furse

ABB

M Series

Launch brochure

ESP M Series

For almost two decades the market leading Furse ESP M series surge protection devices (SPDs) have been specified and used by engineers all over the world. In that time others have tried and failed to match the capabilities of the ESP M series for mains power supplies offering optimal system protection from transient overvoltages.

- Patented transient discriminative technology to ensure the industry's best voltage protection level or let-though voltage
- Safer disconnection from abnormal/faulty supplies when tested to latest IEC/EN 61643 standards
- Increased direct surge current (10/350 waveform) ratings (phase and neutral modes to earth)
- Larger and robust colour-coded terminals for easier, enhanced installation
- Improved status indication to include the Neutral conductor
- Updated high integrity steel housing design
- Improved, straightforward installation instructions
- Reduced product packaging

These new versions bring you all the benefits of the original ESP M series with the addition of ground breaking advances in transient overvoltage protection for mains power supplies.

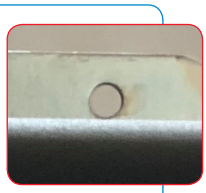
Three way visual indication of protector status giving advance pre-failure warning

Flashing warning of potentially fatal neutral to earth supply voltages (caused by incorrect earthing, wiring errors or unbalanced conditions)

Larger and robust colour coded terminals for easier, enhanced installation

Improved status indication to include the Neutral conductor

Protector base provides ultra low inductance earth bond to metal panels with convenient fixing holes for flat mounting



Updated high integrity steel housing design

EFFECTIVE PROTECTION AGAINST OVERVOLTAGES · TO I.E.T. WIRING REGS 18th EDITION ·
BS 7671
18th Edition

Key points of installation

Lightning and electrical switching events can cause transient overvoltages on main power supplies, exposing computers and other electronic equipment to:

- Data loss and disruption
- Component degradation and damage
- Costly system

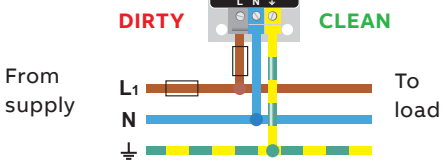
Simple parallel connection to phase(s), neutral and earth at the distribution board feeding equipment.

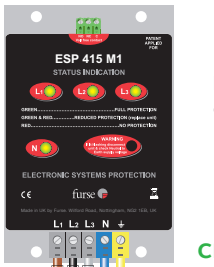
The protector can be installed on either:
a) The load side of the incoming isolator, or
b) The closest outgoing way to the incoming supply.

Phase connecting leads should be fused in accordance to the installation instructions ensuring discrimination with the upstream device.

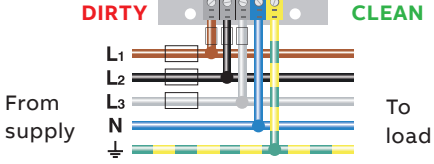
Installation

Parallel connection of ESP 240 M1 single phase protector





Parallel connection of ESP 415 M1 to three phase star (4 wire and earth) supplies



Selection

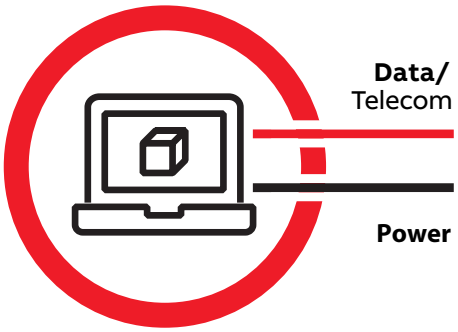
Since the supply current doesn't go through the ESP M series SPD, each is equally suitable for supplies of 20, 200 or 2000 A.

- Use ESP 415 M series to protect electronic equipment on three phase mains power supplies (346-484 volts RMS).
- Use ESP 240 M1 to protect electronic equipment on single phase mains power supplies (200-280 volts RMS).

Uses

ESP M series are designed for installation on mains power distribution systems, to protect connected equipment from transient overvoltage damage.

Typical uses include the protection of:
- Computer equipment
- Transmitter/receiver systems
- Uninterruptible power supplies (UPSs)
- Drives and inverters
- Programmable logic controllers (PLCs)
- Medical equipment
- Critical equipment



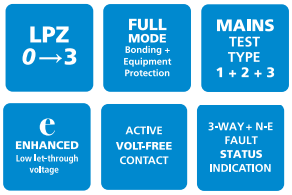
IMPORTANT:
Equipment is ONLY protected against transient overvoltages if all incoming / outgoing mains and data lines have protection fitted.

DATASHEET

Mains power protection

ESP M1 Series

Combined Type 1, 2 and 3 tested protector (to BS EN 61643) for use on mains power distribution systems primarily to protect connected electronic equipment from transient overvoltages on the mains supply, e.g. computer, communications or control equipment. For use at boundaries up to LPZ 0 to protect against flashover (typically the main distribution board location, with multiple metallic services entering) through to LPZ 3 to protect sensitive electronic equipment.



Features & benefits

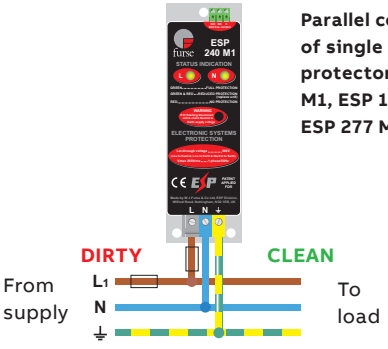
- Very low let-through voltage (enhanced protection to IEC/BS EN 62305) between all sets of conductors (phase to neutral, phase to earth, neutral to earth - Full Mode protection)
- Full mode design capable of handling partial lightning currents as well as allowing continual operation of protected equipment
- Repeated protection in lightning intense environments
- Innovative multiple thermal disconnect technology for safe disconnection from faulty or abnormal supplies (without compromising protective performance)
- Three way visual indication of protection status and advanced pre-failure warning so you need never be unprotected
- Remote indication facility allows pre-failure warning to be linked to a building management system, buzzer or light
- Changeover active volt-free contact enables the protector to be used to warn of phase loss (i.e. power failure, blown fuses etc)
- Flashing warning of potentially fatal neutral to earth supply faults (due to incorrect earthing, wiring errors or unbalanced conditions)
- Robust steel housing
- Base provides ultra-low inductance earth bond to metal panels
- Compact size for installation in the power distribution board
- ESP 120 M1 and ESP 240 M1 have Network Rail Approval PA05/02700 and PA05/01832 respectively. NRS PADS reference 086/000556 (ESP 120 M1) and 086/047149 (ESP 240 M1)

Installation

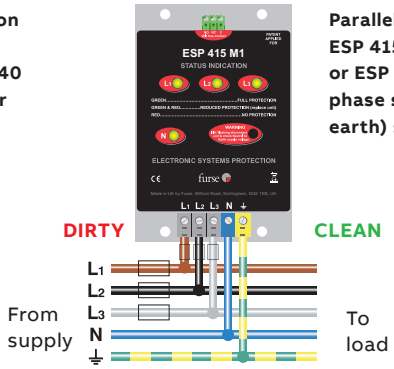
Install in parallel, within the power distribution board or directly (via fuses) on to the supply feeding equipment. At distribution boards, the protector can be installed either on the load side of the incoming isolator, or on the closest outgoing way to the incoming supply. Connect, with very short connecting leads, to phase(s), neutral and earth. For TT installations, contact Furse.

Accessories

Weatherproof enclosures:
WBX 3
Order code:
7TCA085410R0023
Use with single phase protectors
WBX 4
Order code:
7TCA085410R0027
Use with three phase protectors



Parallel connection of single phase protectors ESP 240 M1, ESP 120 M1 or ESP 277 M1



Parallel connection of ESP 415 M1, ESP 208 M1 or ESP 480 M1 to three phase star (4 wire and earth) supplies

NOTE: If you desire a protector with an extra high maximum surge current use the ESP M2 or ESP M4 series. If your supply is fused at 16 amps, or less, the in-line protectors (ESP 240 or 120-5A (or -16A) and their ready-boxed derivatives) may be more suitable. If you need to mount the display panel separately from the main protector unit, use the ESP M1R series.

ESP M1 Series - Technical specification

Electrical specification	ESP 120 M1	ESP 208 M1	ESP 240 M1	ESP 415 M1	ESP 277 M1	ESP 480 M1
ABB order code	7TCA085460R0070	7TCA085460R0078	7TCA085460R0089	7TCA085460R0112	7TCA085460R0097	7TCA085460R0136
Nominal voltage - Phase-Neutral *U*o (RMS)	120 V	120 V	240 V	240 V	277 V	277 V
Maximum voltage - Phase-Neutral *U*c (RMS)	150 V	150 V	280 V	280 V	350 V	350 V
Temporary Overvoltage TOV U_T[1]	175 V	175 V	350 V	350 V	402 V	402 V
Short circuit withstand capability	25 kA/50 Hz	25 kA/50 Hz	25 kA/50 Hz	25 kA/50 Hz	25 kA/50 Hz	25 kA/50 Hz
Working voltage (RMS)	90-150 V	156-260 V	200-280 V	346-484 V	232-350 V	402-600 V
Frequency range	47-63 Hz					
Max. back-up fuse (see installation instructions)	≤ 125 A					
Leakage current (to earth)	< 250 µA					
Indicator circuit current	< 10 mA					
Volt free contact:[2]	Screw terminal					
– Current rating	1 A					
– Nominal voltage (RMS)	250 V					
Transient specification	**ESP 120 M1**	**ESP 208 M1**	**ESP 240 M1**	**ESP 415 M1**	**ESP 277 M1**	**ESP 480 M1**
Type 1 (BS EN/EN), Class I (IEC)						
Nominal discharge current 8/20 µs (per mode) *I*n	20 kA					
Let-through voltage Up at In	< 1 kV	< 1 kV	< 1.3 kV	< 1.3 kV	< 1.4 kV	< 1.4 kV
Impulse discharge current 10/350 µs *I*imp (to earth)[4,7]	6.25 kA					
Total discharge current 10/350 µs *I*total (total to earth)[4,5]	12.5 kA	25 kA	12.5 kA	25 kA	12.5 kA	25 kA
Type 2 (BS EN/EN), Class II (IEC)						
Nominal discharge current 8/20 µs (per mode) *I*n	20 kA					
Let-through voltage Up at *I*n	< 1 kV	< 1 kV	< 1.3 kV	< 1.3 kV	< 1.4 kV	< 1.4 kV
Maximum discharge current *I*max (L/N-PE, L-N)[4]	40 kA, 40 kA					
Type 3 (BS EN/EN), Class III (IEC)						
Let-through voltage at Uoc of 6 kV 1.2/50 µs and *I*sc of 3 kA 8/20 µs (per mode)[3,6]	390 V	390 V	600 V	600 V	680 V	680 V
Mechanical specification	**ESP 120 M1**	**ESP 208 M1**	**ESP 240 M1**	**ESP 415 M1**	**ESP 277 M1**	**ESP 480 M1**
Temperature range	-40 to +80 °C					
Connection type	Screw terminal - maximum torque 2.65 Nm					
Conductor size (stranded)	35 mm²					
Earth connection	Screw terminal - maximum torque 2.65 Nm					
Volt free contact	Connect via screw terminal with conductor up to 2.5 mm² (stranded) - maximum torque 0.25 Nm					
Degree of protection (IEC 60529)	IP20					
Case material	Steel					
Weight: – Unit	0.6 kg	1.0 kg	0.6 kg	1.0 kg	0.6 kg	1.0 kg
– Packaged	0.7 kg	1.1 kg	0.7 kg	1.1 kg	0.7 kg	1.1 kg
Dimensions	See diagrams below					

[1] Temporary Overvoltage rating is for a maximum duration of 5 seconds tested to BS EN/EN/IEC 61643

[2] Minimum permissable load is 5 V DC, 10 mA to ensure reliable operation

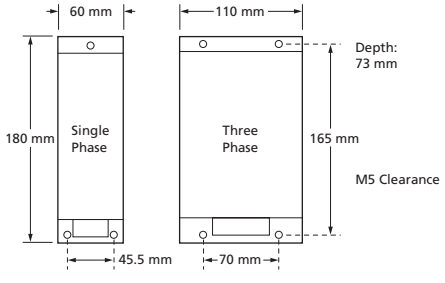
[3] The maximum transient voltage let-through of the protector throughout the test (±10%), phase to neutral, phase to earth and neutral to earth

[4] The electrical system, external to the unit, may constrain the actual current rating achieved in a particular installation

[5] Rating is considered as the current capability of the protector for equipotential bonding near the service entrance

[6] Combination wave test within IEC/BS EN 61643, IEEE C62.41-2002 Location Cats C1 & B3, SS 555:2010, AS/NZS 1768-2007, UL 1449 mains wire-in

[7] Total Discharge Current Iimp 10/350 µs is 4 kA L-N



DATASHEET

Mains power protection

ESP M2/M4 Series

Combined Type 1, 2 and 3 tested protector (to BS EN 61643) for use on the main distribution board directly feeding electronic equipment such as computers, communication and control equipment, particularly where a structural Lightning Protection System (LPS) is employed. For use at boundaries up to LPZ 0 to protect against flashover (typically the main distribution board location) through to LPZ 3 to protect sensitive electronic equipment.

LPZ 0→3 | FULL MODE Bonding + Equipment Protection | MAINS TEST TYPE 1 + 2 + 3 | 3-WAY + N-E FAULT STATUS INDICATION | ENHANCED Low let-through voltage | ACTIVE VOLT-FREE CONTACT

Features & benefits

- Very low let-through voltage (enhanced protection to IEC/BS EN 62305) between all sets of conductors (phase to neutral, phase to earth and neutral to earth - Full Mode protection)
- Full Mode design capable of handling high energy partial lightning currents as well as allowing continual operation of protected equipment
- Innovative multiple thermal disconnect technology, for safe disconnection from faulty or abnormal supplies (without compromising protective performance)
- Three way visual indication of protection status
- Advanced pre-failure warning so you need never be unprotected
- Remote indication facility allows pre-failure warning to be linked to a building management system, buzzer or light
- Changeover active volt-free contact enables the protector to be used to warn of phase loss (i.e. power failure, blown fuses, etc)
- Unique flashing warning of potentially fatal neutral to earth supply faults (caused by incorrect earthing, wiring errors or unbalanced conditions)
- Robust steel housing
- Protector base provides ultra low inductance earth bond to metal panels
- Convenient holes for flat mounting

Application

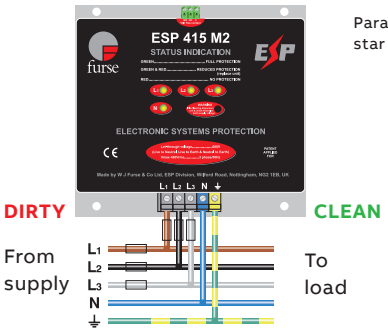
Use ESP M2 versions on main distribution board for buildings with a Class III or IV structural LPS fitted or exposed 3 phase power lines where no LPS is fitted. Use ESP M4 versions on main distribution board for buildings with a Class I or II LPS fitted.

Installation

Install in parallel, within the power distribution board, either on the load side of the incoming isolator, or on the closest outgoing way to the incoming supply. Connect, with very short connecting leads, to phase(s), neutral and earth. Phase/live connecting leads should be fused with HRC fuses, a switchfuse, MCCB or type ‘C’ MCB. For TT installations, contact Furse.

Accessories

Weatherproof enclosures:
WBX M2
Order code: 7TCA085410R0034
For use with the ESP XXX M2
WBX M4
Order code: 7TCA085410R0035
For use with the ESP XXX M4



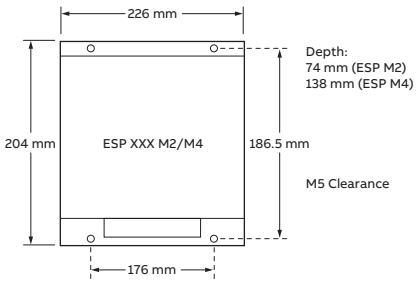
Parallel connection to three phase star (4 wire and earth) supplies

NOTE: For main distribution boards with multiple metallic services (gas, water, telecom/data lines) entering and for sub-distribution boards, the ESP M1 Series are more suited. If your supply is fused at 16 Amps, or less, the in-line protection (ESP 240 or 120-5A (or -16A) and ready-boxed derivatives) may be suitable. If you need to mount the display panel separately from the main protector unit, use the ESP XXX M2R or ESP XXX M4R.

ESP M2/M4 Series - Technical specification

Electrical specification	ESP 415 M2	ESP 415 M4	ESP 480 M2	ESP 480 M4
ABB order code	7TCA085460R0119	7TCA085460R0124	7TCA085460R0138	7TCA085460R0140
Nominal voltage - Phase-Neutral *Uo* (RMS)	240 V	240 V	277 V	277 V
Maximum voltage - Phase-Neutral *Uc* (RMS)	280 V	280 V	350 V	350 V
Temporary Overvoltage TOV *UT*[1]	350 V	350 V	402 V	402 V
Short circuit withstand capability	25 kA/50 Hz			
Working voltage (RMS)	346-484 V	346-484 V	402-600 V	402-600 V
Frequency range	47-63 Hz			
Max. back-up fuse (see installation instructions)	≤ 200 A	≤ 315 A	≤ 200 A	≤ 315 A
Leakage current (to earth)[7]	< 250 µA			
Indicator circuit current[7]	< 5 mA	< 10 mA	< 5 mA	< 10 mA
Volt free contact:[2]	Screw terminal			
– Current rating	1 A			
– Nominal voltage (RMS)	250 V			
Transient specification	**ESP 415 M2**	**ESP 415 M4**	**ESP 480 M2**	**ESP 480 M4**
Type 1 (BS EN/EN), Class I (IEC)				
Nominal discharge current 8/20 µs (per mode) *In*	20 kA	25 kA	20 kA	25 kA
Let-through voltage *Up* at *In*[3]	< 1.3 kV	< 1.3 kV	< 1.4 kV	< 1.4 kV
Impulse discharge current 10/350 µs *Iimp* (to earth)[4]	12.5 kA	25 kA	12.5 kA	25 kA
Total discharge current 10/350 µs *Itotal* (total to earth)[4,5]	50 kA	100 kA	50 kA	100 kA
Type 2 (BS EN/EN), Class II (IEC)				
Nominal discharge current 8/20 µs (per mode) *In*	20 kA	25 kA	20 kA	25 kA
Let-through voltage *Up* at *In*[3]	< 1.3 kV	< 1.3 kV	< 1.4 kV	< 1.4 kV
Maximum discharge current Imax (L/N-PE, L-N)[4]	80 kA, 40 kA	150 kA, 40 kA	80 kA, 40 kA	150 kA, 40 kA
Type 3 (BS EN/EN), Class III (IEC)				
Let-through voltage at *Uoc* of 6 kV 1.2/50 µs and Isc of 3 kA 8/20 µs (per mode)[3,6]	< 600 V	< 600 V	< 680 V	< 680 V
Mechanical specification	**ESP 415 M2**	**ESP 415 M4**	**ESP 480 M2**	**ESP 480 M4**
Temperature range	-40 to +80 °C			
Connection type	Screw terminal - maximum torque 2.65 Nm			
Conductor size (stranded)	25 mm²			
Earth connection	Screw terminal - maximum torque 2.65 Nm			
Volt free contact	Connect via screw terminal with conductor up to 2.5 mm² (stranded) - maximum torque 0.25 Nm			
Degree of protection (IEC 60529)	IP20			
Case material	Steel			
Weight: – Unit	2.35 kg	3.9 kg	2.35 kg	3.9 kg
– Packaged	2.5 kg	4.2 kg	2.5 kg	4.2 kg
Dimensions	226 mm x 204 mm x 74 mm	226 mm x 204 mm x 138 mm	226 mm x 204 mm x 74 mm	226 mm x 204 mm x 138 mm

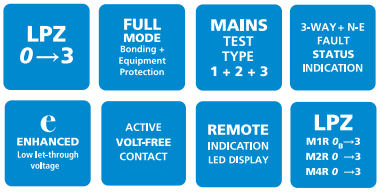
[1] Temporary Overvoltage rating is for a maximum duration of 5 seconds tested to BS EN/EN/IEC 61643
[2] Minimum permissible load is 5 V DC, 10 mA to ensure reliable operation
[3] The maximum transient voltage let-through of the protector throughout the test (±10%), phase to neutral, phase to earth and neutral to earth
[4] The electrical system, external to the unit, may constrain the actual current rating achieved in a particular installation
[5] Rating is considered as the current capability of the protector for equipotential bonding near the service entrance
[6] Combination wave test within IEC/BS EN 61643, IEEE C62.41-2002 Location Cats C1 & B3, SS 555:2010, AS/NZS 1768-2007, UL 1449 mains wire-in
[7] Measured at Nominal Voltage *Uo*



DATASHEET

Mains power protection

ESP M1R, M2R & M4R Series



Combined Type 1, 2 and 3 tested protector (to BS EN 61643) for use on mains power distribution systems primarily to protect connected electronic equipment from transient overvoltages on the mains supply, e.g. computer, communications or control equipment. Remote display allows both display and protector unit to be mounted in their optimum positions. For use at boundaries up to LPZ 0 to protect against flashover (typically the main distribution board location, with multiple metallic services entering) through to LPZ 3 to protect sensitive electronic equipment.

Features & benefits

- The remote display means the protector can be mounted close to the incoming feed or first way on the distribution board and the display in an easily visible position, e.g. on front of cabinet
- Very low let-through voltage (enhanced protection to IEC/BS EN 62305) between all sets of conductors (phase to neutral, phase to earth, neutral to earth - Full Mode protection)
- Full Mode design capable of handling partial lightning currents as well as allowing continual operation of protected equipment
- Repeated protection in lightning intense environments
- Innovative multiple thermal disconnect technology for safe disconnection from abnormal or faulty supplies
- Remote display gives three way visual indication of protection status
- Plug-in cable connections between protector and display enable easy connection (1 m cable supplied as standard)
- Advanced pre-failure warning so you need never be unprotected
- Remote indication facility allows pre-failure warning to be linked to a building management system, buzzer or light
- Changeover active volt-free contact enables the protector to be used to warn of phase loss (i.e. power failure, blown fuses, etc)
- Unique flashing warning of potentially fatal neutral to earth supply faults (caused by incorrect earthing, wiring errors or unbalanced conditions)
- Robust steel housing (protector), and sturdy ABS housing (display)
- Base provides ultra-low inductance earth bond to metal panels
- Remote display comes with integral fixings and a panel drilling template

Application

ESP M1R: main distribution board for buildings with multiple metallic services (e.g. gas, water, telecoms) and sub-distribution boards feeding sensitive equipment. ESP M2R: main distribution board for buildings with Class III or IV LPS fitted or exposed 3-ph power lines where no LPS is fitted. ESP M4R: main distribution board for buildings with a Class I or II LPS.

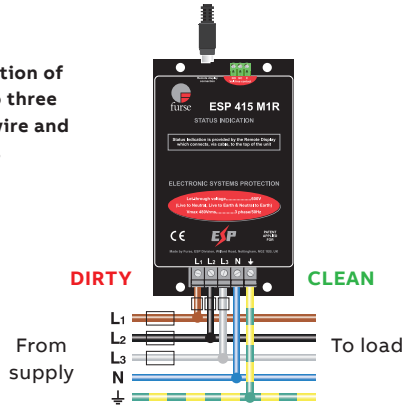
Installation

Installation of the protector unit is identical to the ESP M1, M2 or M4. Position remote display, making sure that the cable is long enough, is unimpeded within the cabinet, and allows a minimum of 60 mm behind the panel front (for the interconnection cable). For TT installations, contact Furse.

Accessories

ESP RLA-1
Order code: 7TCA085460R0153
Spare 1 metre cable assembly
ESP RLA-2
Order code: 7TCA085460R0154
Spare 2 metre cable assembly
ESP RLA-4
Order code: 7TCA085460R0155
Spare 4 metre cable assembly

Parallel connection of ESP 415 M1R to three phase star (4 wire and earth) supplies



Simple plug and socket connection between the protector unit and the remote display

NOTE: For three phase applications where a remote display is unnecessary, use the respective ESP M1, M2 or M4 Series.

ESP M1R, M2R & M4R Series - Technical specification

Electrical specification	ESP 415 M1R	ESP 480 M1R	ESP 415 M2R	ESP 480 M2R	ESP 415 M4R	ESP 480 M4R
ABB order code	7TCA085460R0115	7TCA085460R0137	7TCA085460R0123	7TCA085460R0078	7TCA085460R0126	7TCA085460R0340
Nominal voltage - Phase-Neutral *Uo* (RMS)	240 V	277 V	240 V	277 V	240 V	277 V
Maximum voltage - Phase-Neutral *Uc* (RMS)	280 V	350 V	280 V	350 V	280 V	350 V
Temporary Overvoltage TOV *UT*[1]	350 V	402 V	350 V	402 V	350 V	402 V
Short circuit withstand capability	25 kA/50 Hz					
Working voltage (RMS)	346-484 V	402-600 V	346-484 V	402-600 V	346-484 V	402-600 V
Frequency range	47-63 Hz					
Max. back-up fuse (see installation instructions)	≤ 125 A	≤ 125 A	≤ 200 A	≤ 200 A	≤ 315 A	≤ 315 A
Leakage current (to earth)	< 250 µA					
Indicator circuit current	< 5 mA	< 10 mA	< 5 mA	< 10 mA	< 5 mA	< 10 mA
Volt free contact:[2]	Screw terminal					
– Current rating	1 A					
– Nominal voltage (RMS)	250 V					
Transient specification	**ESP 415 M1R**	**ESP 480 M1R**	**ESP 415 M2R**	**ESP 480 M2R**	**ESP 415 M4R**	**ESP 480 M4R**
Type 1 (BS EN/EN), Class I (IEC)						
Nominal discharge current 8/20 µs (per mode) *In*	20 kA	20 kA	20 kA	20 kA	25 kA	25 kA
Let-through voltage Up at *In*	< 1.3 kV	< 1.4 kV	< 1.3 kV	< 1.4 kV	< 1.3 kV	< 1.4 kV
Impulse discharge current 10/350 µs *Iimp* (to earth)[4]	6.25 kA	6.25 kA	12.5 kA	12.5 kA	25 kA	25 kA
Total discharge current 10/350 µs *Itotal* (total to earth)[4,5]	25 kA	25 kA	50 kA	50 kA	100 kA	100 kA
Type 2 (BS EN/EN), Class II (IEC)						
Nominal discharge current 8/20 µs (per mode) *In*	20 kA	20 kA	20 kA	20 kA	25 kA	25 kA
Let-through voltage *Up* at *In*[3]	< 1.3 kV	< 1.4 kV	< 1.3 kV	< 1.4 kV	< 1.3 kV	< 1.4 kV
Maximum discharge current *Imax* (L/N-PE, L-N)[4]	40 kA, 40 kA	40 kA, 40 kA	80 kA, 40 kA	80 kA, 40 kA	150 kA, 40 kA	150 kA, 40 kA
Type 3 (BS EN/EN), Class III (IEC)						
Let-through voltage at *Uoc* of 6 kV 1.2/50 µs and *Isc* of 3 kA 8/20 µs (per mode)[3,6]	600 V	680 V	< 600 V	< 680 V	< 600 V	< 680 V
Mechanical specification	**ESP 415 M1R**	**ESP 480 M1R**	**ESP 415 M2R**	**ESP 480 M2R**	**ESP 415 M4R**	**ESP 480 M4R**
Temperature range	-40 to +80 °C					
Connection type	Screw terminal - maximum torque 2.65 Nm					
Conductor size (stranded)	25 mm²					
Earth connection	Screw terminal - maximum torque 2.65 Nm					
Volt free contact	Connect via screw terminal with conductor up to 2.5 mm² (stranded) - maximum torque 0.25 Nm					
Degree of protection (IEC 60529)	IP20					
Display connection	6 way 1 metre interconnection cable - 2 or 4 metre cable optional					
Case material	Unit - Steel, Display - FR Polymer UL-94 V0					
Weight: – Unit	1.0 kg	1.0 kg	2.35 kg	2.35 kg	3.9 kg	3.9 kg
– Packaged	1.1 kg	1.1 kg	2.5 kg	2.5 kg	4.2 kg	4.2 kg
Dimensions	See diagrams below					

[1] Temporary Overvoltage rating is for a maximum duration of 5 seconds tested to BS EN/EN/IEC 61643

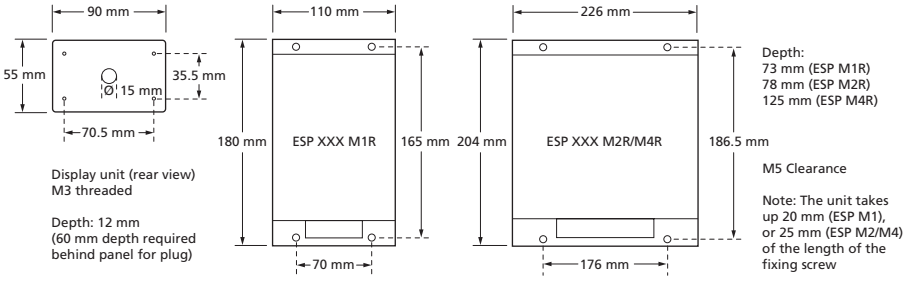
[2] Minimum permissable load is 5 V DC, 10 mA to ensure reliable operation. Under fault conditions, the remote display will go blank if the L1 phase loses power or becomes faulty.
This is due to the isolation requirements needed for circuitry mounted externally to the main protector unit

[3] The maximum transient voltage let-through of the protector throughout the test (±10%), phase to neutral, phase to earth and neutral to earth

[4] The electrical system, external to the unit, may constrain the actual current rating achieved in a particular installation

[5] Rating is considered as the current capability of the protector for equipotential bonding near the service entrance

[6] Combination wave test within IEC/BS EN 61643, IEEE C62.41-2002 Location Cats C1 & B3, SS 555:2010, AS/NZS 1768-2007, UL 1449 mains wire-in



Transient overvoltage protection
Introduction

Based on the IEC 60364 series, the 18th Edition of BS 7671 Wiring regulations covers the electrical installation of buildings including the use of surge protection.

The 18th Edition of BS 7671 applies to the design, erection and verification of electrical installations, and also to additions and alterations to existing installations. Existing installations that have been installed in accordance with earlier editions of BS 7671 may not comply with the 18th edition in every respect. This does not necessarily mean that they are unsafe for continued use or require upgrading.

A key update in the 18th Edition relates to Sections 443 and 534, which concern protection of electrical and electronic systems against transient overvoltages, either as a result of atmospheric origin (lightning) or electrical switching events.

Essentially, the 18th Edition requires all new electrical system designs and installations, as well as alterations and additions to existing installations, to be assessed against transient overvoltage risk and, where necessary, protected using appropriate protection measures (in the form of SPDs).

Within BS 7671:

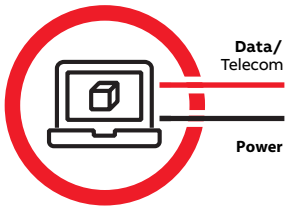
- **Section 443** defines the criteria for risk assessment against transient overvoltages, considering the supply to the structure, risk factors and rated impulse voltages of equipment
- **Section 534** details the selection and installation of SPDs for effective transient overvoltage protection, including SPD Type, performance and coordination

Readers of this guide should be mindful of the need to protect all incoming metallic service lines against the risk of transient overvoltages.

BS 7671 provides focussed guidance for the assessment and protection of electrical and electronic equipment intended to be installed on AC mains power supplies.

In order to observe the Lightning Protection Zone LPZ concept within BS 7671 and BS EN 62305, all other incoming metallic service lines, such as data, signal and telecommunications lines, are also a potential route through which transient overvoltages to damage equipment. As such all such lines will require appropriate SPDs.

BS 7671 clearly points the reader back to BS EN 62305 and BS EN 61643 for specific guidance. This is covered extensively in the Furse guide to BS EN 62305 Protection Against Lightning.



IMPORTANT:
Equipment is ONLY protected against transient overvoltages if all incoming / outgoing mains and data lines have protection fitted.

ABB Furse ESP range of SPDs

Enhanced solutions to BS EN 62305/BS 7671

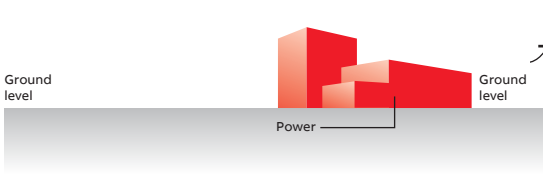
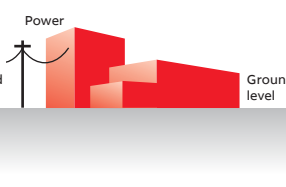
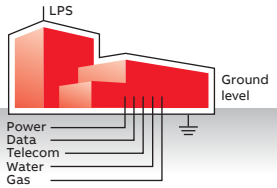
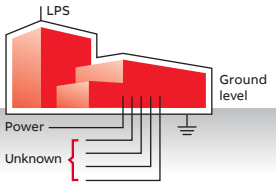
The Furse ESP range of SPDs (power, data and telecom) are widely specified in all applications to ensure the continuous operation of critical electronic systems. They form part of a complete lightning protection solution to BS EN 62305. Furse ESP M and ESP D power SPD products are Type 1+2+3 devices, making them suitable for installation at the service entrance, whilst giving superior voltage protection levels (enhanced to BS EN 62305) between all conductors or modes.

The active status indication informs the user of:

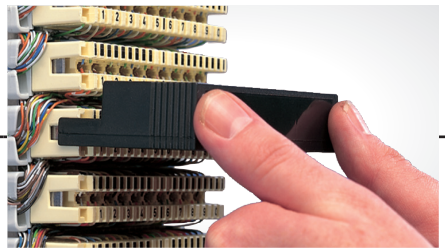
- Loss of power
- Loss of phase
- Excessive N-E voltage
- Reduced protection

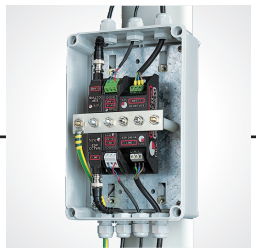
The SPD and supply status can also be monitored remotely via the volt-free contact.

Protection for 230/400 V TN-S or TN-C-S supplies

Supply type	Example 1	Example 2	Example 3	Example 4
	No external lightning protection sytem fitted	No external lightning protection sytem fitted	External lightning protection sytem fitted	External lightning protection sytem fitted
	Underground mains supply feed	Exposed overhead mains supply feed	Multiple connected metallic services	No. of services unknown
				
Main distribution board (MDB)	**Type 1+2+3**	**Type 1+2 OR Type 1+2+3**	**Type 1+2+3**	**Type 1+2 OR Type 1+2+3**
3 Phase 400 V Service entrance, after electricity meter (Main distribution board (MDB)). Type 1+2+3 SPDs such as the ESP M and D series are used where the MDB directly feeds critical electronics	 ESP 415 D1 Series **OR** ESP 415 M1 Series	 ESP 415/III/TNS **OR** ESP 415 M2 Series for critical electronics	 ESP 415 D1 Series **OR** ESP 415 M1 Series	 For LPL I & II: ESP 415/I/TNS LPL III or IV: ESP 415/III/TNS **OR** ESP 415 M4 Series for critical electronics
Sub-distribution board (SDB)	**Type 1+2+3**			
Located >10 m from MDB feeding electronic equipment	 **OR** **For 3 Phase 400 V** ESP 415 D1 Series, or ESP 415 M1 Series		 **OR**	**For 1 Phase 230 V** ESP 240 D1 Series, or ESP 240 M1 Series
Final circuit equipment	**For 13 A sockets** (e.g. servers)	**Fused spurs**		**Consumer units**
Located >10 m from SDB	 ESP MC ESP MC/TN/RJ11 ESP MC/Cat-5e	 ESP 240D-10A ESP 240D-32A		 Furse MMP 2C275/1+1T

Protection for data signal and telecoms applications





The new ABB Furse ESP data and telecom SPD range overview

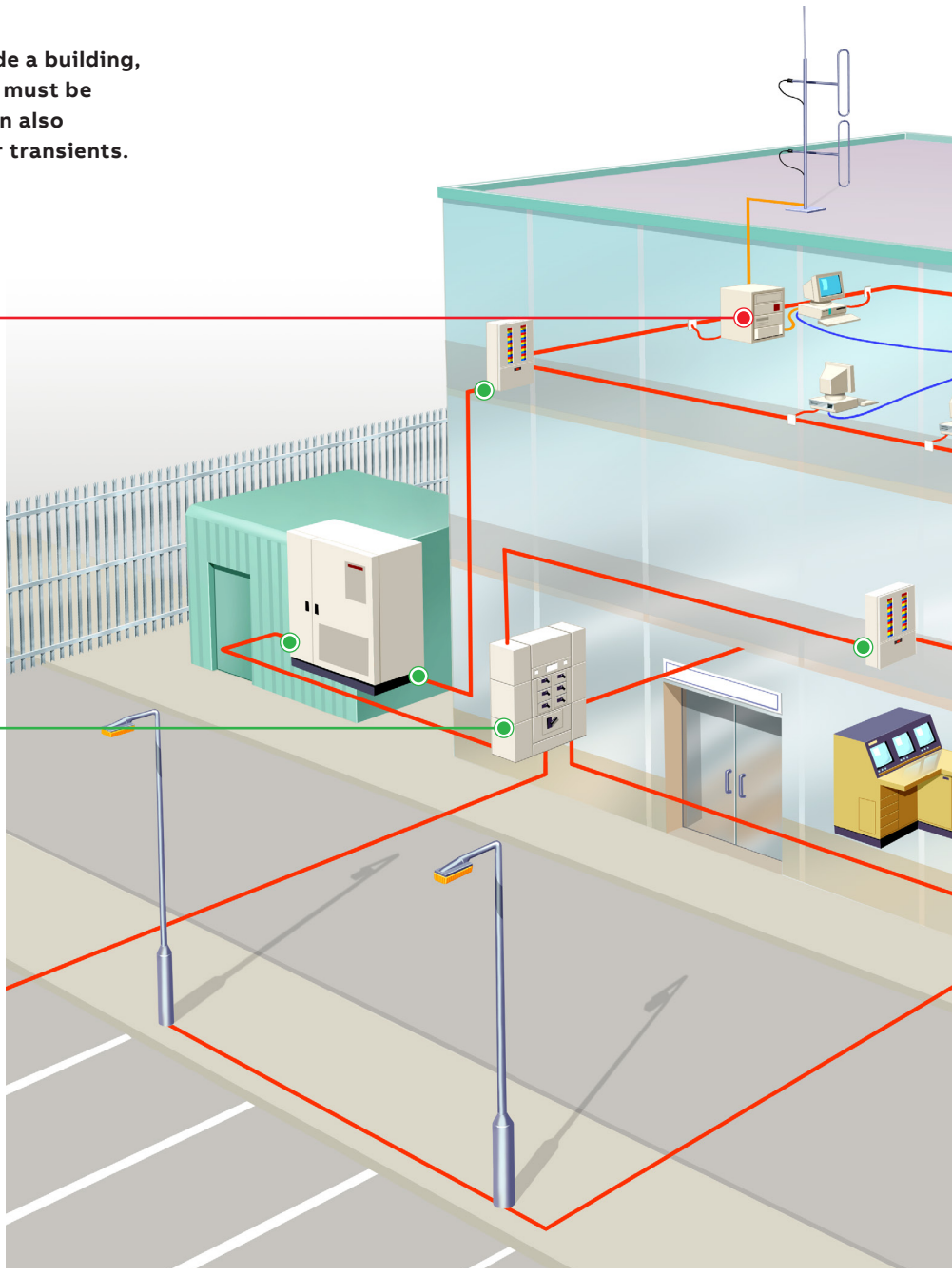
Protecting critical electronic systems

Furse ESP data/telecom range of SPDs are designed to protect equipment connected to data and telephone lines to complement the ESP power SPD products and offer a complete system protection solution (power & data) against surges.

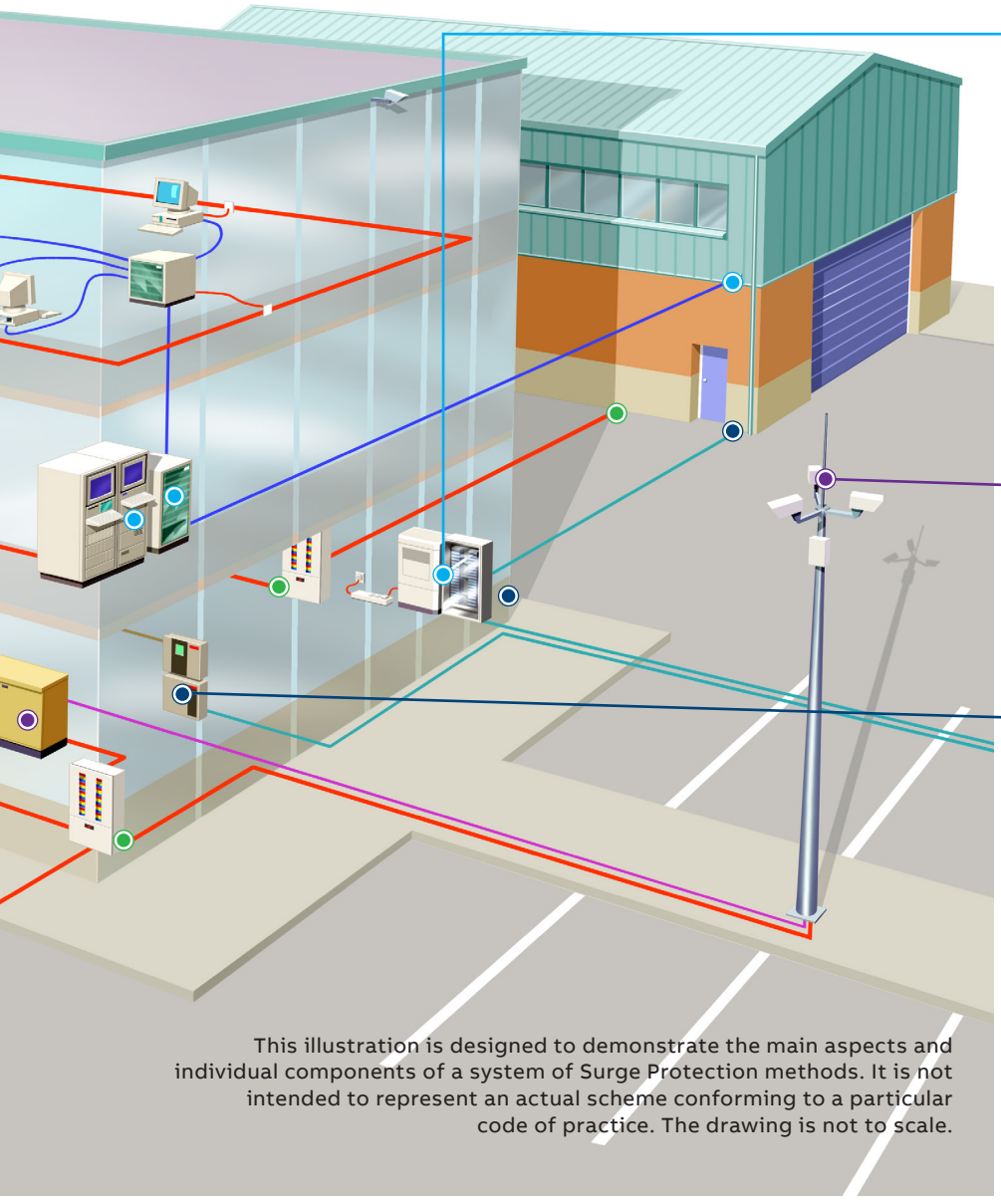
To protect the electronic equipment inside a building, all cables that enter or leave the building must be protected. Cables leaving the building can also provide a route back into the building for transients.

Data & measurement systems
- 2 wire (ESP SL series)
- 2 wire ATEX (ESP SLX series)
- 2 wire (ESP D/E/H series)
- 3 wire (ESP SL-3W series)
- 4-20 mA (ESP SL 4-20)
- 8 wire (ESP Q series)
- RTD (ESP RTD series)

Mains power supply
- See ESP power SPD series



The comprehensive range includes protection for twisted pair data lines (including hazardous environments), computer networks, telecom systems including PBX and ISDN, CCTV, TV and RF systems.



Information technology systems
- Cat 6 + PoE (ESP Cat-6 series)
- Cat 5e + PoE (ESP Cat-5e series)
- RS485/HART/Profibus/Fieldbus (ESP RS485 series)

Transceiver/CCTV systems
- RF (ESP RF series)
- CCTV (ESP CCTV series with ESP 240-16A in-line power SPD)

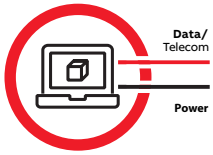
Telecom systems
- PBX (ESP KT series)
- RJ11 (ESP TN series)
- RJ45 (ESP ISDN series)
- 2 wire (ESP TN, ESP SLTN)
- 4 pairs 8 wire (ESP TNQ)

This illustration is designed to demonstrate the main aspects and individual components of a system of Surge Protection methods. It is not intended to represent an actual scheme conforming to a particular code of practice. The drawing is not to scale.

Protection and safety

Short Selection Guide – Surge Protection Devices ESP

Fieldbus/ PROFIBUS Systems HART Systems	 **ESP RS485** Flat/DIN Mount 7TCA085400R0191	 **ESP SL RS485** Slim DIN Mount 7TCA085400R0193	 **ESP RS485Q** Multiple Lines (DIN Mount) 7TCA085400R0192				
Ethernet	 with PoE:	Cat-5 (100 Mbps) **ESP Cat-5e** 7TCA085400R0017 7TCA085400R0021	Cat-6 (1000 Mbps) **ESP Cat-6** 7TCA085400R0023 7TCA085400R0024				
Video Surveillance CCTV	 **5V CCTV** with BNC connector, power, and telemetry line	 **ESP CCTV/B** Video signal 7TCA085400R0123	 **ESP RS485** Telemetry signal 7TCA085400R0191	 **ESP 240-16A** Power line 7TCA085460R0080	 **ESP CME4** Earth Bar 7TCA085400R0001	 **ESP WBX4/GS** Enclosure 7TCA085410R0028	CCTV Protection is also available for different voltages and twisted pair connections.
4 - 20 mA current loops	Screw terminals 30 V	 **ESP SL30L/4-20** Product code: 7TCA085400R0070					
Coaxial antennas: GSM, UMTS, Radar, Radio, TV, GPS		**RF power = 650 W** Female coaxial connector:	**ESP RF 441421** BNC 7TCA085450R0058	**ESP RF AA1421** 7/16 DIN 7TCA085450R0061	**ESP RF 111421** N 7TCA085450R0005		
Telephone ISDN DSL	**2 wire Telecom**	Screw terminals:	 **ESP TN** Flat Mount 7TCA085400R0171	 **ESP SL TN** Slim Mount 7TCA085400R0195	 **ESP SL TNL** Slim Mount with LED 7TCA085400R0226	 **ESP TNQ** Multiple Lines 7TCA085400R0183	
		RJ11, RJ45	RJ11 telephone units	**ESP TN/RJ11-6/6** 6P6C Connector 7TCA085400R0180	RJ45 network units	**ESP ISDN/RJ45-4/8** 8P4C Connector 7TCA085460R0171	
		PBX Telecom	LSA-PLUS connection	**ESP KT1** Single module 7TCA085400R0135	**ESP K10T1** 10 modules 7TCA085400R0130	**ESP KE10** Earth Bar 7TCA085400R0134	
TV: Satellite, Cable		**ESP CATV/F** Cable 7TCA085400R0122	**ESP SMATV/F** Satellite 7TCA085450R0026	**ESP TV/EURO** Antenna 7TCA085450R0027			
2 wire systems (30 V)		 **ESP 30E** Flat Mount 7TCA085400R0104	 **ESP SL30** Slim Mount 7TCA085400R0067	 **ESP 30Q** Multiple Lines 7TCA085400R0107	Protection for different voltages are available		
3 wire systems (30 V)		 **ESP SL30/3W** Slim Mount 7TCA085400R0268	Protection for different voltages are available				
Hazardous Areas ATEX/IEC Approved		 **ESP SL15X** 15 Volt 7TCA085400R0065	**ESP SL30X** 30 Volt 7TCA085400R0071	LED and Isolated base options are available			
Resistance Temperature Detectors (RTD)		 **ESP RTD** Flat/DIN Mount 7TCA085460R0157	 **ESP SL RTD** Slim (DIN Mount) 7TCA085400R0232	 **ESP RTDQ** Multiple Lines (DIN Mount) 7TCA085400R0158			



IMPORTANT:
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Furse overview
Our reach & expertise

Furse is a leading brand of ABB and provides critical solutions for Earthing, Lightning Protection and Electronic Systems Protection for over 125 years.

With a heritage of over 125 years, the Furse brand is synonymous with earthing and lightning protection, and is recognized worldwide for its Total Solution.

The Furse Total Solution incorporates all customer needs for earthing and lightning protection, including:

- Structural lightning protection systems
- Earthing for lightning protection, power and telecommunications systems
- Transient overvoltage protection
- Customer project consultations, technical guidance and system design

The Total Solution delivers the most complete and effective protection against lightning and earth fault current risk, both safeguarding life and ensuring continuous, normal operation of electrical and electronic systems.

Acquired by the ABB Group in 2012, and benefitting from ABB's wider network, the Furse brand has now become an established world leader in earthing and lightning protection, with products specified and installed in many prestigious projects globally.

Why choose Furse products and services?
Being an integral part of ABB reinforces our commitment to quality, service and to providing solutions which deliver safety and protection of people, structures and electrical services within the built environment.

Furse products and services aim to deliver customer value in key areas:

- **Reliability & ease of installation**
  Furse products are manufactured from high quality materials within an ISO 9001 environment, to ensure long lasting performance, and are designed for easiest possible installation.
- **Convenience & support**
  Furse products are readily available through our distributors worldwide, and our sales are supported both locally and globally by technical guidance and support.
- **Expertise & experience**
  Our time served technical engineers provide specific advice on customers' earthing and lightning protection concerns, and can provide drawings and system designs to any recognized standard.

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