	Brass


❖ **Double Bolt Clamps**

	Model(s)	Conductor size	(N.W)	Material
	TS-114	Φ16-17.2mm/50mm ² -95mm ²	0.15kg	Copper


❖ **Copper Terminals/ Bimetallic Cu/AL Terminals**

	Copper Terminal	Cu/AL Terminals	Conductor size
	111-35	111-35	35mm ²
	111-50	111-50	50mm ²
	111-70	111-70	70mm ²
	111-95	111-95	95mm ²
	111-120	111-120	120mm ²
	111-150	111-150	150mm ²
	111-185	111-185	185mm ²
	111-240	111-240	240mm ²

❖ **C-type Copper Clamp**


	Model(s)	Diameter	Suitable Conductor size
	121-35	35mm ²	35mm ²
	121-50	50mm ²	35mm ² ~50mm ²
	121-70	70mm ²	50mm ² ~70mm ²
	121-95	95mm ²	70mm ² ~95mm ²
	21-120	120mm ²	95mm ² ~120mm ²
	21-185	185mm ²	120mm ² ~185mm ²

❖ **Unparallel-groove Clamp Copper/ Bimetallic Cu/AL**

	Unparallel-groove Clamp	Bimetallic Cu/AL	Suitable Conductor size
		120-1	10mm ² ~95mm ²
	117-1	120-2	16mm ² ~120mm ²
	117-2	120-3	50mm ² ~240mm ²




❖ **Copper Contact Clip**





	Model(s)	Suitable Conductor size
	110-400	50mm ² ~70mm ²
	110-500	70mm ² ~95mm ²
	110-600	95mm ² ~120mm ²
	110-800	120mm ² ~150mm ²





❖ **Compression Clamp**





	Model(s)	Suitable Conductor size
	119-50	50mm ² ~70mm ²
	119-70	70mm ² ~95mm ²
	119-95	95mm ² ~120mm ²

❖ **Flexible Copper Braid**

	Model(s)	Dimensions	Conductor size
	BD06	12 x 1.0mm	6mm ²
	BD10	15 x 1.50mm	10mm ²
	BD16	19 x 2.50mm ²	16mm ²
	BD35	25 x 3.50mm ²	35mm ²
	BD70	32 x 6.0mm ²	70mm ²

Test Clamp	T-02 Cable scissors	T-01 Press plier	Inspection pit
			

Φ50x15000mm Effective copper bonded Grounding rods	X Equipotential terminal box	115	116
			

129 One hole cable clip	127 U-bolt rod clamp	128 Pipe clamp	130 High strength splitbolt Connector
			

131 Tape clip	BN35 Flexible copper braid bond	103 U-bolt to tape clamp	101 Rod to tape clamp
			



■ Copper Bonded Earth Rods

❖ **INTRODUCTION:** Earth rods are made by molecularly bonding process 99.9% purity electrolytic copper onto a high tensile low carbon steel cores to ensure a perfect and even bonding between the steel and copper in accordance with national and international standards. The copper layer whose minimum thickness is 254 microns. The steel core is a bar drawn standard size diameter being the most popular used 1/2", 5/8", 3/4".

Our Earth rods with high in protection against natural corrosion and electrochemical reaction when rooted deeply in ground. Earth rods and grind wirings are welded by exothermic welding powder so that the ground system are protected by the copper wholly and free of maintenance.

The rod length range from 4" up to 10". Earth rods are also available in the sectional type with the same length and diameters. These sectional rods are threaded on both ends to allow rod-to-rod connection by use the coupling.

	Diameter	Length	Weight	Packing
	14.2mm(5/8")	1200mm(4")	1.50kgs	10pcs/Bundle
	14.2mm(5/8")	1500mm(5")	1.88kgs	
	14.2mm(5/8")	2400mm(8")	3.00kgs	
	14.2mm(5/8")	2500mm	3.13kgs	
	14.2mm(5/8")	3000mm(10")	3.75kgs	
	16mm	1500mm	2.38kgs	5pcs/Bundle
	16mm	2500mm	3.96kgs	
	17.2mm(3/4")	1500mm(5")	2.75kgs	10pcs/Bundle
	17.2mm(3/4")	2400mm(8")	4.39kgs	
	17.2mm(3/4")	2500mm	4.58kgs	5pcs/Bundle
17.2mm(3/4")	3000mm(10")	5.49kgs		
20mm	1500mm	3.70kgs	10pcs/Bundle	
20mm	2500mm(5")	6.18kgs		
20mm	3000mm	7.41kgs	5pcs/Bundle	
25mm	1500mm	5.78kgs		
25mm	2500mm	9.63kgs		

❖ MAIN CHARACTER:

1. Thickness of the copper layer is from 0.1~0.25mm.
2. Our ground rods can be bent through a 30 or 90 or 135 degrees angle, and the rods will be no evidence of cracking or splitting of the steel or the copper cladding.
3. The advantages are good tensile strength more than 580N/mm².
4. Good in anti-corrosion that usage-life, constant low resistance and good plasticity which had the characteristics of copper as steel.

❖ NOTE

- a. Diameters with Φ12.7mm, Φ14.2mm, Φ17.2mm, we can supply you earth rod with threads as UNC-2A and metric standard. Pls let us know your request before produce.
- b. We can supply you earth rods with much more thickness of copper layer such as 25 microns, 50microns, 100microns, 127microns, 254microns and 330 microns etc.
- c. Also, we can supply you earth rod with two ends thread, un-thread but with one end point, one end thread and the other end point.
- d. Length of earth rod as your request.

❖ EARTH RODS' ACCESSORY



Mode(s) of couplings	Mode(s) of Drilling Heads	Mode(s) of Driving Heads	Remark
L127	Z127	Q127	support the use of 12.7mm earth rods
L142	Z142	Q142	support the use of 14.2mm earth rod
L16	Z16	Q16	support the use of 16mm earth rods
L172	Z172	Q172	Support the use of 17.2mm earth rods
L20	Z20	Q20	Support the use of 20mm earth rods
L25	Z25	Q25	Support the use of 25mm earth rods

❖ FORMULAR OF CALCULATING FOR SINGLE EARTH ROD

$$R = \frac{P}{2\pi L} \left(\ln \frac{8L}{d} - 1 \right) \quad (d \ll L)$$

R: Earthing resistance of single earth rod (Ω)

p: Earthing resistance rate after revised (Ω.m)

L: Length of earth rod (m)

d: Diameter of earth rod (m)





Braided Copper



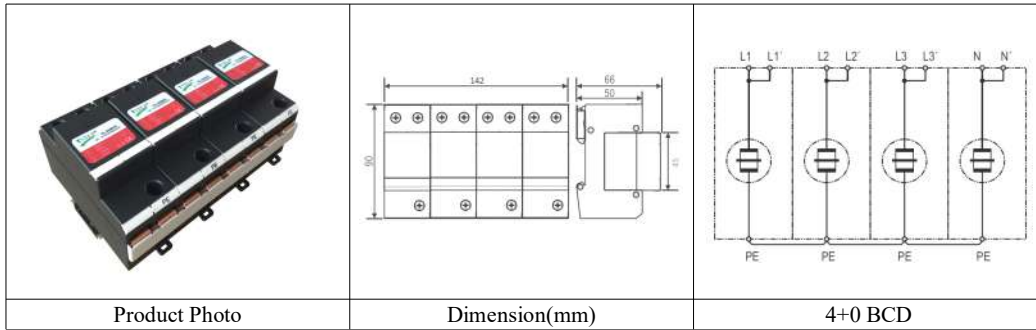
Strands X pc(s) X single line normal diameter(mm)

36X6X1 /0.15	48X4X1 /0.15
36X16X1 /0.15	48X6X1 /0.15
36X26X1 /0.15	48X12X1 /0.15
36X32X1 /0.15	48X20X1 /0.15
36X40X1 /0.15	48X30X1 /0.15
36X56X1 /0.15	48X20X2 /0.15
36X40X3 /0.15	48X20X3 /0.15
36X56X2 /0.15	48X28X3 /0.15
36X40X3 /0.15	48X28X4 /0.15
	48X28X5 /0.15



TSTLP®/TS-385BC25 Series Type 1+2 Lightning Current & Surge Arrester

- ❖ **INTRODUCTION:** TS-385BC25 is designed to protect low voltage devices from surge damages, specially designed for TN-S or TT system. Mainly used in power supply system such as power distribution-room, distribution-cabinet and other important power supply system. Designed according to IEC 61643-11; GB 18802.1; YD/T 1235.1..



❖ TECHNICAL DATA

Model Number	TS-385BC25/4	TS-385BC25/4	
4+0 for TN-S system; 3+0 for TN-C system	TS-385BC25/2	TS-385BC25/2	
2+0 for TN system	TS-385BC25	TS-385BC25	
3+1 for TN-S/TT system	(4+0, 2+0, 1P)	(3+1, 1+1, N-PE)	
1+1 for TN/TT system			
Rated voltage (max. continuous voltage)	Uc	385 VAC~	385 VAC~
Lightning impulse current (10/350)	I _{imp}	100 kA (total)	100 kA (total)
Lightning impulse current (10/350)	I _{imp}	25 kA	25 kA (L-N) 75 kA(N-PE)
Nominal discharge current (8/20)	I _n	100 kA	100 kA
Max. discharge current (8/20)	I _{max}	120 kA	120 kA
Voltage protection level	U _p	≤ 2.0 kV	≤ 2.0 kV(L-N) ≤ 1.8 kV(N-PE)
Follow current extinguishing capability at U _c	I _f	32A fuse will not be triggered at kArms (L-N)	32A fuse will not be triggered at kArms (L-N) 100A _{rms} (N-PE)
Response time	t _A	≤ 100ns	≤ 100ns
TOV voltage	U _T	335V / 5sec (L-N);	335V / 5sec (L-N); 600V/200ms
Max. back up fuse (L)		200AgL/gG	
Max. back up fuse (L-L')		125AgL/gG	
Operating temperature range (parallel wiring)	T _{UP}	-40°C...+80°C	
Operating temperature range (through wiring)	T _{US}	-40°C...+60°C	
Relative humidity:		≤ 95% (25°C)	
Cross-sectional area		35mm ² solid / 50mm ² flexible	
Mounting on		35mm DIN rail	
Enclosure material		Black thermoplastic, UL94-V0	
Standards		IEC 61643-11; GB 18802.1; YD/T 1235.1	
Compliance		CE	

❖ MAIN CHARACTER

- ✓ Combined SPD for three-phase TN /TT system
- ✓ Adopt hermetical GDT technology, high follow current extinguish capacity
- ✓ Extremely low voltage protection
- ✓ Double terminals for parallel or series (V-shape) connection
- ✓ Multifunctional connection for conductor and busbars

INSTALLATION INSTRUCTION

According to lightning protection zones concept, for installed at LPZ 0_A -1 or higher. This surge protection is usually A installed in distribution-box or feeder bus of UPS, protecting devices or equipment downstream. Fuse must be installed at the upstream of the SPD or the lightning arrester to make sure that protected system has double protection. The value of the fuse used in a SPD system should be conformed to:

1. The value of FUSE should not be larger than the max.withstand capacity of the SPD's backup fuse value.
2. Under the status of the max. current in the power supply & close loop circuit available current, the fuse should be able to disconnect when overloaded or short-circuited.

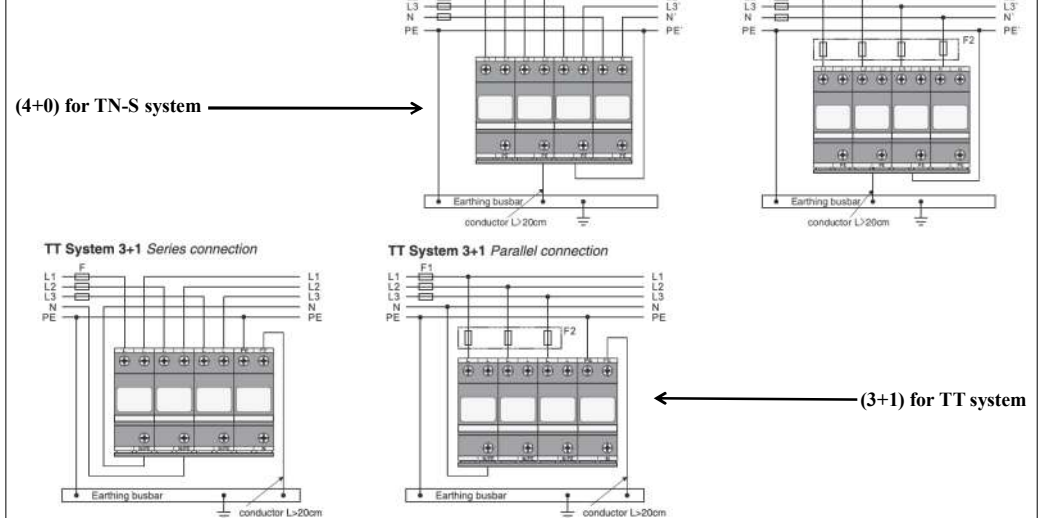
Take 1 & 2 into consideration, the fuse should be as large as possible to allow the maximum surge discharge of SPD.

INSTALLATION STEPS

- a. Mount the SPD on 35 mm DIN rail.
- b. Connect conductors, the cross-sectional area of cable (L-N) must be larger than 16mm², and the earthing cable(N-PE) larger than 25mm. The withstand voltage value of cable is not smaller than AC500V; ensure wiring reliable.
- c. After above, switch on the power supply and turn on the circuit breaker, test the SPD does not fault appear, this indicates the unit is operating normally.

Regularly inspect the operating status, especially after lightning. Once the fuse upstream break, or the SPD's fault appear, electrician should check/replace the SPD.

INSTALLATION DIAGRAM FOR REFERENCE



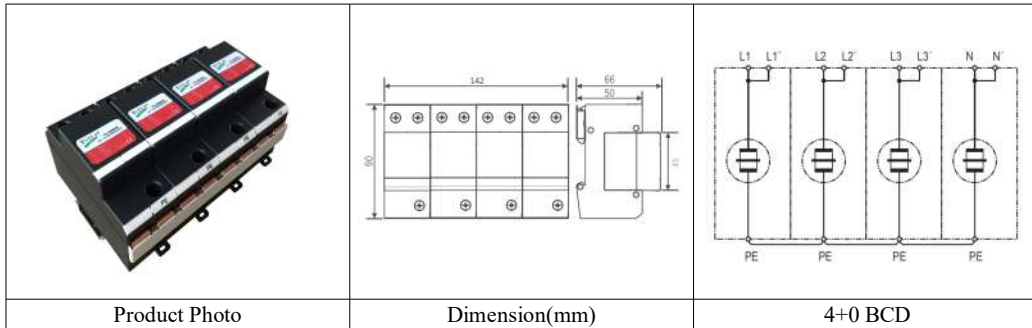
WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



TSTLP®/TS-255BC25 Type 1+2 Lightning Current & Surge Arrester

- ❖ **INTRODUCTION:** TS-255BC25 is designed to protect low voltage devices from surge damages, specially designed for TN-S or TT system. Mainly used in power supply system such as power distribution-room, distribution-cabinet and other important power supply system. Designed according to IEC 61643-11; GB 18802.1; YD/T 1235.1..



❖ TECHNICAL DATA

Model Number	TS-255BC25/4	TS-255BC25/4	TS-255BC25/2	TS-255BC25
4+0 for TN-S system	TS-255BC25/4	TS-255BC25/4	TS-255BC25/2	TS-255BC25
3+0 for TN-C system	TS-255BC25	TS-255BC25	TS-255BC25	TS-255BC25
2+0 for TN system	(4+0, 2+0, 1P)	(3+1, 1+1, N-PE)		
3+1 for TN-S/TT system				
1+1 for TN/TT system				
Rated voltage (max. continuous voltage)	Uc	255VAC~	255VAC~	
Lightning impulse current (10/350)	I _{imp}	100 kA (total)	100 kA (total)	
Lightning impulse current (10/350)	I _{imp}	25 kA	25 kA (L-N)	75 kA(N-PE)
Nominal discharge current (8/20)	I _n	100 kA	100 kA	
Max. discharge current (8/20)	I _{max}	120 kA	120 kA	
Voltage protection level	U _p	≤ 1.8 kV	≤ 1.8 kV(L-N);	≤ 1.5 kV(N-PE)
Follow current extinguishing capability at U _c	I _f	32A fuse will not be triggered at kArms (L-N)	32A fuse will not be triggered at kArms (L-N)	100A _{rms} (N-PE)
Response time	t _a	≤ 100ns	≤ 100ns	
TOV voltage	U _T	335V / 5sec (L-N);	335V / 5sec (L-N);	600V/200ms
Max. back up fuse (L)		200AgL/gG		
Max. back up fuse (L-L')		125AgL/gG		
Operating temperature range (parallel wiring)	T _{UP}	-40°C...+80°C		
Operating temperature range (through wiring)	T _{US}	-40°C...+60°C		
Relative humidity:		≤ 95% (25°C)		
Cross-sectional area		35mm ² solid / 50mm ² flexible		
Mounting on		35mm DIN rail		
Enclosure material		Black thermoplastic, UL94-V0		
standards		IEC 61643-11; GB 18802.1; YD/T 1235.1		
Compliance		CE		

❖ MAIN CHARACTER

- ✓ Combined SPD for three-phase TN /TT system
- ✓ Adopt hermetical GDT technology, high follow current extinguish capacity
- ✓ Extremely low voltage protection
- ✓ Double terminals for parallel or series (V-shape) connection
- ✓ Multifunctional connection for conductor and busbars

INSTALLATION INSTRUCTION

According to lightning protection zones concept, for installed at LPZ 0_A -1 or higher. This surge protection is usually A installed in distribution-box or feeder bus of UPS, protecting devices or equipment downstream. Fuse must be installed at the upstream of the SPD or the lightning arrester to make sure that protected system has double protection. The value of the fuse used in a SPD system should be conformed to:

1. The value of FUSE should not be larger than the max.withstand capacity of the SPD's backup fuse value.
2. Under the status of the max. current in the power supply & close loop circuit available current, the fuse should be able to disconnect when overloaded or short-circuited.

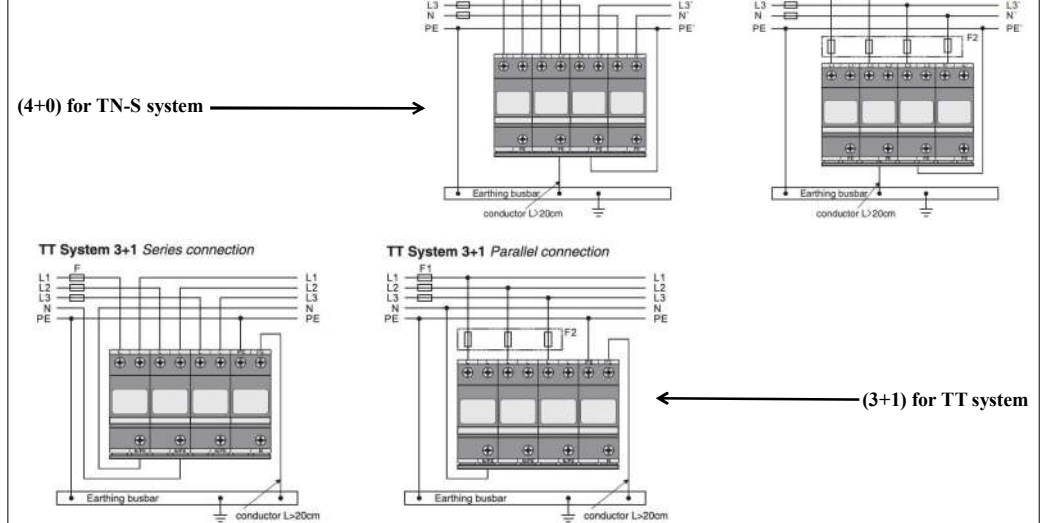
Take 1 & 2 into consideration, the fuse should be as large as possible to allow the maximum surge discharge of SPD.

INSTALLATION STEPS

- a. Mount the SPD on 35 mm DIN rail.
- b. Connect conductors, the cross-sectional area of cable (L-N) must be larger than 16mm², and the earthing cable(N-PE) larger than 25mm². The withstand voltage value of cable is not smaller than AC500V; ensure wiring reliable.
- c. After above, switch on the power supply and turn on the circuit breaker, test the SPD does not fault appear, this indicates the unit is operating normally.

Regularly inspect the operating status, especially after lightning. Once the fuse upstream break, or the SPD's fault appear, electrician should check/replace the SPD.

INSTALLATION DIAGRAM FOR REFERENCE



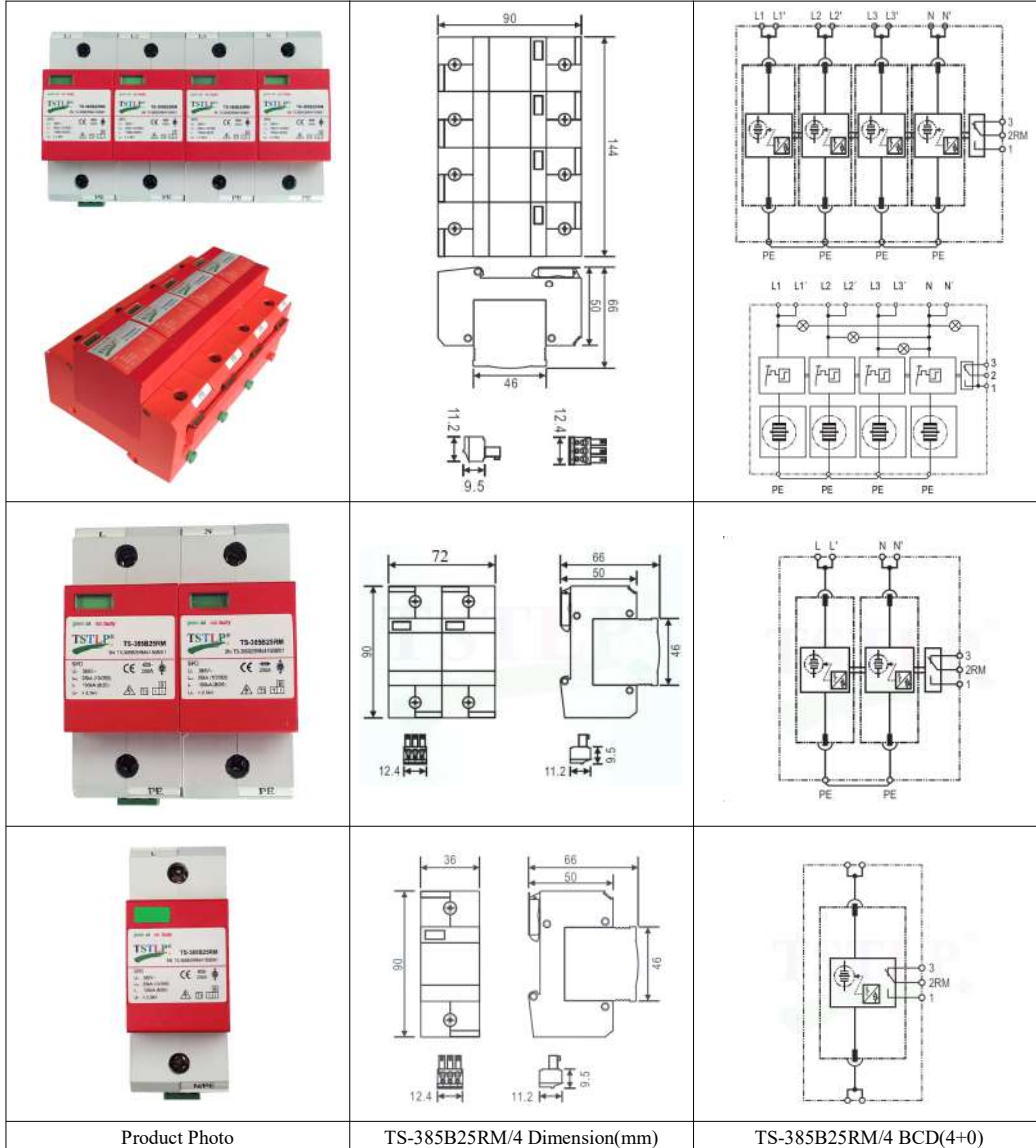
WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



TSTLP®/TS-385B25RM Series Type 1 Lightning Current Arrester (CE Approval)

❖ **INTRODUCTION:** TS-385B25RM series is for installation at LPZ 0A -1 or higher, protecting low voltage equipment against lightning and surge damages. Applied in SPD Type 1/Class I(Class B) for various power supply system. Designed according to GB 18802.1 / IEC 61643-11



❖ TECHNICAL DATA

Model Number	TS-385B25RM/4 TS-385B25/4 TS-385B25RM/2 TS-385B25RM (4+0, 2+0, 1P)	TS-385B25RM/4 TS-385B25/4 TS-385B25RM/2 TS-385B25RM (3+1, 1+1, N-PE)
4+0 for TN-S system; 3+0 for TN-C system 2+0 for TN system 3+1 for TN-S/TT system 1+1 for TN/TT system		
Rated voltage (max. continuous voltage)	Uc 385 VAC~	385 VAC~
Lightning impulse current (10/350)	I _{imp} 25 kA	25 kA 75 kA (N-PE)
Nominal discharge current (8/20)	I _n 100 kA	100 kA
Max. discharge current (8/20)	I _{max} 120 kA	120 kA
Voltage protection level	U _p ≤ 2.5 kV	≤ 2.5 kV ≤ 2.2 kV
Follow current extinguishing capability at U _c	I _f 32A fuse will not be triggered at 2kArms	32A fuse will not be triggered at 2kArms 100Arms (N-PE)
Response time	t _A ≤ 100ns	
TOV voltage	U _T 335V / 5sec	335V / 5sec 600V/200ms
Max. back up fuse (L)	200AgL/gG	
Max. back up fuse (L-L')	125AgL/gG	
Operating temperature range (parallel wiring)	T _{UP} -40°C...+80°C	
Operating temperature range (through wiring)	T _{US} -40°C...+60°C	
Relative humidity:	≤95% (25°C)	
Cross-sectional area	35mm ² solid / 50mm ² flexible	
Mounting on	35mm DIN rail	
Enclosure material	White/Red thermoplastic, UL94-V0	
standards	IEC 61643-11; GB 18802.1; YD/T 1235.1	
Certification	CE (LVD, EMC)	

❖ MAIN CHARACTER

- ✓ Combined SPD for three-phase TN / TT system
- ✓ Adopted hermetical GDT technology, high follow current extinguish capability
- ✓ Double thermal disconnection device , provide more reliable protection
- ✓ (SPD with WINDOW indication only) Window will display red when fault occurs,remote alarm terminal at the same time
- ✓ (SPD with both WINDOWS & LIGHTS indication),provide DOUBLE indications for users to check its working status : 4 small WINDOWS and 3 Green lights will display HIGH GREEN when it's working OK, when fault occurs, the windows will show RED color and another RED light will display HIGH RED.



INSTALLATION INSTRUCTION

According to lightning protection zones concept, for installation at LPZ 0A -1 or higher. It is usually installed in floor distribution-box or ClassI main distribution-box

Fuse must be installed at the upstream of the SPD or the lightning arrester to make sure that protected system has double protection. The value of the fuse used in a SPD system should be conformed to:

1. The value of FUSE should not be larger than the max.withstand capacity of the SPD's backup fuse value.
2. Under the status of the max. current in the power supply & close loop circuit available current, the fuse should be able to disconnect when overloaded or short-circuited.

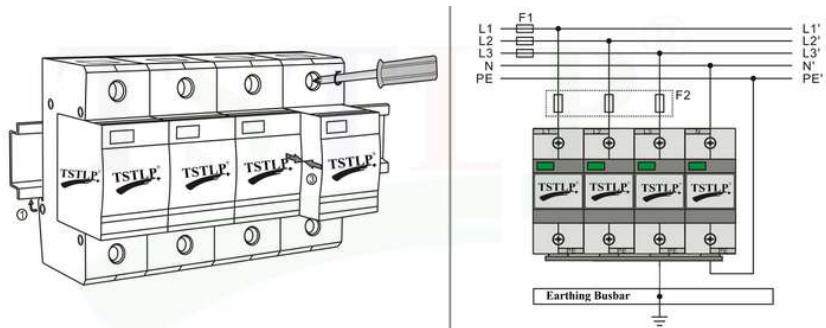
Take 1 & 2 into consideration, the fuse should be as large as possible to allow the maximum surge discharge of SPD.

INSTALLATION STEPS

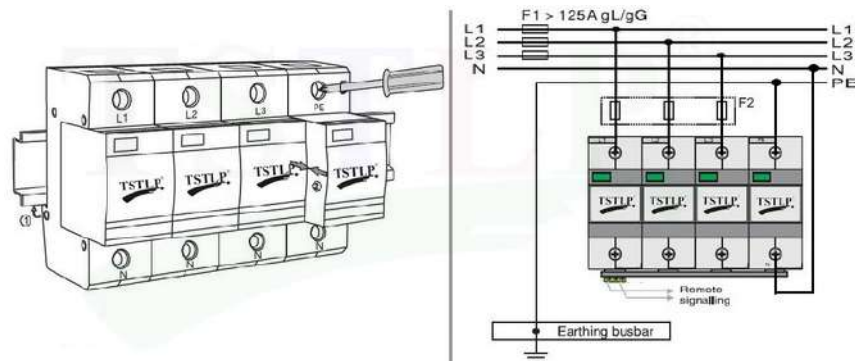
- 1) Check the product for integrity of the packAge; make sure the product window indicates green.
- 2) Mount the SPD on 35 mm DIN rail.
- 3) Connect conductors, the cross-sectional area of cable must be larger than 16mm². The withstand voltage value of cable is not smaller than AC500V; ensure wiring reliable.
- 4) If need remote alarm, it should be connected signal lines to remote signal terminal 1 and 2, or 2 and 3 (When normal, 1 and 2 open, 2 and 3 close; when fault, the state is reversed).
- 5) After above, switch on the power supply and turn on the circuit breaker, if the SPD's window does not appear red, this indicates the unit is operating normally.

Regularly inspect the operating status, especially after lightning. Once the fuse upstream break, or the SPD's fault appear, electrician should check/replace the SPD.

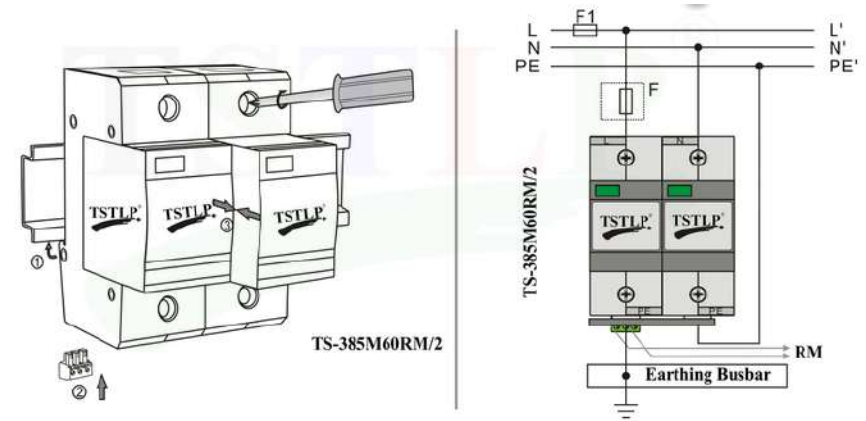
INSTALLATION DIAGRAM (4+0)



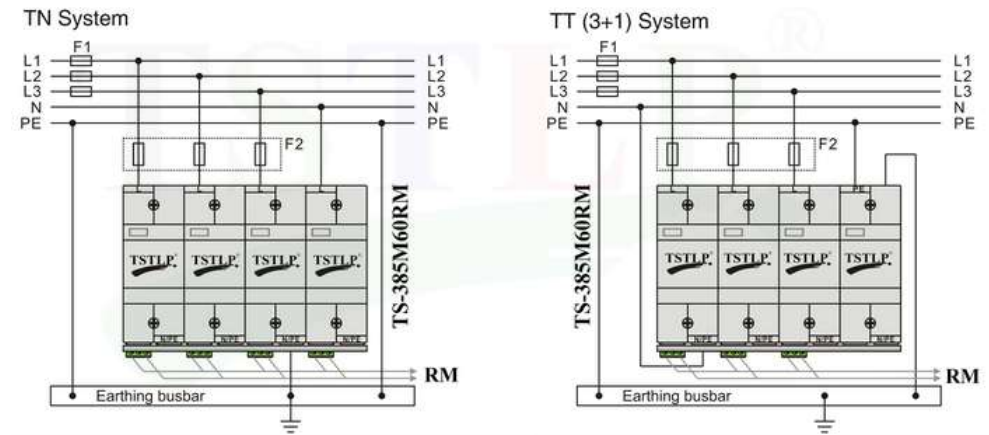
INSTALLATION DIAGRAM (3+1)



INSTALLATION DIAGRAM (2+0)



INSTALLATION DIAGRAM (L-N/PE)



WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards & safety regulations.
2. It is recommended that installation should be done under power off condition.



TSTLP®/TS-255B25RM Series Type 1 Lightning Current Arrester

- ❖ **INTRODUCTION:** TS-255B25RM series is for installation at LPZ 0_A -1 or higher, protecting low voltage equipment against lightning and surge damages. Applied in SPD Type 1/Class I(Class B) for various power supply system. Designed according to GB 18802.1 / IEC 61643-11

Product Photo	TS-385B25RM/4 Dimension(mm)	TS-385B25RM/4 BCD(4+0)

❖ TECHNICAL DATA

Model Number	TS-255B25RM/4 TS-255B25/4 TS-255B25RM/2 TS-255B25RM (4+0, 2+0, 1P)	TS-255B25/4RM TS-255B25/4 TS-255B25/2RM TS-255B25RM (3+1, 1+1, N-PE)
4+0 for TN-S system; 3+0 for TN-C system 2+0 for TN system 3+1 for TN-S/TT system 1+1 for TN/TT system		
Rated voltage (max. continuous voltage)	U _c 255VAC~	255 VAC~
Lightning impulse current (10/350)	I _{imp} 25 kA	25 kA 75 kA (N-PE)
Nominal discharge current (8/20)	I _n 100 kA	100 kA
Max. discharge current (8/20)	I _{max} 120 kA	120 kA
Voltage protection level	U _p ≤ 2.2 kV	≤ 2.2 kV ≤ 1.8kV
Follow current extinguishing capability at U _c	I _f 32A fuse will not be triggered at 2kArms	32A fuse will not be triggered at 2kArms 100Arms (N-PE)
Response time	t _A ≤ 100ns	
TOV voltage	U _T 335V / 5sec	335V / 5sec 600V/200ms
Max. back up fuse (L)	200AgL/gG	
Max. back up fuse (L-L')	125AgL/gG	
Operating temperature range (parallel wiring)	T _{UP} -40°C...+80°C	
Operating temperature range (through wiring)	T _{US} -40°C...+60°C	
Relative humidity:	≤95% (25°C)	
Cross-sectional area	35mm ² solid / 50mm ² flexible	
Mounting on	35mm DIN rail	
Enclosure material	White/Red thermoplastic, UL94-V0	
standards	IEC 61643-11; GB 18802.1; YD/T 1235.1	
Compliance	CE (LVD, EMC)	

❖ MAIN CHARACTER

- ✓ Combined SPD for three-phase TN / TT system
- ✓ Adopted hermetical GDT technology, high follow current extinguish capability
- ✓ Double thermal disconnection device , provide more reliable protection
- ✓ (SPD with WINDOW indication only) Window will display red when fault occurs,remote alarm terminal at the same time
- ✓ (SPD with both WINDOWS & LIGHTS indication),provide DOUBLE indications for users to check its working status : 4 small WINDOWS and 3 Green lights will display HIGH GREEN when it's working OK, when fault occurs, the windows will show RED color and another RED light will display HIGH RED.



INSTALLATION INSTRUCTION

According to lightning protection zones concept, for installation at LPZ 0A -1 or higher. It is usually installed in floor distribution-box or ClassI main distribution-box

Fuse must be installed at the upstream of the SPD or the lightning arrester to make sure that protected system has double protection. The value of the fuse used in a SPD system should be conformed to:

1. The value of FUSE should not be larger than the max.withstand capacity of the SPD's backup fuse value.
2. Under the status of the max. current in the power supply & close loop circuit available current, the fuse should be able to disconnect when overloaded or short-circuited.

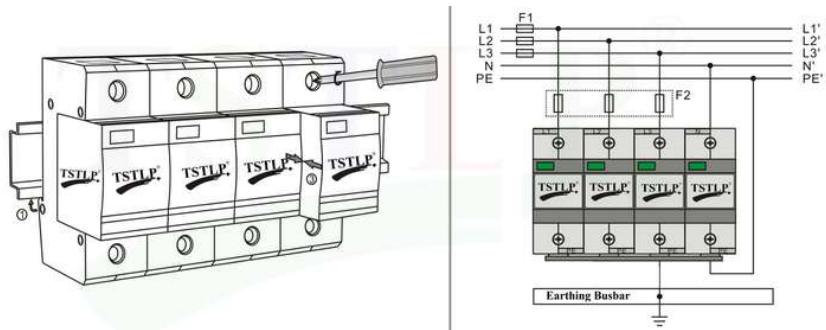
Take 1 & 2 into consideration, the fuse should be as large as possible to allow the maximum surge discharge of SPD.

INSTALLATION STEPS

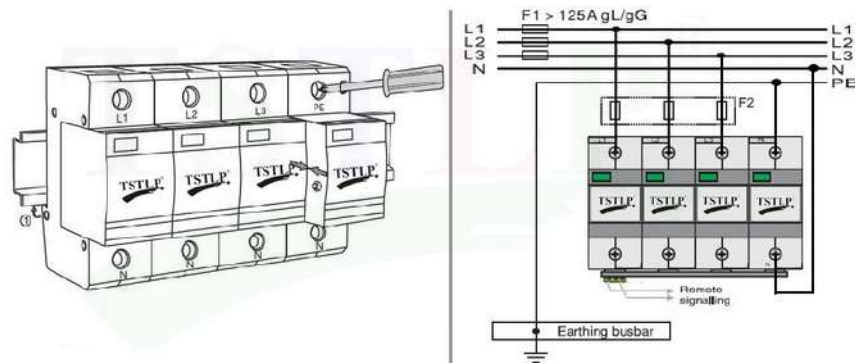
- 1) Check the product for integrity of the packAge; make sure the product window indicates green.
- 2) Mount the SPD on 35 mm DIN rail.
- 3) Connect conductors, the cross-sectional area of cable must be larger than 16mm². The withstand voltage value of cable is not smaller than AC500V; ensure wiring reliable.
- 4) If need remote alarm, it should be connected signal lines to remote signal terminal 1 and 2, or 2 and 3 (When normal, 1 and 2 open, 2 and 3 close; when fault, the state is reversed).
- 5) After above, switch on the power supply and turn on the circuit breaker, if the SPD's window does not appear red, this indicates the unit is operating normally.

Regularly inspect the operating status, especially after lightning. Once the fuse upstream break, or the SPD's fault appear, electrician should check/replace the SPD.

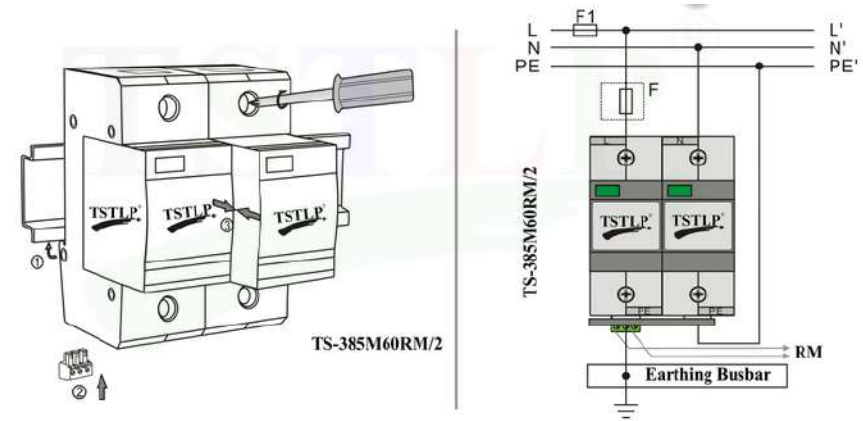
INSTALLATION DIAGRAM (4+0)



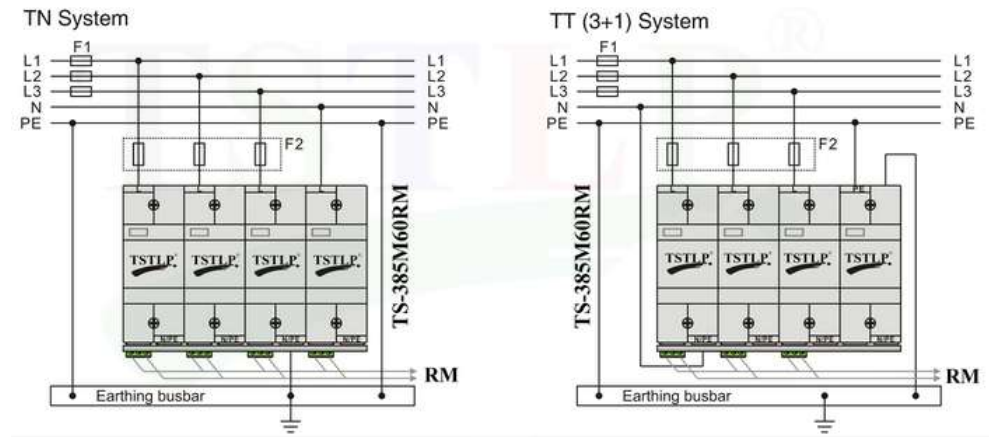
INSTALLATION DIAGRAM (3+1)



INSTALLATION DIAGRAM (2+0)



INSTALLATION DIAGRAM (L-N/PE)



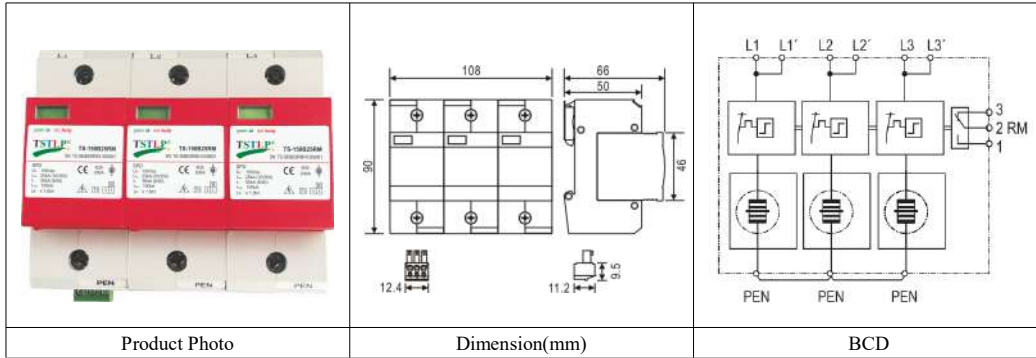
WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards & safety regulations.
2. It is recommended that installation should be done under power off condition.



TSTLP®/TS-150B25RM/3F Type 1 Lightning Current Arrester

- ❖ **INTRODUCTION:** TS-150B25RM/3F, designed according to GB 18802.1 / IEC 61643-11 is for installation at LPZ 0_A -1 or higher, protecting low voltage equipment against lightning and surge damages. Specially designed for TN-C system ("3-0" circuit), mainly for installing indoor or outdoor main power distribution-box to discharge direct lightning current.



❖ TECHNICAL DATA

Model Number		TS-150B25RM/3F
Rated voltage (max. continuous voltage)	U _c	150VAC~
Lightning impulse current (10/350)	I _{imp}	25 kA
Nominal discharge current (8/20)	I _n	50 kA
Max. discharge current (8/20)	I _{max}	100 kA
Voltage protection level	U _p	≤ 1.5 kV
Follow current extinguishing capability at U _c	I _f	32A fuse will not be triggered at 2kArms
Response time	t _A	≤ 100ns
TOV voltage	U _T	335V / 5sec
Max. back up fuse (L)		200AgL/gG
Max. back up fuse (L-L')		125AgL/gG
Operating temperature range (parallel wiring)	T _{UP}	-40°C...+80°C
Operating temperature range (through wiring)	T _{US}	-40°C...+60°C
Relative humidity:		≤ 95% (25°C)
Cross-sectional area		35mm ² solid / 50mm ² flexible
Mounting on		35mm DIN rail
Enclosure material		White/Red thermoplastic, UL94-V0
standards		IEC 61643-11; GB 18802.1; YD/T 1235.1
Compliance		CE (LVD, EMC)

❖ MAIN CHARACTER

- ✓ Three-phase protection for TN-C System
- ✓ Adopted hermetical GDT technology, high follow current extinguish capability
- ✓ Double thermal disconnection device , provide more reliable protection
- ✓ Multifunctional connection for conductors & busbars.
- ✓ Green window will change to red when fault occurs, also provide remote alarm at the same time.

INSTALLATION INSTRUCTION

According to lightning protection zones concept, for installation at LPZ 0_A -1 or higher. It is usually installed in floor distribution-box or Class I main distribution-box

Fuse must be installed at the upstream of the SPD or the lightning arrester to make sure that protected system has double protection. The value of the fuse used in a SPD system should be conformed to:

1. The value of FUSE should not be larger than the max.withstand capacity of the SPD's backup fuse value.
2. Under the status of the max. current in the power supply & close loop circuit available current, the fuse should be able to disconnect when overloaded or short-circuited.

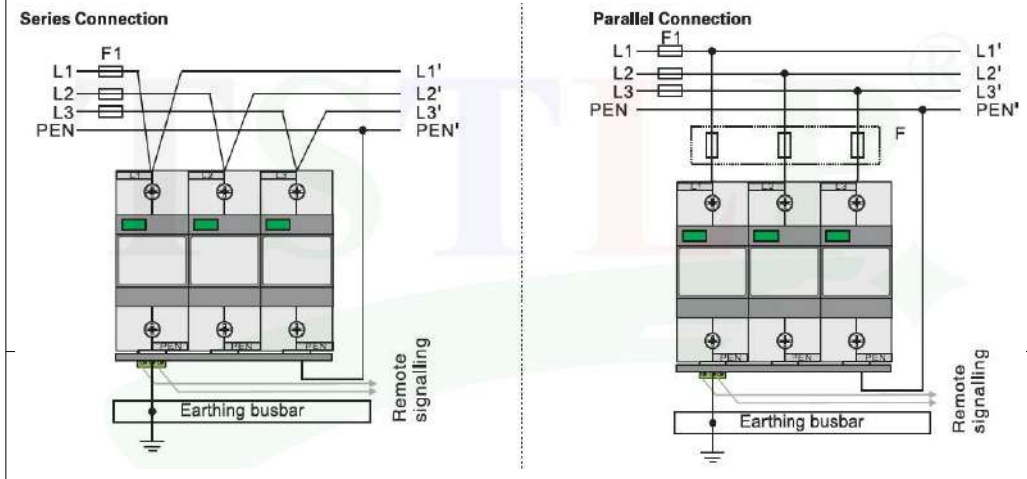
Take 1 & 2 into consideration, the fuse should be as large as possible to allow the maximum surge discharge of SPD.

INSTALLATION STEPS

- 1) Check the product for integrity of the packAge; make sure the product window indicates green.
- 2) Mount the SPD on 35 mm DIN rail.
- 3) Connect conductors, the cross-sectional area of cable must be larger than 16mm² . The withstand voltage value of cable is not smaller than AC500V; ensure wiring reliable.
- 4) If need remote alarm, it should be connected signal lines to remote signal terminal 1 and 2, or 2 and 3 (When normal, 1 and 2 open, 2 and 3 close; when fault, the state is reversed).
- 5) After above, switch on the power supply and turn on the circuit breaker, if the SPD's window does not appear red, this indicates the unit is operating normally.

Regularly inspect the operating status, especially after lightning. Once the fuse upstream break, or the SPD's fault appear, electrician should check/replace the SPD.

INSTALLATION DIAGRAM





■ TSTLP®/TS-385M60,50,40,30(RM) series Type 1 Power Surge Arrester

❖ **INTRODUCTION:** TS-385M60,50,40,30(RM) is designed to protect low voltage devices from surge damages, Mainly used in power supply system such as power distribution-room, distribution-cabinet and other important power supply system. Applied in SPD Type 1/Class I/Class B for various power supply system. Designed according to IEC 61643-11; GB 18802.1; YD/T 1235.1

Product Photo	Dimension(mm)	BCD-(4+0)	BCD-(3+1)
Product Photo	Dimension(mm)	BCD-(2+0)	BCD-(1+1)
Product Photo	Dimension(mm)	BCD-(1P)	BCD-(N-PE)

❖ TECHNICAL DATA

Model Number		TS-385M60RM/4 TS-385M60/4 TS-385M60RM/2 TS-385M60RM (4+0,2+0, 1P)	TS-385M50RM/4 TS-385M50/4 TS-385M50RM/2 TS-385M50RM (4+0,2+0, 1P)	TS-385M40RM/4 TS-385M40/4 TS-385M40RM/2 TS-385M40RM (4+0,2+0, 1P)	TS-385M30RM/4 TS-385M30/4 TS-385M30RM/2 TS-385M30RM (4+0,2+0, 1P)
4+0 for TN-S system 3+0 for TN-C system 2+0 for TN system 3+1 for TN-S/TT system 1+1 for TN/TT system					
Rated voltage (max. continuous voltage)	Uc	385V~	385V~	385V~	385V~
Nominal discharge current (8/20)	I _n	60 kA	50 kA	40 kA	30 kA
Max. discharge current (8/20)	I _{max}	120 kA	100 kA	80 kA	60 kA
Voltage protection level	U _p	≤ 2.5 kV	≤ 2.2 kV	≤ 2 kV	≤ 1.8 kV
Response time	t _A	≤ 25ns			
Max. back up fuse (L)		200AgL/gG			
Max. back up fuse (L-L')		125AgL/gG			
Operating temperature range	T _u	-40°C...+80°C			
Relative humidity:		≤ 95% (25°C)			
Cross-sectional area		35mm ² solid / 50 mm ² flexible			
Mounting on		35mm ² DIN rail			
Enclosure material		White/Red thermoplastic, UL94-V0			
Dimension		8 mods			
Standards		IEC 61643-11; GB 18802.1; YD/T 1235.1			
Type of remote signalling contact		Switching contact			
Switching capacity	U/I	AC:250V/0.5A DC:250V/0.1A,125V/0.2A,75V/0.5A			
Cross-sectional area for remote signalling contact		Max. 1.5mm ² solid / flexible			
Compliance		CE (LVD, EMC)			

❖ MAIN CHARACTER

- ✓ Combined SPD for three-phase TN / TT system
- ✓ Double terminals for parallel or series(V-shape) connection
- ✓ Pluggable module, easy for installation and maintenance
- ✓ High discharge capacity, quick response
- ✓ Low residual voltage, fine protection
- ✓ Multifunctional connection for conductor and busbars
- ✓ (SPD with WINDOW indication only) Window will display red when fault occurs, remote alarm terminal at the same time
- ✓ (SPD with both WINDOWS & LIGHTS indication), provide DOUBLE indications for users to check its working status : 4 small WINDOWS and 3 Green lights will display HIGH GREEN when it's working OK, when fault occurs, the windows will show RED color and another RED light will display HIGH RED.



INSTALLATION INSTRUCTION

According to lightning protection zones concept, for installation at LPZ 0_A -1 or higher. This surge protective device is usually installed in distribution-box or feeder bus of UPS, protecting devices or equipment downstream. Fuse must be installed at the upstream of the SPD or the lightning arrester to make sure that the protected system has double protection. The value of the fuse used in a SPD system should be conformed to:

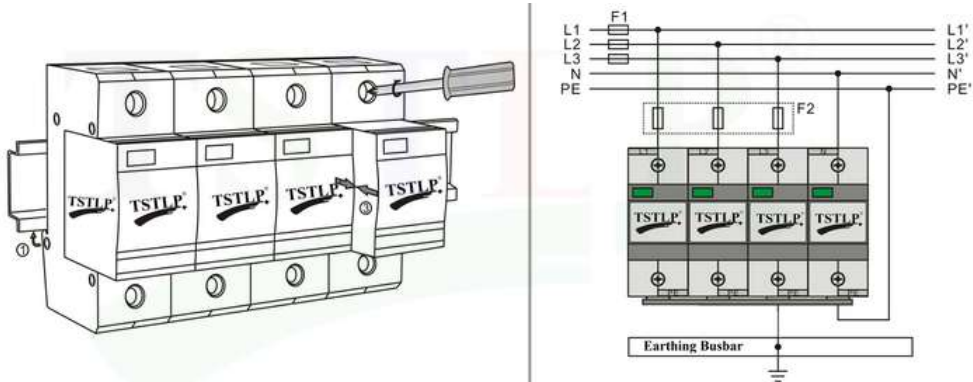
1. The value of FUSE should not be larger than the max withstand capacity of the SPD's backup fuse value.
2. Under the status of the max. current in the power supply & close loop circuit available current, the fuse should be able to disconnect when overloaded or short-circuited.
3. Take 1 & 2 into consideration, the fuse should be as large as possible to allow the maximum surge discharge of SPD.

INSTALLATION STEPS

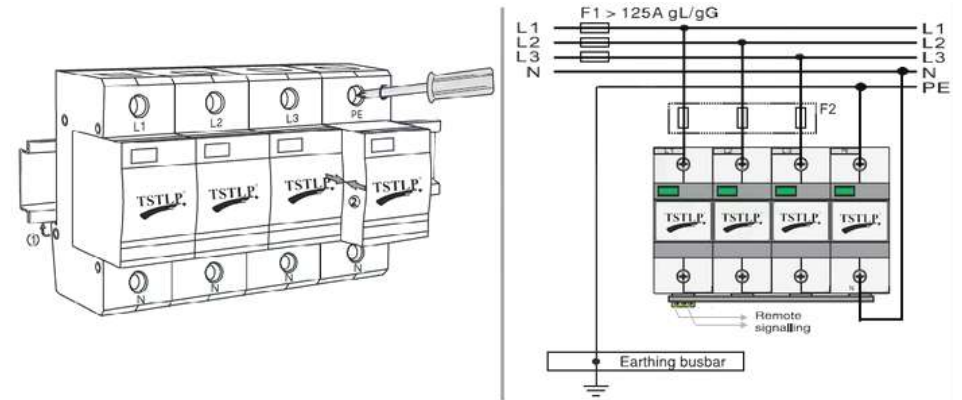
- 1) Check the product for integrity of the packAge; make sure the product window indicates green.
- 2) Mount the SPD on 35 mm DIN rail.
- 3) Connect conductors, the cross-sectional area of cable must be larger than 16mm². The withstand voltage value of cable is not smaller than AC500V; ensure wiring reliable.
- 4) If need remote alarm, it should be connected signal lines to remote signal terminal 1 and 2, or 2 and 3 (When normal,1 and 2 open, 2 and 3 close; when fault, the state is reversed).
- 5) After above, switch on the power supply and turn on the circuit breaker,if the SPD's window does not appear red,(and if the SPD with lights,3 green lights display HIGH GREEN and another red light doesn't display HIGH RED), this indicates the unit is operating normally.

Regularly inspect the operating status, especially after lightning. Once the fuse upstream break, or the SPD's window indicates red and 1 light display HIGH RED, electrician should check/replace the SPD.

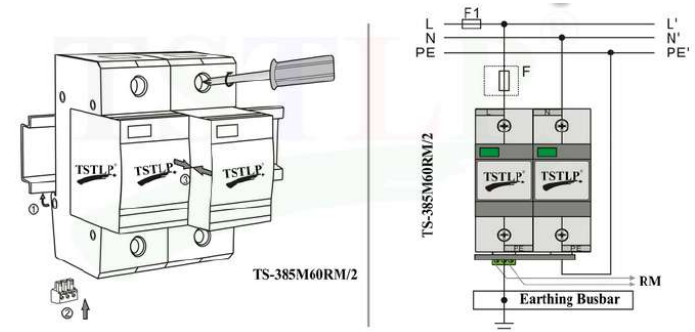
INSTALLATION DIAGRAM FOR REFERENCE (4+0)



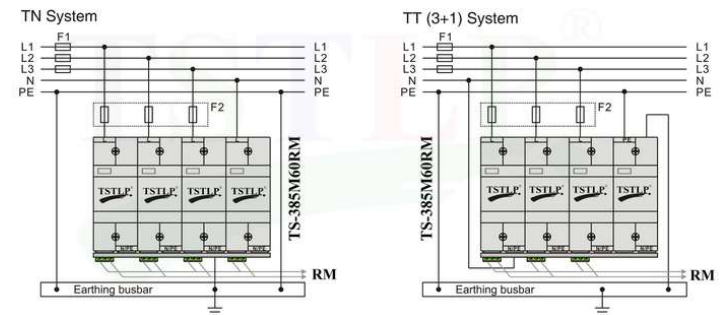
INSTALLATION DIAGRAM FOR REFERENCE (3+1)



INSTALLATION DIAGRAM (2+0)



INSTALLATION DIAGRAM (L-N/PE)




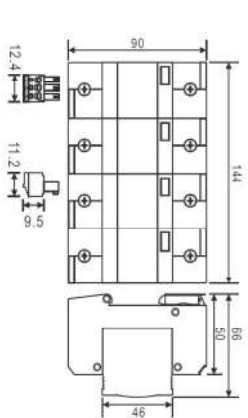
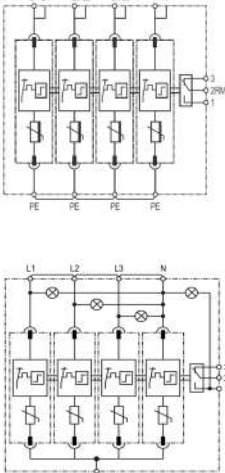
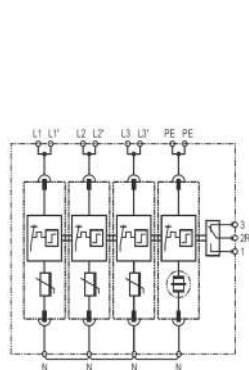

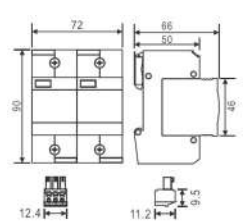
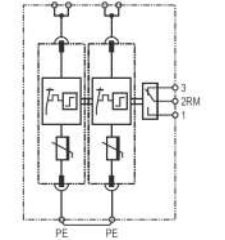
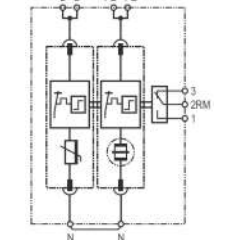

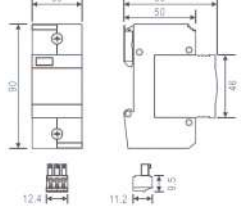
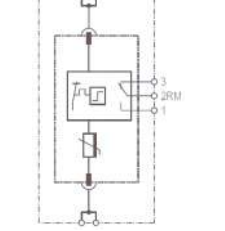
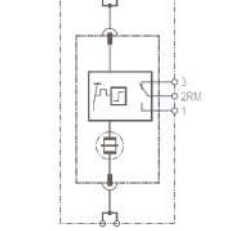
WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



■ TSTLP®/TS-275M60,50,40,30(RM) series Type 1 Power Surge Arrester

❖ **INTRODUCTION:** TS-275M60,50,40,30(RM) is designed to protect low voltage devices from surge damages, Mainly used in power supply system such as power distribution-room, distribution-cabinet and other important power supply system. Applied in SPD Type 1/Class I/Class B for various power supply system. Designed according to IEC 61643-11; GB 18802.1; YD/T 1235.1

			
Product Photo	Dimension(mm)	BCD-(4+0)	BCD-(3+1)
			
Product Photo	Dimension(mm)	BCD-(2+0)	BCD-(1+1)
			
Product Photo	Dimension(mm)	BCD-(1P)	BCD-(N-PE)

❖ TECHNICAL DATA

Model Number		TS-275M60RM/4 TS-275M60/4 TS-275M60RM/2 TS-275M60RM (4+0,2+0, 1P)	TS-275M50RM/4 TS-275M50/4 TS-275M50RM/2 TS-275M50RM (4+0,2+0, 1P)	TS-275M40RM/4 TS-275M40/4 TS-275M40RM/2 TS-275M40RM (4+0,2+0, 1P)	TS-275M30RM/4 TS-275M30/4 TS-275M30RM/2 TS-275M30RM (4+0,2+0, 1P)
4+0 for TN-S system 3+0 for TN-C system 2+0 for TN system 3+1 for TN-S/TT system 1+1 for TN/TT system					
Rated voltage (max. continuous voltage)	Uc	275V~	275V~	275V~	275V~
Nominal discharge current (8/20)	I _n	60 kA	50 kA	40 kA	30 kA
Max. discharge current (8/20)	I _{max}	120 kA	100 kA	80 kA	60 kA
Voltage protection level	U _p	≤ 2.2 kV	≤ 2.0 kV	≤ 1.8 kV	≤ 1.5 kV
Response time	t _A	≤ 25ns			
Max. back up fuse (L)		200AgL/gG			
Max. back up fuse (L-L')		125AgL/gG			
Operating temperature range	T _u	-40°C...+80°C			
Relative humidity:		≤ 95% (25°C)			
Cross-sectional area		35mm ² solid / 50 mm ² flexible			
Mounting on		35mm ² DIN rail			
Enclosure material		White/Red thermoplastic, UL94-V0			
Dimension		8 mods			
Standards		IEC 61643-11; GB 18802.1; YD/T 1235.1			
Type of remote signalling contact		Switching contact			
Switching capacity	U/I	AC:250V/0.5A DC:250V/0.1A,125V/0.2A,75V/0.5A			
Cross-sectional area for remote signalling contact		Max. 1.5mm ² solid / flexible			
Compliance		CE (LVD, EMC)			

❖ MAIN CHARACTER

- ✓ Combined SPD for three-phase TN / TT system
- ✓ Double terminals for parallel or series(V-shape) connection
- ✓ Pluggable module, easy for installation and maintenance
- ✓ High discharge capacity, quick response
- ✓ Low residual voltage, fine protection
- ✓ Multifunctional connection for conductor and busbars
- ✓ (SPD with WINDOW indication only) Window will display red when fault occurs, remote alarm terminal at the same time
- ✓ (SPD with both WINDOWS & LIGHTS indication), provide DOUBLE indications for users to check its working status : 4 small WINDOWS and 3 Green lights will display HIGH GREEN when it's working OK, when fault occurs, the windows will show RED color and another RED light will display HIGH RED.



INSTALLATION INSTRUCTION

According to lightning protection zones concept, for installation at LPZ 0_A -1 or higher. This surge protective device is usually installed in distribution-box or feeder bus of UPS, protecting devices or equipment downstream. Fuse must be installed at the upstream of the SPD or the lightning arrester to make sure that the protected system has double protection. The value of the fuse used in a SPD system should be conformed to:

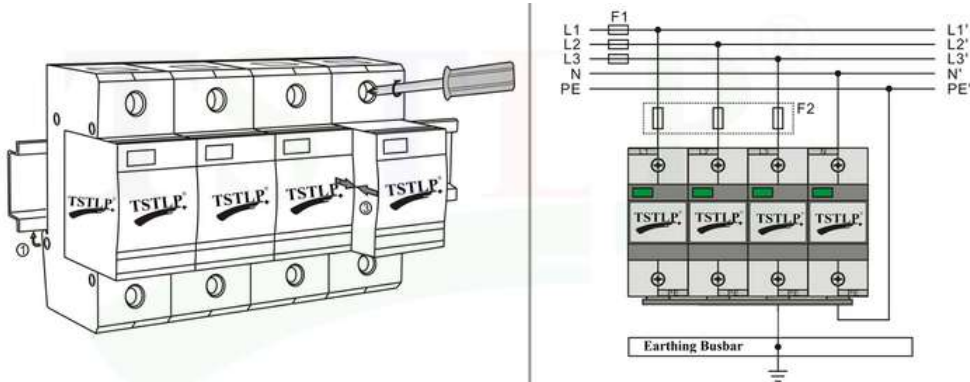
1. The value of FUSE should not be larger than the max withstand capacity of the SPD's backup fuse value.
2. Under the status of the max. current in the power supply & close loop circuit available current, the fuse should be able to disconnect when overloaded or short-circuited.
3. Take 1 & 2 into consideration, the fuse should be as large as possible to allow the maximum surge discharge of SPD.

INSTALLATION STEPS

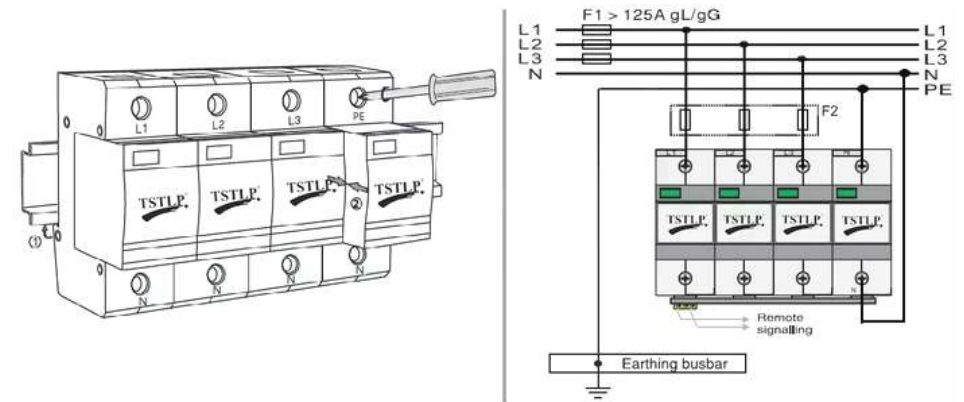
- 1) Check the product for integrity of the packAge; make sure the product window indicates green.
- 2) Mount the SPD on 35 mm DIN rail.
- 3) Connect conductors, the cross-sectional area of cable must be larger than 16mm². The withstand voltage value of cable is not smaller than AC500V; ensure wiring reliable.
- 4) If need remote alarm, it should be connected signal lines to remote signal terminal 1 and 2, or 2 and 3 (When normal,1 and 2 open, 2 and 3 close; when fault, the state is reversed).
- 5) After above, switch on the power supply and turn on the circuit breaker,if the SPD's window does not appear red,(and if the SPD with lights,3 green lights display HIGH GREEN and another red light doesn't display HIGH RED), this indicates the unit is operating normally.

Regularly inspect the operating status, especially after lightning. Once the fuse upstream break, or the SPD's window indicates red and 1 light display HIGH RED, electrician should check/replace the SPD.

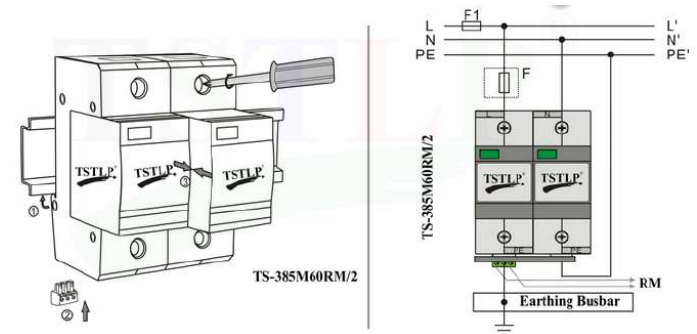
INSTALLATION DIAGRAM FOR REFERENCE (4+0)



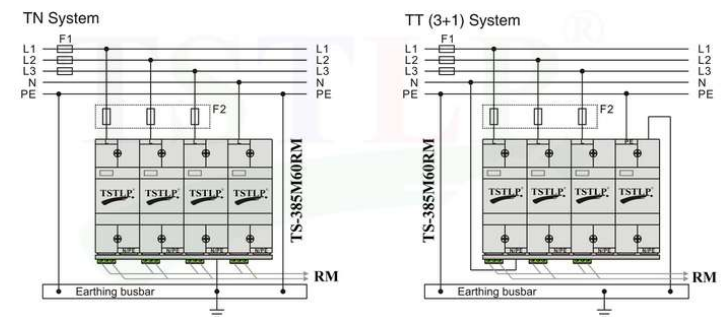
INSTALLATION DIAGRAM FOR REFERENCE (3+1)



INSTALLATION DIAGRAM (2+0)



INSTALLATION DIAGRAM (L-N/PE)



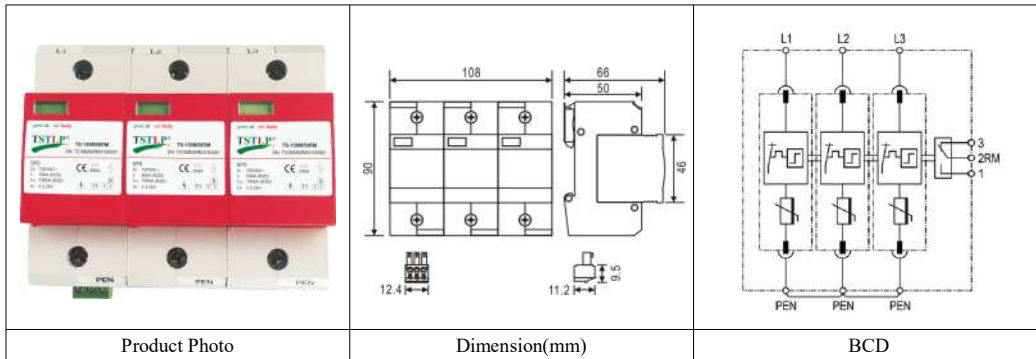
WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



TSTLP®/TS-150M50RM/3F Type 1 Surge Arrester

- ❖ **INTRODUCTION:** TS-150M50RM/3F, designed according to IEC 61643-11; GB 18802.1; YD/T 1235.1, is to protect low voltage devices from surge damages, Mainly used in power supply system such as power distribution-room, distribution-cabinet and other important power supply system. Applied in SPD Type 1/Class I/Class B for various power supply system.



❖ TECHNICAL DATA

Model Number		TS-150M50RM/3F
Rated voltage (max. continuous voltage)	U_c	150VAC~
Nominal discharge current (8/20)	I_n	50 kA
Max. discharge current (8/20)	I_{max}	100 kA
Voltage protection level	U_p	≤ 2.2 kV
Follow current extinguishing capability at U_c	I_f	32A fuse will not be triggered at 2kArms
Response time	t_A	≤ 100 ns
TOV voltage	U_T	335V / 5sec
Max. back up fuse (L)		200AgL/gG
Max. back up fuse (L-L')		125AgL/gG
Operating temperature range (parallel wiring)	T_{UP}	-40°C...+80°C
Operating temperature range (through wiring)	T_{US}	-40°C...+60°C
Relative humidity:		$\leq 95\%$ (25°C)
Cross-sectional area		35mm ² solid / 50mm ² flexible
Mounting on		35mm DIN rail
Enclosure material		White/Red thermoplastic, UL94-V0
standards		IEC 61643-11; GB 18802.1; YD/T 1235.1
Compliance		CE (LVD, EMC)

❖ MAIN CHARACTER

- ✓ Three-phase protection for TN-C System
- ✓ Double terminals for parallel or series connection
- ✓ Pluggable module, easy for installation and maintenance
- ✓ Multifunctional connection for conductors & busbars.
- ✓ Green window will change to red when fault occurs, also provide remote alarm at the same time.

INSTALLATION INSTRUCTION

According to lightning protection zones concept, for installation at LPZ 0_A -1 or higher. This surge protective device is usually installed in distribution-box or feeder bus of UPS, protecting devices or equipment downstream. Fuse must be installed at the upstream of the SPD or the lightning arrester to make sure that the protected system has double protection. The value of the fuse used in a SPD system should be conformed to:

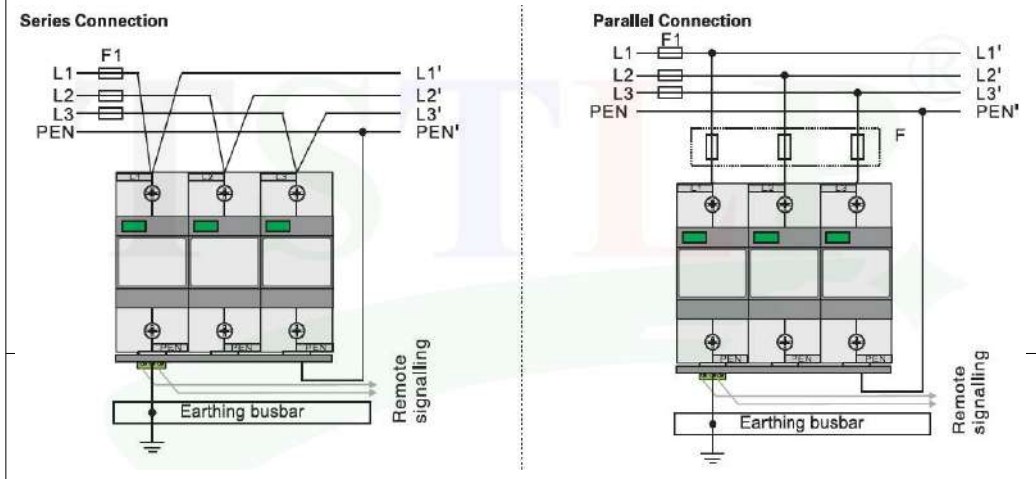
1. The value of FUSE should not be larger than the max withstand capacity of the SPD's backup fuse value.
2. Under the status of the max. current in the power supply & close loop circuit available current, the fuse should be able to disconnect when overloaded or short-circuited.
3. Take 1 & 2 into consideration, the fuse should be as large as possible to allow the maximum surge discharge of SPD.

INSTALLATION STEPS

- 1) Check the product for integrity of the package; make sure the product window indicates green.
- 2) Mount the SPD on 35 mm DIN rail.
- 3) Connect conductors, the cross-sectional area of cable must be larger than 16mm². The withstand voltage value of cable is not smaller than AC500V; ensure wiring reliable.
- 4) If need remote alarm, it should be connected signal lines to remote signal terminal 1 and 2, or 2 and 3 (When normal, 1 and 2 open, 2 and 3 close; when fault, the state is reversed).
- 5) After above, switch on the power supply and turn on the circuit breaker, if the SPD's window does not appear red, this indicates the unit is operating normally.

Regularly inspect the operating status, especially after lightning. Once the fuse upstream break, or the SPD's fault appear, electrician should check/replace the SPD.

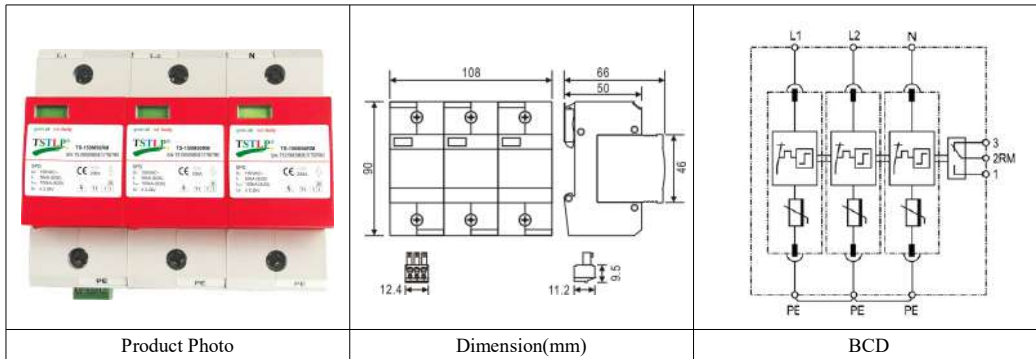
INSTALLATION DIAGRAM





TSTLP®/TS-150M50RM/3 Type 1 Surge Arrester

- ❖ **INTRODUCTION:** TS-150M50RM/3, designed according to IEC 61643-11; GB 18802.1; YD/T 1235.1, is to protect low voltage devices from surge damages, Mainly used in power supply system such as power distribution-room, distribution-cabinet and other important power supply system. Applied in SPD Type 1/Class I/Class B for various power supply system.



❖ TECHNICAL DATA

Model Number		TS-150M50RM/3
Rated voltage (max. continuous voltage)	U_c	150VAC~
Nominal discharge current (8/20)	I_n	50 kA
Max. discharge current (8/20)	I_{max}	100 kA
Voltage protection level	U_p	≤ 2.2 kV
Follow current extinguishing capability at U_c	I_f	32A fuse will not be triggered at 2kArms
Response time	t_A	≤ 100 ns
TOV voltage	U_T	335V / 5sec
Max. back up fuse (L)		200AgL/gG
Max. back up fuse (L-L')		125AgL/gG
Operating temperature range (parallel wiring)	T_{UP}	-40°C...+80°C
Operating temperature range (through wiring)	T_{US}	-40°C...+60°C
Relative humidity:		$\leq 95\%$ (25°C)
Cross-sectional area		35mm ² solid / 50mm ² flexible
Mounting on		35mm DIN rail
Enclosure material		White/Red thermoplastic, UL94-V0
standards		IEC 61643-11; GB 18802.1; YD/T 1235.1
Compliance		CE (LVD, EMC)

❖ MAIN CHARACTER

- ✓ Double terminals for parallel or series connection
- ✓ Pluggable module, easy for installation and maintenance
- ✓ Multifunctional connection for conductors & busbars.
- ✓ Green window will change to red when fault occurs, also provide remote alarm at the same time.

INSTALLATION INSTRUCTION

According to lightning protection zones concept, for installation at LPZ 0A -1 or higher. This surge protective device is usually installed in distribution-box or feeder bus of UPS, protecting devices or equipment downstream. Fuse must be installed at the upstream of the SPD or the lightning arrester to make sure that the protected system has double protection. The value of the fuse used in a SPD system should be conformed to:

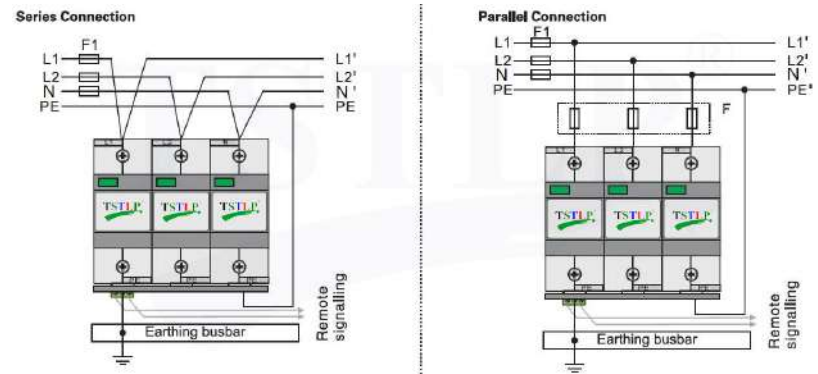
1. The value of FUSE should not be larger than the max withstand capacity of the SPD's backup fuse value.
2. Under the status of the max. current in the power supply & close loop circuit available current, the fuse should be able to disconnect when overloaded or short-circuited.
3. Take 1 & 2 into consideration, the fuse should be as large as possible to allow the maximum surge discharge of SPD.

INSTALLATION STEPS

- 1) Check the product for integrity of the package; make sure the product window indicates green.
- 2) Mount the SPD on 35 mm DIN rail.
- 3) Connect conductors, the cross-sectional area of cable must be larger than 16mm². The withstand voltage value of cable is not smaller than AC500V; ensure wiring reliable.
- 4) If need remote alarm, it should be connected signal lines to remote signal terminal 1 and 2, or 2 and 3 (When normal, 1 and 2 open, 2 and 3 close; when fault, the state is reversed).
- 5) After above, switch on the power supply and turn on the circuit breaker, if the SPD's window does not appear red, this indicates the unit is operating normally.

Regularly inspect the operating status, especially after lightning. Once the fuse upstream break, or the SPD's fault appear, electrician should check/replace the SPD.

INSTALLATION DIAGRAM



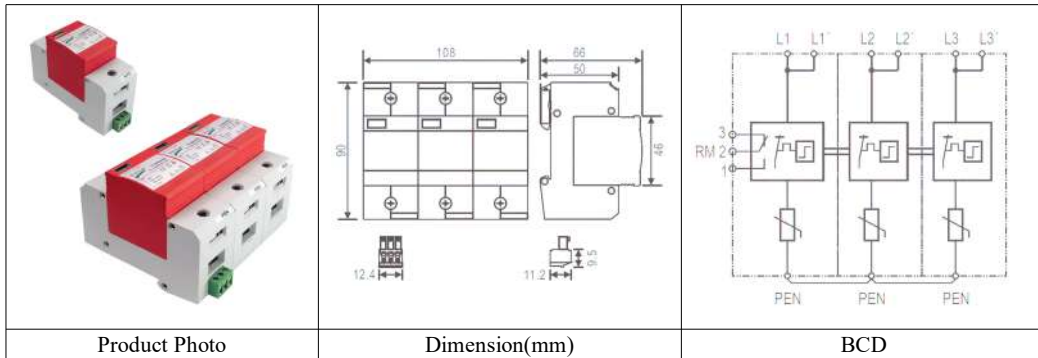
WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards & safety regulations.
2. It is recommended that installation should be done under power off condition.



■ TSTLP® TS-WTS Series Surge Arrester for Wind-Turbine System

- ❖ **INTRODUCTION:** TS-WTS Series is applied for wind turbine system. The max. Continuous operation up to 600VDC /700VDC protecting turbine and so on. Designed according to GB 18802.1-2002 / IEC61643-11



❖ TECHNICAL DATA

Model Number		TS-WTS600RM TS-WTS600RM/3	TS-WTS750RM TS-WTS750RM/3
Rated voltage (max. a.c. continuous voltage)	U _c	600V	750V
Rated voltage (max. a.c. continuous voltage)	U _c	600V	750V
Nominal discharge current (8/20)	I _n	20 kA	15 kA
Max. discharge current (8/20)	I _{max}	40 kA	30 kA
Voltage protection level at I _n	U _p	≤ 3 kV	≤ 3 kV
Voltage protection level 5kA	U _p	≤2.5 kV	≤2.5 kV
Response time	t _A	≤ 25ns	
Max. back up fuse (L-1)		200 A gL/gG	
Max. back up fuse (L-L')		125A gL/gG	
Short-circuit withstand capability for max. Back up fuse		25kA _{rms}	
Operating temperature range	T _u	-40°C...+80°C	
Relative humidity:		≤95% (25°C)	
Cross-sectional area		1.5mm ~ 25mm solid / 35mm flexible	
Mounting on		35mm ² DIN rail	
Enclosure material		White Red thermoplastic, UL94-V0	
Standards		IEC 61643-11; GB 18802.1; YD/T 1235.1	
Type of remote signalling contact		Switching contact	
Switching capacity	U _N /I _N	AC:250V/0.5A DC:250V/0.1A,125V/0.2A,75V/0.5A	
Cross-sectional area for remote signalling contact		Max. 1.5mm ² solid / flexible	
Compliance		CE (LVD, EMC)	

❖ MAIN CHARACTER

- ✓ High discharge capacity, quick response
- ✓ Low residual voltage, fine protection and with double terminals for parallel or serial (V-shape) connection.
- ✓ Multi functional connection for conductor and busbars
- ✓ Window will display red when dault occurs, also provide remote alarm terminal at the same time.

INSTALLATION INSTRUCTION

This surge arrester is usually in stalled in distribution-box,protecting wind turbine and so on. For TN system, usually use 3P or 3+1(PE/N) pieces of this product.

Fuse must be installed at the upstream of the SPD or the lightning arrester to make sure that protected system has double protection. The value of the fuse used in a SPD system should be confirmed to:

1. The value of FUSE should not be larger than the max.withstand capacity of the SPD's backup fuse value.
2. Under the status of the max. current in the power supply & close loop circuit available current, the fuse should be able to disconnect when overloaded or short-circuited.

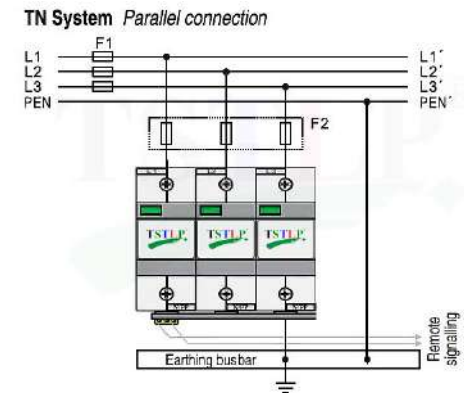
Take 1 & 2 into consideration, the fuse should be as large as possible to allow the maximum surge discharge of SPD.

INSTALLATION STEPS

- 1) Check the product for integrity of the packAge; make sure the product window indicate green.
- 2) Mount the SPD on the 35mm DIN rail.
- 3) Connect conductors, the cross-section area of cable must be larger than 16mm². The withstand voltage value of cable is not smaller than AC500V; ensure wiring reliable.
- 4) If need remote alarm, it should be connected signal lines to remote signal terminal 1 and 2, or 2 and 3 (When normal,1 and 2 open, 2 and 3 close; when fault, the state is reversed).
- 5) After above, switch on the power supply and turn on the circuit breaker, if the SPD's window does not appear red, this indicates the unit is operating normally.

Regularly inspect the operating status, especially after lightning. Once the fuse upstream break, or the SPD's window indicates red, electrician should check/replace the SPD.

INSTALLATION DIAGRAM FOR REFERENCE



WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



■ TSTLP® 10~30kA 385Vac Type 2 Power Surge Arrester

❖ **INTRODUCTION:** TSTLP® Type 2 Power Surge Arrester is for installation at LPZ 0_B -1 or higher, protecting low voltage devices from surge. Applied in pluggable SPD Type 2 / Class II / Class C for TN-S power supply system. Designed according to GB 18802.1-2002 / IEC61643-11

Product Photo	Dimension(mm)	BCD-(4+0)	BCD-(3+1)
Product Photo	Dimension(mm)	BCD-(2+0)	BCD-(1+1)
Product Photo	Dimension(mm)	BCD-(1P)	BCD-(N-PE)

❖ TECHNICAL DATA

Model Number		TS-385M30RM/4(S) TS-385M30/4(S)	TS-385M20RM/4 TS-385M20/4	TS-385M10RM/4 TS-385M10/4
4+0 for TN-S system 3+0 for TN-C system 2+0 for TN system		TS-385M30RM/2(S) TS-385M30RM(S) (4+0, 2+0, 1P)	TS-385M20RM/2 TS-385M20RM (4+0, 2+0, 1P)	TS-385M10RM/2 TS-385M10RM (4+0, 2+0, 1P)
Rated voltage (max. continuous voltage)	U _c	385V~	385V~	385V~
Nominal discharge current (8/20)	I _n	30 kA	20 kA	10 kA
Max. discharge current (8/20)	I _{max}	60 kA	40 kA	20 kA
Voltage protection level	U _p	≤ 1.8 kV	≤ 1.8 kV	≤ 1.25 kV
Voltage protection level 5kA	U _p	≤ 1.35 kV	≤ 1.35 kV	
Response time	t _A	≤ 25ns		
Max. back up fuse (L)		200A gL/gG		
Max. back up fuse (L-L')		125A gL/gG		
Operating temperature range	T _u	-40°C...+80°C		
Relative humidity:		≤95% (25°C)		
Cross-sectional area		1.5mm ² ~ 25mm ² solid / 35mm ² flexible		
Mounting on		35mm ² DIN rail		
Enclosure material		White/Red thermoplastic, UL94-V0		
Standards		IEC 61643-11; GB 18802.1; YD/T 1235.1		
Type of remote signalling contact		Switching contact		
Switching capacity	U _N /I _N	AC:250V/0.5A DC:250V/0.1A,125V/0.2A,75V/0.5A		
Cross-sectional area for remote signalling contact		Max. 1.5mm ² solid / flexible		
Compliance		CE (LVD, EMC)		

❖ MAIN CHARACTER

- ✓ Combined SPD for three-phase TN / TT system
- ✓ Pluggable module, easy for installation and maintenance
- ✓ High discharge capacity, quick response
- ✓ Low residual voltage, fine protection
- ✓ Multifunctional connection for conductor and busbars
- ✓ (SPD with WINDOW indication only) Window will display red when fault occurs, remote alarm terminal at the same time
- ✓ (SPD with both WINDOWS & LIGHTS indication), provide DOUBLE indications for users to check its working status : 4 small WINDOWS and 3 Green lights will display HIGH GREEN when it's working OK, when fault occurs, the windows will show RED color and another RED light will display HIGH RED.



Model Number 3+1 for TN-S/TT system 1+1 for TN/TT system		TS-385M30RM/4(S) TS-385M30RM/2(S) TS-385M30RM(S) (3+1, 1+1, N-PE)		TS-385M20RM/4 TS-385M20RM/2 TS-385M30RM (3+1, 1+1, N-PE)	
Rated voltage (max. continuous voltage)	Uc	385V~ (L-N)	255V~ (N-PE)	385V~ (L-N)	255V~ (N-PE)
Nominal discharge current (8/20)	In	30 kA(L-N)	40 kA(N-PE)	20 kA(L-N)	40 kA(N-PE)
Max. discharge current (8/20)	Imax	60 kA(L-N)	65 kA (N-PE)	40 kA(L-N)	65 kA (N-PE)
Voltage protection level	Up	≤ 1.8 kV	≤ 1.5 kV	≤ 1.8 kV	≤ 1.5 kV
Voltage protection level 5kA	Up	≤ 1.35 kV		≤ 1.35 kV	
Response time	tA	≤ 25ns	≤ 100ns	≤ 25ns	≤ 100ns
Max. back up fuse (L)		200A gL/gG			
Max. back up fuse (L-L')		125A gL/gG			
Operating temperature range	Tu	-40°C...+80°C			
Relative humidity:		≤95% (25°C)			
Cross-sectional area		1.5mm ² ~ 25mm ² solid / 35mm ² flexible			
Mounting on		35mm ² DIN rail			
Enclosure material		White/Red thermoplastic, UL94-V0			
Standards		IEC 61643-11; GB 18802.1; YD/T 1235.1			
Type of remote signalling contact		Switching contact			
Switching capacity	UN/IN	AC:250V/0.5A DC:250V/0.1A,125V/0.2A,75V/0.5A			
Cross-sectional area for remote signalling contact		Max. 1.5mm ² solid / flexible			
Certification		CE (LVD, EMC)			

INSTALLATION INSTRUCTION

According to lightning protection zones concept, for installation at LPZ 0_B-1 or higher. This surge protection is usually installed in distribution-box or feeder bus of UPS, protecting devices or equipment downstream. Fuse must be installed at the upstream of the SPD or the lightning arrester to make sure that protected system has double protection. The value of the fuse used in a SPD system should be confirmed to:

1. The value of FUSE should not be larger than the max.withstand capacity of the SPD's backup fuse value.
2. Under the status of the max. current in the power supply & close loop circuit available current, the fuse should be able to disconnect when overloaded or short-circuited.
3. Take 1 & 2 into consideration, the fuse should be as large as possible to allow the maximum surge discharge of SPD.

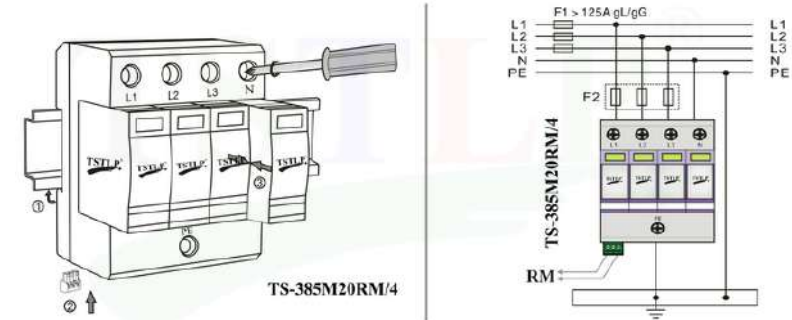
INSTALLATION STEPS

- 1) Check the product for integrity of the packAge; make sure the product window indicate green.
 - 2) Mount the SPD on the 35mm DIN rail.
 - 3) Connect conductors, the cross-section area of cable must be larger than 6mm². The withstand voltage value of cable is not smaller than AC500V; ensure wiring reliable.
 - 4) If need remote alarm, it should be connected signal lines to remote signal terminal 1 and 2, or 2 and 3 (When normal,1 and 2 open, 2 and 3 close; when fault, the state is reversed).
- 1) After above, switch on the power supply and turn on the circuit breaker,if the SPD's window does not appear red,(and if the SPD with lights,3 green lights display HIGH GREEN and another red light doesn't display HIGH RED), this indicates the unit is operating normally.

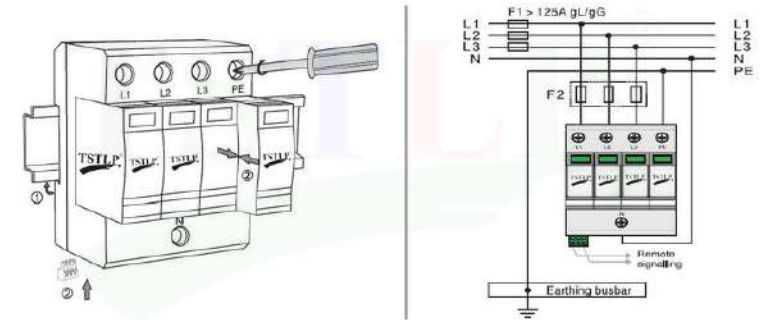
Regularly inspect the operating status, especially after lightning. Once the fuse upstream break, or the SPD's window indicates red, electrician should check/replace the SPD.

INSTALLATION DIAGRAM FOR REFERENCE

(4+0) for TN-S system



(3+1) for TT system



WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



■ TSTLP® 10~30kA 275Vac Type 2 Power Surge Arrester

❖ **INTRODUCTION:** TSTLP® Type 2 Power Surge Arrester is for installation at LPZ 0_B -1 or higher, protecting low voltage devices from surge. Applied in pluggable SPD Type 2 / Class II / Class C for TN-S power supply system. Designed according to GB 18802.1-2002 / IEC61643-11

Product Photo	Dimension(mm)	BCD-(4+0)	BCD-(3+1)
Product Photo	Dimension(mm)	BCD-(2+0)	BCD-(1+1)
Product Photo	Dimension(mm)	BCD-(1P)	BCD-(N-PE)

❖ TECHNICAL DATA

Model Number		TS-275M30RM/4(S) TS-275M30/4(S) TS-275M30RM/2(S) TS-275M30RM(S) (4+0, 2+0, 1P)	TS-275M20RM/4 TS-275M20/4 TS-275M20RM/2 TS-275M20RM (4+0, 2+0, 1P)	TS-275M10RM/4 TS-275M10/4 TS-275M10RM/2 TS-275M10RM (4+0, 2+0, 1P)
4+0 for TN-S system 3+0 for TN-C system 2+0 for TN system				
Rated voltage (max. continuous voltage)	U _c	275V~	275V~	275V~
Nominal discharge current (8/20)	I _n	30 kA	20 kA	10 kA
Max. discharge current (8/20)	I _{max}	60 kA	40 kA	20 kA
Voltage protection level	U _p	≤ 1.5 kV	≤ 1.8 kV	≤ 1.25 kV
Voltage protection level 5kA	U _p	≤ 1.2 kV	≤ 1.35 kV	≤ 1.0 kV
Response time	t _A	≤ 25ns		
Max. back up fuse (L)		200A gL/gG		
Max. back up fuse (L-L')		125A gL/gG		
Operating temperature range	T _u	-40°C...+80°C		
Relative humidity:		≤95% (25°C)		
Cross-sectional area		1.5mm ² ~ 25mm ² solid / 35mm flexible		
Mounting on		35mm ² DIN rail		
Enclosure material		White/Red thermoplastic, UL94-V0		
Standards		IEC 61643-11; GB 18802.1; YD/T 1235.1		
Type of remote signalling contact		Switching contact		
Switching capacity	U _N /I _N	AC:250V/0.5A DC:250V/0.1A,125V/0.2A,75V/0.5A		
Cross-sectional area for remote signalling contact		Max. 1.5mm ² solid / flexible		
Compliance		CE (LVD, EMC)		

❖ MAIN CHARACTER

- ✓ Combined SPD for three-phase TN / TT system
- ✓ Pluggable module, easy for installation and maintenance
- ✓ High discharge capacity, quick response
- ✓ Low residual voltage, fine protection
- ✓ Multifunctional connection for conductor and busbars
- ✓ (SPD with WINDOW indication only) Window will display red when fault occurs, remote alarm terminal at the same time
- ✓ (SPD with both WINDOWS & LIGHTS indication), provide DOUBLE indications for users to check its working status : 4 small WINDOWS and 3 Green lights will display HIGH GREEN when it's working OK, when fault occurs, the windows will show RED color and another RED light will display HIGH RED.



Model Number 3+1 for TN-S/TT system 1+1 for TN/TT system		TS-275M30RM/4(S) TS-275M30RM/2(S) TS-275M30(S) (3+1, 1+1, N-PE)		TS-275M20RM/4 TS-275M20RM/2 TS-275M20RM (3+1, 1+1, N-PE)	
Rated voltage (max. continuous voltage)	U _c	275V~ (L-N)	255V~ (N-PE)	275V~ (L-N)	255V~ (N-PE)
Nominal discharge current (8/20)	I _n	30 kA(L-N)	40 kA(N-PE)	20 kA(L-N)	40 kA(N-PE)
Max. discharge current (8/20)	I _{max}	60 kA(L-N)	65 kA (N-PE)	40 kA(L-N)	65 kA (N-PE)
Voltage protection level	U _p	≤1.5 kV	≤1.5 kV	≤1.25 kV	≤1.5 kV
Voltage protection level 5kA	U _p	≤1.0 kV		≤1.0 kV	
Response time	t _A	≤ 25ns			
Max. back up fuse (L)		200A gL/gG			
Max. back up fuse (L-L')		125A gL/gG			
Operating temperature range	T _u	-40°C...+80°C			
Relative humidity:		≤95% (25°C)			
Cross-sectional area		1.5mm ² ~ 25mm ² solid / 35mm ² flexible			
Mounting on		35mm ² DIN rail			
Enclosure material		White/Red thermoplastic, UL94-V0			
Standards		IEC 61643-11; GB 18802.1; YD/T 1235.1			
Type of remote signalling contact		Switching contact			
Switching capacity	U _N /I _N	AC:250V/0.5A DC:250V/0.1A,125V/0.2A,75V/0.5A			
Cross-sectional area for remote signalling contact		Max. 1.5mm ² solid / flexible			
Compliance		CE (LVD, EMC)			

INSTALLATION INSTRUCTION

According to lightning protection zones concept, for installation at LPZ 0_B-1 or higher. This surge protection is usually installed in distribution-box or feeder bus of UPS, protecting devices or equipment downstream. Fuse must be installed at the upstream of the SPD or the lightning arrester to make sure that protected system has double protection. The value of the fuse used in a SPD system should be confirmed to:

1. The value of FUSE should not be larger than the max.withstand capacity of the SPD's backup fuse value.
2. Under the status of the max. current in the power supply & close loop circuit available current, the fuse should be able to disconnect when overloaded or short-circuited.
3. Take 1 & 2 into consideration, the fuse should be as large as possible to allow the maximum surge discharge of SPD.

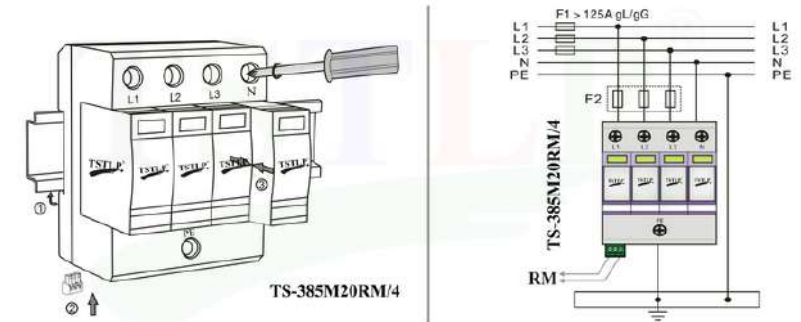
INSTALLATION STEPS

- 1) Check the product for integrity of the packAge; make sure the product window indicate green.
 - 2) Mount the SPD on the 35mm DIN rail.
 - 3) Connect conductors, the cross-section area of cable must be larger than 6mm². The withstand voltage value of cable is not smaller than AC500V; ensure wiring reliable.
 - 4) If need remote alarm, it should be connected signal lines to remote signal terminal 1 and 2, or 2 and 3 (When normal,1 and 2 open, 2 and 3 close; when fault, the state is reversed).
- 1) After above, switch on the power supply and turn on the circuit breaker,if the SPD's window does not appear red,(and if the SPD with lights,3 green lights display HIGH GREEN and another red light doesn't display HIGH RED), this indicates the unit is operating normally.

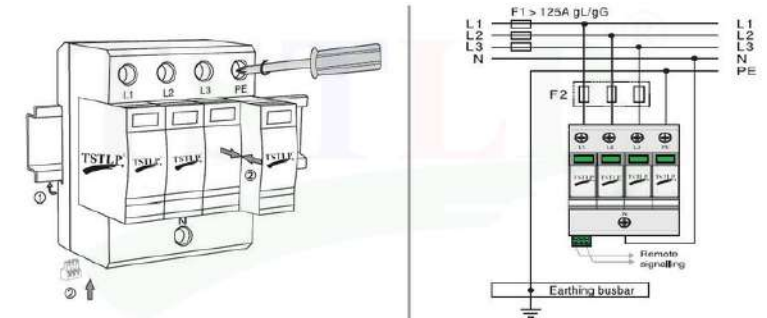
Regularly inspect the operating status, especially after lightning. Once the fuse upstream break, or the SPD's window indicates red, electrician should check/replace the SPD.

INSTALLATION DIAGRAM FOR REFERENCE

(4+0) for TN-S system



(3+1) for TT system



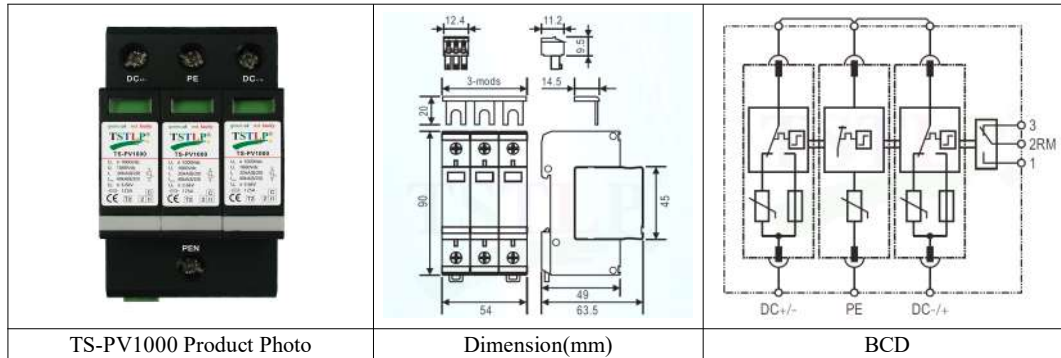
WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



TSTLP® Photovoltaic Surge Arrester

INTRODUCTION: TSTLP® TS-PV1000 Photovoltaic Surge Arrester, designed according to IEC 61643-11; GB 18802.1; YD/T 1235.1, is applied in photovoltaic system. The max. PV voltage up to $U_{CPV} = 800V$ dc, protecting photovoltaic inverter and so on



TECHNICAL DATA

Model Number		TS-PV1000
Max. PV voltage [$U_{c\ pv}$]	U_n	$\leq 1000V$
DC voltage (max. continuous voltage)	U_c	1,060V
Normal discharge current (8/20)	I_n	20 kA
Max. discharge current (8/20)	I_{max}	40 kA
Voltage protection level at I_n	U_p	≤ 3.6 kV
Voltage protection level 5kA	U_p	≤ 1.2 kV
Response time	t_k	$\leq 25ns$
Max. back up fuse (L)		200A gL/gG
Max. back up fuse (L-L')		125A gL/gG
Operating temperature range	T_u	-40°C...+80°C
Relative humidity:		$\leq 95\%$ (25°C)
Cross-sectional area		1.5mm ² ~ 25mm ² solid / 35mm ² flexible
Mounting on		35mm ² DIN rail
Enclosure material		Black thermoplastic, UL94-V0
Standards		IEC 61643-11; GB 18802.1; YD/T 1235.1
Type of remote signalling contact		Switching contact
Switching capacity	U_n/I_n	AC:250V/0.5A DC:250V/0.1A,125V/0.2A,75V/0.5A
Cross-sectional area for remote signalling contact		Max. 1.5mm ² solid / flexible
Compliance		CE (LVD, EMC)

MAIN CHARACTER

- ✓ High discharge capacity, quick response, pluggable
- ✓ Approved fault-resistant circuit, consist of three varistors and thermal disconnection device
- ✓ Multi functional connection for conductor and busbars
- ✓ Window will display red when fault occurs, also provide remote alarm terminal at the same time

INSTALLATION INSTRUCTION

This surge arrester is usually installed in distribution-box, protecting PV system devices in photovoltaic generator circuit. Fuse must be installed at the upstream of the surge arrester or the lightning arrester to make sure that the protected system has double protection. The value of the fuse used in a surge arrester system should be conformed to:

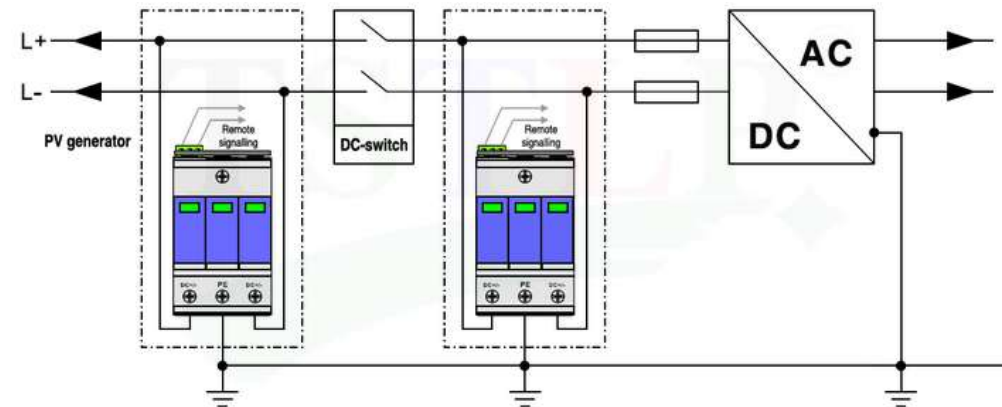
1. The value of FUSE should not be larger than the max. withstand capacity of the surge arrester's backup fuse value.
2. Under the status of the max. current in the power supply & close loop circuit available current, the fuse should be able to disconnect when overloaded or short-circuited.
3. Take 1 & 2 into consideration, the fuse should be as large as possible to allow the maximum surge discharge of surge arrester.

INSTALLATION STEPS

1. Check the product for integrity of the package; make sure the product window indicate green.
2. Mount the surge arrester on 35 mm DIN rail.
3. Connect conductors, the cross-sectional area of cable must be larger than 6mm². The withstand voltage value of cable is not smaller than AC800V; ensure wiring reliable.
4. If need remote alarm, it should be connected signal lines to remote signal terminal 1 and 2, or 2 and 3 (When normal 1 and 2 open, 2 and 3 close; when fault, the state is reversed).
5. After above, switch on the power supply and turn on the circuit breaker, if the surge arrester appeared green window, indicates the unit is operating normally.

Regularly inspect the operating status, especially after lightning. Once the fuse upstream break, or the surge arrester's window not indicate green, electrician should check/replace the surge arrester.

INSTALLATION DIAGRAM FOR REFERENCE



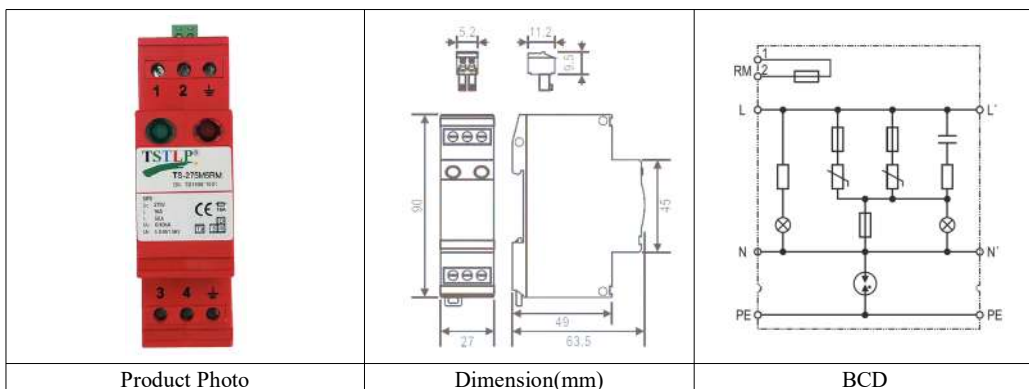
WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



■ TSTLP® TS-275M5RM Type 3 Power Surge Arrester

- ❖ **INTRODUCTION:** TS-275M5RM Type 3 Surge Protective devices are designed as fine protection for electronic devices. For installation at LPZ 1-2 or higher, applied in SPD Class III (Class D/Type III) for power supply system(provide fine protection for single-phase power of low power supply system;e.g. icebox, air conditioner, photocopy, communication equipment, network equipment and so on.). Designed according to IEC 61643-11; GB 18802.1;YD/T 1235.1



❖ TECHNICAL DATA

Model Number		TS-275M5RM
Rated voltage (max. continuous voltage)	U_c	275V~
Normal Current	I_L	16A
Nominal discharge current (8/20)	I_n	5 kA(L-N); 5 kA(L+N-PE); I_n : 10 kA(total)
Max. discharge current (8/20)	I_{max}	10 kA(L-N); 10 kA (L+N-PE); I_{max} : 20 kA(total)
Voltage protection level	U_p	≤ 0.95 kV(L-N); ≤ 1.5 kV(L+N-PE)
Response time	t_A	≤ 25 ns; ≤ 100 ns(L+N-PE)
Max. back up fuse		16A gL/gG
Operating temperature range	T_u	-40°C...+80°C
Relative humidity:		$\leq 95\%$ (25°C)
Cross-sectional area		0.5mm ² ~ 6mm ² solid / 4mm ² flexible
Mounting on		35mm ² DIN rail
Enclosure material		Red thermoplastic, UL94-V0
Standards		IEC 61643-11; GB 18802.1; YD/T 1235.1
Type of remote signalling contact		Break contact
Switching capacity	U_N/I_N	AC:250V/0.5A DC:250V/0.1A,125V/0.2A,75V/0.5A
Cross-sectional area for remote signalling contact		Max. 1.5mm ² solid / flexible
Compliance		CE (LVD, EMC)

❖ MAIN CHARACTER

- ✓ (1+1 circuit mode) for TN-S/ TT system
- ✓ Green light indicates normal and red indicates fault
- ✓ Single-phase protection and with disconnecter
- ✓ Remote signalling connector for fault indication

INSTALLATION INSTRUCTION

According to lightning protection zones concept, for installation at LPZ 1-2 or higher. This surge protective device is usually installed in distribution-box, protecting electronic devices.

Fuse must be installed at the upstream of the SPD or the lightning arrester to make sure that the protected system has double protection. The value of the fuse used in a SPD system should be conformed to:

1. The value of FUSE should not be larger than the max. withstand capacity of the SPD's backup fuse value.
2. Under the status of the max. current in the power supply & close loop circuit available current, the fuse should be able to disconnect when overloaded or short-circuited.

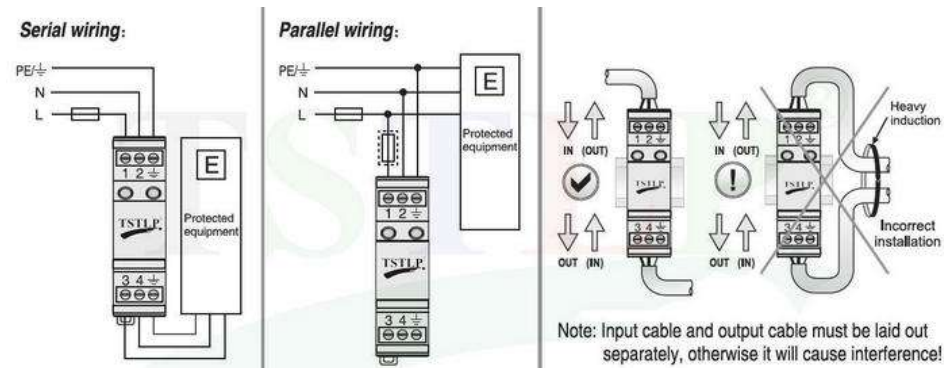
Take 1 & 2 into consideration, the fuse should be as large as possible to allow the maximum surge discharge of SPD.

INSTALLATION STEPS

1. Mount the SPD on 35 mm DIN rail.
2. Connect conductors, the cross-sectional area of cable must be larger than 4mm². The withstand voltage value of cable is not smaller than AC500V; ensure wiring reliable.
3. If need remote alarm, it should be connected signal lines to remote signal terminal 1 and 2 connected.
4. After above, switch on the power supply and turn on the circuit breaker, if the SPD's indicator light displays green,this indicates the unit is operating normally.

Regularly inspect the operating status, especially after lightning. Once the fuse upstream breaks, or the SPD's indicator light displays red, electrician should check/replace the SPD.

INSTALLATION DIAGRAM FOR REFERENCE



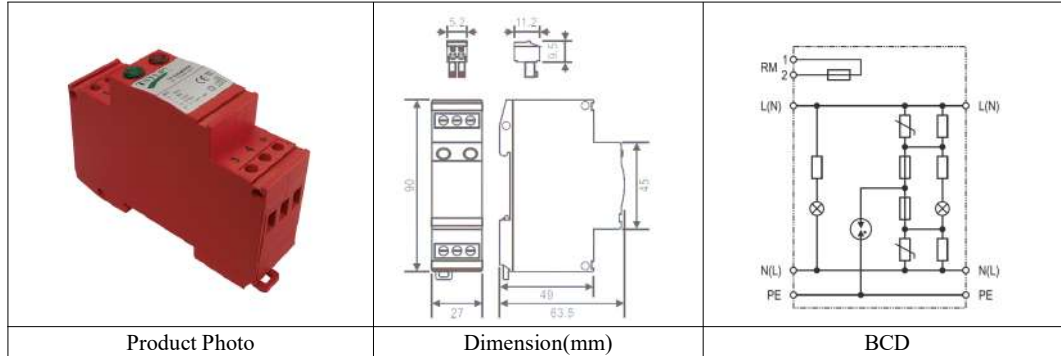
WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



■ TSTLP® 24-230V Type 3 Power Surge Arrester

- ❖ **INTRODUCTION:** TSTLP® Type 3 Surge Protective devices are designed as fine protection for electronic devices. For installation at LPZ 1-2 or higher, applied in SPD Class III (Class D/Type III) for power supply system(provide fine protection for single-phase power of low power supply system;e.g. icebox, air conditioner, photocopy, communication equipment, network equipment and so on.). Designed according to IEC 61643-11; GB 18802.1;YD/T 1235.1



TECHNICAL DATA

Model Number		TS-230M5RM	TS-120M5RM	TS-60M5RM	TS-48M2RM	TS-24M2RM
Normal a.c. Voltage	Un	230V	120V	60V	48V	24V
Rated voltage (max.a.c. continuous voltage)	Uc	320V	150V	75V	60V	30V
Rated voltage (max.d.c. continuous voltage)	Uc	320V	150V	75V	60V	30V
Normal Current	IL	16A	16A	16A	16A	16A
Nominal discharge current (8/20, L-N)	In	3 kA	2.5 kA	2.5 kA	1 kA	1 kA
Nominal discharge current (8/20, L+N-PE)	In	5 kA	5 kA	5 kA	2 kA	2 kA
Combination wave (L-N)	Uoc	6 kV	6 kV	6 kV	2 kV	2 kV
Combination wave (L+N-PE)	Uoc	10 kV	10 kV	10 kV	4 kV	4 kV
Voltage protection level(L-N)	Up	≤1.15 kV	≤0.7 kV	≤0.5 kV	≤0.35 kV	≤0.2 kV
Voltage protection level(L+N-PE)	Up	≤1.5 kV	≤1.1 kV	≤0.85 kV	≤0.85 kV	≤0.85 kV
Response time	tA	≤25ns (L-N); ≤100ns(L+N-PE)				
Max. back up fuse		16A gL/gG				
Operating temperature range	Tu	-40°C...+80°C				
Short-circuit withstand capability at max.backup fuse		6kArms				
Relative humidity:		≤95% (25°C)				
Cross-sectional area		0.5mm ² ~ 6mm ² solid / 4mm ² flexible				
Mounting on		35mm ² DIN rail				
Enclosure material		Red thermoplastic, UL94-V0				
Standards		IEC 61643-11; GB 18802.1; YD/T 1235.1				
Type of remote signalling contact		Break contact				
Switching capacity	U _W /I _N	AC:250V/0.5A DC:250V/0.1A,125V/0.2A,75V/0.5A				
Cross-sectional area for remote signalling contact		Max. 1.5mm ² solid / flexible				
Compliance		CE (LVD, EMC)				

❖ MAIN CHARACTER

- ✓ Green light indicates normal and red indicates fault
- ✓ Single-phase protection and with disconnecter
- ✓ Remote signalling connector for fault indication

INSTALLATION INSTRUCTION

According to lightning protection zones concept, for installation at LPZ 1-2 or higher. This surge protective device is usually installed in distribution-box, protecting electronic devices.

Fuse must be installed at the upstream of the SPD or the lightning arrester to make sure that the protected system has double protection. The value of the fuse used in a SPD system should be conformed to:

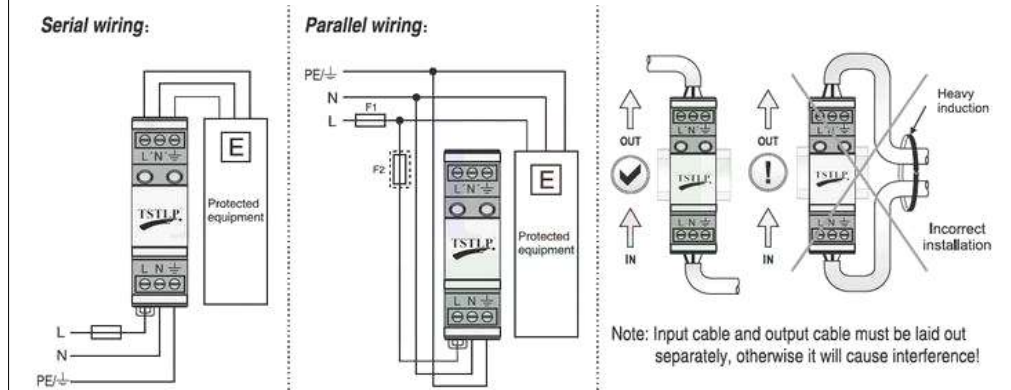
1. The value of FUSE should not be larger than the max. withstand capacity of the SPD's backup fuse value.
2. Under the status of the max. current in the power supply & close loop circuit available current, the fuse should be able to disconnect when overloaded or short-circuited.
3. Take 1 & 2 into consideration, the fuse should be as large as possible to allow the maximum surge discharge of SPD.

INSTALLATION STEPS

1. Mount the SPD on 35 mm DIN rail.
2. Connect conductors, the cross-sectional area of cable must be larger than 4mm². The withstand voltage value of cable is not smaller than AC500V; ensure wiring reliable.
3. If need remote alarm, it should be connected signal lines to remote signal terminal 1 and 2 connected.
4. After above, switch on the power supply and turn on the circuit breaker, if the SPD's indicator light displays green,this indicates the unit is operating normally.

Regularly inspect the operating status, especially after lightning. Once the fuse upstream breaks, or the SPD's indicator light displays red, electrician should check/replace the SPD.

INSTALLATION DIAGRAM FOR REFERENCE



WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



❖ TSTLP® Type 3 Power line Surge Arrester (small size & pluggable)

<p align="center">Product Photo</p>	<p align="center">Size(mm)</p>
<p align="center">TS-230M5 BCD</p>	<p align="center">TS-24M2 BCD</p>

MODEL	TS-230M5	TS-24M2
LPZ	Zone 2-3	≥ 1-2
Type	3	3
Nominal operating voltage	230V AC	24V AC
Maximal operating Voltage	255V AC	30V AC/DC
Max Discharge Current I_{max}	10 kA	4 kA
Protection Level	<1.0 kV	<0.7 kV
Operating time	<25 ns	<25 ns
Follow Current Extng.Cap.on UC	not applicable	not applicable
Maximum Line Fuse	16 A	16 A
Operating temperature	- 40 - + 80 °C	- 40 - + 80 °C
I/O Connection	1,5	1,5
Degree of protection	IP 20	IP 20
Remote-Contact	NC	NC
Switching power	250 V 0.5 A	250 V 0.5 A
I/O Connection Remote contact	1.5 qmm	1.5 qmm
Housing-material	Polyamide	Polyamide
Color	Green/Yellow	Green/Yellow
Weight	80g	80g

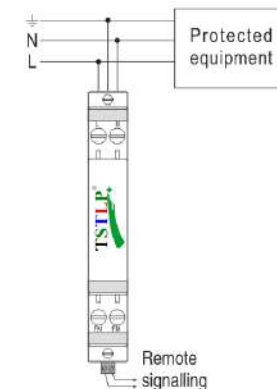
TS-230M5 CHARACTER

- ✓ The pluggable Module allows a fast replacement in case of fail.
- ✓ The grounding is realized through an earthing-clip on the DIN-Rail and/or earthing-clamp
- ✓ These devices protect low-voltage consumer installations from voltage surges of all kinds .They are available in **double-pole** or **four-pole** versions,with or without filters
- ✓ All Versions have an NC-contact for fault-signalisation

TS-24M2 CHARACTER

- ✓ The pluggable Module allows a fast replacement in case of fail.
- ✓ The grounding is realised trough an earthing-clip on the DIN-Rail and/or earthing-clamp
- ✓ Type TS-24M2 series is an protecting device for 24 Volts power supplies.Due to the parallel connecting method is no limiting in operating current.

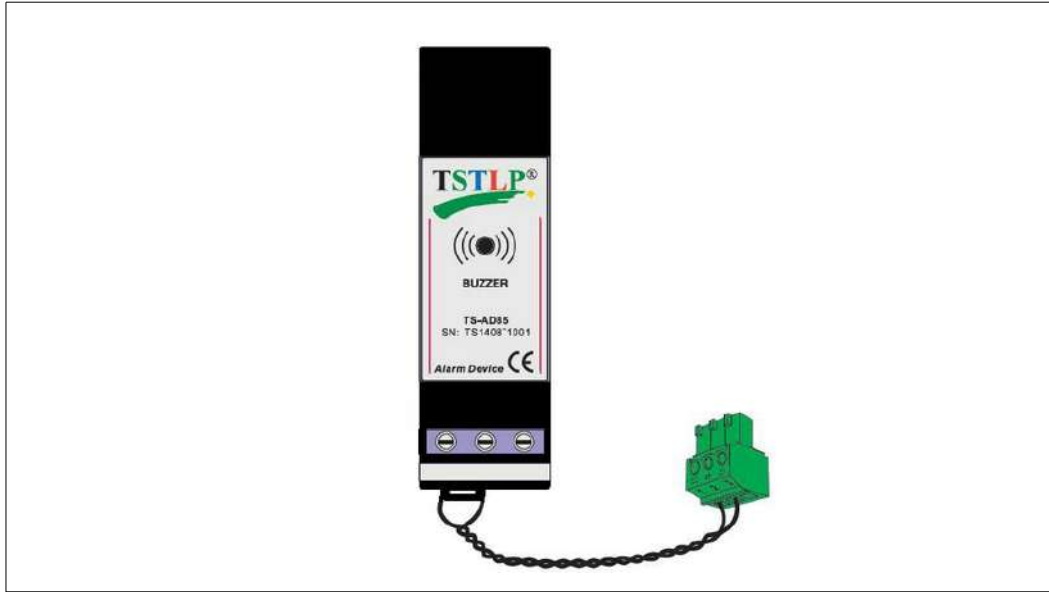
Installation Diagram(for reference)



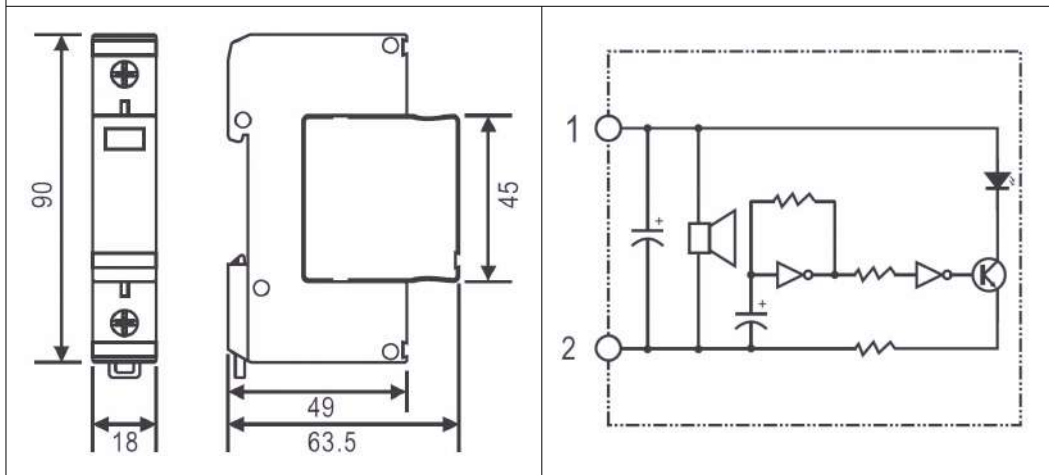


❖ TSTLP® Surge Alarm Device

Introduction: TS-AD85 Surge Alarm Device is designed to be connected with SPD's remote signal terminal, this device will sound the alarm and the red LED will be flashing when SPD is faulty.



Product Photo



Size(mm)

BCD

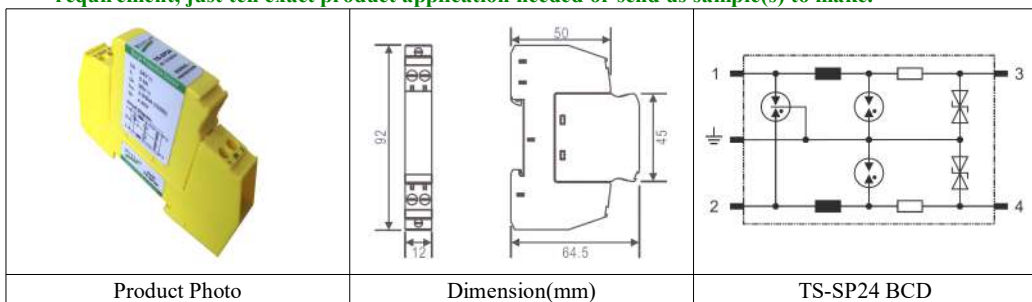
❖ Technical Data

Type	TS-AD85
Power supply (Un)	3V battery, exchangeable
Sound alarm	≤85dB
Visual	Red LED
Operating temperature range (Tu)	-40°C...+80°C
Mounting on	35mm ² DIN rail
Enclosure material	Black thermoplastic, UL94-V0
Dimension	1.5 mods
Compliance	CE



■ TSTLP®/TS-SP series Surge Arrester for Information Technology System

- ❖ **INTRODUCTION:** TS-SP series are installed at LPZ 0_A -2 or higher, or directly at the upstream near the protected devices. Provide protection for 2 single wires of unbalanced interfaces for measuring and controlling system. Designed according to IEC 61643-21; GB 18802.21; YD/T 1542.
- ❖ Mainly used in lightning protection for measuring and controlling system. such as the field bus, input/output interface of the 0-20mA, 4-20mA control line. (TS-SP110 could also be used for telephone line, ADSL/ISDN line)
- ❖ **We're able to make different CIRCUIT 、 Voltage & Technical Data according to customers' requirement, just tell exact product application needed or send us sample(s) to make.**



❖ TECHNICAL DATA

Model		TS-SP5	TS-SP12	TS-SP24	TS-SP48	TS-SP60	TS-SP110
Nominal voltage	U_n	5V	12V	24V	48V	60V	110V
Rated voltage (max. continuous voltage)	U_c	6V-/4.2V~	14V-/10V~	26V-/19V~	55V-/39V~	65V-/50V~	170V-/130V~
Nominal current	I_L	0.5A	0.5A	0.5A	0.5A	0.5A	1A
Lightning discharge current (10/350)	I_{imp}	2.5kA (per line) 5kA (total)					
Nominal discharge current (8/20)	I_n	10kA (per line) 20kA (total)					
Voltage protection level at I_{imp}	U_p	$\leq 30V$ (line-line) $\leq 17V$ (line-PG)	$\leq 60V$ (line-line) $\leq 30V$ (line-PG)	$\leq 90V$ (line-line) $\leq 45V$ (line-PG)	$\leq 150V$ (line-line) $\leq 75V$ (line-PG)	$\leq 200V$ (line-line) $\leq 100V$ (line-PG)	$\leq 600V$ (line-line) $\leq 300V$ (line-PG)
Response time	t_a	$\leq 1ns$ (line-line) $\leq 1ns$ (line-PG)	$\leq 1ns$ (line-line) $\leq 1ns$ (line-PG)	$\leq 1ns$ (line-line) $\leq 1ns$ (line-PG)	$\leq 1ns$ (line-line) $\leq 1ns$ (line-PG)	$\leq 1ns$ (line-line) $\leq 1ns$ (line-PG)	25ns (line-line) 25ns (line-PG)
Bandwidth	f_G	1.6MHz (AD-PG)	2.9MHz (AD-PG)	5.1MHz (AD-PG)	8.5MHz (AD-PG)	10.8MHz (AD-PG)	24.0MHz (AD-PG)
Series impedance per line	R	1.4 Ω	1.9 Ω	2.2 Ω	2.2 Ω	2.2 Ω	0.4 Ω
Capacitance	C	3nF (line-line) 5nF (line-PG)	1nF (line-line) 2nF (line-PG)	0.7nF (line-line) 1.3nF (line-PG)	0.3nF (line-line) 0.6nF (line-PG)	0.3nF (line-line) 0.6nF (line-PG)	0.2nF (line-line) 1.4nF (line-PG)
Operating temperature range		-40°C...+80°C					
Relative humidity		$\leq 95\%$ (25°C)					
Cross-sectional area		Max. 2.5mm ² flexible					
Mounting on		35mm DIN rail					
Enclosure material		Yellow thermoplastic, UL94-V0					
Standards		IEC 61643-21; GB 18802.21; YD/T 1542					
Compliance		CE (LVD, EMC)					

❖ MAIN CHARACTER

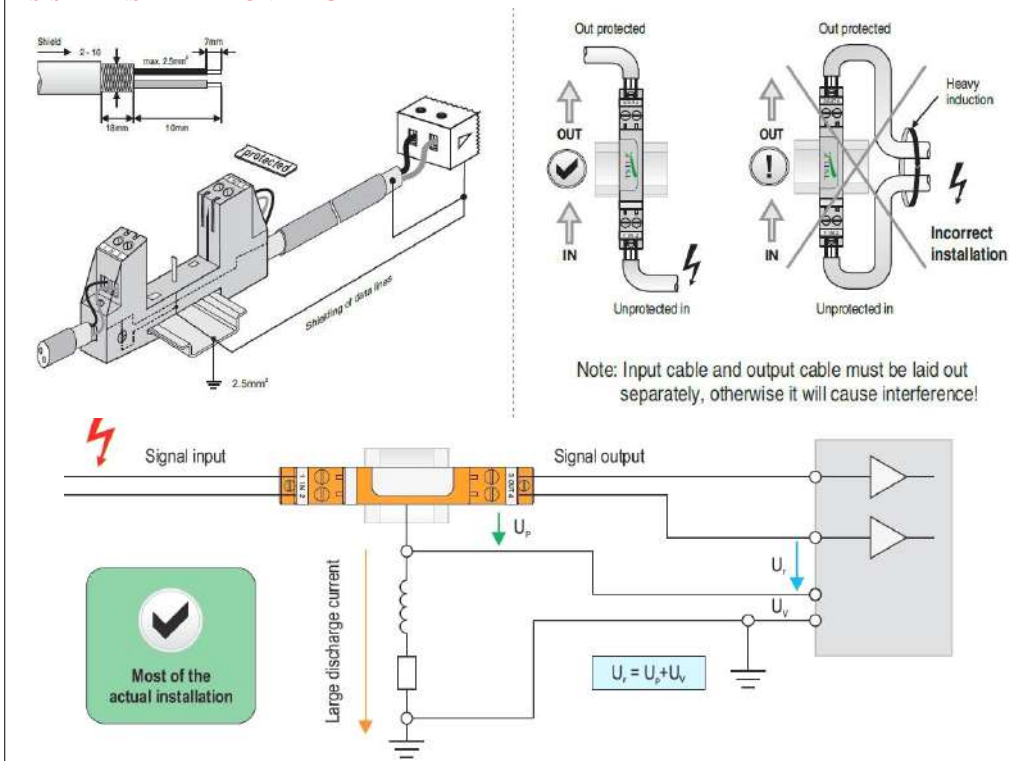
- ✓ Composed by two parts: the base and the protection module
- ✓ The signal will not be disconnected when replacing the module
- ✓ High discharge capacity, low voltage protection level

INSTALLATION INSTRUCTION

1. This product is connected in series to the protected device.
2. Mount the SPD on the 35 mm DIN rail.
3. The out terminal should be connected to the protected devices.
4. There is a earthing terminal in each side, and it is recommended to use the one at output side; earth lead must be connected to the earthing system, ideally using 2.5mm² cable. The cable should be as short as possible.
5. After above, you should ensure the circuit is functioning.

Regularly inspect the operating status, especially after lightning. Once the communication is off, electrician should check/replacethe SPD.

TS-SP24 INSTALLATION DIAGRAM



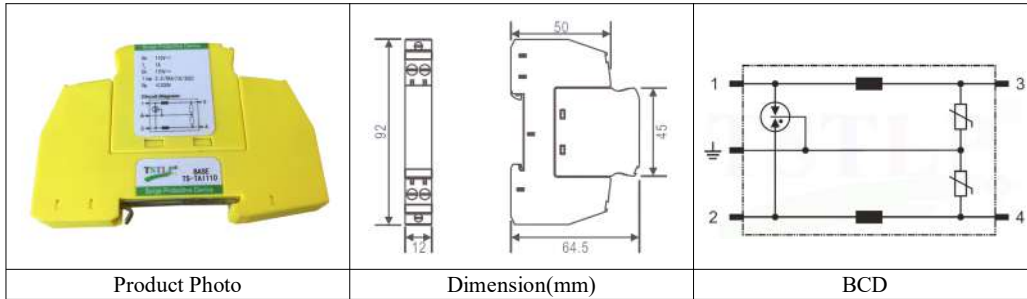
WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



■ TSTLP®/TS-TAI110 Surge Arrester for Communication Protection

- ❖ **INTRODUCTION:** TS-TAI110 Telephone Line Surge Arrester is designed according to IEC 61643-21; GB 18802.21; YD/T 1542. and at LPZ 0_A -2 or higher, especially used for telephone line, ADSL line and ISDN line.



❖ TECHNICAL DATA

Model	TS-SP110	
Nominal voltage	U_n	110 V
Rated voltage (max. continuous voltage)	U_c	170 V~/130 V~
Nominal current	I_L	1 A
Lightning discharge current (10/350)	i_{imp}	2.5 kA (per line) 5 kA (total)
Nominal discharge current (8/20)	I_n	10 kA (per line) 20 kA (total)
Voltage protection level at i_{imp}	U_p	≤ 600 V (line-line) ≤ 300 V (line-PG)
Response time	t_A	25ns (line-line) 25ns (line-PG)
Bandwidth	f_G	24.0MHz (AD-PG)
Series impedance per line	R	0.4 Ω
Capacitance	C	0.2nF (line-line) 1.4nF (line-PG)
Operating temperature range		-40°C...+80°C
Relative humidity		$\leq 95\%$ (25°C)
Cross-sectional area		Max. 2.5mm ² flexible
Mounting on		35mm DIN rail
Enclosure material		Yellow thermoplastic, UL94-V0
Standards		IEC 61643-21; GB 18802.21; YD/T 1542
Compliance		CE (LVD, EMC)

❖ MAIN CHARACTER

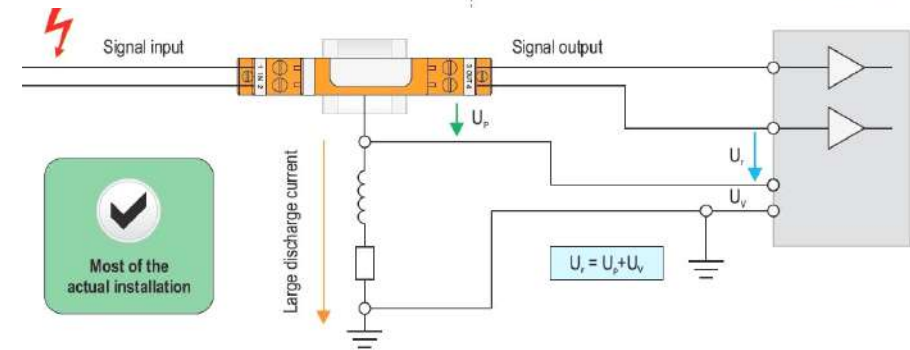
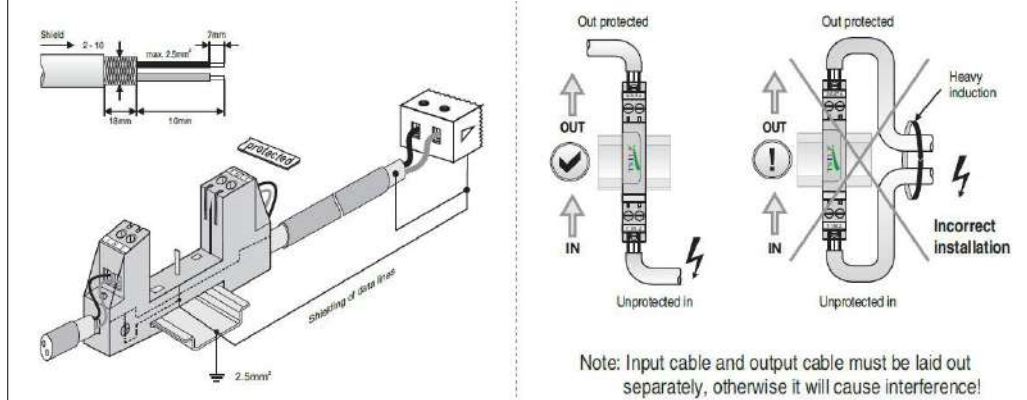
- ✓ Composed by two parts: the base and the protection module
- ✓ The signal will not be disconnected when replacing the module
- ✓ High discharge capacity, low voltage protection level

INSTALLATION INSTRUCTION

1. This product is connected in series to the protected device.
2. Mount the SPD on the 35 mm DIN rail.
3. The out terminal should be connected to the protected devices.
4. There is a earthing terminal in each side, and it is recommended to use the one at output side; earth lead must be connected to the earthing system, ideally using 2.5mm² cable. The cable should be as short as possible.
5. After above, you should ensure the circuit is functioning.

Regularly inspect the operating status, especially after lightning. Once the communication is off, electrician should check/replacethe SPD.

TS-SP24 INSTALLATION DIAGRAM



WARNING:

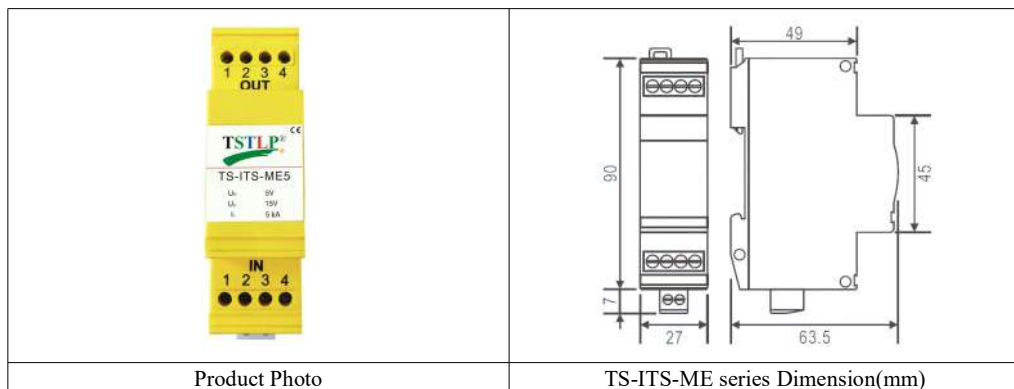
1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



■ TSTLP®/TS-ITS-ME series Surge Arrester for Information Technology System

❖ **INTRODUCTION:**The series product are applied to the signal control system, such as RS485,RS232, RS422, V11, TTY, video,xDSL, fire alarm system,flexible to make it to be 2 wires, 3 wires, 4 wires or more wires protection.

❖ We're able to make **different CIRCUIT、Voltage & Technical Data** according to customers' requirement, just tell exact product application needed or send us sample(s) to make.



❖ TECHNICAL DATA

MODEL	TS-ITS-ME5	TS-ITS-ME12	TS-ITS-ME24	TS-ITS-ME48	TS-ITS-ME110
Product Application	The series products are applied to the signal control system, such as 4-20mA,RS485,RS422, RS232, V11, TTY, video, xDSL, Fire Alarm System ,Audio,flexible to make it to be 2 wires, 3 wires, 4 wires or more wires protection.				
Un	5V	12V	24V	48V	110V
Up	15V	25V	60V	85V	300V
In	5KA	5KA	5KA	5KA	5KA
Imax	10KA	10KA	10KA	10KA	10KA
Series R*(1)*	1 Ω	1 Ω	1 Ω	1 Ω	1 Ω
Series R*(2)*	100μH	100μH	100μH	100μH	100μH
Load current*(3)*	400mA	400mA	400mA	400mA	400mA
Trans f(G)(4)*	f=25 KHz with L; f=50 MHz with R				
Operating Temperature	-40°C~+80°C				
Operating humidity	≤95%RH				
If *(1), *(2) is installed, then R=1 Ω, L=100 μH *(3) >400 mA, need special making ; (4):Max trans Fg					

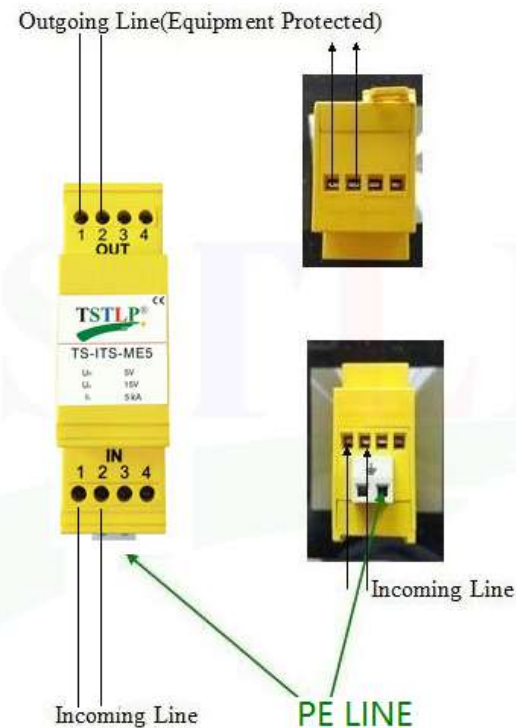
❖ MAIN CHARACTER

- ✓ Adopting multi-level protection, reasonable between level matching.
- ✓ Fast response
- ✓ Precise Clamping, low voltage protection level(low Up),less insertion loss,double over-voltage protection function,making the safety of protected equipment get most security.
- ✓ Modular intergration, installed by 35mm Din Rail.

INSTALLATION INSTRUCTION

Regularly inspect the operating status, especially after lightning. Once the communication is off, electrician should check/replacethe SPD.

TS-ITS-ME5 INSTALLATION DIAGRAM (FOR REFERENCE)



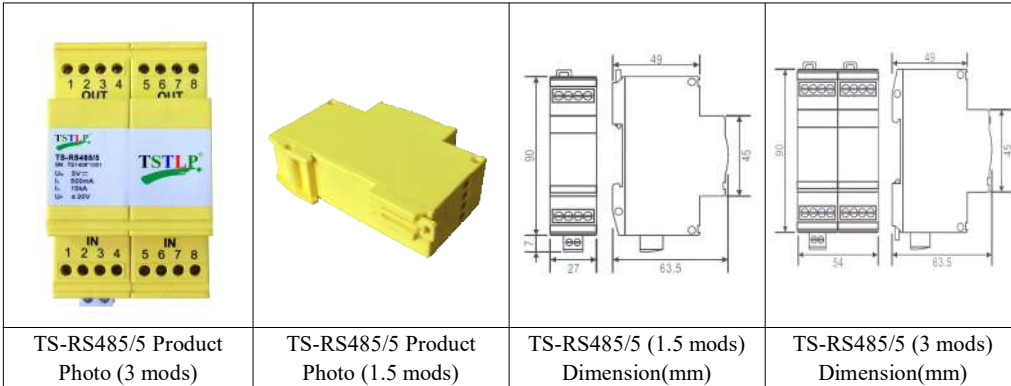
WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



■ TSTLP®/TS-RS485/5 Surge Arrester for Information Technology System

- ❖ **INTRODUCTION:** TS-RS485/5 is designed according to GB 18802.21-2004/IEC 61643-21 for installation at LPZ 0B -2 or higher. Provide surge current protection for RS 485/RS 422 industrial bus control, other field bus and temperature measurement.
- ❖ We're able to make **different CIRCUIT, Voltage & Technical Data** according to customers' requirement, just tell exact product application needed or send us sample(s) to make.



❖ TECHNICAL DATA

Model		TS-RS485/5
Nominal voltage	Un	5V-
Rated voltage (max. continuous voltage)	Uc	6V- / 4.2V~
Nominal current	IL	0.5A
Nominal discharge current (8/20)	In	10kA
Voltage protection level at In	Up	≤ 20V (line-line) ≤ 700V (line-PG)
Voltage protection level at 1KV/μs	Up	≤ 8.5V (line-line) ≤ 600V (line-PG)
Response time	tA	≤ 1ns (line-line) ≤ 100ns (line-PG)
Bandwidth	fG	1.7MHz
Series impedance per line	R	1.8Ω
Capacitance	C	≤ 5nF
Operating temperature range		-40°C...+80°C
Relative humidity:		≤95% (25°C)
Cross-sectional area		Max. 2.5mm ² flexible
Mounting on		35mm DIN rail
Enclosure material		Yellow thermoplastic, UL94-V0
Standards		IEC 61643-21:2000; GB 18802.21-2004; YD/T 1542-2006
Compliance		CE (LVD, EMC)

❖ MAIN CHARACTER

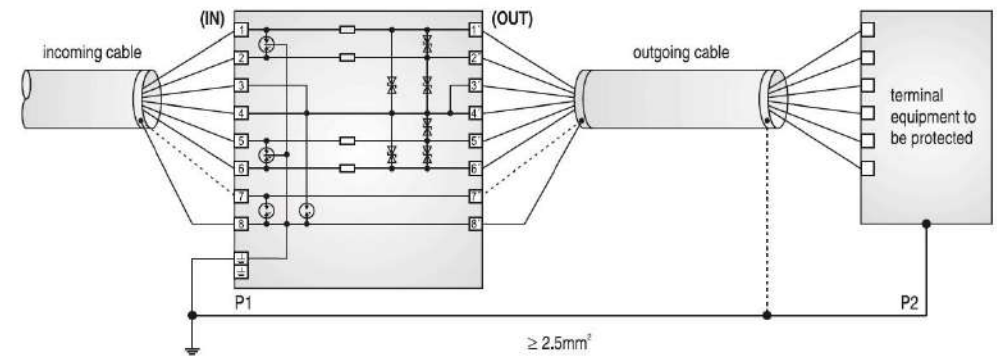
- ✓ Quick response, Low voltage protection level
- ✓ Direct or indirect shield earthing

INSTALLATION INSTRUCTION

1. This product is connected in series to the protected device.
2. The out terminal should be connected to the protected devices.
3. There is a earthing terminal at input side, earth lead must be connected to the lightning earthing system, ideally using 2.5mm² cable. The cable should be as short as possible.
4. Shields on the TS-RS485/5 can be grounded directly or indirectly. If grounded directly, the shield of the incoming cable is connected to terminal 8(IN) and the outgoing cable is connected to terminal 8'(OUT). If grounded directly, the shield of the incoming cable is connected to terminal 7(IN) and the outgoing cable is connected to terminal 7'(OUT).

Regularly inspect the operating status, especially after lightning. Once the communication is off, electrician should check/replace the SPD.

TS-RS485/5 INSTALLATION DIAGRAM



WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



■ TSTLP®/TS-SC series Surge Arrester for Information Technology System

- ❖ **INTRODUCTION:** TS-SC series is installed at LPZ 0_B -2 or higher. Applied in measuring and controlling system, providing coarse and fine protection. Designed according to IEC 61643-21; GB 18802.21; YD/T 1542. mainly used in industry controlling system, measuring system and controlling devices and so on.
- ❖ We're able to make **different CIRCUIT, Voltage & Technical Data** according to customers' requirement, just tell exact product application needed or send us sample(s) to make.

Product Photo	Dimension(mm)	TS-SC12 BCD

❖ TECHNICAL DATA

Model		TS-SC12	TS-SC24	TS-SC48	TS-SC110
Nominal voltage	U _n	12V-	24V	48V	110V
Rated voltage (max. continuous voltage)	U _c	14V- / 9.5V~	33V- / 23V~	55V- / 38.5V~	170V- / 120V~
Nominal current	I _L	0.5A	0.5A	0.5A	0.5A
Nominal discharge current (8/20)	I _n	5kA (per line) 10kA (total)			
Voltage protection level at I _n	U _p	≤ 55V (line-line) ≤ 40V (line-PG)	≤ 110V (line-line) ≤ 65V (line-PG)	≤ 175V (line-line) ≤ 100V (line-PG)	≤ 500V (line-line) ≤ 270V (line-PG)
Voltage protection level at 1kV/μs	U _p	≤ 36V (line-line) ≤ 19V (line-PG)	≤ 90V (line-line) ≤ 45V (line-PG)	≤ 160V (line-line) ≤ 80V (line-PG)	≤ 460V (line-line) ≤ 230V (line-PG)
Response time	t _A	≤ 1ns (line-line) ≤ 1ns (line-PG)			
Bandwidth	f _G	2.5MHz (line-PG)	6MHz (line-PG)	10MHz (line-PG)	16MHz (line-PG)
Series impedance per line	R	1.8Ω			
Capacitance	C	≤ 1.2nF (line-line) ≤ 2.4nF (line-PG)	≤ 0.5nF (line-line) ≤ 1nF (line-PG)	≤ 0.3nF (line-line) ≤ 0.6nF (line-PG)	≤ 0.2nF (line-line) ≤ 0.4nF (line-PG)
Operating temperature range		-40°C...+80°C			
Cross-sectional area		Max. 2.5m ² flexible			
Mounting on		35mm DIN rail			
Enclosure material		Yellow thermoplastic, UL94-V0			
Standards		IEC 61643-21; GB 18802.21; YD/T 1542			
Compliance		CE (LVD, EMC)			

❖ MAIN CHARACTER

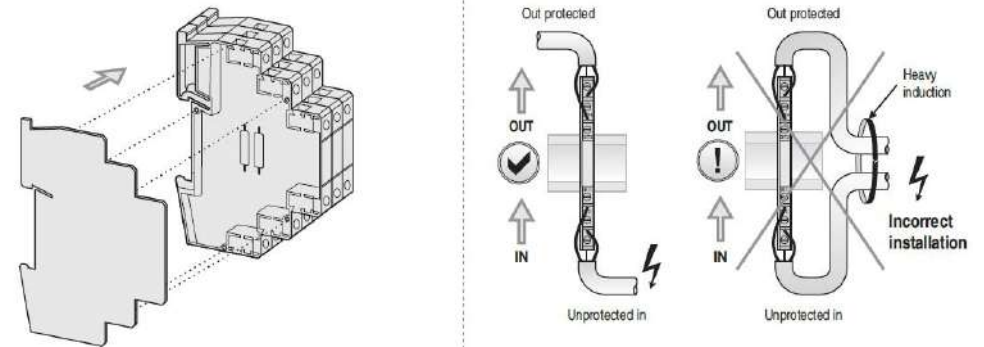
- ✓ Small size, only 6mm wide module
- ✓ Connected to earth by DIN rail or earth terminal

INSTALLATION INSTRUCTION

1. This product is connected in series to the protected device.
2. Mount the SPD on the 35 mm DIN rail.
3. The out terminal should be connected to the protected devices.
4. There is a earthing terminal in each side, and it is recommended to use the one at output side, earth lead must be connected to the earthing system, ideally using 2.5mm² cable. The cable should be as short as possible.
5. After above, you should ensure the circuit is functioning.

Regularly inspect the operating status, especially after lightning. Once the communication is off, electrician should check/replace the SPD.

TS-SC12 INSTALLATION DIAGRAM



In order to reduce the installation room, this product can be installed as follow with only one cover.

Note: Input cable and output cable must be laid out separately, otherwise it will cause interference!

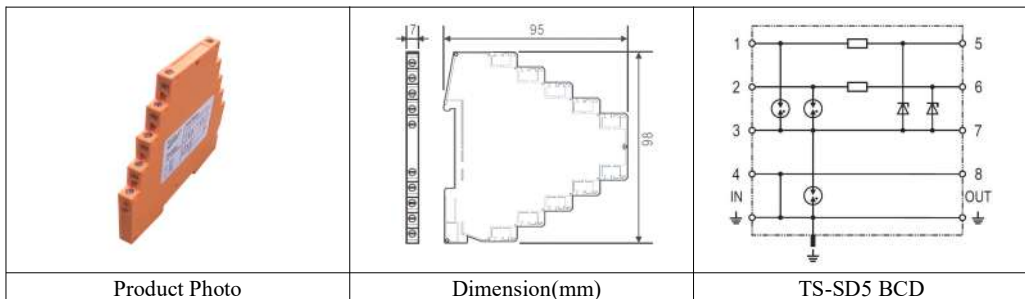
WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



■ TSTLP®/TS-SD series Surge Arrester for Information Technology System

- ❖ **INTRODUCTION:** TS-SD Series is for installation at LPZ 0B -2 or higher, protecting the RS-422/RS-485 devices against lightning and surge damages, providing coarse and fine protection.
- ❖ We're able to make **different CIRCUIT, Voltage & Technical Data** according to customers' requirement, just tell exact product application needed or send us sample(s) to make.



❖ TECHNICAL DATA

Model		TS-SD5	TS-SD24
Nominal voltage	Un	5V-	24V-
Rated voltage (max. continuous voltage)	Uc	6V(line/line) 160V(line/PG,SG/PG) 6V(line/SG)	32V(line/line) 160V(line/PG,SG/PG) 32V(line/SG)
Nominal discharge current (8/20)	In	10 KA	10 KA
Max. discharge current(8/20)	I _{max}	20 KA	20 KA
Lightning discharge current (10/350)	I _{imp}	1KA	1KA
Voltage protection level at 4kV(1.2/50μs)	Up	25V(line/line) ≤800V(line/PG,SG/PG) ≤25V(line/SG)	60V(line/line) ≤800V(line/PG,SG/PG) ≤60V(line/SG)
Response time	t _A	≤4ns(line/line) ≤20ns(line/PG,SG/PG) ≤4ns(line/SG)	≤4ns(line/line) ≤20ns(line/PG,SG/PG) ≤4ns(line/SG)
Max. load current	I _N	100mA	400mA
Series impedance per line	R	2Ω	1.5Ω
Capacitance	C	≤300pF(line/line) ≤100pF(line/PG,SG/PG) ≤300pF(line/SG)	≤1500pF(line/line) ≤100pF(line/PG,SG/PG) ≤1500pF(line/SG)
Operating temperature range		-40°C...+80°C	
Cross-sectional area		Max. 2.5m ² flexible	
Mounting on		35mm DIN rail	
Enclosure material		Orange thermoplastic material, UL94-V0	
Standards		IEC 61643-21; GB 18802.21; YD/T 1542	
Compliance		CE (LVD, EMC)	

❖ MAIN CHARACTER

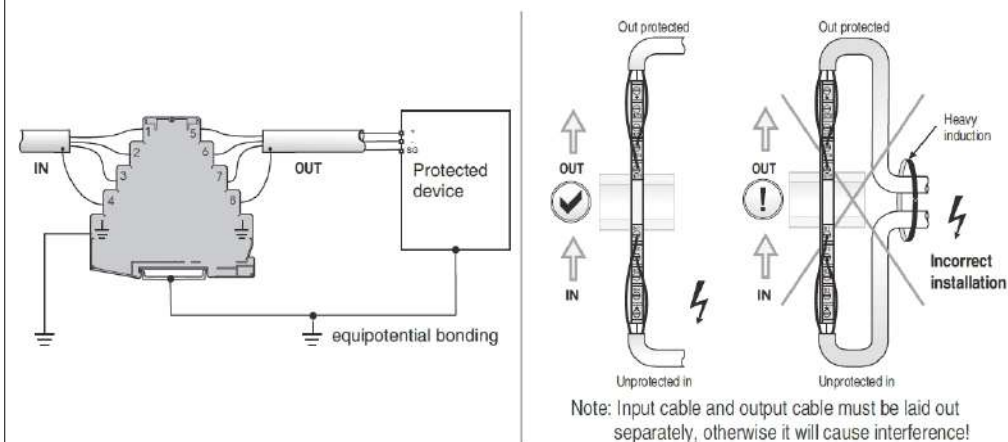
- ✓ Small size, only 7mm wide module
- ✓ Connected to earth by DIN rail or earthing terminal
- ✓ With shield terminal(direct or indirect to earth)

INSTALLATION INSTRUCTION

1. This product is connected in series to the protected device.
2. The IN (1/2, 3/4) terminal should be connected to the single lines input, the OUT (5/6, 7/8) terminal should be connected to the protected devices.
3. There is a earthing terminal in each side, and it is recommended to use the one at output side; earth lead must be connected to the earthing system, ideally using 2.5mm² cable. The cable should be as short as possible.
4. After above, you should ensure the circuit is functioning.

Regularly inspect the operating status, especially after lightning. Once the communication is off, electrician should check/replacethe SPD.

TS-SD5 INSTALLATION DIAGRAM



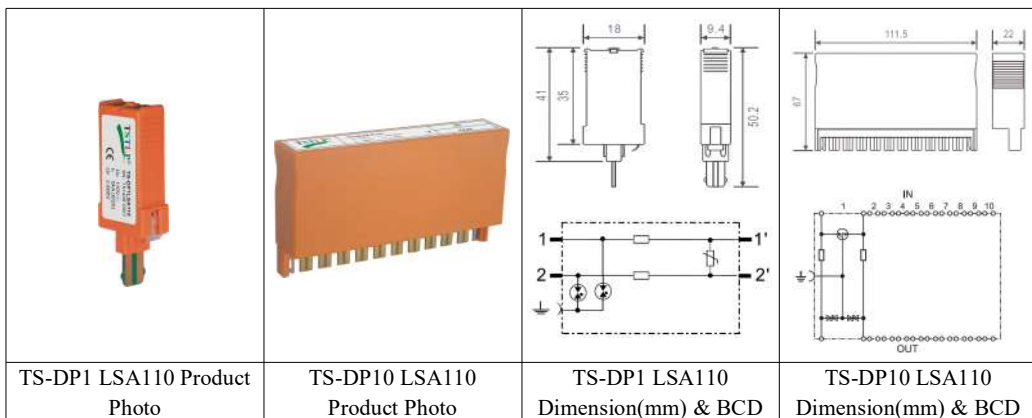
WARNING:

- 1, The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
- 2, It is recommended that installation should be done under power off condition.



■ **TSTLP®/TS-DP LSA Series Surge Arrester for LSA-PLUS Technology System**

- ❖ **INTRODUCTION:** TS-DP1 LSA110 & TS-DP10 LSA is designed according to GB 18802.21-2004/IEC 61643-21:2000, based on the LSA-PLUS wiring technology, easy for installation. it can provide surge voltage protection for one pairs of conductors or two single conductors(or 10-pair of conductors or 20 single conductors). Mainly used for telephone system or measurement and control system.
- ❖ We're able to make **different CIRCUIT, Voltage & Technical Data** according to customers' requirement, just tell exact product application needed or send us sample(s) to make.



❖ **TECHNICAL DATA**

Model		TS-DP1 LSA110	TS-DP10 LSA110
Nominal voltage	U_n	110V-	110V-
Rated voltage (max. continuous voltage)	U_c	180V- /126V~	120V- / 84.6V~
Nominal current	I_L	370mA	180mA
Nominal discharge current (8/20)	I_n	5kA (per line)	5kA (per line)
Voltage protection level at 1KV/ μ S	U_p	$\leq 250V$ (line-line) $\leq 600V$ (line-PG)	$\leq 180V$ (line-PG)
Response time	t_A	$\leq 25ns$ (line-line) $\leq 100ns$ (line-PG)	$\leq 1ns$ (line-line) $\leq 1ns$ (line-PG)
Bandwidth	f_G	30MHz (line - line)	10.0MHz (line -PG)
Series impedance per line	R	4.7 Ω	22 Ω
Capacitance	C	$\leq 0.2nF$ $\leq 15pF$	$\leq 1nF$ (l ine-PG)
Relative humidity		$\leq 95\%$ (25°C)	
Operating temperature range		-40°C~ - +80°C	-20°C~ - +80°C
Pluggable into		LSA-PLUS disconnection block	
Earthing via		Earthing BusBar	
Enclosure material		Orange thermoplastic material , UL94-V0	
Standards		IEC 61643-21:2000; GB 18802.21-2004; YD/T 1542-2006	
Certification		CE (LVD, EMC)	

❖ **MAIN CHARACTER**

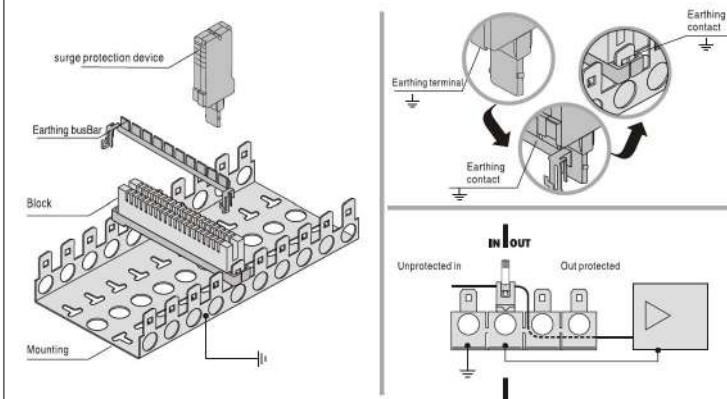
- ✓ Good transmission
- ✓ Decoupling resistance integrated
- ✓ For installing at LPZ 0B-2 or higher

Installation instruction

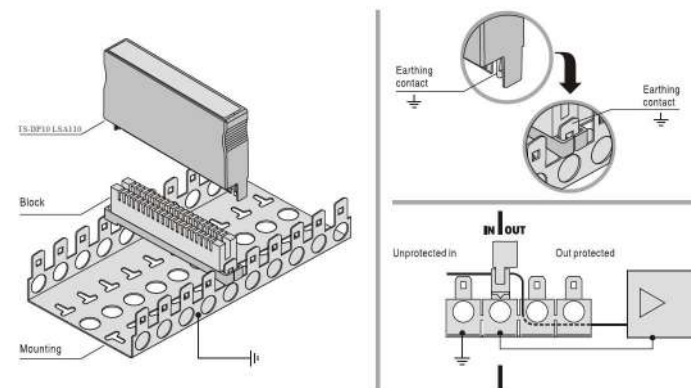
1. The device must be installed in correct direction.
2. Plug earthing BusBar into input terminal of LSA-PLUS disconnection block
3. Plug this product into the jack of LSA-PLUS disconnection block;make sure earthing terminal is contacted fully with earthing BusBar.

Regularly inspect the operating status, especially after lightning. Once the communication is off, electrician should check/replacethe SPD.

TS-DP1 LSA110 installation diagram



TS-DP10 LSA110 installation diagram



WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



■ **TSTLP®/TS-TAIRJ11 Surge Ar rester for RJ11 communication**

❖ **INTRODUCTION:**TS-TAIRJ11 with RJ11 interface according to YD/T 1542-2006; GB 18802.21-2004; IEC61643-21:2000, is designed to protect the telecommunication system and ISDN system from interruption caused by surge voltages; network equipment from interruption caused by surge current.

Product Photo	Dimension(mm)	BCD

❖ **TECHNICAL DATA**

Model		TS-TAIRJ11
Nominal voltage	Un	110V-
Rated voltage (max. continuous voltage)	Uc	170V-/ 120V~
Normal Current	IL	0.5KA
Nominal discharge current (8/20)	In	2.5kA (per line) 5 kA (Total)
Voltage protection level at In	Up	≤500V (line-line) ≤270V (line-PG)
Voltage protection level at 1kV/ms	Up	≤460V (line-line) ≤230V (line-PG)
Response time	tA	≤ 1ns (line-line) ≤ 100ns (line-PG)
Bandwidth	fG	16MHz (AD-PG)
Series impedance per line	R	1.8 Ohm
Operating temperature range		-40°C...+80°C
Connection (input / output)		RJ11 shield socket
Earthing via		Earthing screw
Mounting on		35mm DIN rail
Enclosure material		Aluminum
Standards		YD/T 1542-2006; GB 18802.21-2004; IEC61643-21:2000
Compliance		CE(LVD,EMC)

❖ **MAIN CHARACTER**

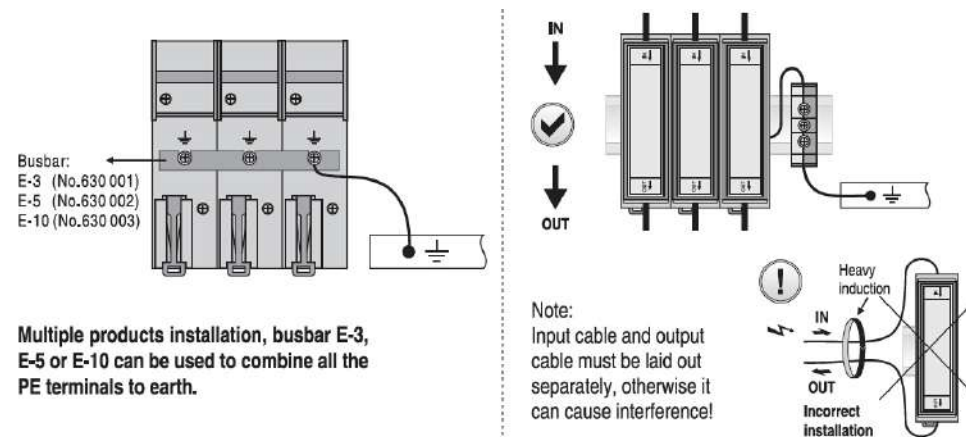
- ✓ For protecting telephone system(line)/ ISDN system and so on.
- ✓ Good discharge capacity, low voltage protection level
- ✓ Quick response, high transmission speed, low signal attenuation
- ✓ RJ11 connection, easy for installation

INSTALLATION INSTRUCTION

1. This product is connected in series to the protected device.
2. Mount the SPD on 35 mm DIN rail.
3. The out terminal should be connected to the protected devices.
4. SPD's earthing terminal must be connected to nearby earthing BusBar or the metal earthing enclosure of protected device.
5. After above, you should ensure the circuit is functioning.

Regularly inspect the operating status, especially after lightning, once the communication is off, electrician should check/replace the SPD.

TS-TAIRJ11 INSTALLATION DIAGRAM



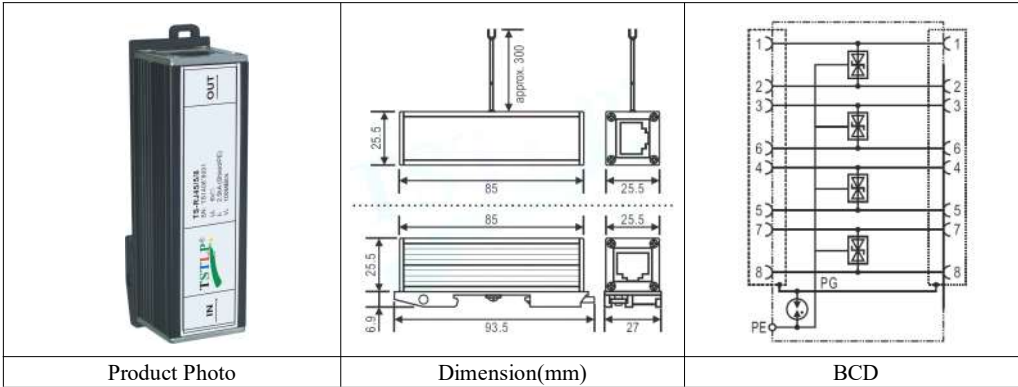
WARNING:

- The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
- It is recommended that installation should be done under power off condition.



■ TSTLP® Single-Port Surge Arrester for RJ45 Network Protection

❖ **INTRODUCTION:** TS-RJ45 is designed to protect network equipment from interruption caused by surge current according to IEC 61643-21; GB 18802.21; YD/T 15420. Mainly used for network equipment, e.g. Switch, router, HUB, modem and so on.



❖ TECHNICAL DATA

Model		TS-RJ45/5/8	TS-RJ45/24/8
Nominal voltage	Un	5V	24V
Rated voltage (max. continuous dc voltage)	Uc	6V	30V
Rated voltage (max. continuous ac voltage)	Uc	4.2V	21.1V
Lightning Impulse Current (10/350)	Iimp	0.5kA	0.5kA
Nominal discharge current (8/20)	In	0.3kA (line-line) 0.3kA (line-PG) 2.5kA (shield-PG)	0.1kA (line-line) 0.1kA (line-PG) 2.5kA (shield-PG)
Max. discharge current (8/20)	Imax	0.4kA (line-line) 0.4kA (line-PG) 5kA (shield-PG)	0.2kA (line-line) 0.2kA (line-PG) 5kA (shield-PG)
Voltage protection level at In	Up	≤35V (line-line) ≤35V (line-PG)	≤60V (line-line) ≤60V (line-PG)
Voltage protection level at 1kV/ms	Up	≤13V (line-line-PG) ≤700V (shield-PG)	≤45V (line-line-PG) ≤700V (shield-PG)
Response time	tA	≤1ns (line-line) ≤100ns (shield-PG)	
Bandwidth	fG	165MHz	
Max. data transmission rates	Vs	100Mbits/s	
Operating temperature range		-40°C...+80°C	
Connection (input / output)		RJ45 shield socket	
Pining		1/2, 3/6, 4/5, 7/8	
Earthing via		Earthing screw	
Mounting on		35mm DIN rail	
Enclosure material		Aluminum	
Standards		IEC 61643-21; GB 18802.21; YD/T 1542	
Compliance		CE(LVD,EMC)	

❖ MAIN CHARACTER

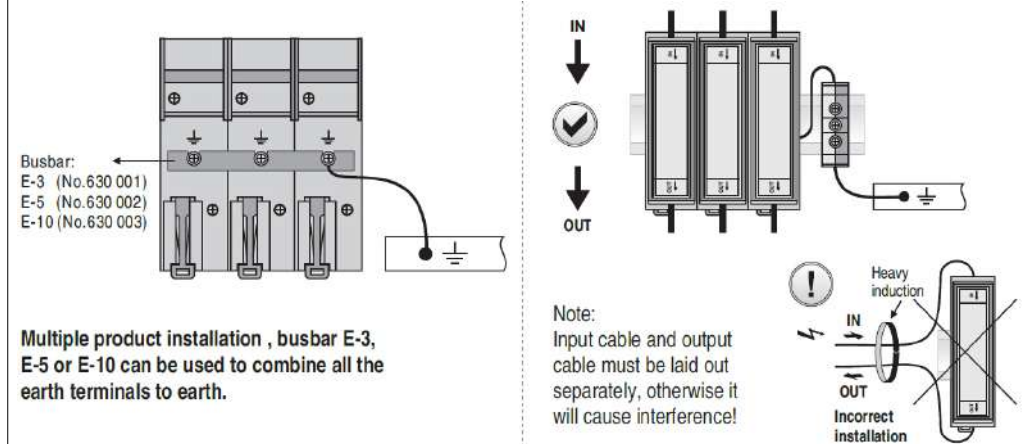
- ✓ For protecting computer data transmission system, network system and so on
- ✓ Good discharge capacity, low voltage protection level
- ✓ Quick response, high transmission speed, low signal attenuation
- ✓ RJ45 connection, easy for installation

INSTALLATION INSTRUCTION

1. This product is connected in series to the protected device.
2. Mount the SPD on 35 mm DIN rail.
3. The out terminal should be connected to the protected devices.
4. SPD's earthing terminal must be connected to nearby earthing BusBar or the metal earthing enclosure of protected device.

Regularly inspect the operating status, especially after lightning. Once the communication is off, electrician should check/replace the SPD.

TS-RJ45/5/8 & TS-RJ/24/8 INSTALLATION DIAGRAM



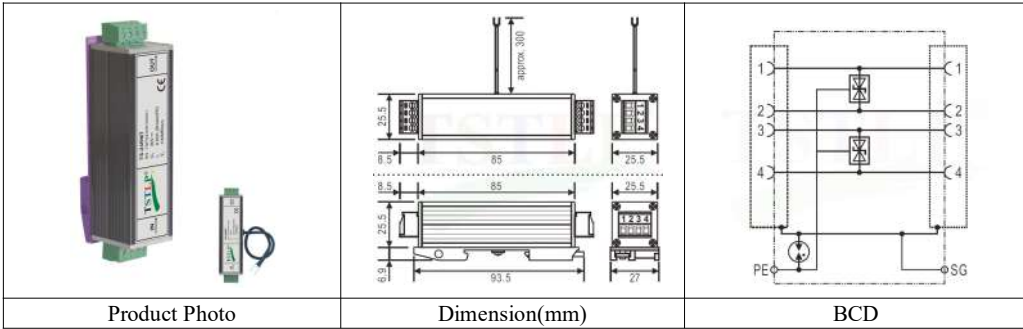
WARNING:

- The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
- It is recommended that installation should be done under power off condition.



■ **TSTLP®/TS-24RMT Surge Arrester for network equipment**

❖ **INTRODUCTION:** TS-24RMT, with UTP cables interface, designed according to IEC61643-21, GB 18802.21 & YD/T 1542, protects network equipment (switch, router, HUB, modem and so on) from interruption caused by surge current.



❖ **TECHNICAL DATA**

Model	TS-24RMT	
Nominal voltage	Un	24 V-
Rated voltage (max. continuous voltage)	Uc	30Vdc; 21.1Vac;
Lightning impulse current (10/350) (SG-PG)	Iimp	0.5kA
Nominal discharge current (8/20)	In	0.1kA (line-line-PG) 2.5kA (shield-PG)
Max. discharge current (8/20)	Imax	0.2kA (line-line-PG) 5kA (shield-PG)
Voltage protection level at In	Up	≤60V (line-line) ≤60V (line-PG)
Voltage protection level at 1kV/ms	Up	≤ 45V (line-line-PG) ≤ 700V (shield-PG)
Capacitance	C	≤ 35pF (line-line) ≤50pF (line-PG)
Response time	tA	≤ 1ns (line-line-PG) ≤ 100ns (shield-PG)
Bandwidth(line-line)	fG	165Mbits/s
Max. data transmission rates	Vs	100Mbits/s
Operating temperature range		-40°C...+80°C
Relative humidity		≤95% (25°C)
Connection (input / output)		RMT connecting terminal
Pining		1/2, 3/6, 4/5, 7/8
Mounting on		Type A: 35mm DIN rail
Earthing		Type A: earthing screw / Type B: outgoing cable 1.5mm2 x 300mm
Shield earthing		Indirectly via integrated spark gap
Standards		IEC 61643-21; GB 18802.21; YD/T 1542
Compliance		CE(LVD,EMC)

❖ **MAIN CHARACTER**

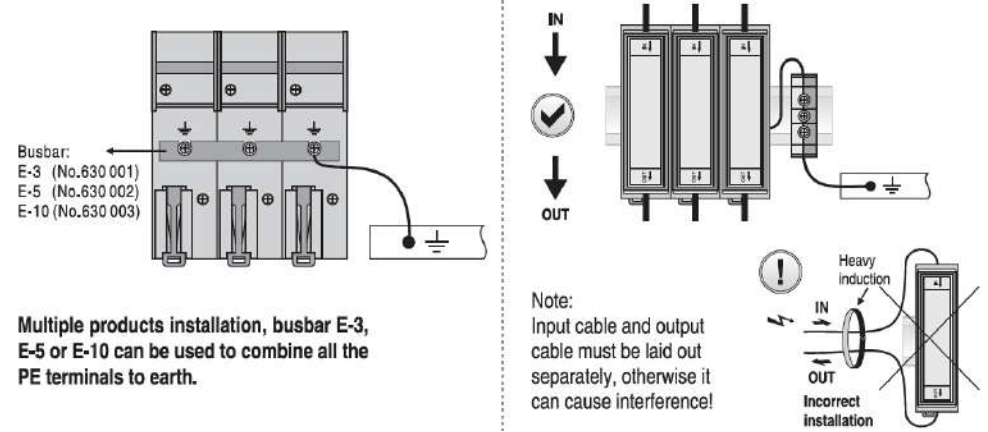
- ✓ For protecting computer data transmission system, network system and so on.
- ✓ Good discharge capacity, low voltage protection level
- ✓ Quick response, high transmission speed, low signal attenuation
- ✓ RM connection terminal, easy for installataion.

INSTALLATION INSTRUCTION

1. This product is connected in series to the protected device.
2. Mount the SPD on 35 mm DIN rail.
3. The out terminal should be connected to the protected devices.
4. SPD's earthing terminal must be connected to nearby earthing BusBar or the metal earthing enclosure of protected device.
5. After above, you should ensure the circuit is functioning.

Regularly inspect the operating status, especially after lightning, once the communication is off, electrician should check/replace the SPD.

TS-24RMT INSTALLATION DIAGRAM



WARNING:

- The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
- It is recommended that installation should be done under power off condition.



■ TSTLP® Multi-RJ45 Port Surge Arrester for Network Protection

- ❖ **INTRODUCTION:** Multi-RJ45 Port Surge Arrester are designed to protect network equipment from interruption caused by surge current;. Surge protective devices with 24/16/8 Ports RJ45 interface, all protected by four pairs lines protected. Designed according to IEC 61643-21; GB 18802.21; YD/T 1542. Mainly used for ethernet 100BaseT/TX/T4、ATM 155MBit/s、100VG-Any-LAN、CDDI、10Base T(IEEE 802.3)、Token Ring(IEEE 802.5)etc.(e.g. Telecom-communication, server, router, computer, and so on). Module design for standard 19" distribution cabinet.

<p>TS-8RJ45/5/8 Product Photo</p>	<p>TS-8RJ45/5/8 Dimension(mm)</p>	<p>TS-8RJ45/5/8 BCD</p>
<p>TS-16RJ45/5/8 Product Photo</p>	<p>TS-16RJ45/5/8 Dimension(mm)</p>	<p>TS-16RJ45/5/8 BCD</p>
<p>TS-24RJ45/5/8 Product Photo</p>	<p>TS-24RJ45/5/8 Dimension(mm)</p>	<p>TS-24RJ45/5/8 BCD</p>

❖ TECHNICAL DATA

Model		TS-24RJ45/5/8 TS-16RJ45/5/8 TS-8RJ45/5/8
Nominal voltage	Un	5V-
Rated voltage (max. continuous voltage)	Uc	6V- 4.2V~
Nominal discharge current (8/20)	In	300A (line-line) 300A (line-PG)
Max. discharge current (8/20)	Imax	400A (line-line) 400A (line-PG)
Voltage protection level at In	Up	≤50V (line-line) ≤50V (line-PG)
Voltage protection level at 1kV/ms	Up	≤ 13V (line-line) ≤ 13V (line-PG)
Capacitance	C	≤ 35pF (line-line) ≤ 50pF (line-PG)
Response time	tA	≤ 1ns (line-line) ≤ 1ns (line-PG)
Bandwidth	fG	165Mbits/s
Max. data transmission rates	Vs	155Mbits/s
Operating temperature range		-40°C...+80°C
Relative humidity		≤95% (25°C)
Connection (input / output)		RJ45 shield socket
Pining		1/2, 3/6, 4/5, 7/8
Shield earthing		Metal enclosure
Standards		IEC 61643-21; GB 18802.21; YD/T 1542
Compliance		CE(LVD,EMC)



❖ MAIN CHARACTER

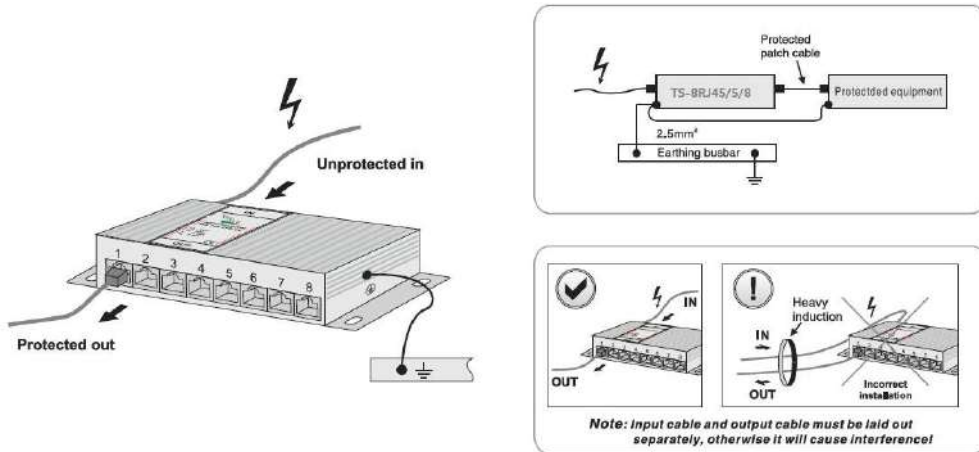
- ✓ Low voltage protection level;
- ✓ Quick response;
- ✓ Low insertion loss

INSTALLATION INSTRUCTION

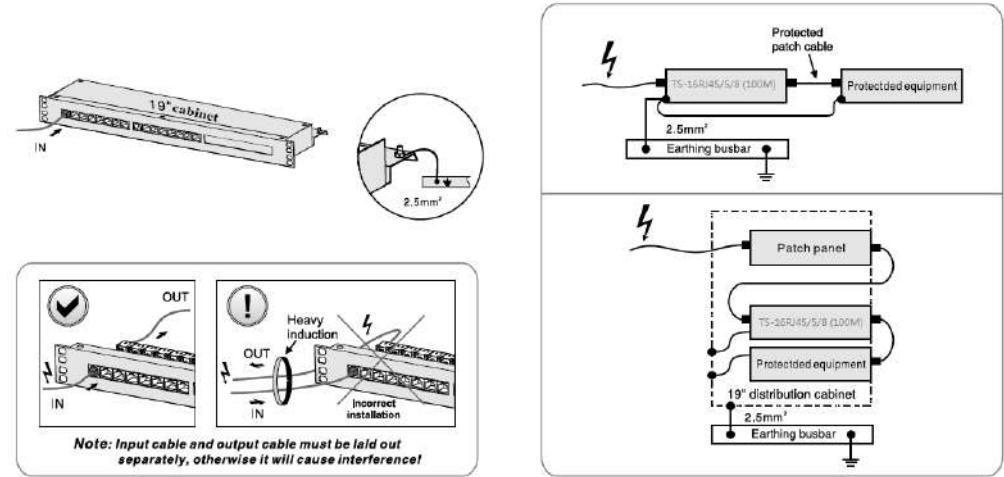
1. This product is connected in series to the protected device.
2. Can be mounted in the 19" distribution cabinet.
3. The out terminal should be connected to the protected devices.
4. SPD's earthing terminal must be connected to nearby earthing BusBar or the metal earthing enclosure of protected device.
5. After above, you should ensure the circuit is functioning.

Regularly inspect the operating status, especially after lightning. Once the communication is off, electrician should check/replace the SPD.

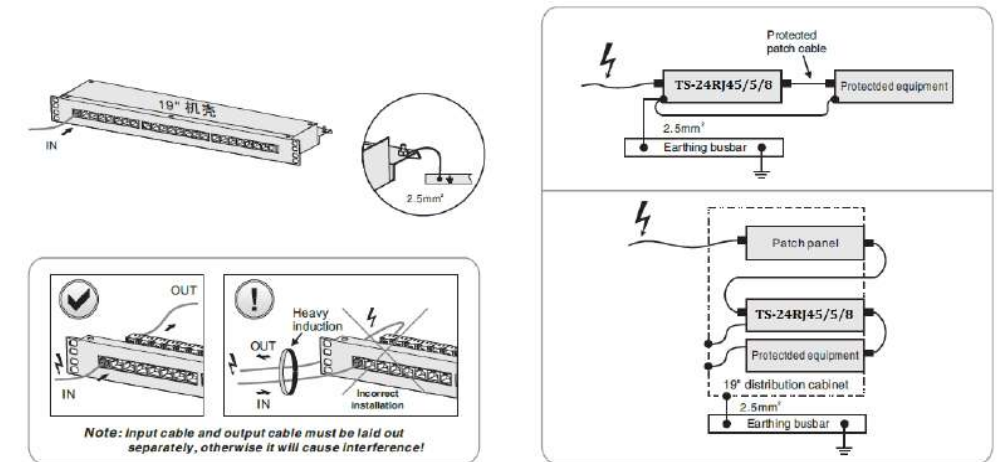
TS-8RJ45/5/8 INSTALLATION DIAGRAM



TS-16RJ45/5/8 INSTALLATION DIAGRAM



TS-24RJ45/5/8 INSTALLATION DIAGRAM



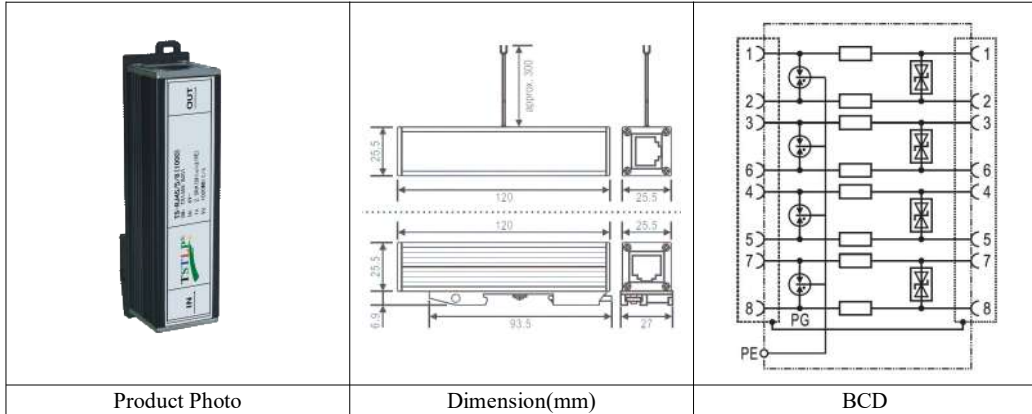
WARNING:

- The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
- It is recommended that installation should be done under power off condition.



■ **TSTLP®/TS-RJ45/5/8 (1000M) Surge Arrester for RJ45 Network Protection**

❖ **INTRODUCTION :** TS-RJ45/5/8(1000) is designed to protect network equipment from interruption caused by surge current according to IEC 61643-21 & GB 18801.21; Mainly used in Gigabit Ethernet ATM, Voip Networks, PoE system and other signal line system, and computer network equipment and other signal control equipment. (e.g. Telecommunication, Server, Routers, Computers and so on)



❖ **TECHNICAL DATA**

Model		TS-RJ45/5/8(1000)
Nominal voltage	Un	5V-
Rated voltage (max. continuous voltage)	Uc	6V-
Nominal Current	IN	1A
Nominal discharge current (8/20)	In	2.5kA (line-line) 2.5kA (line-PG)
Max. discharge current (8/20)	Imax	10 kA(total)
Voltage protection level at In	Up	≤15V (line-line) ≤150V (line-PG)
capacitance	C	≤30pF (line-line) ≤25pF (line-PG)
Max. data transmission rates	Vs	1000Mbits/s
Operating temperature range		-40°C...+80°C
Connection (input / output)		RJ45 shield socket
Pining		1/2, 3/6, 4/5, 7/8
Earthing via		Earthing screw
Mounting on		35mm DIN rail
Enclosure material		Aluminum
Standards		IEC 61643-21:2001; GB 18802.21-2004; YD/T 1542-2006
Compliance		CE(LVD,EMC)

❖ **MAIN CHARACTER**

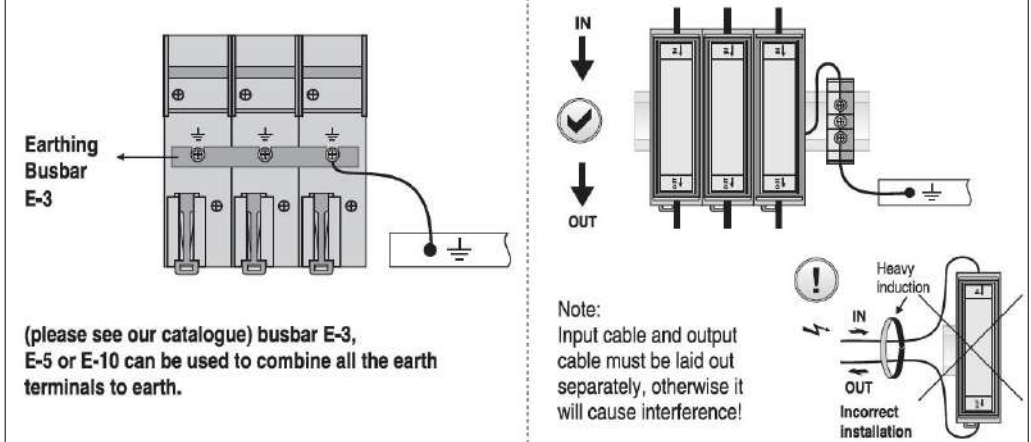
- ✓ For protecting computer data transmission system, network system and so on
- ✓ Good discharge capacity, low voltage protection level
- ✓ Quick response, high transmission speed, low signal attenuation
- ✓ RJ45 connection, easy for installation

INSTALLATION INSTRUCTION

1. This product is connected in series to the protected device.
2. Mount the SPD on 35 mm DIN rail.
3. The out terminal should be connected to the protected devices.
4. SPD's earthing terminal must be connected to nearby earthing BusBar or the metal earthing enclosure of protected device.

Regularly inspect the operating status, especially after lightning. Once the communication is off, electrician should check/replace the SPD.

TS-RJ45/5/8 (1000M) INSTALLATION DIAGRAM



WARNING:

- The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
- It is recommended that installation should be done under power off condition.



■ **TSTLP® Multi-RJ45 Port Surge Arrester (1000M)for Network Protection**

❖ **INTRODUCTION:**Multi-RJ45 Port Surge Arrester are designed to protect network equipment from interruption caused by surge current;. Surge protective devices with 24/16/8 Ports RJ45 interface, all protected by four pairs lines protected. Designed according to IEC 61643-21; GB 18802.21; YD/T 1542.Mainly used for offices and industry like Gigabit Ethernet, ATM or ISDN system,like VOIP can be protected.(e.g. Telecom-munication server, router,computer, and so on).Module design for standard 19"distribution cabinet.

<p>TS-8RJ45/5/8 Product Photo</p>	<p>TS-8RJ45/5/8 Dimension(mm)</p>	<p>TS-8RJ45/5/8 BCD</p>
<p>TS-16RJ45/5/8 Product Photo</p>	<p>TS-16RJ45/5/8 Dimension(mm)</p>	<p>TS-16RJ45/5/8 BCD</p>
<p>TS-24RJ45/5/8 Product Photo</p>	<p>TS-24RJ45/5/8 Dimension(mm)</p>	<p>TS-24RJ45/5/8 BCD</p>

❖ **TECHNICAL DATA**

Model		TS-24RJ45/5/8/ (1000) TS-16RJ45/5/8(1000) TS-8RJ45/5/8(1000)
Nominal voltage	Un	5V-
Rated voltage (max. continuous voltage)	Uc	6V- 4.2V~
Normal current	IN	0.35A
Nominal discharge current (8/20)	In	300A (line-line) 2.5KA (line-PG)
Max. discharge current (8/20)	I _{total}	5KA (line-PG)
Voltage protection level at In	Up	≤15V (line-line) ≤150V (line-PG)
Voltage protection level at 1kV/ms	Up	≤ 13V (line-line) ≤ 150V (line-PG)
Capacitance	C	≤ 35pF (line-line) ≤35pF (line-PG)
Response time	t _A	≤10ns (line-line) ≤10ns (line-PG)
Max. data transmission rates	Vs	1000 Mbits/s
Dimension(mm)		L*W*H [24/16 P 484(448)*160*45mm]; 8P:168*82*41mm
Operating temperature range		-40°C...+80°C
Relative humidity		≤95% (25°C)
Connection (input / output)		RJ45 shield socket
Pining		1/2, 3/6, 4/5, 7/8
Shield earthing		Metal enclosure
Standards		IEC 61643-21; GB 18802.21; YD/T 1542
Compliance		CE(LVD,EMC)



❖ AIN CHARACTER

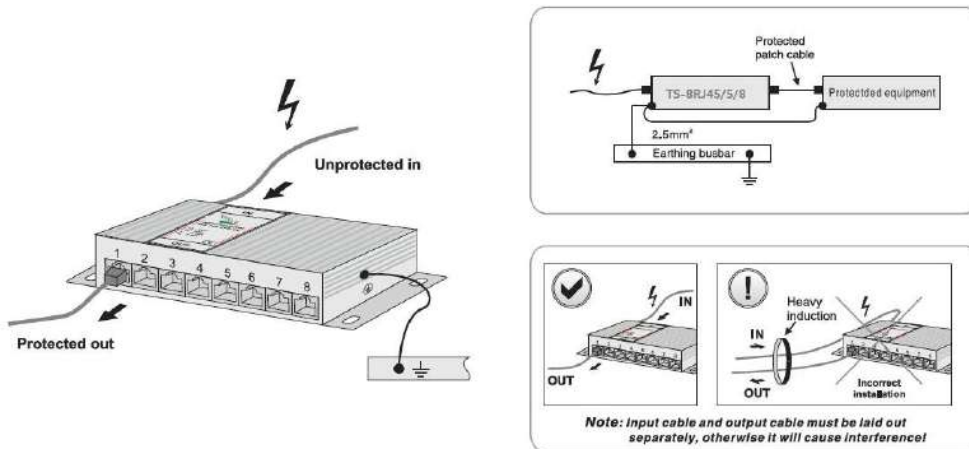
- ✓ Low voltage protection level & Low insertion loss
- ✓ Quick response
- ✓ Module design(4 pairs lines) for standard 19" distribution cabinet, available with 8,16,24 ports RJ45 connection.

INSTALLATION INSTRUCTION

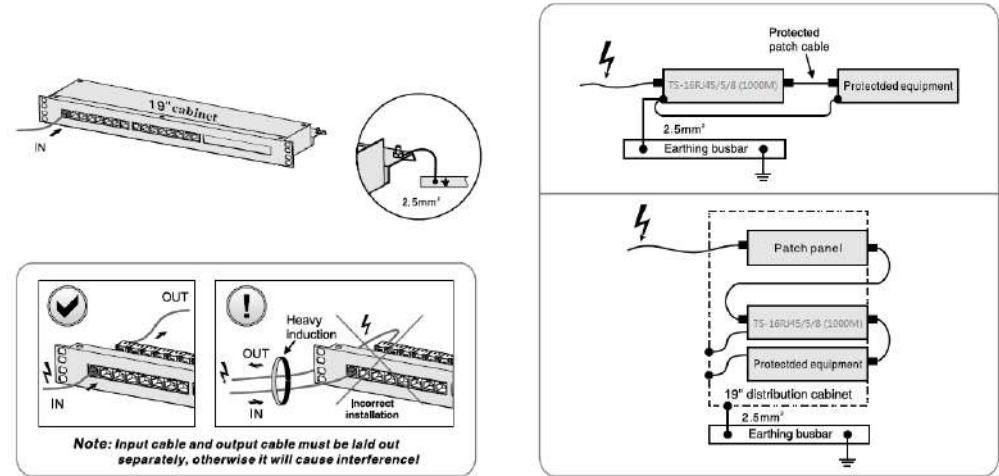
1. This product is connected in series to the protected device.
2. Can be mounted in the 19" distribution cabinet.
3. The out terminal should be connected to the protected devices.
4. SPD's earthing terminal must be connected to nearby earthing BusBar or the metal earthing enclosure of protected device.
5. After above, you should ensure the circuit is functioning.

Regularly inspect the operating status, especially after lightning. Once the communication is off, electrician should check/replace the SPD.

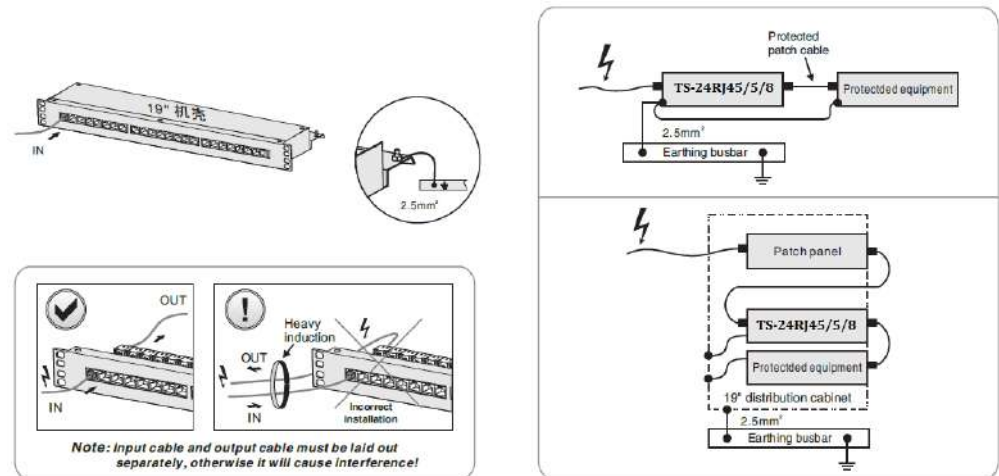
TS-8RJ45/5/8 INSTALLATION DIAGRAM



TS-16RJ45/5/8 INSTALLATION DIAGRAM



TS-24RJ45/5/8 INSTALLATION DIAGRAM



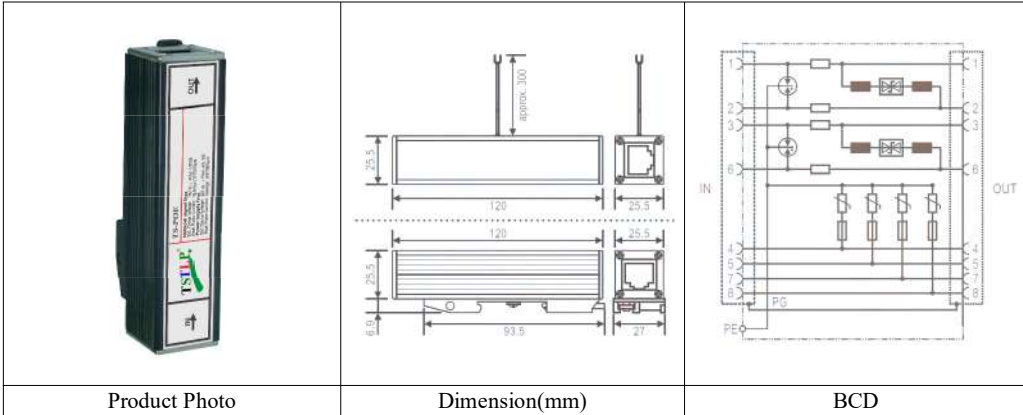
WARNING:

- The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
- It is recommended that installation should be done under power off condition.



■ TSTLP® Single-Port Surge Arrester for RJ45 Network Protection

- ❖ **INTRODUCTION:** TS-POE with RJ45 interface, according to IEC 61643-21; GB 18802.21; YD/T 1542, is designed for protecting POE network device; Normally applied for protecting for IP telephone, IP camera etc. for POE network device.



❖ TECHNICAL DATA

Model		TS-POE	
		RJ45 interface	Power Supply line
Nominal voltage	Un	5V-	48V-
Std. Clamp Voltage	Uc	7.5V-	60V-
Nominal discharge current (8/20)	In	2KA (line-line) 2KA (line-PG)	2.5KA (line-PG)
Peak pulse current(10/1000μs)	Uoc	300A (line-line)	200A
Voltage protection level at In	Up	≤60V (line-line) ≤60V (line-PG)	≤200V
Response time	tA	≤1ns (line-line) ≤1ns (line-PG)	≤25ns
Bandwidth	fG	165Mbits/s	---
Max. data transmission rates	Vs	100Mbits/s	---
Protection lines		1 / 2 / 3 / 6	4 / 5 (+). 7 / 8 (-)
Operating temperature range		-40°C...+80°C	
Relative humidity		≤95% (25°C)	
Connection (input / output)		RJ45 shield socket	
Shield earthing		Screw terminal	
Enclosure material		Aluminum	
Standards		IEC 61643-21; GB 18802.21; YD/T 1542	
Compliance		CE(EMC,LVD)	

❖ MAIN CHARACTER

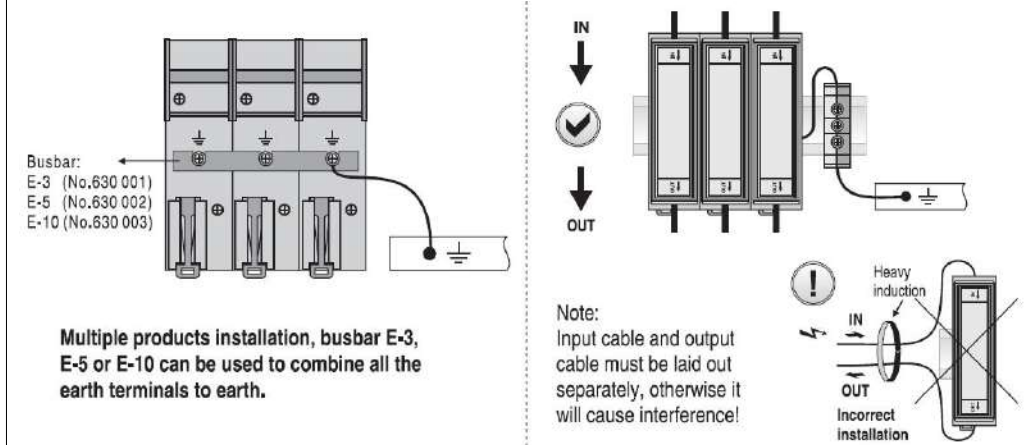
- ✓ POE network device, protect integrated power supply & network signal transmission cables in the twist pairs
- ✓ Good discharge capacity, low voltage protection level
- ✓ Quick response, high transmission speed, low signal attenuation
- ✓ RJ45 connection, easy for installation

INSTALLATION INSTRUCTION

1. This product is connected in series to the protected device.
2. The out terminal should be connected to the protected devices.
3. SPD's earthing terminal must be connected to nearby earthing BusBar or the metal earthing enclosure of protected device.
4. After above, you should ensure the circuit is functioning.

Regularly inspect the operating status, especially after lightning. Once the communication is off, electrician should check/replace the SPD.

TS-POE INSTALLATION DIAGRAM



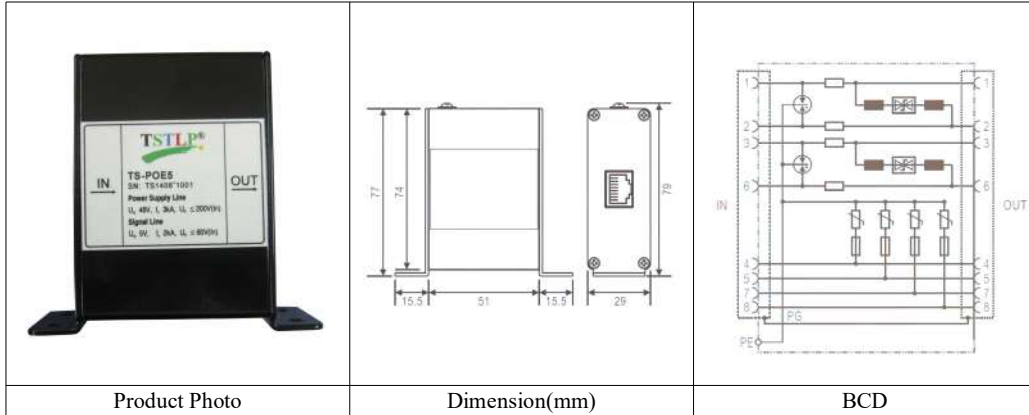
WARNING:

- The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
- It is recommended that installation should be done under power off condition.



■ TSTLP® Single-Port Surge Arrester for RJ45 Network Protection

- ❖ **INTRODUCTION:** TS-POE5 with RJ45 interface, according to IEC 61643-21; GB 18802.21; YD/T 1542, is designed for protecting POE network device; Normally applied for protecting for IP telephone, IP camera etc. for POE network device.



❖ TECHNICAL DATA

Model		TS-POE5	
		RJ45 interface	Power Supply line
Nominal voltage	Un	5V-	48V-
Rated voltage (max. continuous voltage)	Uc	6V-	60V-
Nominal discharge current (8/20)	In	2KA (line-line) 2KA (line-PG)	3KA
Combination wave (10/700)	Uoc	6KA (line-line) 6KA (line-PG)	---
Voltage protection level at In	Up	≤60V (line-line) ≤60V (line-PG)	≤200V
Response time	tA	≤1ns (line-line) ≤1ns (line-PG)	≤25ns
Bandwidth	fG	165Mbits/s	---
Max. data transmission rates	Vs	100Mbits/s	---
Protection lines		1 / 2 / 3 / 6	4 / 5 (+), 7 / 8 (-)
Operating temperature range		-40°C...+80°C	
Relative humidity		≤95% (25°C)	
Connection (input / output)		RJ45 shield socket	
Shield earthing		Screw terminal	
Enclosure material		Aluminum	
Standards		IEC 61643-21; GB 18802.21; YD/T 1542	
Compliance		CE(EMC,LVD)	

❖ MAIN CHARACTER

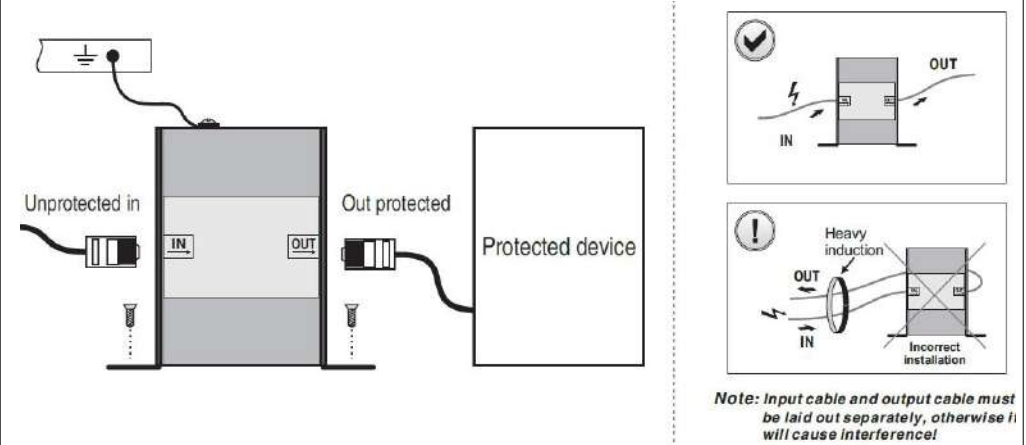
- ✓ POE network device, protect integrated power supply & network signal transmission cables in the twist pairs
- ✓ Good discharge capacity, low voltage protection level
- ✓ Quick response, high transmission speed, low signal attenuation
- ✓ RJ45 connection, easy for installation

INSTALLATION INSTRUCTION

1. This product is connected in series to the protected device.
2. The out terminal should be connected to the protected devices.
3. SPD's earthing terminal must be connected to nearby earthing BusBar or the metal earthing enclosure of protected device.
4. After above, you should ensure the circuit is functioning.

Regularly inspect the operating status, especially after lightning. Once the communication is off, electrician should check/replace the SPD.

TS-POE5 INSTALLATION DIAGRAM




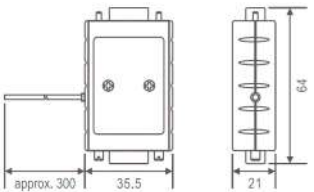
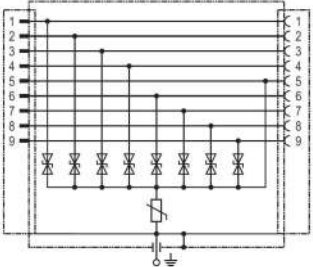

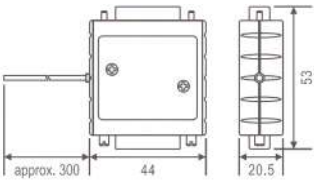
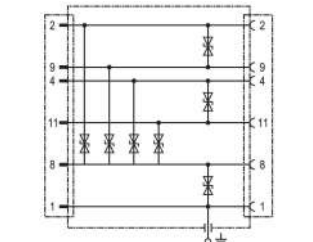

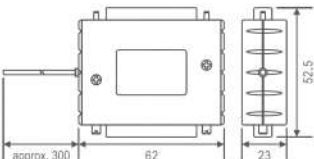
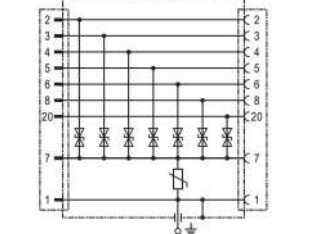

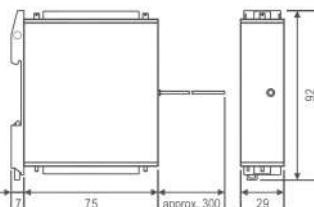
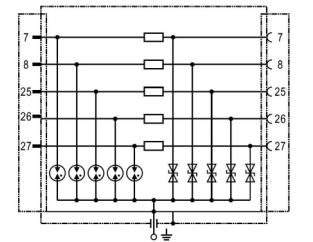
WARNING:

- The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
- It is recommended that installation should be done under power off condition.



■ **TSTLP®/TS-RSP series Surge Arrester for D-SUB Information Technology System Protection**

❖ **INTRODUCTION:** TS-RSP series surge arrester is used at LPZ 2-3 boundary, provide surge protection for RS485, RS422 or RS232 signal devices from damages, such as surge voltages, operating over voltages, electrostatic discharging and so on. Designed according to IEC 61643-21; GB 18802.21; YD/T 1542.

		
TS-RSP9 Product Photo	TS-RSP9 Dimension(mm)	TS-RSP9 BCD
		
TS-RSP15 Product Photo	TS-RSP15 Dimension(mm)	TS-RSP15 BCD
		
TS-RSP25 Product Photo	TS-RSP25 Dimension(mm)	TS-RSP25 BCD
		
TS-RSP37 Product Photo	TS-RSP37 Dimension(mm)	TS-RSP37 BCD

❖ **TECHNICAL DATA**

Model		TS-RSP9	TS-RSP15	TS-RSP25	TS-RSP37
Nominal voltage	U _n	12V-	5V-	12V-	48V-
Rated voltage (max. continuous voltage)	U _c	15V-	8V-	15V-	55V-
Lightning impulse current (10/350)	I _n	/	/	/	2.5kA (line-SG)
Nominal discharge current (8/20)	I _n	100A (line-SG)	200A (line-SG)	100A (line-SG)	3kA (line-SG)
Nominal discharge current (8/20)	I _n	100A (SG-PG)	800A (SG-PG)	100A (SG-PG)	
Max. discharge current (8/20)	I _{max}	200A (line-SG)	400A (line-SG)	200A (line-SG)	5kA (line-SG)
Max. discharge current (8/20)	I _{max}	200A (SG-PG)	1.3kA (SG-PG)	200A (SG-PG)	
Voltage protection level at I _n	U _p	≤24V (line-SG) ≤200V (SG-PG)	≤16V (line-line) ≤16V (line-SG) ≤16V (SG-PG)	≤24V(line-SG) ≤200V(SG-PG)	≤120V (line-PG)
Voltage protection level at 1kV/ms	U _p	≤21V (1 line-SG) ≤90V (SG-PG)	≤11V (line-line) ≤11V (line-SG) ≤11V (SG-PG)	≤21V(1 line-SG) ≤90V (SG-PG)	≤100V (line-PG)
Bandwidth		10 MHz	4 MHz	10 MHz	22 MHz (Series impedance per line (R))
Response time	t _A	≤1ns (line-SG) ≤1ns (SG-PG)	≤1ns (line-SG) ≤1ns (SG-PG)	≤1ns (line-SG) ≤1ns (SG-PG)	≤1ns(line-SG) ≤25ns (SG-PG)
Max. data transmission rates	V _s	1Mbits/s			
Operating temperature range		-40°C...+80°C			
Relative humidity		≤ 95% (25°C)			
Protective lines		Line: 8/ SG/PG	2 two-core lines	7/SG/PG	Line:7/8/25/26/27, PG:12/20/30
Pinning		Line: 1/2/3/4/6/7/8/9, SG: 5 (standby lines disconnected)	2/9 1 st pair; 4/11 2 nd pair; 8:SG: 1:PG (standby lines disconnected)	Line: 2/3/4/6/7/8/20, SG: 7 (standby lines disconnected)	Line: 7/8/25/26/27 (standby lines disconnected)
Mounting in		D-Sub, 2 threaded screws			D-Sub, 2 threaded screws/35mm Din Rail
Connection (input / output)		D-sub 9 socket/plug	D-sub 15 socket/plug	D-sub 25 socket/plug	D-sub 37 socket/plug
Shield earthing		Outgoing cable 1.5mm ² x 300mm			
Enclosure material		Plastic, metallised			
Dimension		64mm x 35.5mm x 21mm			
Standards		IEC 61643-21; GB 18802.21; YD/T 1542			
Certification		CE(EMC, LVD)			



❖ MAIN CHARACTER

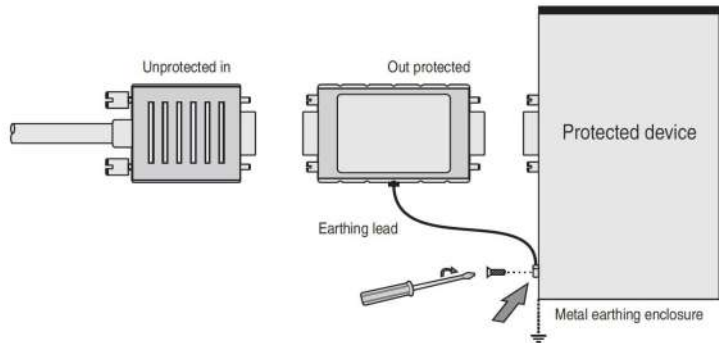
- ✓ High discharge capacity, low voltage protection level, quick response
- ✓ Do not impact the normal work of data management devices and system
- ✓ Apply for high speed transmission devices

INSTALLATION INSTRUCTION

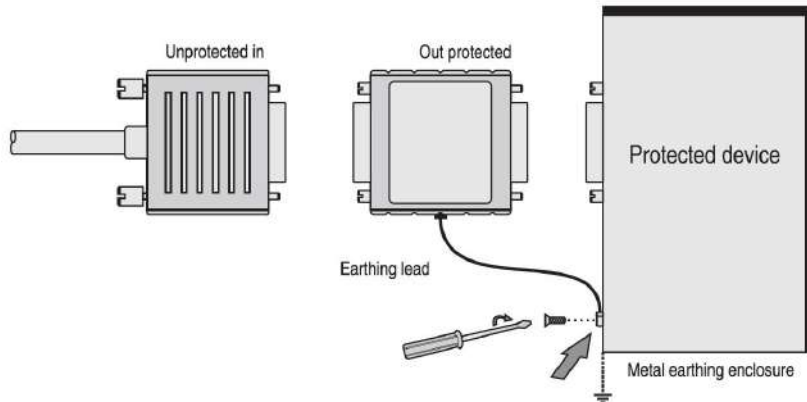
1. This product is connected in series to the protected device, installation in the partition of LPZ 2-3 interface;
In order to prevent lightning induction, LPZ 0A -1 and LPZ 1-2 interface must install additional surge protection products.
2. The out terminal should be connected to the protected devices.
3. SPD's earthing lead must be connected to nearby earthing BusBar or the metal earthing enclosure of protected device.
4. After above, you should ensure the circuit is functioning.

Regularly inspect the operating status, especially after lightning. Once the communication is off, electrician should check/replace the SPD.

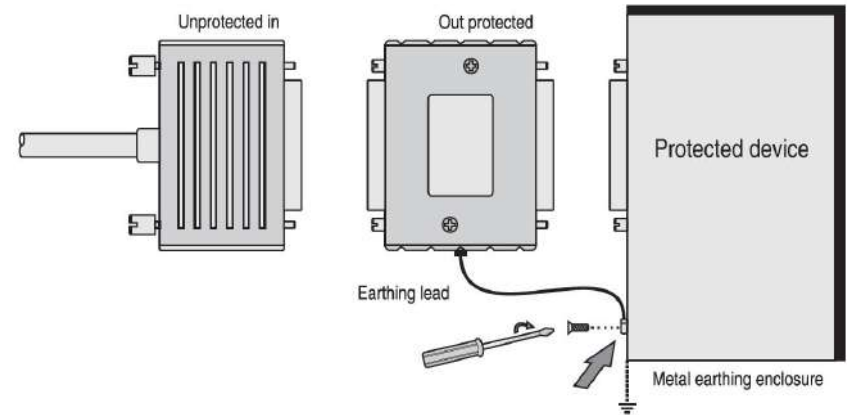
TS-RSP9 INSTALLATION DIAGRAM



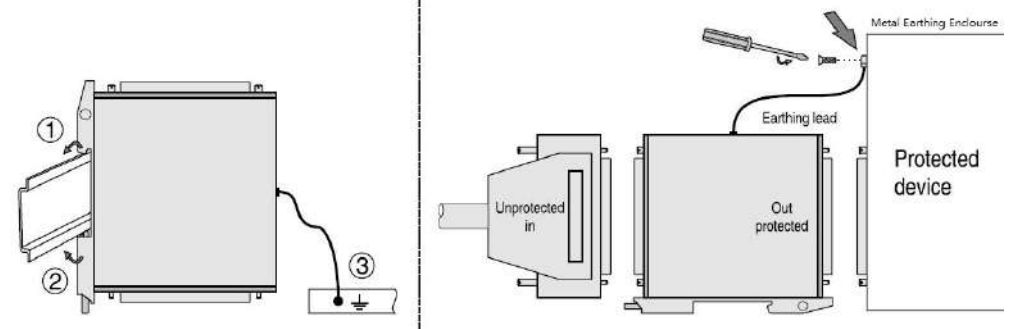
TS-RSP15 INSTALLATION DIAGRAM



TS-RSP25 INSTALLATION DIAGRAM



TS-RSP37 INSTALLATION DIAGRAM



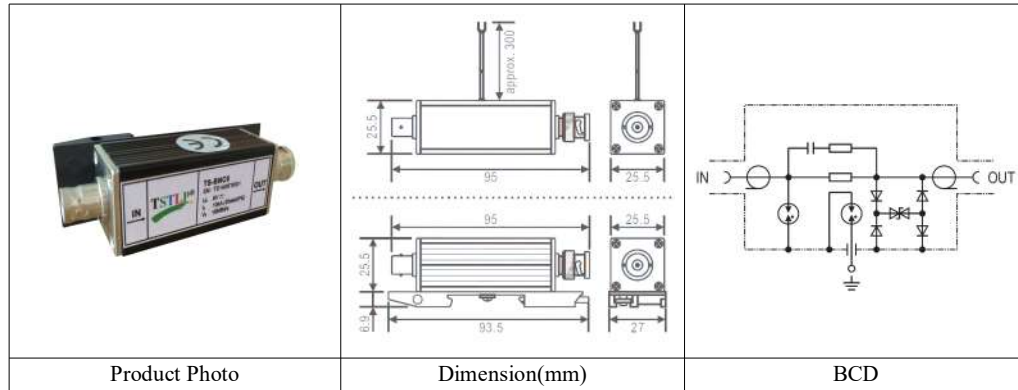
WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



■ TSTLP®/TS-BNC5 Surge Arrester for Coaxial Cable

- ❖ **INTRODUCTION:** TS-BNC5 protects coaxial cable transmission devices from interruption caused by surge current; Designed according to IEC 61643-21; GB 18802.21; YD/T 1542 . Mainly **used for** coaxial cable transmission devices, surveillance video signal transmission and so on.



❖ TECHNICAL DATA

Model		TS-BNC5	TS-BNC8
Nominal voltage	Un	5V-	8V/+1.5v
Rated voltage (max. continuous voltage)	Uc	8V-	-10V/+2.1V
Lightning Impulse Current (10/350)	Iimp	0.5KA	0.5KA
Nominal discharge current (8/20)	In	2.5kA(line-shield) 5kA(shield-PG)	2.5kA(line-shield) 5kA(shield-PG)
Max. discharge current (8/20)	Imax	5kA(line-shield) 10kA(shield-PG)	5kA(line-shield) 10kA(shield-PG)
Voltage protection level at In	Up	≤25V(line-shield)	≤35V(line-shield)
Voltage protection level at 1kV/μs	Up	≤15V(line-shield) ≤600V(line/shield-PG)	≤15V(line-shield) ≤600V(line/shield-PG)
Response time	tA	≤1ns (line- shield) ≤100ns (shield-PG)	≤1ns (line- shield) ≤100ns (shield-PG)
Bandwidth	fG	300MHz	300MHz
Series impedance per line	R	10Ω	1Ω
Max. data transmission rates	Vs	16Mbits/s	10Mbits/s
Operating temperature range		-40°C ~ +80°C	
Relative humidity		≤ 95% (25°C)	
Connection (input / output)		BNC(socket/plug)	
Mounting on		35mm DIN rail	
Earthing via		Earthing screw	
Shield earthing		Indirectly via integrated spark gap	
Standards		IEC 61643-21; GB 18802.21; YD/T 1542	
Compliance		CE(LVD,EMC)	

❖ MAIN CHARACTER

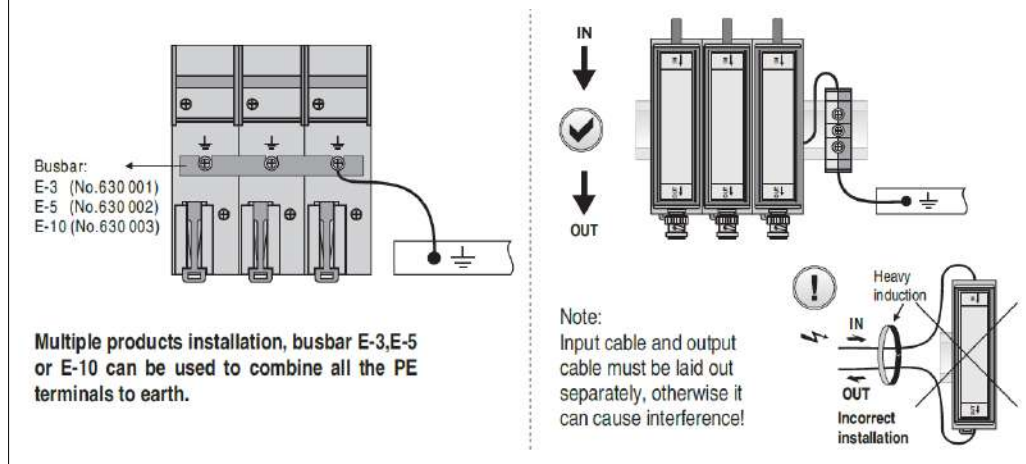
- ✓ Good discharge capacity, low voltage protection level
- ✓ Quick response minimize interruption
- ✓ BNC connection, easy for installation
- ✓ Core components are from internationally well known supplier

INSTALLATION INSTRUCTION

1. This product is connected in series to the protected device.
2. Mount the SPD on 35 mm DIN rail.
3. The out terminal should be connected to the protected devices.
4. SPD's earthing terminal must be connected to nearby earthing Busbar or the metal earthing enclosure of protected device.

Regularly inspect the operating status, especially after lightning, once the communication is off, electrician should check/replace the SPD.

TS-BNC5 INSTALLATION DIAGRAM




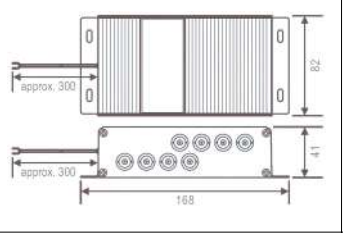
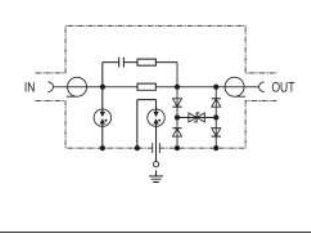

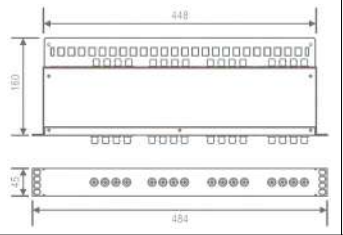
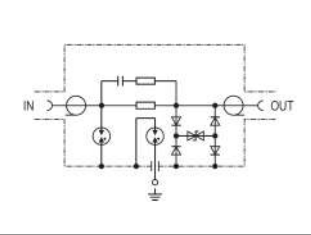

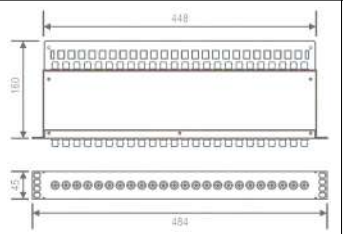
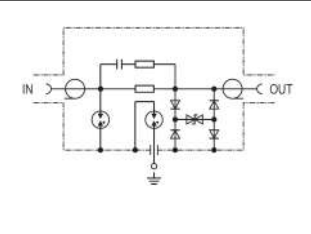
WARNING:

- The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
- It is recommended that installation should be done under power off condition.



■ **TSTLP®/Multi-BNC ports Surge Arrester for Coaxial Cable**

❖ **INTRODUCTION:**TS- Multi-BNC ports protects coaxial cable transmission devices from interruption caused by surge current; Designed according to IEC 61643-21; GB 18802.21; YD/T 1542 . Mainly used for coaxial cable transmission devices, surveillance video signal transmission and so on.

		
TS-8BNC5 Product Photo	TS-8BNC5 Dimension(mm)	TS-8BNC5 BCD
		
TS-16BNC5 Product Photo	TS-16BNC5 Dimension(mm)	TS-16BNC5 BCD
		
TS-24BNC5 Product Photo	TS-24BNC5 Dimension(mm)	TS-24BNC5 BCD

❖ **TECHNICAL DATA**

Models		TS-8BNC5 TS-16BNC5 TS-24BNC5
Nominal voltage	Un	5V-
Rated voltage (max. continuous voltage)	Uc	8V-
Open Voltage(1.2/50)	Uoc	5KV(line-shield) 10KA(shield-PG)
Nominal discharge current (8/20)	In	2.5kA(line-shield) 5kA(shield-PG)
Max. discharge current (8/20)	Imax	5kA(line-shield) 10kA(shield-PG)
Voltage protection level at In	Up	≤25V(line-shield)
Voltage protection level at 1kV/μs	Up	≤15V(line-shield) ≤600V(line/shield-PG)
Response time	tA	≤1ns (line- shield) ≤100ns (shield-PG)
Bandwidth	fG	300MHz
Max. data transmission rates	Vs	16Mbits/s
Operating temperature range		-40°C ~ +80°C
Relative humidity		≤ 95% (25°C)
Connection (input / output)		BNC(socket/plug)
Mounting on		35mm DIN rail
Earthing via		Earthing screw
Shield earthing		Indirectly via integrated spark gap
Standards		IEC 61643-21; GB 18802.21; YD/T 1542
Compliance		CE(LVD,EMC)

❖ **MAIN CHARACTER**

- ✓ Good discharge capacity, low voltage protection level
- ✓ Quick response minimize interruption
- ✓ BNC connection, easy for installation
- ✓ Core components are from internationally well known supplier

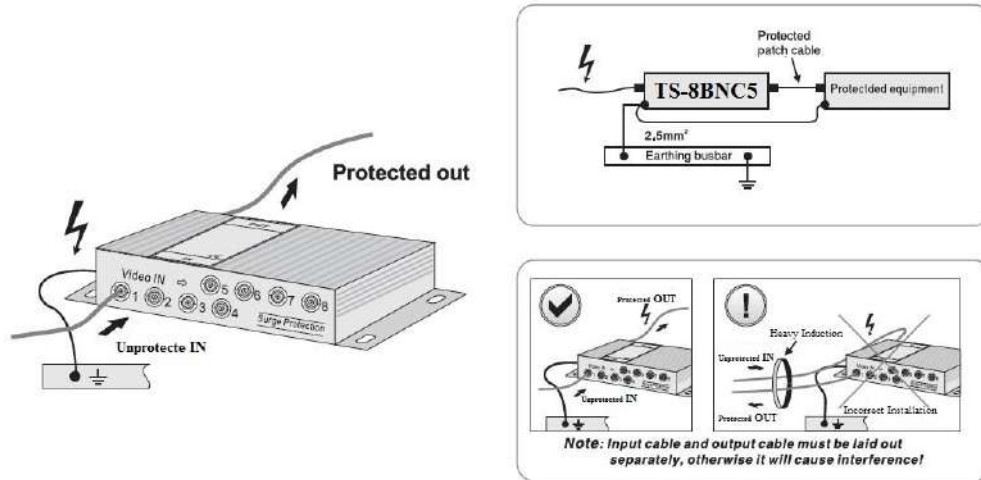


INSTALLATION INSTRUCTION

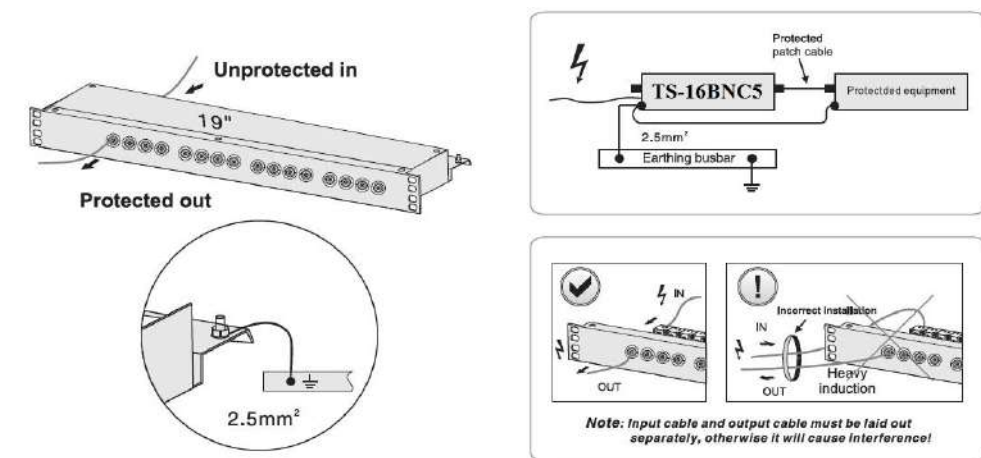
1. This product is connected in series to the protected device.
2. The out terminal should be connected to the protected devices.
3. SPD's earthing terminal must be connected to nearby earthing Busbar or the metal earthing enclosure of protected device.
4. After above, you should ensure the circuit is functioning.

Regularly inspect the operating status, especially after lightning, once the communication is off, electrician should check/replace the SPD.

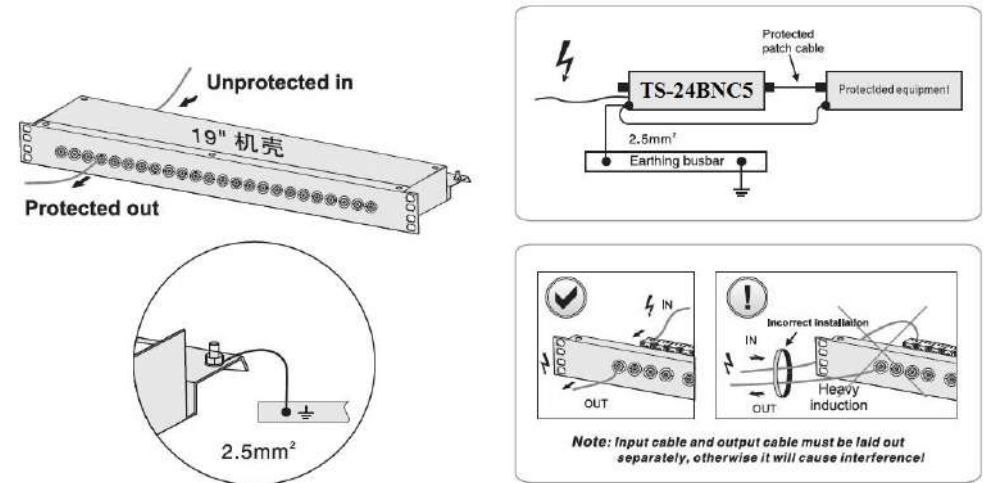
TS-8BNC5 INSTALLATION DIAGRAM



TS-16BNC5 INSTALLATION DIAGRAM



TS-24BNC5 INSTALLATION DIAGRAM



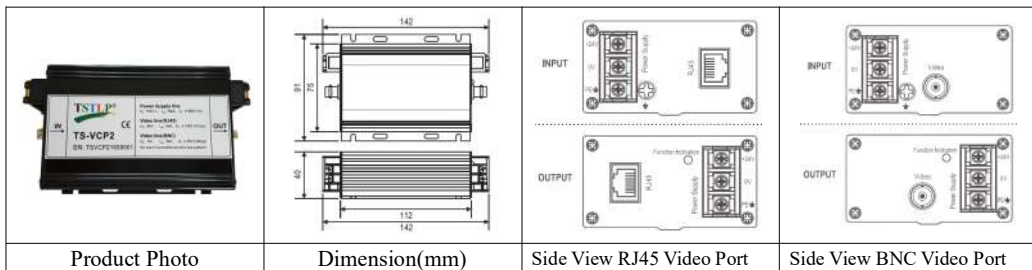
WARNING:

- The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
- It is recommended that installation should be done under power off condition.



■ TSTLP®/TS-VCP2 Surge Arrester for Security Surveillance System

- ❖ **INTRODUCTION:** TS-VCP2 2 in 1 surveillance surge arrester is for protection of power lines and video lines of surveillance devices from surge damages, such as surveillance video receiver and camera and so on. These products are widely used in bank surveillance systems(CCTV system), residential security systems, surveillance devices or school security corporation & roads



❖ TECHNICAL DATA

Model		TS-VCP2					
Protection lines		Video Line (BNC)	Video Line (RJ45)	Power Supply line			
Nominal voltage	Un	5V-	48V-	220V-	48V-	24V-	12V-
Lightning impulse current(10/350)	I _{imp}	0.5KA	0.5KA	---	---	---	---
Nominal discharge current (8/20)	In	2.5KA(line-shield) 5KA (shield-PG)	2.5KA (line-shield) 5KA (shield-PG)	5KA	5KA	5KA	5KA
Max. discharge current (8/20)	I _{max}	5KA (line-shield) 10KA (shield-PG)	5KA (line-shield) 10KA (shield-PG)	10KA	10KA	10KA	10KA
Voltage protection level at In	Up	≤25V (line- shield) ≤25V (shield-PG)	≤130V(line- shield) ≤130V (shield-PG)	≤950V (L-N)	≤450V (L-N)	≤300V (L-N)	≤240V (L-N)
Voltage protection level at 1kV/μs	Up	≤25V (line- shield) ≤25V (shield-PG)	≤145V(line-shield) ≤145V (shield-PG)	---	---	---	---
Response time	t _A	≤1ns (line- shield) ≤100ns (shield-PG)	≤1ns (line- shield) ≤100ns (shield-PG)	≤25ns	≤25ns	≤25ns	≤25ns
Bandwidth	f _G	10MHz	165MHz	---	---	---	---
Max. data transmission rate	V _s	16Mbits/s	100Mbits/s	---	---	---	---
Series impedance		---	---	---	---	---	---
Insertion lose		0.4dB	0.4dB	---	---	---	---
Connection (input/output)		BNC socket/plug	RJ45 socket/plug	Screw			
Operating temperature range		-40°C...+80°C					
Relative humidity:		95% (25°C)					
Earthing via		Earthing screw					
Enclosure material		Aluminum					
Standards		IEC 61643-21; GB 18802.21; YD/T 1542					
Compliance		CE(LVD,EMC)					

❖ MAIN CHARACTER

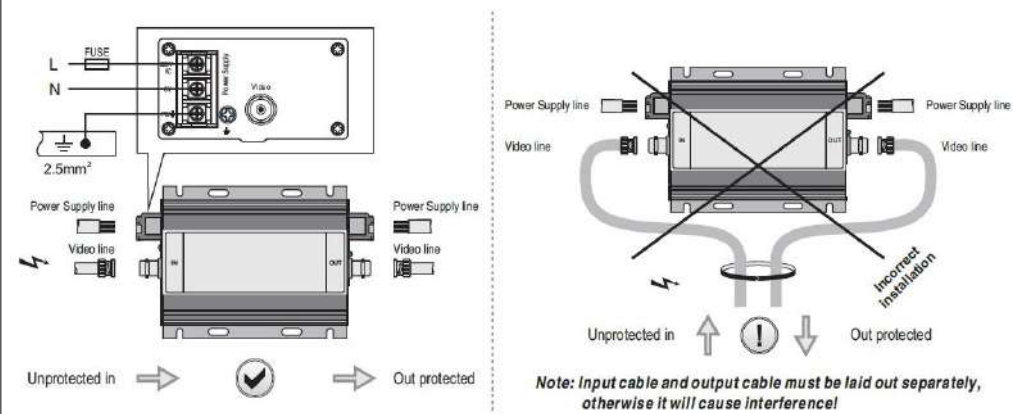
- ✓ Integrated protection for power lines and video signal lines of the camera
- ✓ High discharge capacity, low voltage protection level
- ✓ Quick response, multilevel protection ,small interference to transmission signal

INSTALLATION INSTRUCTION

1. This product is connected in series to the protected device.
2. The out terminal should be connected to the protected devices.
Note: The “IN” terminal power supply must be installed with a backup fuse;
3. Earth lead should be connected to the earthing system, ideally using 2.5mm² cable, the cable should be as short as possible
4. On power up, the green light will be on.

Regularly inspect the operating status, especially after lightning, once the communication is off, electrician should check/replace the SPD.

TS-VCP2 INSTALLATION DIAGRAM



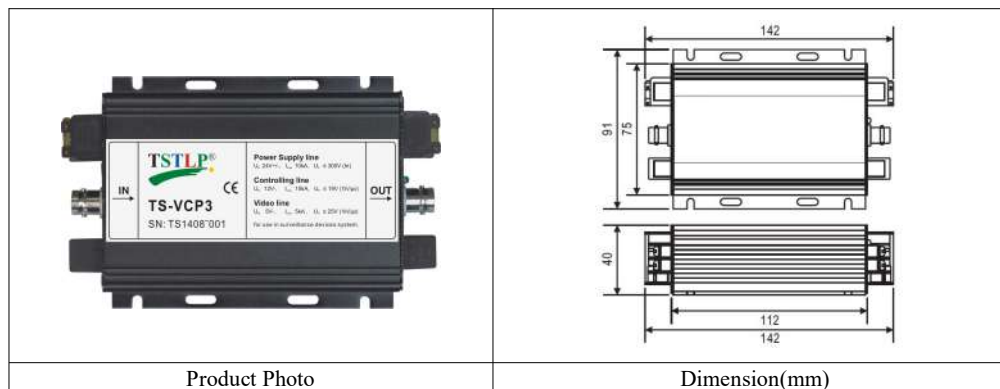
WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



■ **TSTLP®/TS-VCP3 Surge Arrester for Security Surveillance System.**

❖ **INTRODUCTION:**TS-VCP3 3 in 1 is for protection of power supply lines, control signal lines and video signal lines of surveillance devices from surge damages, such as surveillance video receiver, high speed dome camera, fixed camera and so on. These products are widely applied in surveillance systems.



❖ **TECHNICAL DATA**

Model		TS-VCP3					
Protection lines		Video Line	Controlling Line	Power Supply line			
Nominal voltage	Un	5V-	12V-	220V-	48V-	24V-	12V-
Lightning impulse current(10/350)	I _{imp}	0.5KA	2KA	---	---	---	---
Nominal discharge current (8/20)	In	2.5KA (line-shield) 5KA (shield-PG)	5KA (line-shield) 5KA (shield-PG)	5KA	5KA	5KA	5KA
Max. discharge current (8/20)	I _{max}	5KA (line-shield) 10KA (shield-PG)	10KA (line-shield) 10KA (shield-PG)	10KA	10KA	10KA	10KA
Voltage protection level at In	Up	≤25V (line- shield) ≤25V (shield-PG)	≤25V (line- shield) ≤25V (shield-PG)	≤950V (L-N)	≤450V (L-N)	≤300V (L-N)	≤240V (L-N)
Voltage protection level at 1kV/μs	Up	≤25V (line- shield) ≤25V (shield-PG)	≤19V (line- shield) ≤19V (shield-PG)	---	---	---	---
Response time	t _A	≤1ns (line- shield) ≤100ns (shield -PG)	≤1ns (line- shield) ≤100ns (shield -PG)	≤25ns	≤25ns	≤25ns	≤25ns
Bandwidth	f _G	10MHz	2.9MHz	---	---	---	---
Max. data transmission rate	V _S	16Mbits/s	---	---	---	---	---
Series impedance		---	1.9Ω	---	---	---	---
Insertion lose		0.4dB	0.5dB	---	---	---	---
Connection (input/output)		BNC/BNC (RS485)	Connecting terminal	Connecting terminal			
Operating temperature range		-40°C...+80°C					
Relative humidity:		95% (25°C)					
Earthing via		Earthing screw					
Enclosure material		Aluminum					
Standards		IEC 61643-21; GB 18802.21; YD/T 1542					
Compliance		CE(LVD,EMC)					

❖ **MAIN CHARACTER**

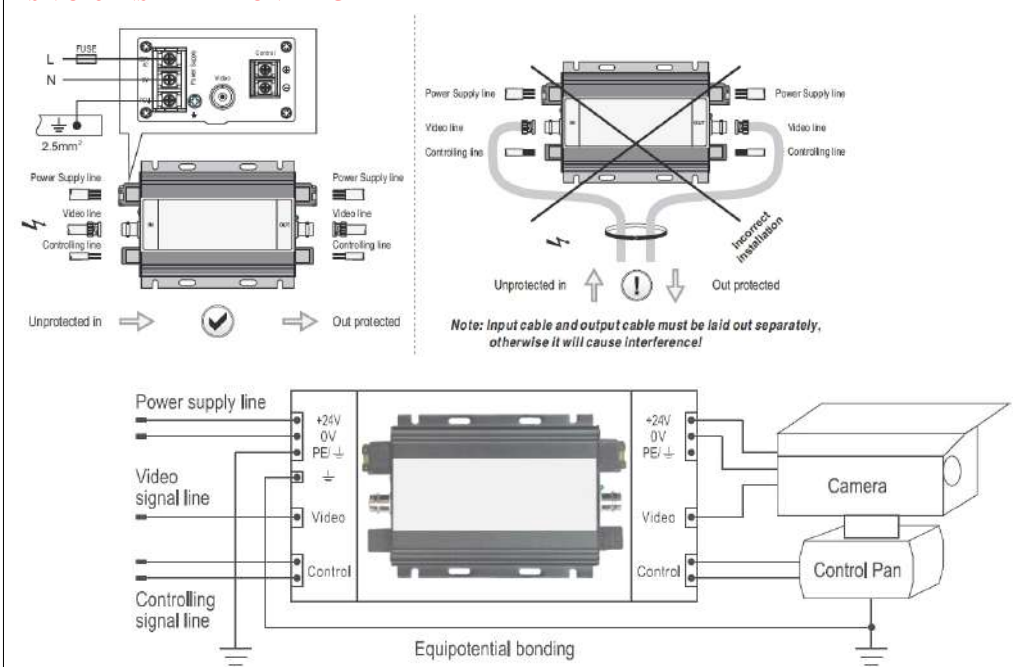
- ✓ Green light indicates normal and red light indicates fault for the power supply protection
- ✓ Integrated protection for power supply lines, control signal lines and video signal lines of the camera
- ✓ High discharge capacity, low voltage protection level
- ✓ Quick response, multilevel protection ,small interference to transmission signal
- ✓ Small volume,for installed on the 35 mm DIN rail.

INSTALLATION INSTRUCTION

1. This product is connected in series to the protected device.
2. Mount the SPD on the 35 mm DIN rail.
3. The out terminal should be connected to the protected devices.
Note: The “IN” terminal power supply must be installed with a backup fuse;
4. Earth lead should be connected to the earthing system, ideally using 2.5mm² cable, the cable should be as short as possible
5. On power up, the green light will be on.

Regularly inspect the operating status, especially after lightning. Once the communication is off, electrician should check/replace the SPD.

TS-VCP3 INSTALLATION DIAGRAM



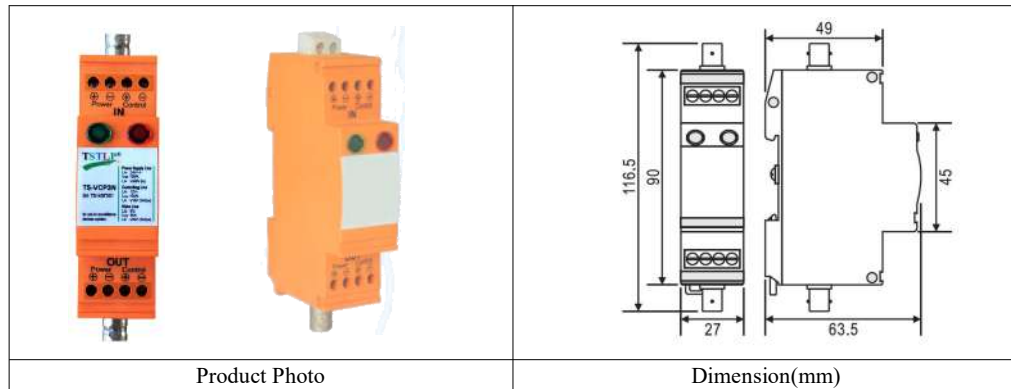
WARNING:

- The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
- It is recommended that installation should be done under power off condition.



■ **TSTLP®/TS-VCP3N Surge Arrester for Security Surveillance System.**

❖ **INTRODUCTION:**TS-VCP3N 3 in 1 is for protection of power supply lines, control signal lines and video signal lines of surveillance devices from surge damages, such as surveillance video receiver, high speed dome camera, fixed camera and so on. These products are widely applied in surveillance systems.



❖ **TECHNICAL DATA**

Model		TS-VCP3N					
Protection lines		Video Line	Controlling Line	Power Supply line			
Nominal voltage	Un	5V-	12V-	220V-	48V-	24V-	12V-
Lightning impulse current(10/350)	I _{imp}	0.5KA	2KA	---	---	---	---
Nominal discharge current (8/20)	In	2.5KA(line-shield) 5KA (shield-PG)	5KA (line-shield) 5KA (shield-PG)	5KA	5KA	5KA	5KA
Max. discharge current (8/20)	I _{max}	5KA (line-shield) 10KA (shield-PG)	10KA (line-shield) 10KA (shield-PG)	10KA	10KA	10KA	10KA
Voltage protection level at In	Up	≤25V (line- shield) ≤25V (shield-PG)	≤25V (line- shield) ≤25V (shield-PG)	≤950 V(L-N)	≤450V (L-N)	≤300V (L-N)	≤240V (L-N)
Voltage protection level at 1kV/μs	Up	≤25V (line- shield) ≤25V (shield-PG)	≤19V (line- shield) ≤19V (shield-PG)	---	---	---	---
Response time	t _A	≤1ns (line- shield) ≤100ns(shield-PG)	≤1ns (line- shield) ≤100ns (shield-PG)	≤25ns	≤25ns	≤25ns	≤25ns
Bandwidth	f _G	10MHz	2.9MHz	---	---	---	---
Max. data transmission rate	V _s	16Mbits/s	---	---	---	---	---
Series impedance		---	1.9Ω	---	---	---	---
Insertion lose		0.4dB	0.5dB	---	---	---	---
Connection (input/output)		BNC/BNC (RS485)	Connecting terminal	Connecting terminal			
Operating temperature range		-40°C...+80°C					
Relative humidity:		95% (25°C)					
Earthing via		Earthing screw					
Enclosure material		Aluminum					
Standards		IEC 61643-21; GB 18802.21; YD/T 1542					
Compliance		CE(LVD,EMC)					

❖ **MAIN CHARACTER**

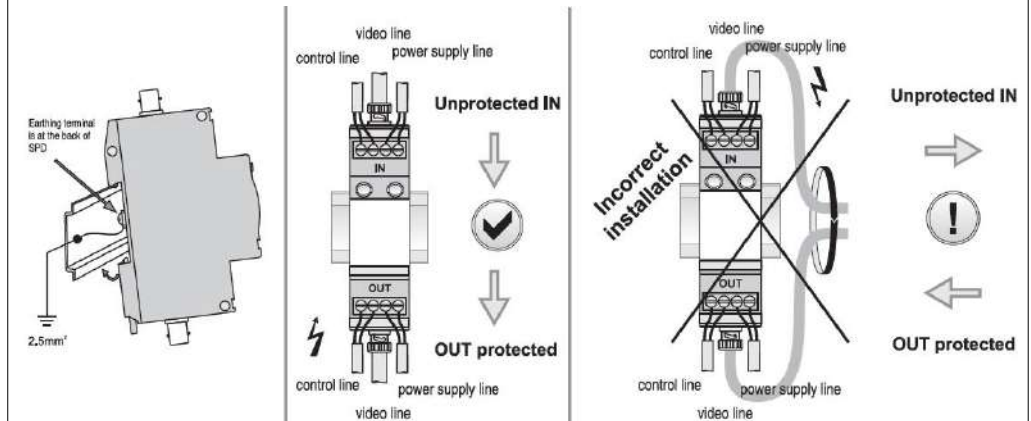
- ✓ Green light indicates normal and red light indicates fault for the power supply protection
- ✓ Integrated protection for power supply lines, control signal lines and video signal lines of the camera
- ✓ High discharge capacity, low voltage protection level
- ✓ Quick response, multilevel protection ,small interference to transmission signal
- ✓ Small volume,for installed on the 35 mm DIN rail.

INSTALLATION INSTRUCTION

1. This product is connected in series to the protected device.
2. Mount the SPD on the 35 mm DIN rail.
3. The out terminal should be connected to the protected devices.
Note: The “IN” terminal power supply must be installed with a backup fuse;
4. Earth lead should be connected to the earthing system, ideally using 2.5mm² cable, the cable should be as short as possible
5. On power up, the green light will be on.

Regularly inspect the operating status, especially after lightning. Once the communication is off, electrician should check/replace the SPD.

TS-VCP3N INSTALLATION DIAGRAM



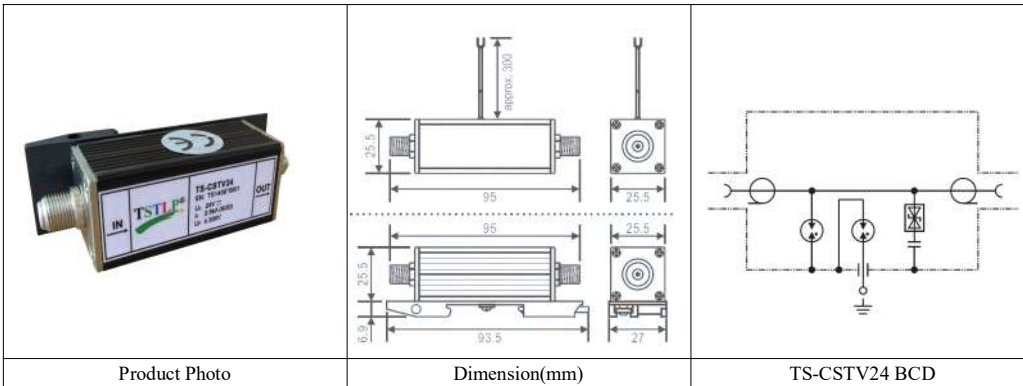
WARNING:

- The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
- It is recommended that installation should be done under power off condition.



■ TSTLP®/TS-CSTV24 Surge Arrester for Satellite & TV Cable System Protection

- ❖ **INTRODUCTION:** TS-CTV24 is applied in 75Ω satellite and cable TV system. Designed according to IEC 61643-2; GB 18802.21; YD/T 1542. Mainly used for 75Ω satellite and cable TV system protection and so on.



❖ TECHNICAL DATA

Model	TS-CSTV24	
Rated voltage (max. continuous voltage)	U _c	24V-
Nominal current	I _L	2A
Lightning Impulse Current (10/350)	I _{imp}	0.5KA
Nominal discharge current (8/20)	I _n	2.5KA
Voltage protection level at In	U _p	≤300V (line-shield)
Voltage protection level at 1kV/ms	U _p	≤60V (line-shield)
Frequency range	F	5-3000MHz
Insertion loss	a _E	1.2dB (5-862MHz)
		1.4dB (862-2400MHz) 2dB (2400-3000MHz)
Return loss (input/output)	a _R	≥ 14dB (5-47MHz)
		≥ 18dB (47-3000MHz)
Shield attenuation	a _s	≥ 85dB (5-300MHz) ≥ 80dB (300-470MHz)
		≥ 75dB (470-1000MHz) ≥ 55dB (1000-3000MHz)
Surge impedance	Z	75Ω
Response time	R	≤ 1ns (line-shield)
Operating temperature range		-40°C...+80°C
Connection (input / output)		F socket
Shield earthing		Screw terminal
Mounting on		35mm DIN rail
Enclosure material		Aluminum
Standards		IEC 61643-2; GB 18802.21; YD/T 1542
Compliance		CE(LVD,EMC)

❖ MAIN CHARACTER

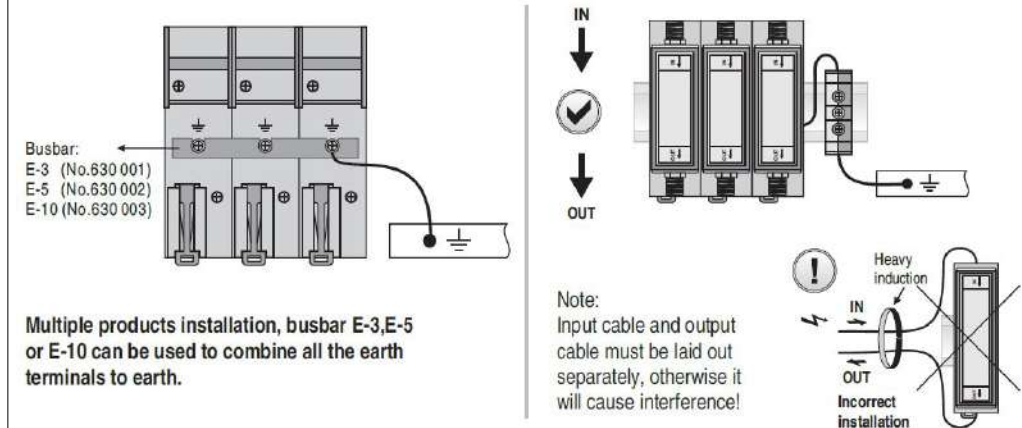
- ✓ Good discharge capacity, low voltage protection level
- ✓ Multiple protection, quick response, no interruption
- ✓ F socket connection, easy for installation

INSTALLATION INSTRUCTION

1. This product is connected in series to the protected device.
2. Mount the SPD on 35 mm DIN rail.
3. The out terminal should be connected to the protected devices.
4. SPD's earthing terminal must be connected to nearby earthing BusBar or the metal earthing enclosure of protected device.
5. After above, you should ensure the circuit is functioning.

Regularly inspect the operating status, especially after lightning. Once the communication is off, electrician should check/replace the SPD.

TS-CSTV24 INSTALLATION DIAGRAM



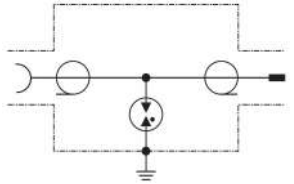
WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
2. It is recommended that installation should be done under power off condition.



■ TSTLP®/TS series Antenna Surge Arrester

- ❖ **MAIN CHARACTER:** TS series antenna surge arrester is for 50Ω coaxial system at LPZ0B-1; Designed according to IEC 61643-21; GB 18802.21; YD/T 1542. Mainly used for various feed system, and so on.

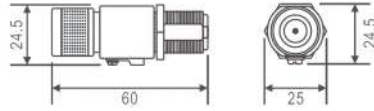


TS-G500N & TS-G500BNC Basic Circuit Diagram

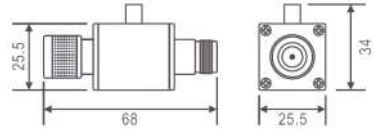


Product Photo

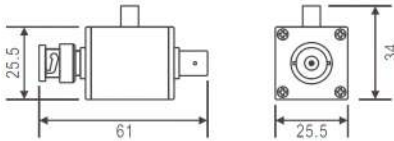
TS-G2500N



TS-G500N



TS-G500BNC



Dimension (mm)

❖ TECHNICAL DATA

Model		TS-G500N	TS-G500BNC	TS-G1000N	TS-G2500N	TS-G3000N
Rated voltage (max. continuous voltage)	Uc	250V	250V	250V	90V	250V
Nominal current	I _L	3.5A	3.5A	3.5A	---	3.5A
Lightning impulse current(10/350)	I _{imp}	1KA	1KA	1KA	1KA	1KA
Nominal discharge current (8/20)	I _n	5KA	5KA	5KA	5KA	8KA
Max. discharge current (8/20)	I _{max}	10KA	10KA	10KA	---	20KA
Voltage protection level at I _{max}	U _p	≤700V	≤700V	≤700V	≤150V	≤750V
Frequency range	F	500MHZ	500MHZ	1000MHZ	2500MHZ	3000MHZ
Max.output power	p	500W	500W	500W	500W	500W
Insertion loss	a _F	≤0.2dB	≤0.2dB	≤0.2dB	≤0.2dB	≤0.2dB
Return loss(input/output)	a _R	≥20dB	≥20dB	≥20dB	≥20dB	≥20dB
Surge impedance	Z	50Ω	50Ω	50Ω	50Ω	50Ω
Operating temperature range		-40°C...+80°C				
Connection (input / output)		N head	BNC head	N socket/ N plug		
Shield earthing		Outgoing connecting port				
Enclosure material		Aluminum				
Standards		IEC 61643-21; GB 18802.21; YD/T 1542				
Compliance		CE(LVD,EMC)				

❖ MAIN CHARACTER

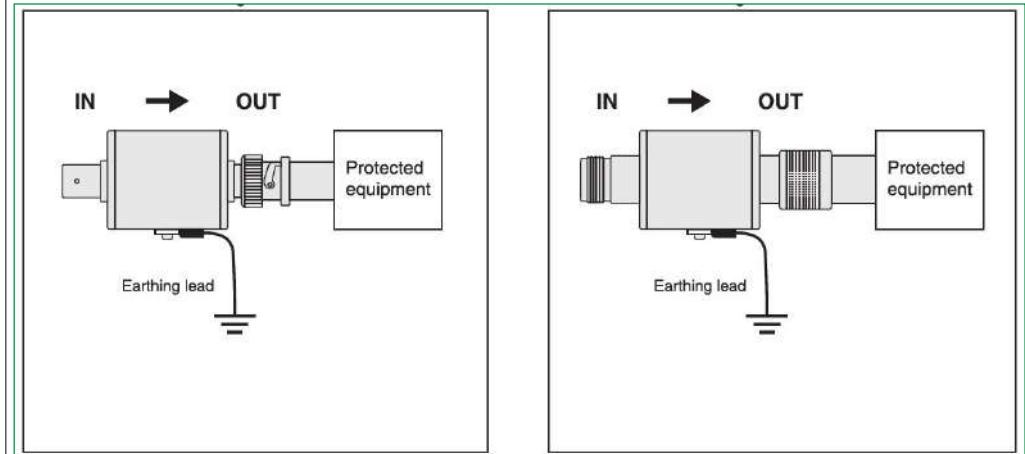
- ✓ Good discharge capacity, low voltage protection level
- ✓ Quick response, no interruption
- ✓ N or BNC connection, easy for installation

INSTALLATION INSTRUCTION

1. This product is connected in series to the protected device.
2. The out terminal should be connected to the protected devices.
3. SPD's earthing terminal must be connected to nearby earthing BusBar or the metal earthing enclosure of protected device.
4. After above, you should ensure the circuit is functioning.

Regularly inspect the operating status, especially after lightning. Once the communication is off, electrician should check/replace the SPD.

TS-G500N & TS-G500BNC INSTALLATION DIAGRAM



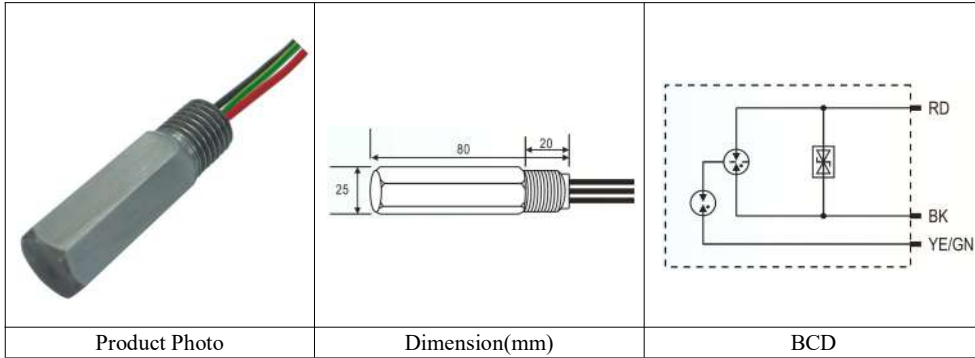
WARNING:

- The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
- It is recommended that installation should be done under power off condition.



■ TSTLP®/TS-EX24 Surge Arrester for Hazardous Areas Technology System

- ❖ Installed at LPZ Ob-2 or higher inside the control equipment, the built-in cable connected with the control equipment's wiring terminal. Applied in intrinsically safe circuit in hazardous areas and 4-20mA measuring control system and bus system.



❖ TECHNICAL DATA

Model Number		TS-EX24
Normal Voltage	U_n	24V-
Rated voltage (max. continuous voltage)	U_c	32V- 22.6V ~
Lightning impulse current (10/350)	I_{imp}	1.5kA
Normal current	I_L	0.55A
Nominal discharge current (8/20)	I_n	10kA (per line); 10kA(total)
Voltage protection level at I_n	U_p	$\leq 58V$ (line/line); $\leq 1700V$ (line/PG)
Voltage protection level at 1kV/ μ s	U_p	$\leq 50V$ (line/line); $\leq 1200V$ (line/PG)
Bandwidth	f_G	67MHz
Capacitance	C	$\leq 25pF$ (line/line); $\leq 15pF$ (line/PG)
Operating temperature range		-40 °C ~ +80 °C
Mounting in		M20 x 1.5 screws
Connection (input / output)		1.3 mm x 250mm length of the connecting lead
Earthing via		Connecting lead
Enclosure material		Stainless steel case
Compliance		IEC-61643-21, GB18802.21, YD/T 1542

❖ MAIN CHARACTER

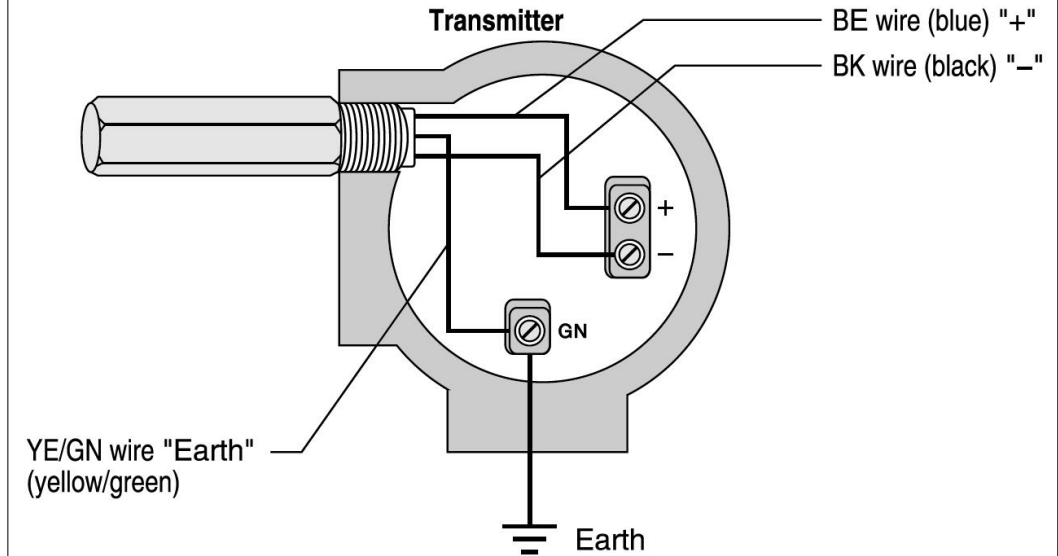
- ✓ Small & easy replacement.
- ✓ Easy to install inside the control equipment.
- ✓ Stainless steel housing, fireproof & explosion-proof outdoor use.

Installation Instruction

1. Screwing into the wiring port of the control equipment directly
2. Blue wire connected with signal port "+", Black Wire connected with signal port "-"
3. Yellow / Green wire connect with grounding port "GN" of grounding system.
4. After installation, check if communication is be operating normally.

Regularly inspect the operating status, especially after lightning. Once the communication is off, electrician should check/replace the SPD.

INSTALLATION DIAGRAM



WARNING:

1. The device must be installed by electrically skilled person, conforming to national standards and safety regulations.
It is recommended that installation should be done under power off condition.

Catalogue V1.1 2017, all rights reserved !

TSLPRO®

TSTLP®



TS Lightning Protection Co.,Ltd
Guangzhou TS Lightning Protection Equipment Co.,Ltd

www.tslpro.com

**We sincerely invite competent customers to be our distributor for WIN-WIN
Cooperation !**

Best Regards

Start Future From Safety

www.tslpro.com