Mains power protection
ESP 240/XXX Series

LPZ *0*→2 | COMMON MODE Equipotential Bonding | MAINS TEST TYPE 1 + 2 | ENHANCED Low let-through voltage | STATUS INDICATION + VOLT-FREE CONTACT

Combined Type 1 and 2 tested protector (to BS EN 61643) for use on the main distribution board, particularly where a structural Lightning Protection System (LPS) is employed, for equipotential bonding. For use at boundaries up to LPZ *0* to protect against flashover (typically the main distribution board location) through to LPZ 2 to protect electrical equipment from damage.

Features & benefits

- Enhanced protection (to BS EN 62305) offering low let-through voltage further minimizing the risk of flashover creating dangerous sparking or electric shock
- Repeated protection in lightning intense environments
- Compact, space saving design
- The varistor based design eliminates the high follow current (I_f) associated with spark gap based surge protection
- Indicator shows when the protector requires replacement
- Remote signal contact can indicate the protector's status through interfacing with a building management system

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 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 TN-C-S earthing systems

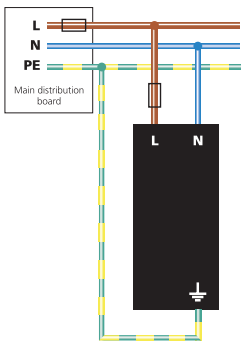
Installation

Protector to be installed in the main distribution board with connecting leads of minimal length. The protector should be fused and is suitable for attachment to a 35 mm top hat DIN rail. The diagrams below illustrate how to wire the appropriate ESP protector according to your chosen electrical system.

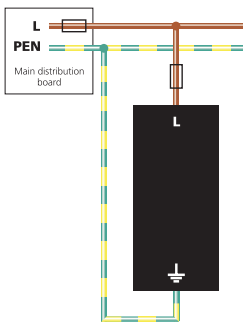
Accessories

Weatherproof enclosure:
WBX D4

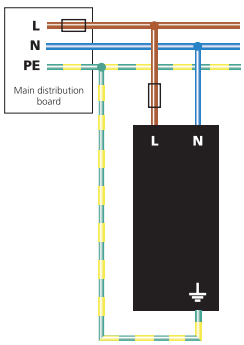
TN-S earthing system



TN-C earthing system



TT earthing system



IMPORTANT: The primary purpose of lightning current or equipotential bonding mains Type 1 Surge Protective Devices (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 mains Type 2 and 3 SPDs such as the ESP M1 Series or ESP D1 Series are further required, typically installed at downstream subdistribution boards feeding sensitive equipment. BS EN/IEC 62305 refers to the correct application of mains Type 1, 2 and 3 SPDs as a coordinated set. For further information, please refer to the Furse Guide to BS EN 62305 Protection against Lightning.

Mains power protection
ESP 240/XXX Series

ESP 240/XXX Series - Technical specification

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 - Phase-Neutral *Uo* (RMS)	240 V					
Maximum voltage - Phase-Neutral *Uc* (RMS/DC)	320 V/420 V					
Temporary Overvoltage TOV U_T[1]	350 V					
Short circuit withstand capability	25 kA/50 Hz					
Frequency range	47-63 Hz					
Max. back-up fuse (see installation instructions)	250 A					
Leakage current (to earth)	< 2.5 mA	< 2.5 mA	< 2.5 mA	< 2.5 mA	–	–
Volt free contact:	Screw terminal					
– Current rating	0.5 A					
– Nominal voltage (RMS)	250 V					

Transient 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
Type 1 (BS EN/EN), Class I (IEC)						
Nominal discharge current 8/20 µs (per mode) *In*	50 kA	25 kA	50 kA	25 kA	50 kA/100 kA (N-E)	25 kA/50 kA (N-E)
Let-through voltage *Up* at *In*[2]	< 1.5 kV	< 1.4 kV	< 1.5 kV	< 1.4 kV	< 1.5 kV	< 1.4 kV
Impulse discharge current 10/350 µs *Iimp* (per mode)[2]	50 kA	25 kA	50 kA	25 kA	50 kA/100 kA (N-E)	25 kA/50 kA (N-E)
Let-through voltage *Up* at *Iimp*[2]	< 1.2 kV	< 1.2 kV	< 1.2 kV	< 1.2 kV	< 1.2 kV	< 1.2 kV
Let-through voltage *Up* at 1.2/50 µs (N-E, TT system)	–	–	–	–	< 1.2 kV	< 1.2 kV
Type 2 (BS EN/EN), Class II (IEC)						
Nominal discharge current 8/20 µs (per mode) *In*	50 kA	25 kA	50 kA	25 kA	50 kA/100 kA (N-E)	25 kA/50 kA (N-E)
Let-through voltage *Up* at *In*[2]	< 1.5 kV	< 1.4 kV	< 1.5 kV	< 1.4 kV	< 1.5 kV	< 1.4 kV
Maximum discharge current Imax (per mode)[3]	100 kA	100 kA	100 kA	100 kA	100 kA/160 kA (N-E)	100 kA/100 kA (N-E)

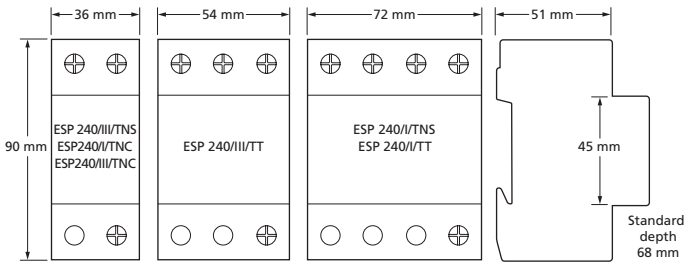
Mechanical Specification	ESP 240/I/TNS	ESP 240/III/TNS	ESP 240/I/TNC	ESP 240/III/TNC	ESP 240/I/TT	ESP 240/III/TT
Temperature range	-40 to +80 °C					
Connection type	Screw terminal					
Conductor size (stranded)	25 mm²					
Earth connection	Screw terminal					
Degree of protection (IEC 60529)	IP20					
Volt free contact	Connect via screw terminal with conductor up to 1.5 mm² (stranded)					
Case material	Thermoplastic, UL 94 V-0					
Mounting	Indoor, 35 mm top hat DIN rail					
Weight: – Unit	0.84 kg	0.44 kg	0.44 kg	0.29 kg	0.68 kg	0.44 kg
– Packaged	0.94 kg	0.54 kg	0.54 kg	0.39 kg	0.78 kg	0.54 kg
Dimensions to DIN 43880 - HxDxW[4]	90 mm x 68 mm x 72 mm (4TE)	90 mm x 68 mm x 36 mm (2TE)	90 mm x 68 mm x 36 mm (2TE)	90 mm x 68 mm x 36 mm (2TE)	90 mm x 68 mm x 72 mm (4TE)	90 mm x 68 mm x 54 mm (3TE)

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

[2] The maximum transient voltage let-through of the protector throughout the test, phase to earth and neutral to earth

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

[4] The remote signal contact (removable) adds 10 mm to height



11

Mains power protection
ESP 415/XXX Series

LPZ 0→2 | COMMON MODE Equipotential Bonding | MAINS TEST TYPE 1 + 2 | ENHANCED Low let-through voltage | STATUS INDICATION + VOLT-FREE CONTACT

Combined Type 1 and 2 tested protector (to BS EN 61643) for use on the main distribution board, particularly where a structural Lightning Protection System (LPS) is employed, for equipotential bonding. For use at boundaries up to LPZ *0* to protect against flashover (typically the main distribution board location) through to LPZ 2 to protect electrical equipment from damage.

Features & benefits

- Enhanced protection (to BS EN 62305) offering low let-through voltage further minimizing the risk of flashover creating dangerous sparking or electric shock
- Repeated protection in lightning intense environments
- The varistor based design eliminates the high follow current (If) associated with spark gap based surge protection
- Compact, space saving design
- Indicator shows when the protector requires replacement
- Remote signal contact can indicate the protector's status through interfacing with a building management system

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 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 TN-C-S earthing systems

Installation

Protector to be installed in the main distribution board with connecting leads of minimal length. The protector should be fused and is suitable for attachment to a 35 mm top hat DIN rail. The diagrams below illustrate how to wire the appropriate ESP protector according to your chosen electrical system.

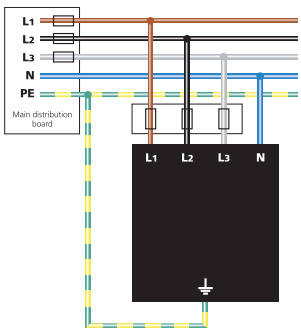
Accessories

Weatherproof enclosures:

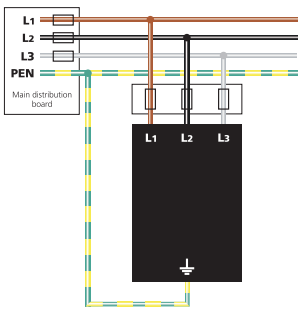
WBX D4
Use with TN-S, TN-C versions and ESP 415/III/TT

WBX D8
Use with ESP 415/I/TT

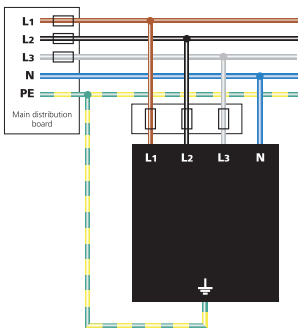
TN-S earthing system



TN-C earthing system



TT earthing system



IMPORTANT: The primary purpose of lightning current or equipotential bonding mains Type 1 Surge Protective Devices (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 mains Type 2 and 3 SPDs such as the ESP M1 Series or ESP D1 Series are further required, typically installed at downstream subdistribution boards feeding sensitive equipment. BS EN/IEC 62305 refers to the correct application of mains Type 1, 2 and 3 SPDs as a coordinated set. For further information, please refer to the Furse Guide to BS EN 62305 Protection against Lightning.

Mains power protection
ESP 415/XXX Series

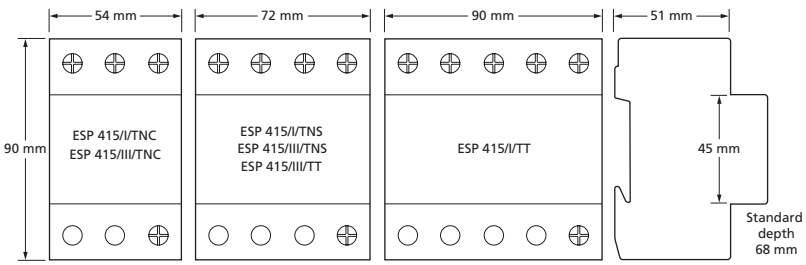
ESP 415/XXX Series - Technical specification

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 - Phase-Neutral *Uo* (RMS)	240 V					
Maximum voltage - Phase-Neutral *Uc* (RMS/DC)	320 V					
Temporary Overvoltage TOV U_T[1]	350 V					
Short circuit withstand capability	25 kA/50 Hz					
Frequency range	47-63 Hz					
Max. back-up fuse (see installation instructions)	250 A					
Leakage current (to earth)	< 2.5 mA	< 2.5 mA	< 2.5 mA	< 2.5 mA	–	–
Volt free contact:[2]	Screw terminal					
– Current rating	0.5 A					
– Nominal voltage (RMS)	250 V					

Transient 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
Type 1 (BS EN/EN), Class I (IEC)						
Nominal discharge current 8/20 µs (per mode) *In*	25 kA	20 kA	25 kA	20 kA	25 kA/100 kA (N-E)	20 kA/50 kA (N-E)
Let-through voltage *Up* at *In*[2]	< 1.4 kV	< 1.5 kV	< 1.4 kV	< 1.5 kV	< 1.4 kV	< 1.5 kV
Impulse discharge current 10/350 µs *Iimp* (per mode)[3]	25 kA	12.5 kA	25 kA	12.5 kA	25 kA/100 kA (N-E)	25 kA/100 kA (N-E)
Let-through voltage *Up* at *Iimp*[2]	< 1.3 kV	< 1.2 kV	< 1.3 kV	< 1.2 kV	< 1.3 kV	< 1.2 kV
Let-through voltage *Up* at 1.2/50 µs (N-E, TT system)	–	–	–	–	< 1.2 kV	< 1.2 kV
Type 2 (BS EN/EN), Class II (IEC)						
Nominal discharge current 8/20 µs (per mode) *In*	Screw terminal					
Let-through voltage *Up* at *In*[2]	0.5 A					
Maximum discharge current Imax (per mode)[3]	250 V					

Mechanical 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
Temperature range	-40 to +80 °C					
Connection type	Screw terminal					
Conductor size (stranded)	25 mm²					
Earth connection	Connect via screw terminal with conductor up to 1.5 mm² (stranded)					
Volt free contact	IP20					
Case material	Thermoplastic, UL 94 V-0					
Mounting	Indoor, 35 mm top hat DIN rail					
Weight: – Unit	0.84 kg	0.59 kg	0.64 kg	0.44 kg	0.9 kg	0.67 kg
– Packaged	0.94 kg	0.69 kg	0.74 kg	0.54 kg	1.0 kg	0.77 kg
Dimensions to DIN 43880 - HxDxW[4]	90 mm x 68 mm x 72 mm (4TE)	90 mm x 68 mm x 72 mm (4TE)	90 mm x 68 mm x 54 mm (3TE)	90 mm x 68 mm x 54 mm (3TE)	90 mm x 68 mm x 90 mm (5TE)	90 mm x 68 mm x 72 mm (4TE)

[1] Temporary Overvoltage rating is for a maximum duration of 5 seconds tested to BS EN/EN/IEC 61643
[2] The maximum transient voltage let-through of the protector throughout the test, phase to earth and neutral to earth
[3] The electrical system, external to the unit, may constrain the actual current rating achieved in a particular installation
[4] The remote signal contact (removable) adds 10 mm to height



11

Mains power protection
ESP D/DS 10A & 32A Series (Single phase)

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

Combined Type 1, 2 and 3 tested protector (to BS EN 61643) for use on low current (up to 10 or 32 A) single phase systems to protect connected electronic equipment from transient overvoltages on the mains supply, e.g. fire/intruder alarm panels. Available for 90-150 Volts, 200-280 Volts and 232-350 Volts supplies. For use at boundary LPZ 0 through to LPZ 3 boundaries to protect sensitive electronic equipment.

Features & benefits

- Very low let-through voltage (enhanced protection to BS EN 62305) between all sets of conductors (phase to neutral, phase to earth, neutral to earth - Full Mode protection)
- Repeated protection in lightning intense environments
- Compact space saving DIN housing for easy incorporation in the protected system
- 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
- Advanced status (DS) version has remote indication facility to a BMS via an active changeover volt-free contact to show pre-failure warnings and potential phase loss (i.e. power failure, blown fuses etc), and a flashing warning of potentially fatal neutral to earth supply volts

Installation

Connect in-line with the power supply usually either within the equipment panel (or for CCTV cameras, in an enclosure close by), or on the fused connection that supplies equipment.

To protect equipment inside a building from transients entering on an outgoing feed (e.g. to CCTV cameras or to site lighting) the protector should be installed as close to where the cable leaves the building as possible.

Protectors should be installed either within an existing cabinet/cubicle or in a separate enclosure.

Application

Use these protectors on low current mains power supplies, e.g. CCTV cameras, alarm panels, industrial battery chargers and telemetry equipment.

Connect in-line on supplies fused up to 10 A (ESP 120D-10A, ESP 120DS-10A, ESP 240D-10A, ESP 240DS-10A, ESP 277D-10A or ESP 277DS-10A) or 32 A (ESP 120D-32A, ESP 120DS-32A, ESP 240D-32A, ESP 240DS-32A, ESP 277D-32A or ESP 277DS-32A)

Accessories

Weatherproof enclosure:
WBX D4

NOTE: If your supply is fused at more than 32 Amps the ESP 120 M1, ESP 240 M1 or ESP 277 M1 are suitable.

Mains power protection
ESP D/DS 10A & 32A Series (Single phase)

ESP D/DS 10A & 32A Series (Single phase) - Technical specification

Electrical Specification	ESP 120D-10A ESP 120DS-10A	ESP 120D-32A ESP 120DS-32A	ESP 240D-10A ESP 240DS-10A	ESP 240D-32A ESP 240DS-32A	ESP 277D-10A ESP 277DS-10A	ESP 277D-32A ESP 277DS-32A
Nominal voltage - Phase-Neutral *Uo* (RMS)	120 V		240 V		277 V	
Maximum voltage - Phase-Neutral *Uc* (RMS)	150 V		280 V		350 V	
Temporary Overvoltage TOV U_T[1]	175 V		350 V		402 V	
Short circuit withstand capability	10 kA/50 Hz					
Working voltage (RMS)	90-150 V		200-280 V		232-350 V	
Frequency range	47-63 Hz					
Current rating (supply)	10 A or less	32 A or less	10 A or less	32 A or less	10 A or less	32 A or less
Max. back-up fuse (see installation instructions)	10 A	32 A	10 A	32 A	10 A	32 A
Leakage current (to earth)	Zero					
Indicator circuit current	< 10 mA					
Volt free contact (DS versions only):[2]	Screw terminal					
– Current rating	1 A					
– Nominal voltage (RMS)	250 V					

Transient Specification	ESP 120D-10A ESP 120DS-10A	ESP 120D-32A ESP 120DS-32A	ESP 240D-10A ESP 240DS-10A	ESP 240D-32A ESP 240DS-32A	ESP 277D-10A ESP 277DS-10A	ESP 277D-32A ESP 277DS-32A
Type 1 (BS EN/EN), Class I (IEC)						
Nominal discharge current 8/20 µs (per mode) *In*	20 kA					
Let-through voltage *Up* at *In*	700 V		1000 V		1200 V	
Impulse discharge current 10/350 µs *Iimp* (per mode)[4]	4 kA					
Let-through voltage *Up* at *Iimp*[3]	650 V		900 V		1000 V	
Total discharge current (total to earth) *Itotal*[4,5]	6.25 kA					
Type 2 (BS EN/EN), Class II (IEC)						
Nominal discharge current 8/20 µs (per mode) *In*	20 kA					
Let-through voltage *Up* at *In*	700 V		1000 V		1200 V	
Maximum discharge current *Imax* (per mode)[4]	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]	390 V		600 V		680 V	

Mechanical Specification	ESP 120D-10A ESP 120DS-10A	ESP 120D-32A ESP 120DS-32A	ESP 240D-10A ESP 240DS-10A	ESP 240D-32A ESP 240DS-32A	ESP 277D-10A ESP 277DS-10A	ESP 277D-32A ESP 277DS-32A
Temperature range	-40 to +80 °C					
Connection type	Screw terminal - maximum torque 0.8 Nm[7]					
Conductor size (stranded)	4 mm²					
Earth connection	Screw terminal - maximum torque 0.8 Nm[7]					
Volt free contact (DS versions only)	Connect via screw terminal with conductor up to 1.5 mm² (stranded) - maximum torque 0.25 Nm[7]					
Degree of protection (IEC 60529)	IP20					
Case material	Flame retardant to UL-94 V-0					
Weight: – Unit	0.23 kg					
– Packaged	0.25 kg					
Dimensions to DIN 43880 - HxDxW[8]	90 mm x 88 mm x 72 mm (4TE)					

*To enclose the products to IP65, fit within a WDX D4, available from Furse

[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%)

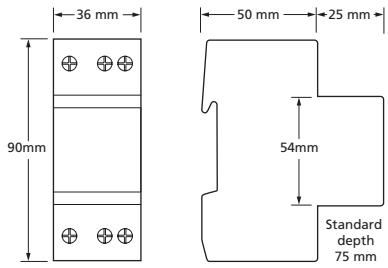
[4] The electrical system, external to the unit, may constrain the actual current rating achieved in a particular installation

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

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

[7] Torque should typically be 50% to 75% of the maximum value

[8] The remote signal contact (removable) adds 10 mm to height



Mains power protection
ESP D1 Series (Single phase)

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

Combined Type 1, 2 and 3 tested protector (to BS EN 61643) for use on single phase 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.

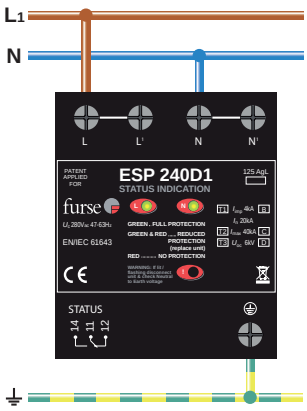
Features & benefits

- Very low let-through voltage (enhanced protection to 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)
- Through terminal facility allows series connection on low current supplies to eliminate high additive voltage associated with connecting
- leads on units installed in parallel
- 4 Compact space saving DIN housing

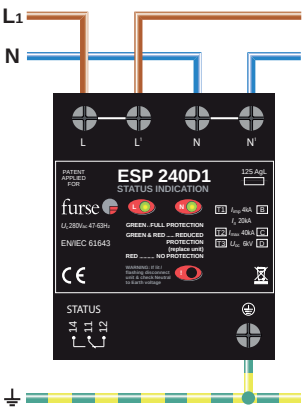
Installation

Protector to be installed in the main distribution board with connecting leads of minimal length. The protector should be fused and is suitable for attachment to a 35 mm top hat DIN rail. The diagrams below illustrate how to wire the appropriate ESP protector according to your chosen electrical system.

Parallel connection of ESP 120 D1, ESP 240 D1 and ESP 277 D1 series to single phase supplies (fuses not shown for clarity)



Series connection of ESP 120 D1, ESP 240 D1 and ESP 277 D1 to single phase supplies up to 125 A (fuses not shown for clarity)



Accessories

Weatherproof enclosure:
WBX D4

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 (and their ready-boxed derivatives) may be more suitable.

Mains power protection
ESP D1 Series (Single phase)

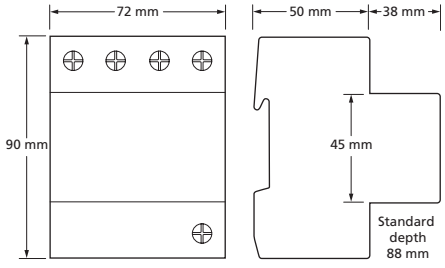
ESP D1 Series (Single phase) - Technical specification

Electrical Specification	ESP 120 D1	ESP 240 D1	ESP 277 D1
Nominal voltage - Phase-Neutral *Uo* (RMS)	120 V	240 V	277 V
Maximum voltage - Phase-Neutral *Uc* (RMS)	150 V	280 V	350 V
Temporary Overvoltage TOV U_T[1]	175 V	350 V	402 V
Short circuit withstand capability	25 kA/50 Hz		
Working voltage (RMS)	156-260 V	346-484 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 D1	ESP 240 D1	ESP 277 D1
Type 1 (BS EN/EN), Class I (IEC)			
Nominal discharge current 8/20 µs (per mode) *In*	20 kA		
Let-through voltage *Up* at *In*[3]	600 V	900 V	1 kV
Impulse discharge current 10/350 µs *Iimp* (per mode)[4]	4 kA		
Let-through voltage *Up* at *Iimp*[3]	500 V	750 V	850 V
Impulse discharge current (per phase) *Iimp*[5]	6.25 kA		
Type 2 (BS EN/EN), Class II (IEC)			
Nominal discharge current 8/20 µs (per mode) *In*	20 kA		
Let-through voltage *Up* at *In*[3]	600 V	900 V	1 kV
Maximum discharge current Imax (per mode)[4]	40 kA		
Maximum discharge current Imax (per phase)	80 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)[6]	390 V	600 V	680 V

Mechanical Specification	ESP 120 D1	ESP 240 D1	ESP 277 D1
Temperature range	-40 to +80 °C		
Connection type	Screw terminal		
Conductor size (stranded)	25 mm²		
Earth connection	Screw terminal		
Volt free contact	Connect via screw terminal with conductor up to 1.5 mm² (stranded)		
Degree of protection (IEC 60529)	IP20		
Case material	FR ABS UL-94 V-0		
Weight: – Unit	0.4 kg		
– Packaged	0.5 kg		
Dimensions to DIN 43880 - HxDxW[7]	90 mm x 88 mm x 72 mm (4TE)		

[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 (±5%), phase to neutral, phase to earth and neutral to earth
[4] Rating is considered as the current capability of the protector for equipotential bonding near the service entrance
[5] The electrical system, external to the unit, may constrain the actual current rating achieved in a particular installation
[6] Combination wave test within BS EN/IEC 61643, IEEE C62.41-2002 Location Cats C1 & B3, SS 555:2010, AS/NZS 1768-2007, UL 1449 mains wire-in
[7] The remote signal contact (removable) adds 10 mm to height



Mains power protection
ESP D1 Series (Three phase)

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

Combined Type 1, 2 and 3 tested protector (to BS EN 61643) for use on three phase mains power distribution systems primarily to protect connected electronic equipment from transient overvoltages on the mains supply, e.g. computer, communications or control equipment. Innovative remote display options allow both protector and display to be mounted in their optimum position. 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 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
- ESP XXX D1R or ESP XXX D1R/LCD units (where XXX = 208, or 415, or 480) have a remote display that allows the protector to be mounted close to the incoming feed or distribution board with the display being mounted in a visible
- ESP XXX D1/LCD or ESP XXX D1R/LCD units have backlit LCD intelligent display offering clear status information that can be rotated for side mounting to facilitate short connecting leads
- 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)
- Through terminal facility allows series connection on low current supplies to eliminate high additive voltage associated with connecting leads on units installed in parallel
- Compact space saving DIN housing

Installation

Install in parallel, within the power distribution board or directly (via fuses) on to the supply feeding equipment. Can be installed in series for low current supplies - see installation instructions. For ESP D1R or D1R/LCD units, 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). 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 phases, neutral and earth. For TT installations, contact Furse.

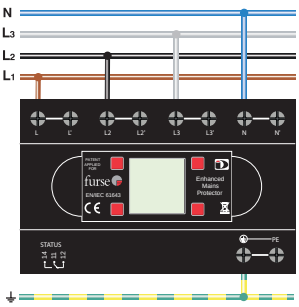
Accessories

Weatherproof enclosure:
WBX D4

ESP RLA HD-1
Spare 1 m cable assembly for ESP XXX D1R or ESP XXX D1R/LCD

ESP RLA HD-2
Spare 2 m cable assembly for ESP XXX D1R or ESP XXX D1R/LCD

ESP RLA HD-4
Spare 4 m cable assembly forESP XXX D1R or ESP XXX D1R/LCD



Parallel connection of ESP 415 D1, ESP 208 D1 and ESP 480 D1 series to three phase star (4 wire and earth) supplies (fuses not shown for clarity)

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 (and their ready-boxed derivatives) may be more suitable.

Mains power protection
ESP D1 Series (Three phase)

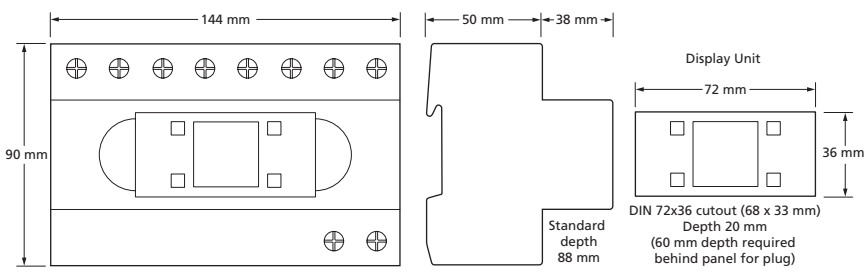
ESP D1 Series (Three phase) - Technical specification

Electrical Specification	ESP 208 D1[1]	ESP 415 D1[1]	ESP 480 D1[1]
Nominal voltage - Phase-Neutral *Uo* (RMS)	120 V	240 V	277 V
Maximum voltage - Phase-Neutral *Uc* (RMS)	150 V	280 V	350 V
Temporary Overvoltage TOV U_T[2]	175 V	350 V	402 V
Short circuit withstand capability	25 kA/50 Hz		
Working voltage (RMS)	90-150 V	200-280 V	232-350 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:[3]	Screw terminal		
– Current rating	1 A		
– Nominal voltage (RMS)	250 V		

Transient Specification	ESP 208 D1	ESP 415 D1	ESP 480 D1
Type 1 (BS EN/EN), Class I (IEC)			
Nominal discharge current 8/20 µs (per mode) *In*	20 kA		
Let-through voltage *Up* at *In*[4]	600 V	900 V	1 kV
Impulse discharge current 10/350 µs *Iimp* (per mode)[5]	4 kA		
Let-through voltage *Up* at *Iimp*[4]	500 V	750 V	850 V
Impulse discharge current (per phase) *Iimp*[6]	6.25 kA	6.25 kA	6.25 kA
Type 2 (BS EN/EN), Class II (IEC)			
Nominal discharge current 8/20 µs (per mode) *In*	20 kA		
Let-through voltage *Up* at *In*[4]	600 V	900 V	1 kV
Maximum discharge current Imax (per mode)[5]	40 kA		
Maximum discharge current Imax (per phase)	80 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)[7]	390 V	600 V	680 V

Mechanical Specification	ESP 120 D1	ESP 240 D1	ESP 277 D1
Temperature range	-40 to +80 °C		
Connection type	Screw terminal		
Conductor size (stranded)	25 mm²		
Earth connection	Screw terminal		
Volt free contact	Connect via screw terminal with conductor up to 1.5 mm² (stranded)		
Display connection (D1R & D1R/LCD versions)	HD-D Type 1 metre interconnection cable / 2 metre cable (ESP RLA HD-2) or 4 metre cable (ESP RLA HD-4) optional		
Degree of protection (IEC 60529)	IP20		
Case material	FR ABS UL-94 V-0		
Weight: – Unit	0.85 kg		
– Packaged	0.95 kg		
Dimensions to DIN 43880 - HxDxW[8]	90 mm x 88 mm x 144 mm (8TE)		

[1] Three phase series (208 V, 415 V or 480 V) include fixed (D1) or remote (D1R) LED or LCD options, e.g. ESP 415 D1, ESP 415 D1/LCD, ESP 415 D1R, ESP 415 D1R/LCD
[2] Temporary Overvoltage rating is for a maximum duration of 5 seconds tested to BS EN/EN/IEC 61643
[3] Min. permissable load is 5 V DC, 10 mA to ensure reliable operation
[4] The maximum transient voltage let-through of the protector throughout the test (±5%), phase to neutral, phase to earth and neutral to earth
[5] The electrical system, external to the unit, may constrain the actual current rating achieved in a particular installation
[6] Rating is considered as the current capability of the protector for equipotential bonding near the service entrance
[7] Combination wave test within BS EN/IEC 61643, IEEE C62.41-2002 Location Cats C1 & B3, SS 555:2010, AS/NZS 1768-2007, UL 1449 mains wire-in
[8] The remote signal contact (removable) adds 10 mm to height



Mains power protection
ESP M2/M4 Series

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

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.

Features & benefits

- Very low let-through voltage (enhanced protection to 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.

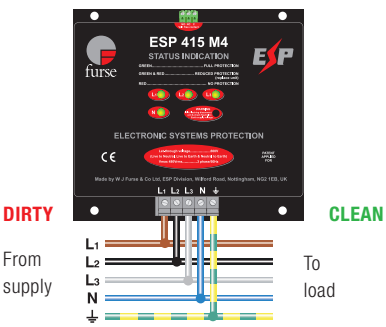
Accessories

Weatherproof enclosures:

WBX M2
For use with the ESP XXX M2

WBX M4
For use with the ESP XXX M4

Parallel connection to three phase star (4 wire and earth) supplies (fuses not shown for clarity)



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.

Mains power protection
ESP M2/M4 Series

ESP M2/M4 Series - Technical specification

Electrical Specification	ESP 415 M2	ESP 415 M4	ESP 480 M2	ESP 480 M4
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 U_T[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)	< 500 µA	< 1000 µA	< 500 µA	< 1000 µA
Indicator circuit current	< 20 mA	< 40 mA	< 20 mA	< 40 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*	40 kA	80 kA	40 kA	80 kA
Let-through voltage *Up* at *In*[3]	900 V	900 V	1 kV	1 kV
Impulse discharge current 10/350 µs *Iimp* (per mode)[4]	8 kA	16 kA	8 kA	16 kA
Let-through voltage *Up* at *Iimp*[2]	750 V	750 V	850 V	850 V
Impulse discharge current (per phase) *Iimp*[5]	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) *In*	40 kA	80 kA	40 kA	80 kA
Let-through voltage *Up* at *In*[3]	900 V	900 V	1 kV	1 kV
Maximum discharge current Imax (per mode)[4]	80 kA	160 kA	80 kA	160 kA
Maximum discharge current Imax (per phase)	160 kA	320 kA	160 kA	320 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)[6]	590 V	570 V	670 V	650 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			
Conductor size (stranded)	25 mm^2	50 mm^2	25 mm^2	50 mm^2
Earth connection	Screw terminal			
Volt free contact	Connect via screw terminal with conductor up to 1.5 mm^2 (stranded)			
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 78 mm	226 mm x 204 mm x 125 mm	226 mm x 204 mm x 78 mm	226 mm x 204 mm x 125 mm

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

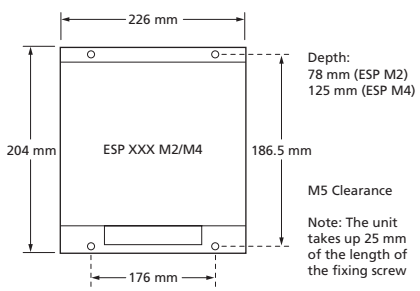
[2] Minimum permissable load is 5 V DC, 10 mA to ensure reliable operation

[3] The maximum transient voltage let-through of the protector throughout the test (±5%), 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 BS EN/IEC 61643, IEEE C62.41-2002 Location Cats C1 & B3, SS 555:2010, AS/NZS 1768-2007, UL 1449 mains wire-in



Mains power protection
ESP M1 Series

LPZ 0→3

FULL MODE Bonding + Equipment Protection

MAINS TEST TYPE 1 + 2 + 3

ENHANCED Low let-through voltage

ACTIVE VOLT-FREE CONTACT

3-WAY + N-E FAULT STATUS INDICATION

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

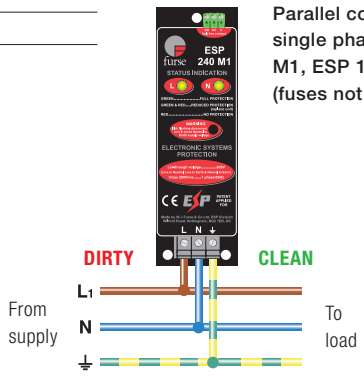
- Very low let-through voltage (enhanced protection to BS EN 62305) between all sets of conductors (phase to neutral, phase to earth, neutral to earth - Full Mode protection)
- Full mode design capable of handling partial lightning currents as well as allowing continual operation of protected equipment
- 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

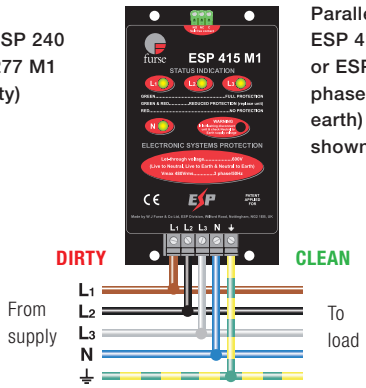
Install in parallel, within the power distribution board or directly (via fuses) on to the supply feeding equipment. At distribution boards, the protector can be installed either on the load side of the incoming isolator, or on the closest outgoing way to the incoming supply. Connect, with very short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

Accessories

Weatherproof enclosures:
WBX 3
Use with single phase protectors
WBX 4
Use with three phase protectors



Parallel connection of single phase protectors ESP 240 M1, ESP 120 M1 or ESP 277 M1 (fuses not shown for clarity)



Parallel connectionof ESP 415 M1, ESP 208 M1 or ESP 480 M1 to three phase star (4 wire and earth) supplies (fuses not shown for clarity)

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.

Mains power protection
ESP M1 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
Nominal voltage - Phase-Neutral *Uo* (RMS)	120 V	120 V	240 V	240 V	277 V	277 V
Maximum voltage - Phase-Neutral *Uc* (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) *In*	20 kA					
Let-through voltage *Up* at *In*[3]	600 V	600 V	900 V	900 V	1 kV	1 kV
Impulse discharge current 10/350 µs *Iimp* (per mode)[4]	4 kA					
Let-through voltage Up at *Iimp*[3]	40 kA					
Impulse discharge current (per phase) *Iimp*[5]	6.25 kA					
Type 2 (BS EN/EN), Class II (IEC)						
Nominal discharge current 8/20 µs (per mode) *In*	20 kA					
Let-through voltage *Up* at *In*[3]	600 V	600 V	900 V	900 V	1 kV	1 kV
Maximum discharge current Imax (per mode)[4]	40 kA					
Maximum discharge current Imax (per phase)	80 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)[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					
Conductor size (stranded)	16 mm²					
Earth connection	Screw terminal					
Volt free contact	Connect via screw terminal with conductor up to 2.5 mm² (stranded)					
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

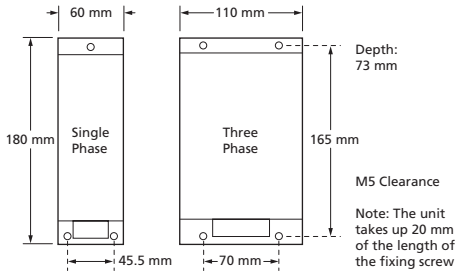
[2] Minimum permissable load is 5 V DC, 10 mA to ensure reliable operation

[3] The maximum transient voltage let-through of the protector throughout the test (±5%), 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 BS EN/IEC 61643, IEEE C62.41-2002 Location Cats C1 & B3, SS 555:2010, AS/NZS 1768-2007, UL 1449 mains wire-in



Mains power protection
ESP M1R, M2R & M4R Series

FULL MODE Bonding + Equipment Protection

MAINS TEST TYPE 1 + 2 + 3

REMOTE INDICATION LED DISPLAY

ENHANCED Low let-through voltage

ACTIVE VOLT-FREE CONTACT

3-WAY + N-E FAULT STATUS INDICATION

LPZ *0*→3

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 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

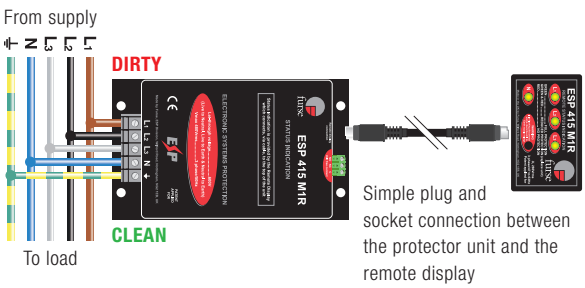
ESP M1R: main distribution board for buildings with multiple metallic services (e.g. gas, water, telecoms) & sub-distribution boards feeding sensitive equipment. ESP M2R: main distribution board for buildings with Class III or IV LPS fitted or exposed 3-ph power lines where no LPS is fitted. ESP M4R: 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
Spare 1 metre cable assembly
ESP RLA-2
Spare 2 metre cable assembly
ESP RLA-4
Spare 4 metre cable assembly



Parallel connection of ESP 415 M1R to three phase star (4 wire and earth) supplies (fuses not shown for clarity)

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

Mains power protection
ESP M1R, M2R & M4R 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
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 U_T[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	< 250 µA	< 500 µA	<500 µA	< 1000 µA	< 1000 µA
Indicator circuit current	< 10 mA	< 10 mA	< 20 mA	< 20 mA	< 40 mA	< 40 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	40 kA	40 kA	80 kA	80 kA
Let-through voltage *Up* at *In*[3]	900 V	1 kV	900 V	1 kV	900 V	1 kV
Impulse discharge current 10/350 µs *Iimp* (per mode)[4]	4 kA	4 kA	8 kA	8 kA	16 kA	16 kA
Let-through voltage Up at *Iimp*[3]	750 V	850 V	750 V	850 V	750 V	850 V
Impulse discharge current (per phase) *Iimp*[5]	6.25 kA	6.25 kA	12.5 kA	12.5 kA	25 kA	25 kA
Type 2 (BS EN/EN), Class II (IEC)						
Nominal discharge current 8/20 µs (per mode) *In*	20 kA	20 kA	40 kA	40 kA	80 kA	80 kA
Let-through voltage *Up* at *In*[3]	900 V	1 kV	900 V	1 kV	900 V	1 kV
Maximum discharge current Imax (per mode)[4]	40 kA	40 kA	80 kA	80 kA	160 kA	160 kA
Maximum discharge current Imax (per phase)	80 kA	80 kA	160 kA	160 kA	320 kA	320 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)[6]	600 V	680 V	590 V	670 V	570 V	650 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					
Conductor size (stranded)	16 mm²	16 mm²	25 mm²	25 mm²	50 mm²	50 mm²
Earth connection	Screw terminal					
Volt free contact	Connect via screw terminal with conductor up to 2.5 mm² (stranded)					
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 - ABS					
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

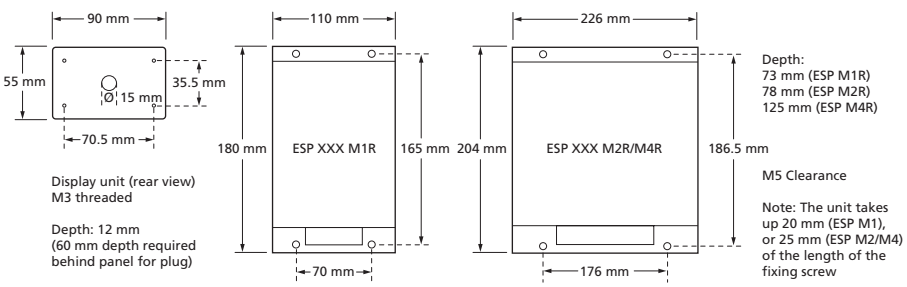
[2] Minimum permissable load is 5 V DC, 10 mA to ensure reliable operation. Under fault conditions, the remote display will go blank if the L1 phase loses power or becomes faulty. This is due to the isolation requirements needed for circuitry mounted externally to the main protector unit

[3] The maximum transient voltage let-through of the protector throughout the test (±5%), 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 BS EN/IEC 61643, IEEE C62.41-2002 Location Cats C1 & B3, SS 555:2010, AS/NZS 1768-2007, UL 1449 mains wire-in



Mains power protection
ESP DC Series

FULL MODE Bonding + Equipment Protection

MAINS TEST TYPE 2 + 3

ENHANCED Low let-through voltage

LPZ 1→3

STATUS INDICATION + VOLT-FREE CONTACT

Combined Type 2 and 3 tested protector (to BS EN 61643) for use on DC systems to protect connected electronic equipment from transient overvoltages on the mains supply, e.g. control equipment. Available for 12, 24, 36 and 48 V DC systems. For use at boundaries LPZ 1 through to LPZ 3 to protect sensitive electronic equipment.

Features & benefits

- Low let-through voltage (enhanced protection to BS EN 62305) between all sets of conductors (positive to negative, positive to earth and negative to earth - Full Mode protection) allowing continuous operation of equipment
- Repeated protection in lightning intense environments
- Visual indication of protector 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
- Robust steel housing
- Simple parallel connection
- Base provides ultra-low inductance earth bond to metal panels
- Compact size for installation in the power distribution board
- Maintenance free

Application

Use on DC power distribution systems to protect connected electronic equipment from transient overvoltages on the DC

Installation

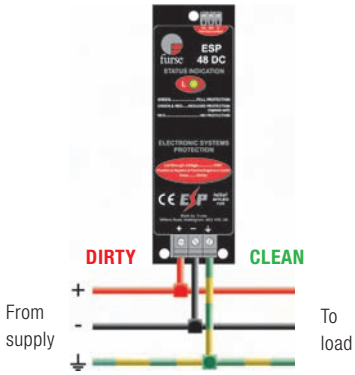
Install in parallel, within the power distribution board or directly on the supply feeding the equipment. At distribution boards, the protector can be installed either on the load side of the incoming isolator, or on the closest outgoing way to the incoming supply. Connect, with very short connecting leads,

11

Accessories

Weatherproof enclosure:
WBX 3

Parallel connection of ESP 48 DC



NOTE: For low current applications, the ESP H Series (4 A), ESP E Series (1.25 A) or ESP D Series (300 mA) protectors may be suitable. For protection of photovoltaic (PV) systems up to 1000 Vdc, see our ESP PV Series.

Mains power protection
ESP DC Series

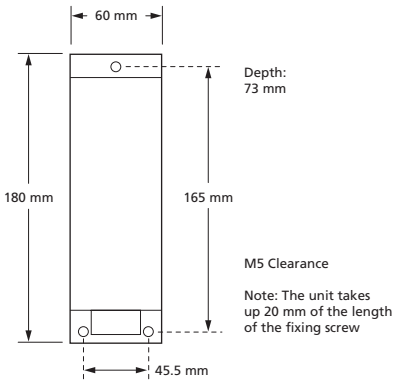
ESP DC Series - Technical specification

Electrical Specification	ESP 12 DC	ESP 24 DC	ESP 36 DC	ESP 48 DC
Nominal voltage (RMS)	12 V	24 V	36 V	48 V
Maximum voltage (RMS)	15 V	30 V	45 V	60 V
Working voltage (RMS)	9-15 V	18-30 V	27-45 V	36-60 V
Max. back-up fuse (see installation instructions)	63 A			
Leakage current (to earth)	< 250 µA			
Indicator circuit current	< 10 mA			
Volt free contact:[1]	Screw terminal			
– Current rating	1 A			
– Nominal voltage (RMS)	250 V			

Transient Specification	ESP 12 DC	ESP 24 DC	ESP 36 DC	ESP 48 DC
Type 2 (BS EN/EN), Class II (IEC)				
Nominal discharge current 8/20 µs (per mode) *In*	5 kA			
Let-through voltage *Up* at *In*[2]	250 V			
Maximum discharge current *Imax* (per mode)[3]	20 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)[4]	190 V			

Mechanical Specification	ESP 12 DC	ESP 24 DC	ESP 36 DC	ESP 48 DC
Temperature range	-40 to +80 °C			
Connection type	Screw terminal			
Conductor size (stranded)	16 mm^2			
Earth connection	Screw terminal			
Volt free contact	Connect via screw terminal with conductor up to 2.5 mm^2 (stranded)			
Degree of protection (IEC 60529)	IP20			
Case material	Steel			
Weight: – Unit	0.6 kg			
– Packaged	0.7 kg			
Dimensions	180 mm x 60mm x 73 mm			

[1] Minimum permissable load is 5 V DC, 10 mA to ensure reliable operation
[2] The maximum transient voltage let-through of the protector throughout the test (±5%) per mode
[3] The electrical system, external to the unit, may constrain the actual current rating achieved in a particular installation
[4] Combination wave test within BS EN/IEC 61643, IEEE C62.41-2002 Location Cats C1 & B3, SS 555:2010, AS/NZS 1768-2007, UL 1449 mains wire-in



Mains power protection
ESP 5A/BX & 16A/BX Series

FULL MODE Bonding + Equipment Protection

MAINS TEST TYPE 2 + 3

ENHANCED Low let-through voltage

LPZ 1→3

BX IP66

Combined Type 2 and 3 tested protector (to BS EN 61643) for use on low current (up to 5 or 16 A) single phase systems to protect connected electronic equipment from transient overvoltages on the mains supply, e.g. fire/intruder alarm panels. Protectors with /BX suffix come ready-boxed, to IP66, for use in dirty or damp environments. Available for 90-150 Volts, 200-280 Volts and 232-350 Volts supplies. For use at boundaries LPZ 1 through to LPZ 3 to protect sensitive electronic equipment.

Features & benefits

- Very low let-through voltage (enhanced protection to BS EN 62305) between all sets of conductors (phase to neutral, phase to earth, neutral to earth - Full Mode protection) allowing continuous operation of equipment
- Repeated protection in lightning intense environments
- Compact size for easy incorporation in the protected system
- Removable DIN rail foot for simple clip-on mounting to top hat DIN rails (unboxed versions)
- Colour coded terminals give a quick and easy installation check - grey for the dirty (line) end and green for the clean end
- Available ready-boxed to IP66 for use in dirty or damp environments (protectors with /BX suffix)
- Robust housing and substantial earth stud
- Fixing holes ready for flat mounting
- Maintenance free
- ESP 240-5A/BX has Network Rail Approval PA05/02896. NRS PADS reference 087/037285

Application

Use these protectors on low current mains power supplies, e.g. CCTV cameras, alarm panels and telemetry equipment.

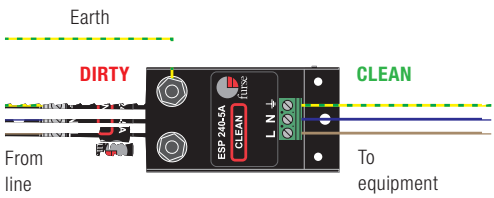
Installation

Connect in-line with the power supply usually either within the equipment panel (or for CCTV cameras, in an enclosure close by), or on the fused connection that supplies equipment.
To protect equipment inside a building from transients entering on an outgoing feed (e.g. to CCTV cameras or to site lighting) the protector should be installed as close to where the cable leaves the building as possible.
Unless readyboxed, protectors should be installed either

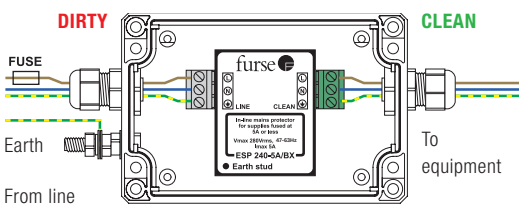
Accessories

If several **ESP 120-5A** or 16A, **ESP 240-5A** or 16A or **ESP 277-5A** or 16A protectors are to be installed together, or if one is in use alongside Lightning Barriers for video or signal lines, these can be simultaneously mounted and earthed on a CME kit and housed in a suitable WBX enclosure.

Connect in-line on supplies fused up to 5 A (ESP 120-5A/BX, ESP 240-5A/BX or ESP 277-5A/BX) or 16 A (ESP 120-16A/BX, ESP 240-16A/BX or ESP 277-16A/BX). Note how the protector can also be earthed from its earth stud



Connect in-line on supplies fused up to 5 A (ESP 120-5A, ESP 240-5A or ESP 277-5A) or 16 A (ESP 120-16A, ESP 240-16A or ESP 277-16A). Note how the protector can also be earthed from its earth stud



NOTE: If your supply is fused at more than 16 Amps the ESP 120 M1, ESP 240 M1 or ESP 277 M1 are suitable.

Mains power protection
ESP 5A/BX & 16A/BX Series

ESP 5A/BX & 16A/BX Series - Technical specification

Electrical Specification	ESP 120-5A ESP 120-5A/BX	ESP 120-16A ESP 120-16A/BX	ESP 240-5A ESP 240-5A/BX	ESP 240-16A ESP 240-16A/BX	ESP 277-5A ESP 277-5A/BX	ESP 277-16A ESP 277-16A/BX
Nominal voltage - Phase-Neutral *Uo* (RMS)	120 V	120 V	240 V	240 V	277 V	277 V
Maximum voltage - Phase-Neutral *Uc* (RMS)	150 V	150 V	280 V	280 V	350 V	350 V
Working voltage (RMS)	90-150 V	90-150 V	200-280 V	200-280 V	232-350 V	232-350 V
Frequency range	47-63 Hz					
Current rating (supply)	5 A or less	16 A or less	5 A or less	16 A or less	5 A or less	16 A or less
Max. back-up fuse (see installation instructions)	5 A	16 A	5 A	16 A	5 A	16 A
Leakage current (to earth)	< 0.5 mA					

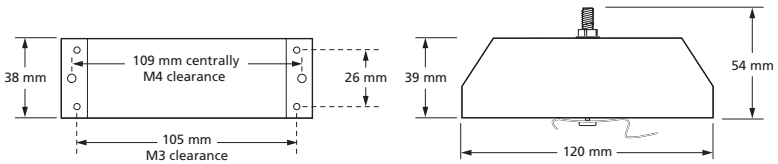
Transient Specification	120 Volt protectors	240 Volt protectors	277 Volt protectors
Type 2 (BS EN/EN), Class II (IEC)			
Nominal discharge current 8/20 µs (per mode) *In*	5 kA		
Let-through voltage *Up* at *In*[1]	450 V	750 V	790 V
Maximum discharge current *I*max (per mode)[2]	10 kA		
Type 3 (BS EN/EN), 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]	390 V	590 V	670 V

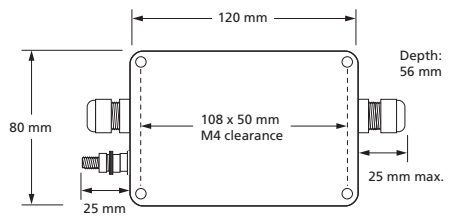
Electrical Specification	ESP 120-5A ESP 120-5A/BX	ESP 120-16A ESP 120-16A/BX	ESP 240-5A ESP 240-5A/BX	ESP 240-16A ESP 240-16A/BX	ESP 277-5A ESP 277-5A/BX	ESP 277-16A ESP 277-16A/BX
Temperature range	-40 to +80 °C			-40 to +80 °C		
Connection type	Screw terminal			Screw terminal		
Conductor size (stranded)	4 mm²			4 mm²		
Earth connection	Via earth terminal or M6 stud			Via earth terminal or M6 stud		
Cable glands	–			5A/BX 4.8-8 mm cable (PG9) 16A/BX 8-12 mm cable (PG13.5)		
Degree of protection (IEC 60529)	IP20			IP66		
Case material	Steel			PVC		
Weight: – Unit	0.23 kg			0.26 kg		
– Packaged	0.25 kg			0.31 kg		
Dimensions	See diagrams below					

[1] The maximum transient voltage let-through of the protector throughout the test (±5%), phase to neutral, phase to earth and neutral to earth

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

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





Mains power protection
ESP MC Series

FULL MODE Bonding + Equipment Protection

SIGNAL/ TELECOM TEST CAT D + C + B

MAINS TEST TYPE 2 + 3

ENHANCED Low let-through voltage

LPZ 0→3

Combined Type 2 and 3 tested protector (to BS EN 61643) with telecom or network protection options. Suitable for use on 220/230/240 Volts supplies. Available with British style (three square pin) plugs and sockets with double-pole action. For use at boundaries LPZ 1 through to LPZ 3 to protect sensitive electronic equipment.

Features & benefits

- Low let-through voltage between all sets of conductors
- Three way visual indication of protection status
- Protects against radio frequency interference
- TN and Cat-5e versions can conveniently protect both mains and telecom/data lines in one unit
- Rugged, heavy duty construction
- Bracket kit ESP MC/19BK available for rear or 19" rack mounting
- Maintenance free

Application

ESP MC series can be used to protect all sorts of plug-in equipment, including hospital laboratory equipment, modems, fax machines and PCs.

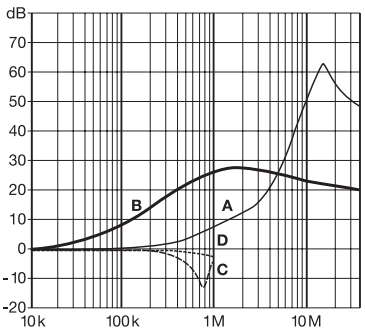
Installation

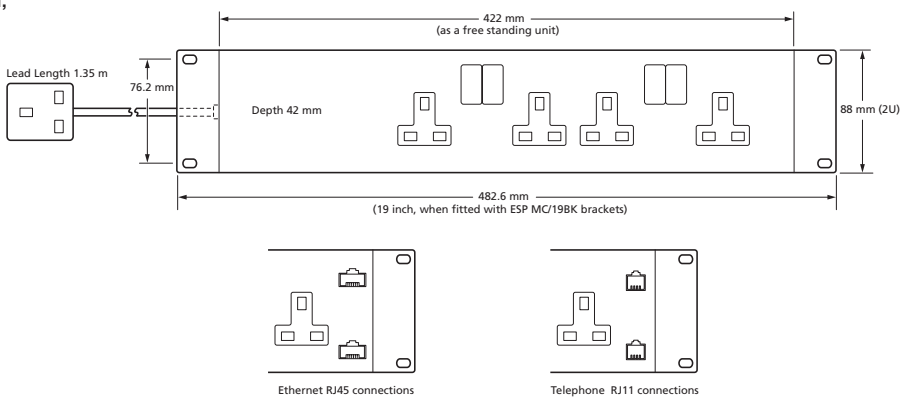
Simply plug the ESP MC series into the mains and your equipment into the ESP MC.

Accessories

ESP MC/19BK bracket kit can be used for rear mounting, or reversed for use in 19" cabinets. All fixings supplied.

RFI performance
Per CISPR 17: A = 50 Ω/50 Ω sym, B = 50 Ω/50 Ω asym, C = 0.1 Ω/100 Ω sym, D = 100 Ω/0.1 Ω sym





NOTE: For wire-in applications up to 16 amps, the ESP 16A/BX Series may be more suitable. For all other supplies, consider the ESP M1 Series.

Mains power protection
ESP MC Series

ESP MC Series - Technical specification

Electrical Specification - Mains	ESP MC	ESP MC/TN/RJ11	ESP MC/Cat-5e
Nominal voltage - Phase-Neutral *Uo* (RMS)	220/230/240 V		
Maximum voltage - Phase-Neutral *Uc* (RMS)	280 V		
Frequency range	47-63 Hz		
Current rating (supply)	13 A		
Leakage current (to earth)	< 0.5 mA		

Electrical Specification - Telecom/data	ESP MC	ESP MC/TN/RJ11	ESP MC/Cat-5e
Nominal voltage	–	296 V	5 V
Maximum working voltage *Uc*[1]	–	296 V	5 V[2]
Current rating (signal)	–	300 mA	300 mA
In-line resistance (per line ±10%)	–	4.4 Ω	1 Ω
Bandwidth (-3 dB 50 Ω system)	–	20 MHz	–
Maximum data rate	–	–	100 Mbps

Transient Specification - Mains	ESP MC	ESP MC/TN/RJ11	ESP MC/Cat-5e
Type 2 (BS EN/EN), Class II (IEC)			
Nominal discharge current 8/20 µs (per mode) *In*	5 kA		
Let-through voltage *Up* at *In*[3]	850 V		
Maximum discharge current *Imax* (per mode)[4]	10 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)[5]	680 V		
Let-through voltage at *Uoc* of 6 kV 1.2/50 µs and *Isc* of 500 A 8/20 (per mode)	555 V		

Transient Specification - Telecom/data	ESP MC	ESP MC/TN/RJ11	ESP MC/Cat-5e
Let-through voltage (all conductors)[6] *Up*			
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21 - line to line / line to earth	–	390 V/390 V	120 V/700 V[8]
C1 test 1 kV, 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21 - line to line / line to earth	–	395 V/395 V	74 V/600 V[8]
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21 - line to line / line to earth	–	295 V/295 V	21 V/550 V[8]
5 kV, 10/700 µs[7] - line to line / line to earth	–	300 V/300 V	25 V/600 V[8]
Maximum surge current[9]			
D1 test 10/350 µs to BS EN/EN/IEC 61643-21	–	1 kA	1 kA
8/20 µs to ITU (formerly CCITT), BS 6651:1999 Appendix C	–	10 kA	10 kA

Mechnical Specification	ESP MC	ESP MC/TN/RJ11	ESP MC/Cat-5e
Temperature range	-25 °C to +80 °C		
Connection type	Via British style three square pin plug and socket to BS 1363		
Conductor size (solid)	–	RJ11	RJ45
Earth connection	Via plug and socket		
Case material	Steel		
Weight: – Unit	1.70 kg	1.75 kg	1.75 kg
– Packaged	1.75 kg	1.8 kg	1.8 kg

[1] Maximum working voltage (DC or AC peak) of telecom/data protection measured at <10 µA leakage for ESP MC/TN/RJ11 and 1 mA for ESP MC/Cat-5e
[2] Maximum working voltage is 5 V for data pairs 1/2 & 3/6
[3] The maximum transient voltage let-through of the protector throughout the test (±5%), 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] Combination wave test within BS EN/IEC 61643, IEEE C62.41-2002 Location Cats C1 & B3, SS 555:2010, AS/NZS 1768-2007, UL 1449 mains wire-in
[6] The maximum transient voltage let-through the protector throughout the test (±10%), line to line & line to earth. Response time < 10 ns
[7] Test to BS EN/IEC 61643, IEC 61000-4-5:2006, ITU-T (formerly CCITT) K.20, K.21 and K.45, Telcordia GR-1089-CORE, Issue 2:2002, ANSI TIA/EIA/IS-968-A:2002 (formerly FCC Part 68)
[8] The interfaces used in Cat-5/5e systems incorporate an isolation transformer that inherently provides an inbuilt immunity to transients between line and earth of 1,500 Volts or more
[9] The installation and connectors external to the protector may limit the capability of the protector