



ESP 415/II/TNS

Enhanced Mains Protector

Iimp = 25kA/mode S
 Imax = 100kA/mode S
In = 40kA/mode
Uc = 275VAC
Up (In) ≤ 1.4kV
Up (Iimp) ≤ 1.1kV



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.

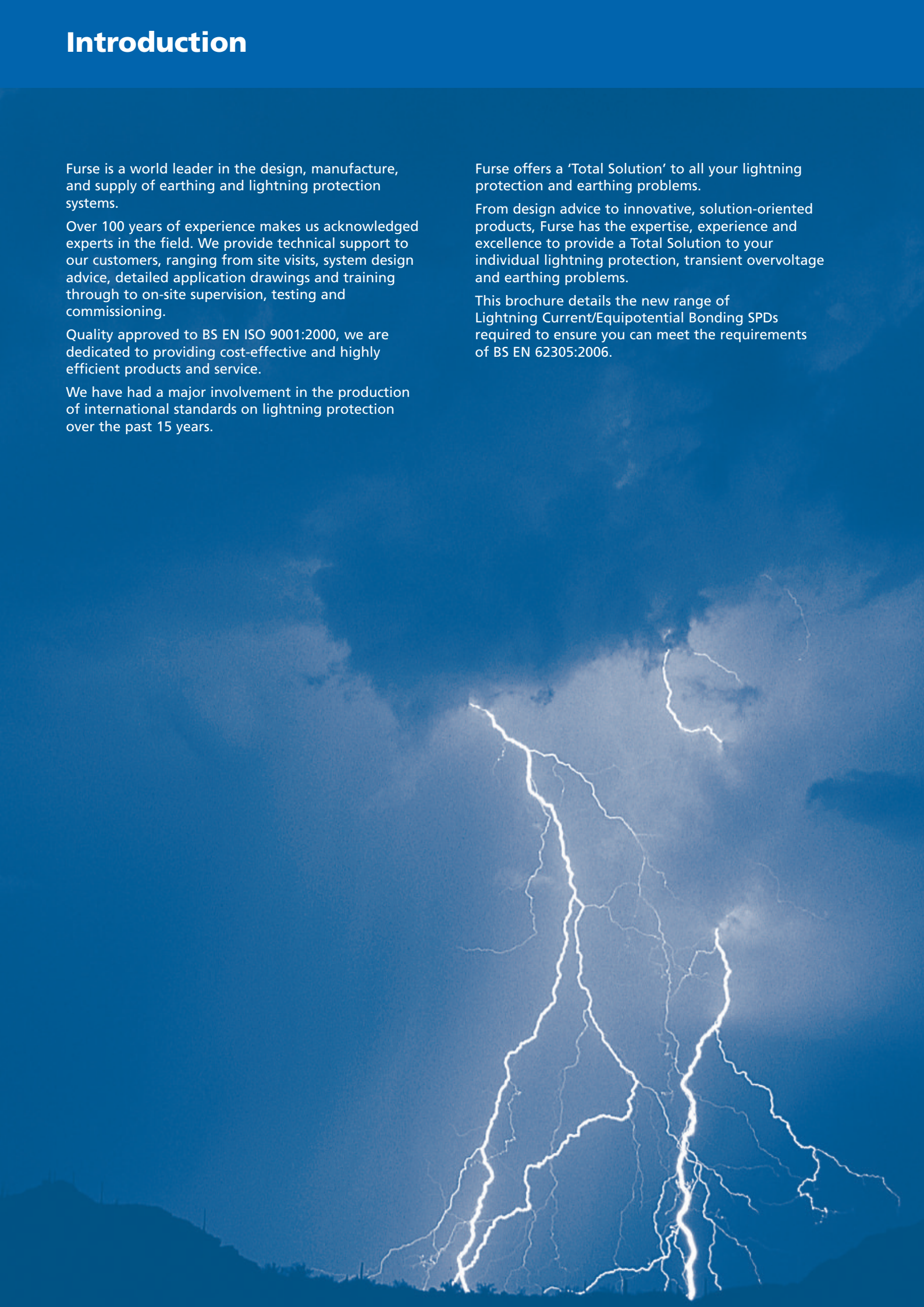
Quality approved to BS EN ISO 9001:2000, we are dedicated to providing cost-effective and highly efficient products and service.

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

4 - 5

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

ESP 415/XXX range

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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



Q06054

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.

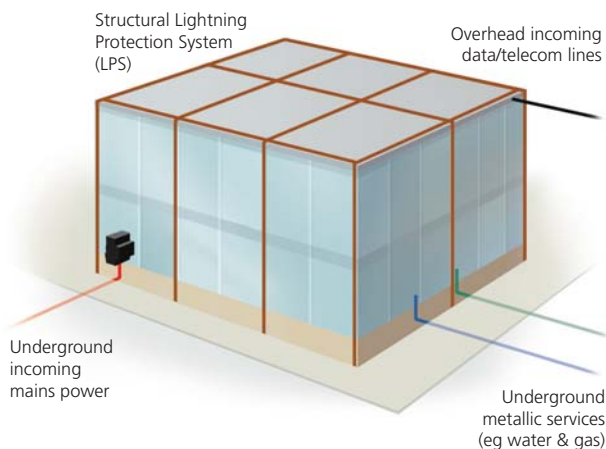
BS EN 62305-2 Risk Management

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

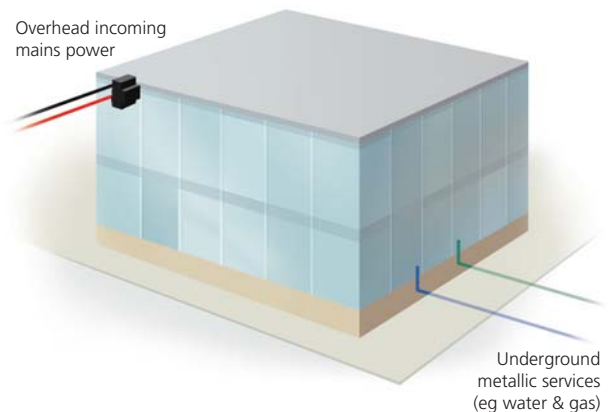
If the risk evaluation demands that a structural LPS is required, then equipotential bonding or lightning current Type I SPDs are always required for any metallic electrical services entering the structure. These would typically be power and telecom lines.

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

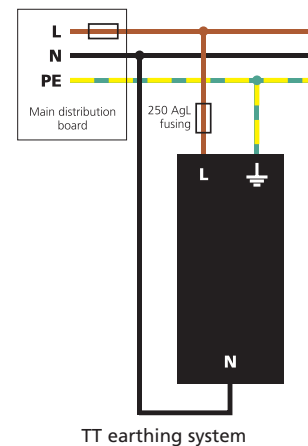
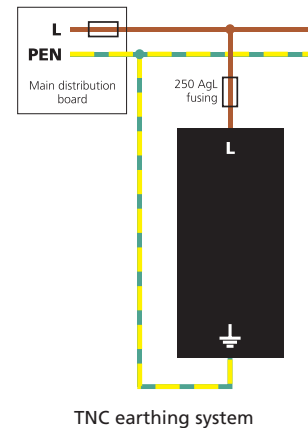
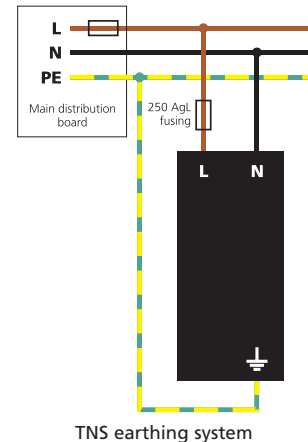
Protector to be installed in the main distribution panel with connecting leads of minimal length. The protector should be fused and is suitable for attachment to a 35mm top hat DIN rail.

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 8/20 μ s per mode (160kA 8/20 μ s for TT versions)
- I_{imp} of up to 25kA 10/350 μ s per mode (100kA 10/350 μ s 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/II/XXX versions for use with Class I or II Lightning Protection Systems (LPS)
- ESP 415/III/XXX versions for use with Class III or IV LPS; or exposed overhead three phase power lines where no LPS is fitted
- ESP 415/X/TNS versions also cover TNC-S earthing systems

Installation

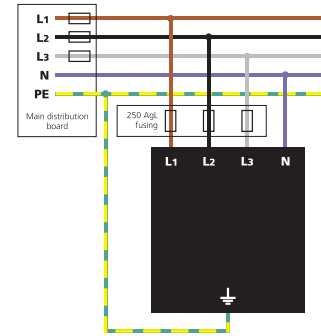
Protector to be installed in the main distribution panel with connecting leads of minimal length. The protector should be fused and is suitable for attachment to a 35mm top hat DIN rail.

Features and benefits

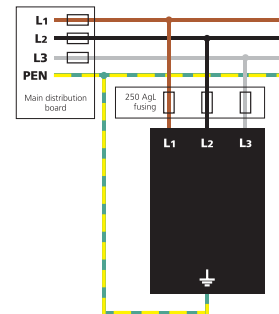
- Enhanced protection offering low let-through voltage (U_p)
- The varistor based design eliminates the high follow current (I_f) associated with spark gap based surge protection
- Compact, space saving design
- Indicator shows when the protector requires replacement
- Remote signal contact can indicate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

Wiring diagrams

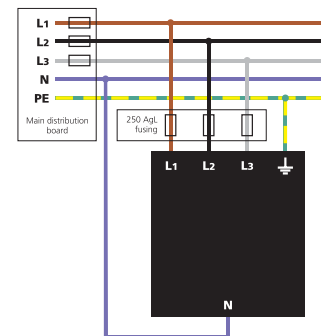
The diagrams below illustrate how to wire the appropriate ESP protector according to your chosen electrical system.



TNS earthing system



TNC earthing system



TT earthing system

Electrical specification

| | ESP 415/I/TNS | ESP 415/III/TNS | ESP 415/I/TNC | ESP 415/III/TNC | ESP 415/I/TT | ESP 415/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 (Uc) | 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 (Up) | | | | | | |
|----------------------------------|--------|--------|--------|--------|---------------------------|---------------------------|
| at In (8/20μs) | <1.4kV | <1.4kV | <1.4kV | <1.4kV | <1.4kV | <1.4kV |
| at Iimp (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 | | | | | | |
| In, (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 | |
| Thermoplastic, UL 94 V-0 | |
| for ESP 415/X/TNS | 90mm x 68mm x 72mm (4TE) |
| for ESP 415/X/TNC | 90mm x 68mm x 54mm (3TE) |
| for ESP 415/X/TT | 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.

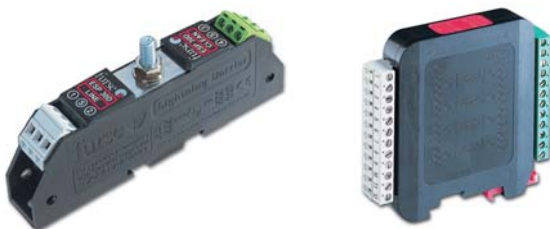
From mains wire-in and plug-in to data, telecoms, RF, CCTV and computer networks, amongst others, the Furse ESP range provides superior protection with low let-through voltage and is maintenance free. With a long lifetime, robust construction and easy installation, the extensive range will protect most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



Thank you for reading this data sheet.

For pricing or for further information, please contact us at our UK Office, using the details below.



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Please note - Product designs and specifications are subject to change without notice. The user is responsible for determining the suitability of this product.