

Lightning Current Equipotential Bonding SPDs

Introduction

Furse is a world leader in the design, manufacture, and supply of earthing and lightning protection systems.

Over 100 years of experience makes us acknowledged experts in the field. We provide technical support to our customers, ranging from site visits, system design advice, detailed application drawings and training through to on-site supervision, testing and commissioning.

Quality approved to BS EN ISO 9001:2000, we are dedicated to providing cost-effective and highly efficient products and service.

We have had a major involvement in the production of international standards on lightning protection over the past 15 years.

Furse offers a 'Total Solution' to all your lightning protection and earthing problems.

From design advice to innovative, solution-oriented products, Furse has the expertise, experience and excellence to provide a Total Solution to your individual lightning protection, transient overvoltage and earthing problems.

This brochure details the new range of Lightning Current/Equipotential Bonding SPDs required to ensure you can meet the requirements of BS EN 62305:2006.



Introduction

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What are Lightning Current/Equipotential Bonding SPDs and how do they differ from 'transient overvoltage' SPDs?

ESP 240/XXX range

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Details of the ESP range of Lightning Current SPDs suitable for use with 240 volt single phase supplies

ESP 415/XXX range

6 - 7

Details of the ESP range of Lightning Current SPDs suitable for use with 415 volt three phase supplies

Transient overvoltage SPDs

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Lightning Current SPDs are not designed to protect electronic equipment against the secondary effects of a lightning strike. Find out which Furse ESP protectors will protect your sensitive electrical and electronic equipment



NEW standards requirements for application of Surge Protection Devices (SPDs)

Previously, in BS 6651, the protection of electrical and electronic equipment was included merely as an annex (Annex C) only as a strong recommendation/guidance measure.

Newly released BS EN 62305 will replace BS 6651 and this new standard considers the protection of electrical and electronic equipment as integrally as the protection of the physical structure itself.

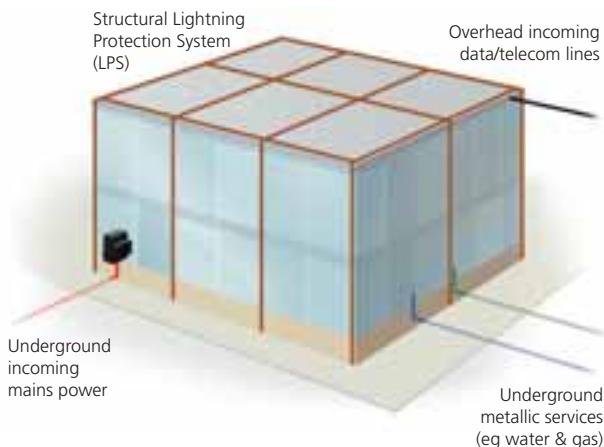
BS EN 62305-2 Risk Management

Is used to evaluate the required level of lightning protection measures necessary to lower the risk of damage to a particular structure, its contents and occupants to a defined tolerable level.

Structural LPS required

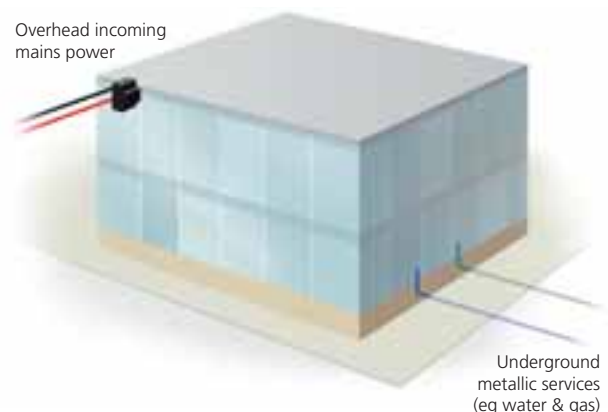
If the risk evaluation demands that a structural LPS is required, then equipotential bonding or lightning current Type I SPDs are always required for any metallic electrical services entering the structure. These would typically be power and telecom lines.

These SPDs are necessary to divert the partial lightning currents safely to earth and limit the transient overvoltage to prevent possible flashover. They are therefore an integral part of the structural LPS and typically form the first part of a coordinated SPD set for effective protection of electronic equipment.



Structural LPS not required

If the risk evaluation shows that a structural LPS is not required but there is an indirect risk, any electrical services feeding the structure via an overhead line will require lightning current Type I SPDs.





Enhanced performance SPDs – SPD*

BS EN 62305-2 details the application of improved performance SPDs to further lower the risk from damage. The lower the sparkover voltage, the lower the chance of flashover causing insulation breakdown, electric shock and fire. SPDs that offer lower (and therefore better) voltage protection levels further reduce the risks of injury to living beings, physical damage as well as the failure and malfunction of internal systems. All Furse ESP protectors offer such superior protection and are therefore termed as enhanced performance SPDs (SPD*) in accordance with BS EN 62305.

Types of SPD

BS 6651 only dealt with the provision of SPDs to protect against transient overvoltages caused by, the secondary effects of the more common indirect lightning strike.

BS EN 62305 deals with the provision of SPDs to protect against both the effects of indirect lightning strikes and high energy direct lightning strikes.

Direct lightning strikes are protected against by the application of Type I lightning current or equipotential bonding SPDs

Indirect lightning strikes and switching transients are protected against by the application of transient overvoltage Type II and Type III SPDs

Type I

Lightning current or equipotential bonding SPD designed to prevent dangerous sparking caused by flashover. Flashover is caused when the extremely high voltage associated with a direct lightning strike breaks down cable insulation. This can occur between the structural LPS and electrical services and presents a potential fire hazard and risk from electric shock. Details of Furse Type I SPDs can be found on pages 4 – 7.



Type II and Type III

Transient overvoltage SPDs designed to protect electrical and electronic equipment from the secondary effects of an indirect lightning strike and against switching transients caused by lift motors and air conditioning for example. SPDs should be installed at sub-distribution boards and at equipment level. Furse Type II and III SPDs are briefly described on page 8. Full details can be found in the separate Total Solutions catalogue.



IMPORTANT

The primary purpose of Lightning current or Equipotential bonding Type I SPDs is to prevent dangerous sparking caused by flashover to protect against the loss of human life. In order to protect electronic equipment and ensure the continual operation of systems, transient overvoltage Type II and III SPDs are required. BS EN 62305 refers to the correct application of Type I, II and III SPDs as a coordinated set.

For further information, please refer to "A Guide to BS EN 62305:2006 Protection Against Lightning" available from Furse.



1 phase Type I protectors

Specifications

- Type I/Class B protectors
- I_{max} of up to 100kA 8/20 μ s per mode (160kA 8/20 μ s for TT versions)
- I_{imp} of up to 50kA 10/350 μ s per mode (100kA 10/350 μ s for TT versions)

Application

- Use on single phase mains supplies and power distribution systems for protection against partial direct or indirect lightning strikes
- ESP 240/I/XXX versions for use with Class I or II Lightning Protection Systems (LPS)
- ESP 240/III/XXX versions for use with Class III or IV LPS; or exposed overhead single phase power lines where no LPS is fitted
- ESP 240/X/TNS versions also cover TNC-S earthing systems

Installation

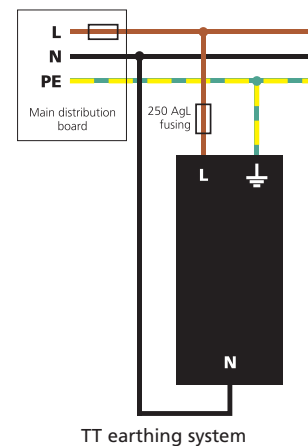
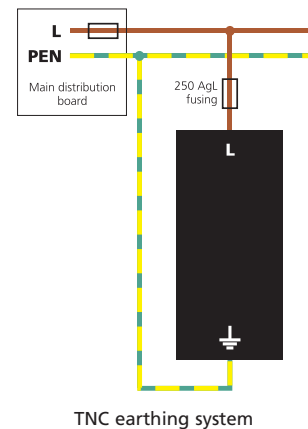
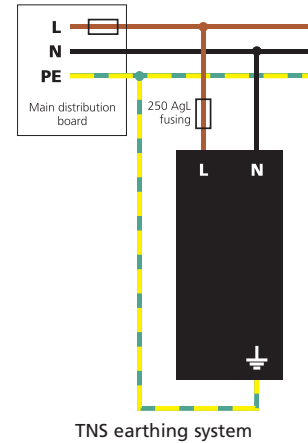
Protector to be installed in the main distribution panel with connecting leads of minimal length. The protector should be fused and is suitable for attachment to a 35mm top hat DIN rail.

Features and benefits

- Enhanced protection offering low let-through voltage (U_p)
- The varistor based design eliminates the high follow current (I_f) associated with spark gap based surge protection
- Compact, space saving design
- Indicator shows when the protector requires replacement
- Remote signal contact can indicate the protectors' status through interfacing with a building management system

Wiring diagrams

The diagrams below illustrate how to wire the appropriate ESP protector according to your chosen electrical system



Electrical specification

	ESP 240/I/TNS	ESP 240/III/TNS	ESP 240/I/TNC	ESP 240/III/TNC	ESP 240/I/TT	ESP 240/III/TT
Nominal voltage	220-240V _{RMS}	220-240V _{RMS}	220-240V _{RMS}	220-240V _{RMS}	220-240V _{RMS}	220-240V _{RMS}
Maximum continuous operating voltage (U_c)	275Vac, 350Vdc	275Vac, 350Vdc	275Vac, 350Vdc	275Vac, 350Vdc	275Vac, 350Vdc	275Vac, 350Vdc
Back up fuse (If mains supply >100A)	250A gL	250A gL	250A gL	250A gL	250A gL	250A gL
Short circuit capability	25kA/50Hz	25kA/50Hz	25kA/50Hz	25kA/50Hz	25kA/50Hz	25kA/50Hz
Signal contact ratings	250V _{RMS} / 0.5A	250V _{RMS} / 0.5A	250V _{RMS} / 0.5A	250V _{RMS} / 0.5A	250V _{RMS} / 0.5A	250V _{RMS} / 0.5A
Arrester classification/Type						
E DIN VDE 0675	B (B+C)	B (B+C)	B (B+C)	B (B+C)	B (B+C)	B (B+C)
IEC ¹	I, II	I, II	I, II	I, II	I, II	I, II

¹ Tested to BS/EN & IEC 61643

Transient specification

Let-through voltage (U_p)						
at I _n (8/20μs)	<1.3kV	<1.4kV	<1.3kV	<1.4kV	<1.3kV	<1.4kV
at I _{imp} (10/350μs)	<1.1kV	<1.1kV	<1.1kV	<1.1kV	<1.1kV	<1.1kV
at (1.2/50μs) – GDT only	-	-	-	-	<1.2kV	<1.2kV
Nominal discharge current						
I _n , (8/20μs)	80kA	40kA	80kA	40kA	80kA(MOV)/ 100kA(GDT)	40kA(MOV)/ 50kA(GDT)
Maximum discharge current						
I _{max} (8/20μs)	100kA	100kA	100kA	100kA	100kA(MOV)/ 160kA(GDT)	100kA(MOV)/ 100kA(GDT)
I _{imp} (10/350μs)	50kA	25kA	50kA	25kA	50kA(MOV)/ 100kA(GDT)	25kA(MOV)/ 50kA(GDT)

Mechanical specification

Temperature range	-40 to +80°C					
Connection						
- for power	35mm ² solid conductor, 25mm ² stranded conductor					
- for signal (remote contact)	1.5mm ² conductor					
Mounting						
Indoor, 35mm top hat DIN rail						
Degree of protection						
IP20						
Case material						
Thermoplastic, UL 94 V-0						
Dimensions to DIN 43880 - H x D x W	90mm x 68mm x 72mm (4TE)	90mm x 68mm x 36mm (2TE)	90mm x 68mm x 72mm (4TE)	90mm x 68mm x 36mm (2TE)	90mm x 68mm x 72mm (4TE)	90mm x 68mm x 54mm (3TE)
The remote signal contact terminals (removable) add 10mm to height						



3 phase Type I protectors

Specifications

- Type I/Class B protectors
- I_{max} of up to 100kA 8/20µs per mode (160kA 8/20µs for TT versions)
- I_{imp} of up to 25kA 10/350µs per mode (100kA 10/350µs for TT versions)

Application

- Use on three phase mains supplies and power distribution systems for protection against partial direct or indirect lightning strikes
- ESP 415/I/XXX versions for use with Class I or II Lightning Protection Systems (LPS)
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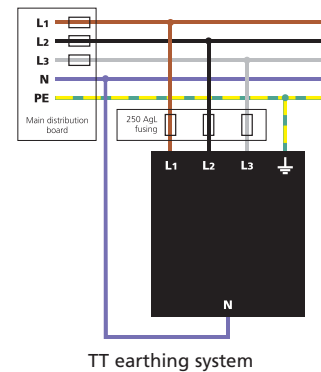
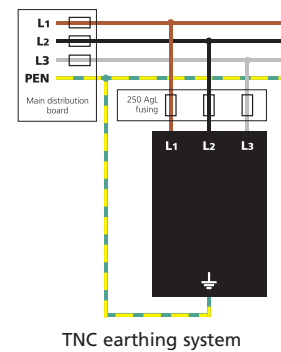
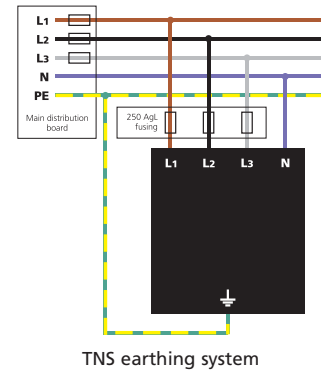
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Features and benefits

- Enhanced protection offering low let-through voltage (U_p)
- The varistor based design eliminates the high follow current (I_f) associated with spark gap based surge protection
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Maximum continuous operating voltage (U_c)	275Vac, 350Vdc	275Vac, 350Vdc	275Vac, 350Vdc	275Vac, 350Vdc	275Vac, 350Vdc	275Vac, 350Vdc
Back up fuse (If mains supply >100A)	250A gL	250A gL	250A gL	250A gL	250A gL	250A gL
Short circuit capability	25kA/50Hz	25kA/50Hz	25kA/50Hz	25kA/50Hz	25kA/50Hz	25kA/50Hz
Signal contact ratings	250V _{RMS} / 0.5A	250V _{RMS} / 0.5A	250V _{RMS} / 0.5A	250V _{RMS} / 0.5A	250V _{RMS} / 0.5A	250V _{RMS} / 0.5A
Arrester classification/Type						
E DIN VDE 0675	B (B+C)	B (B+C)	B (B+C)	B (B+C)	B (B+C)	B (B+C)
IEC ¹	I, II	I, II	I, II	I, II	I, II	I, II

1 Tested to BS/EN & IEC 61643

Transient specification

Let-through voltage (U_p)						
at I _n (8/20μs)	<1.4kV	<1.4kV	<1.4kV	<1.4kV	<1.4kV	<1.4kV
at I _{imp} (10/350μs)	<1.1kV	<1.0kV	<1.1kV	<1.0kV	<1.1kV	<1.0kV
at (1.2/50μs) – GDT only	-	-	-	-	<1.2kV	<1.2kV
Nominal discharge current						
I _n , (8/20μs)	40kA	20kA	40kA	20kA	40kA(MOV)/ 100kA(GDT)	20kA(MOV)/ 50kA(GDT)
Maximum discharge current						
I _{max} (8/20μs)	100kA	50kA	100kA	50kA	100kA(MOV)/ 160kA(GDT)	50kA(MOV)/ 100kA(GDT)
I _{imp} (10/350μs)	25kA	12.5kA	25kA	12.5kA	25kA(MOV)/ 100kA(GDT)	12.5kA(MOV)/ 50kA(GDT)

Mechanical specification

Temperature range	-40 to +80°C
Connection	
- for power	35mm ² solid conductor, 25mm ² stranded conductor
- for signal (remote contact)	1.5mm ² conductor
Mounting	Indoor, 35mm top hat DIN rail
Degree of protection	IP20
Case material	
for ESP 415/X/TNS	Thermoplastic, UL 94 V-0
for ESP 415/X/TNC	90mm x 68mm x 72mm (4TE)
for ESP 415/X/TT	90mm x 68mm x 54mm (3TE)
	90mm x 68mm x 90mm (5TE)
The remote signal contact terminals (removable) add 10mm to height	

Transient overvoltage SPDs

“A Lightning Protection System which only employs equipotential bonding SPDs provides no effective protection against failure of sensitive electrical or electronic systems” BS EN 62305-4

As described on pages 2-3, the Lightning Current SPDs detailed in this brochure protect against flashover caused by a direct lightning strike preventing fire and electric shock hazards – they do not protect electronic systems against transient overvoltages, the secondary effects of a nearby lightning strike.

For many years now the Furse ESP range of transient overvoltage protectors have been providing effective protection for a wide range of applications.

From mains wire-in and plug-in to data, telecoms, RF, CCTV and computer networks, amongst others, the Furse ESP range provides superior protection with low let-through voltage and is maintenance free. With a long lifetime, robust construction and easy installation, the extensive range will protect most modern applications, ensuring continual system operation.



Protect mains supplies and power distribution systems



Protect computer networks



Protect data signal and telephone lines



Protect RF systems

Full details of the Furse ESP range can be found in our Total Solution catalogue. Request your copy today.

Home to many well-known brands and with over 100 years experience, Thomas & Betts provide a truly world-class level of quality, service and support. Thomas & Betts' Electrical Division provides the following key products:

Thomas & Betts
Electrical World

Termination Systems

A wide range of termination systems for a variety of applications, including:

- **Shield-Kon**® for the earth termination of shielded cables
- **Sta-Kon**® insulated and non-insulated terminals for cables from 0.25mm² to 6mm²
- **Dragon Tooth**® insulation piercing connectors to splice, tap and terminate copper or aluminium wires

Cable Ties and Fasteners

From the pioneers of the 'Ty-Rap'® – a huge range of cable ties, including:

- **Ty-Rap**® premium two piece ties with integral steel locking barb
- **Ty-Fast**® high quality, one-piece all-plastic ties
- **Ty-Met**™ self-locking stainless steel ties
- **Ty-Grip**™ hook and loop releasable ties

Conduit and Fittings

A range of flexible and watertight conduits for industrial and commercial applications:

- **Shureseal**™: PVC or galvanised steel with robust jacket (IP rating up to IP67)
- **Shureflex**®: galvanised steel (coated or uncoated) or Halogen-free Polyamide (IP rating up to IP68)
- Quick and easy installation
- A wide range of fittings to a variety of standards

Heatshrink

Shrink-Kon® multi-purpose heatshrink for use in insulation, protection, identification and strain relief:

- Manufactured from cross-linked polyolefin
- Available in a variety of shrink ratios
- Up to 14 nominal widths to deal with a huge variety of applications

- Ty-Rap**®
- Ty-Fast**®
- Ty-Met**™
- Ty-Grip**™
- Col-Ty**™
- E-Klips**®
- Shureseal**™
- Shureflex**®
- Shrink-Kon**®
- Bind-It**®
- Sta-Kon**®
- Color-Keyed**®
- Dragon Tooth**®
- Shield-Kon**®
- Omni-Plus**®

In addition to their own core products, Thomas & Betts is also proud to be home to the following European brands:



Furse is the UK's leading manufacturer of lightning protection products. Additionally, extensive ranges of earthing material, transient overvoltage protectors and exothermic welding equipment mean Furse is able to offer a 'Total Solution' to any earthing and lightning protection requirement.



The E-Klips® range of spring steel fasteners offers a quick, easy and reliable method of fixing services to steelwork without the need for bracket making, drilling holes or the use of nuts and bolts. They can be installed using a minimum of tools - usually only a hammer, screwdriver or pair of pliers.



With over 50 years experience, Kaufel are experts in emergency lighting. They provide a complete range of self-contained luminaires, central sources and slave luminaires as well as a complementary range of fire alarms.



Existalite are dedicated to providing superior equipment and services to the lighting industry. They have built a reputation for providing engineering solutions utilising high quality equipment at cost effective prices. Products include electronic ballasts, combined inverter ballasts and self-contained gear pods for a wide range of lamp types.



With over 50 years of experience Dutch market leader VanLien develops and produces high quality emergency lighting products. The result is a wide range of outstanding user-friendly and highly reliable emergency lighting solutions with metal design signature. The product range includes luminaires for centralized and self contained systems, conversion units, mobile emergency lighting and central power and monitoring systems.



Emergi-Lite is an established name for self-contained emergency luminaires and analogue addressable and conventional fire detection products. Emergi-Lite products, like the infra-red emergency lighting testing system, have been installed in such prestigious buildings as the Savoy Hotel and the Palace of Westminster in London.



From its formation about 80 years ago as a battery manufacturer, KAUFEL (formerly known as NIFE) has grown to become a leading manufacturer of emergency lighting products and safety power supply systems. Every power system is designed specifically to meet each customer's unique requirements.



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