Electronic systems protection
Data & signal protection

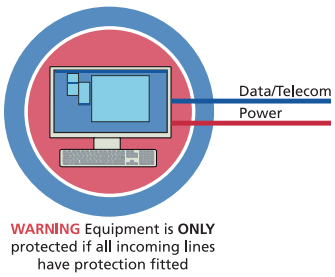
Data & signal protection

Data & signal protection
Product selector - Data / Signal line protection

Selection guide - data/signal systems	Installation locations	
Common applications	**Service entrance**	**Critical terminal equipment - located >20 m from service entrance**
RS 232 Data interfaces - Twisted pair data protection	 **ESP 15D Series** **ESP 15D/BX Series** See pages 12/4 and 12/10	 **ESP LA Series** See page 13/10
Compact for limited space	 **ESP SL15 Series** See page 12/12	
Multiple line protection	 **ESP 15Q Series** See page 12/20	
RS 422 & RS 423 Data interfaces	 **ESP 06E Series** **ESP SL06 Series** See pages 12/6 and 12/12	 **ESP LB Series** See page 13/10
RS 485 Data interfaces	 **ESP RS485 Series** **ESP SL RS485 Series** **ESP RS485Q Series** See pages 12/30	 **ESP LB Series** See page 13/10
PBX systems terminating on LSA-Plus disconnection modules	 **ESP KS Series** **KE Series** See pages 12/22	
Computer networks, including Power over Ethernet (PoE) (see Furse Application Note AN004)	 **ESP Cat-5 Series** **ESP Cat-6 Series** See pages 13/8	 **ESP LN Series** See page 13/12

Protectors for specific systems

System	Protector
4-20 mA loops and low current telemetry systems - Compact, for limited space	 **ESP SL Series** **ESP SL LED 4-20mA Series** See pages 12/12 and 12/16
Multiple line and PBX protection	 **ESP D & Q Series** **ESP KS Series** See pages 12/4, 12/20 and 12/22
Hazardous area (process control, fire & gas detectors, 4-20 mA loops, shut down systems)	 **ESP SL X Series** See pages 12/14



System	Protector
DC systems up to 110V, 4A	 **ESP H Series** See pages 12/8
DC systems up to 110V, 0.75 A - Compact, for limited space	 **ESP SL LED Series** See pages 12/12
3-wire systems - Compact for limited space	 **ESP SL/3W Series** See pages 12/18
RTD systems (see Furse Application Note AN001)	 **ESP RTD Series** **ESP SL RTD Series** **ESP RTDQ Series** See pages 12/28
Data interfaces at PCB level (see Furse Application Note AN003)	 **ESP PCB Series** See pages 12/24
RF radio and antenna communication systems	 **ESP RF Series** See pages 14/16 & 14/18

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Data & signal protection
ESP D & TN Series

LPZ 0→3 | FULL MODE Bonding + Equipment Protection | SIGNAL/TELECOM TEST CAT D + C + B | ENHANCED Low let-through voltage | LOW IN-LINE RESISTANCE 9.4 Ω | CURRENT RATING 300 mA

Combined Category D, C, B tested protector (to BS EN 61643) suitable for most twisted pair signalling applications. Available for working voltages of up to 6, 15, 30, 50 and 110 Volts. ESP TN suitable for Broadband, POTS, dial-up, T1/E1, lease line and *DSL telephone applications. For use at boundaries up to LPZ *0* to protect against flashover (typically the service entrance location) 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 lines - 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
- Low in-line resistance minimizes unnecessary reductions in signal strength
- Strong, flame retardant, ABS housing
- Supplied ready for flat mounting on base or side
- Built-in DIN rail foot for simple clip-on mounting to top hat DIN rails
- Colour coded terminals give a quick and easy installation check - grey for the dirty (line) end and green for the clean end
- Screen terminal enables easy connection of cable screen to earth
- Substantial earth stud to enable effective earthing
- Integral earthing plate for enhanced connection to earth via a CME kit
- ESP 06D and ESP 50D have PADS reference 086/000551 (ESP 06D) and 086/000553 (ESP 50D)
- ESP TN is suitable for telecommunication applications in accordance with Telcordia and ANSI Standards (see Application Note AN005)

Application

Use on twisted pair lines, e.g. those found in process control equipment, modems and computer communications interfaces.

Installation

Connect in series with the data communication or signal line either near where it enters or leaves the building or close to the equipment being protected (e.g. within its control panel). Either way, it must be very close to the system's earth star point. Install protectors either within an existing cabinet/ cubicle or in a separate enclosure.

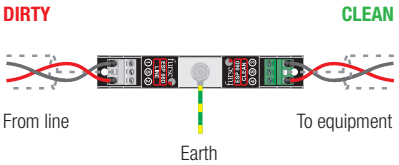
Accessories

Combined Mounting/Earthing kits:
CME 4 Mount & earth up to 4 protectors
CME 8 Mount & earth up to 8 protectors
CME 16 Mount & earth up to 16 protectors
CME 32 Mount & earth up to 32 protectors

Weatherproof enclosures:
WBX 2/G
For use with up to 2 protectors
WBX 3, WBX 3/G
For use with up to 3 protectors
WBX 4, WBX 4/GS
For use with a CME 4 and up to 4 protectors
WBX 8, WBX 8/GS
For use with a CME 8 and up to 8 protectors
WBX 16/2/G
For use with one or two CME 16 and up to 32 protectors

Full product range order codes can be found on pages 17/8-17/9

Install in series (in-line)



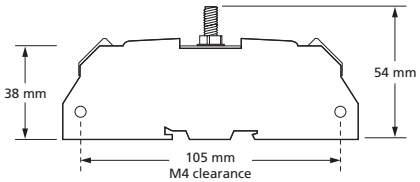
NOTE: Derivatives of these protectors are available ready-boxed to IP66, for use in damp or dirty environments. Slim Line (ESP SL), ATEX (ESP SLX) and PCB mount (ESP PCB) versions are also available. If your system requires a protector with a very low resistance or higher current, see the ESP E & H Series. Also use the ESP E Series for systems needing a higher bandwidth. Protectors for 3-wire (ESP SL/3W) and RTD (ESP RTD, ESP SL RTD) are available, as are the space saving protectors (ESP Q, ESP SL Series). The ESP KT and TN Series are additional protectors specifically for telephone lines.
The ESP KS Series are protectors for data and signal lines on an LSA-PLUS module.

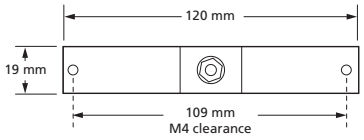
Data & signal protection
ESP D & TN Series

ESP D & TN Series - Technical specification

Electrical specification	ESP 06D	ESP 15D	ESP 30D	ESP 50D	ESP 110D	ESP TN
ABB order code	7TCA085400R0079	7TCA085400R0089	7TCA085400R0099	7TCA085400R0109	7TCA085400R0005	7TCA085400R0171
Nominal voltage[1]	6 V	15 V	30 V	50 V	110 V	–
Maximum working voltage *Uc* (RMS/DC)[2]	5 V / 7.79 V	13 V / 19 V	26 V / 37.1 V	41 V / 58 V	93 V / 132 V	– / 296 V
Current rating (signal)	300 mA					
In-line resistance (per line ±10%)	9.4 Ω	9.4 Ω	9.4 Ω	9.4 Ω	9.4 Ω	4.4 Ω
Bandwidth (-3 dB 50 Ω system)	800 kHz	2.5 MHz	4 MHz	6 MHz	9 MHz	20 MHz
Transient specification	**ESP 06D**	**ESP 15D**	**ESP 30D**	**ESP 50D**	**ESP 110D**	**ESP TN**
Let-through voltage (all conductors)[3] *Up*						
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21	12.0 V	25.0 V	44.0 V	78.0 V	155 V	395 V
C1 test 1 kV, 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21	11.5 V	24.5 V	43.5 V	76.0 V	150 V	390 V
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21	10.0 V	23.0 V	42.5 V	73.0 V	145 V	298 V
5 kV, 10/700 µs[4]	10.5 V	23.8 V	43.4 V	74.9 V	150 V	300 V
Maximum surge current						
D1 test 10/350 µs to – Per signal wire	2.5 kA					
BS EN/EN/IEC 61643-21: – Per pair	5 kA					
8/20 µs to ITU-T K.45:2003, – Per signal wire	10 kA					
IEEE C62.41.2:2002: – Per pair	20 kA					
Mechanical specification	**ESP 06D**	**ESP 15D**	**ESP 30D**	**ESP 50D**	**ESP 110D**	**ESP TN**
Temperature range	-40 to +80 °C					
Connection type	Screw terminal - maximum torque 0.5 Nm					
Conductor size (stranded)	2.5 mm^2					
Earth connection	M6 stud					
Case material	FR Polymer UL-94 V-0					
Weight: – Unit	0.08 kg					
– Packaged (per 10)	0.85 kg					
Dimensions	See diagram below					

[1] Nominal voltage (RMS/DC or AC peak) measured at < 5 µA (ESP 15D, ESP 30D, ESP 50D, ESP 110D) and <200 µA (ESP 06D)
[2] Maximum working voltage (RMS/DC or AC peak) measured at < 1 mA leakage (ESP 15D, ESP 30D, ESP 50D, ESP 110D), < 10 mA (ESP 06D) and < 10 µA (ESP TN)
[3] The maximum transient voltage let-through of the protector throughout the test (±10%), line to line & line to earth, both polarities. Response time < 10 ns
[4] Test to 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)





Data & signal protection
ESP E Series

LPZ 0→3 | FULL MODE Bonding + Equipment Protection | HIGH BANDWIDTH | SIGNAL/TELECOM TEST CAT D + C + B | ENHANCED Low let-through voltage | LOW IN-LINE RESISTANCE 1 Ω | CURRENT RATING 1.25 A

Combined Category D, C, B tested protector (to BS EN 61643) suitable for twisted pair signalling applications which require either a lower in-line resistance, an increased current or a higher bandwidth than the ESP D Series. Also suitable for DC power applications less than 1.25 Amps. Available for working voltages of up to 6, 15, 30, 50 and 110 Volts. For use at boundaries up to LPZ *0* to protect against flashover (typically the service entrance location) 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 lines - 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
- Very low (1 Ω) in-line resistance allows resistance critical applications (e.g. alarm loops) to be protected
- High (1.25 A) maximum running current
- High bandwidth enables higher frequency (high traffic or bit rate) data communications
- Screen terminal enables easy connection of cable screen to earth
- Strong, flame retardant, ABS housing
- Built-in DIN rail foot for simple clip-on mounting to top hat DIN rails
- Colour coded terminals give a quick and easy installation check - grey for the dirty (line) end and green for clean
- Substantial earth stud to enable effective earthing
- Supplied ready for flat mounting on base or side
- Integral earthing plate for enhanced connection to earth via CME kit
- ESP 06E and ESP 15E have Network Rail Approval PA05/02047. NRS PADS reference 086/000201 (ESP 06E) and 086/000200 (ESP 15E)

Application

Use these units to protect resistance sensitive, higher frequency or running current systems, e.g. high speed digital communications equipment or systems with long signal lines.

Installation

Connect in series with the data communication or signal line either near where it enters or leaves the building or close to the equipment being protected (e.g. within its control panel). Either way, it must be very close to the system's earth star point. Install protectors either within an existing cabinet/ cubicle or in a separate enclosure.

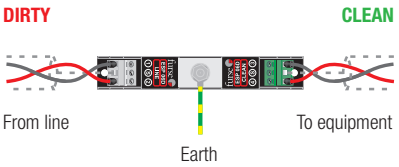
Accessories

Combined Mounting/Earthing kits:
CME 4 Mount & earth up to 4 protectors
CME 8 Mount & earth up to 8 protectors
CME 16 Mount & earth up to 16 protectors
CME 32 Mount & earth up to 32 protectors

Weatherproof enclosures:
WBX 2/G
For use with up to 2 protectors
WBX 3, WBX 3/G
For use with up to 3 protectors
WBX 4, WBX 4/GS
For use with a CME 4 and up to 4 protectors
WBX 8, WBX 8/GS
For use with a CME 8 and up to 8 protectors
WBX 16/2/G
For use with one or two CME 16 and up to 32 protectors

Full product range order codes can be found on pages 17/8-17/9

Install in series (in-line)



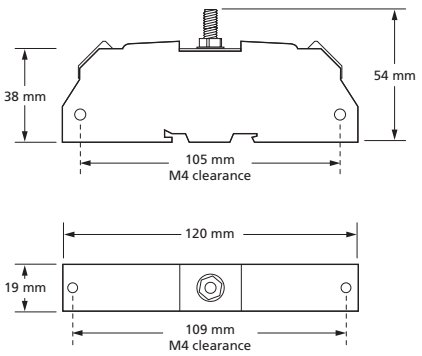
NOTE: Slim Line (ESP SL), ATEX (ESP SLX) and PCB mount (ESP PCB) are available. For many twisted pair data and signal applications, the lower cost ESP D Series may be suitable. For applications requiring higher current (1.25 A to 4 A) or ultra-low in-line resistance, the ESP H Series protectors may be more suitable. For data and signal lines on LSA-PLUS modules, use the ESP KS Series.

Data & signal protection
ESP E Series

ESP E Series - Technical specification

Electrical specification	ESP 06E	ESP 15E	ESP 30E	ESP 50E	ESP 110E
ABB order code	7TCA085400R0084	7TCA085400R0095	7TCA085400R0104	7TCA085400R0116	7TCA085400R0007
Nominal voltage[1]	6 V	15 V	30 V	50 V	110 V
Maximum working voltage *Uc* (RMS/DC)[2]	5 V / 7.79 V	11 V / 16.7 V	25 V / 36.7 V	40 V / 56.7 V	93 V / 132 V
Current rating (signal)	1.25 A				
In-line resistance (per line ±10%)	1.0 Ω				
Bandwidth (-3 dB 50 Ω system)	45 MHz				
Transient specification	**ESP 06E**	**ESP 15E**	**ESP 30E**	**ESP 50E**	**ESP 110E**
Let-through voltage (all conductors)[3] *Up*					
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21	36.0 V	39.0 V	60.0 V	86.0 V	180 V
C1 test 1 kV, 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21	26.2 V	28.0 V	49.0 V	73.5 V	170 V
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21	16.0 V	25.5 V	43.5 V	65.0 V	160 V
5 kV, 10/700 µs[4]	17.0 V	26.2 V	44.3 V	65.8 V	165 V
Maximum surge current					
D1 test 10/350 µs to – Per signal wire	2.5 kA				
BS EN/EN/IEC 61643-21: – Per pair	5 kA				
8/20 µs to ITU-T K.45:2003, – Per signal wire	10 kA				
IEEE C62.41.2:2002: – Per pair	20 kA				
Mechanical specification	**ESP 06E**	**ESP 15E**	**ESP 30E**	**ESP 50E**	**ESP 110E**
Temperature range	-40 to +80 °C				
Connection type	Screw terminal - maximum torque 0.5 Nm				
Conductor size (stranded)	2.5 mm^2				
Earth connection	M6 stud				
Case material	FR Polymer UL-94 V-0				
Weight: – Unit	0.08 kg				
– Packaged (per 10)	0.85 kg				
Dimensions	See diagram below				

[1] Nominal voltage (RMS/DC or AC peak) measured at < 10 µA (ESP 15E, ESP 30E, ESP 50E, ESP 110E) and < 200 µA (ESP 06E)
[2] Maximum working voltage (RMS/DC or AC peak) measured at < 5 mA leakage (ESP 15E, ESP 30E, ESP 50E, ESP 110E) and < 10 mA (ESP 06E)
[3] The maximum transient voltage let-through of the protector throughout the test (±10%), line to line & line to earth, both polarities. Response time < 10 ns
[4] Test to 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)



Data & signal protection
ESP H Series

LPZ *0*→3 | FULL MODE Bonding + Equipment Protection | SIGNAL/ TELECOM TEST CAT D + C + B | ENHANCED Low let-through voltage | LOW IN-LINE RESISTANCE 0.05 Ω | CURRENT RATING 4 A

Combined Category D, C, B tested protector (to BS EN 61643) suitable for twisted pair signalling applications which require either a lower in-line resistance or an increased current than the ESP D or E Series. Also suitable for DC power applications less than 4 Amps. Available for working voltages of up to 6, 15, 30, 50 and 110 Volts. For use at boundaries up to LPZ *0* to protect against flashover (typically the service entrance location) 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 lines - 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
- Ultra-low (< 0.05 Ω) in-line resistance allows resistance critical applications (e.g. alarm loops) to be protected
- Very high (4 A) maximum running current
- Strong, flame retardant ABS housing
- Supplied ready for flat mounting on base or side
- Built-in DIN rail foot for simple clip-on mounting to top hat DIN rails
- Colour coded terminals give a quick and easy installation check - grey for the dirty (line) end and green for clean
- Screen terminal enables easy connection of cable screen to earth
- Substantial earth stud to enable effective earthing
- Integral earth plate enables enhanced connection to earth via CME kit

Application

Use these applications to protect resistance sensitive or higher running current systems, e.g. systems with long signal lines, or DC power applications.

Installation

Connect in series with the data communication or signal line either near where it enters or leaves the building or close to the equipment being protected (e.g. within its control panel). Either way, it must be very close to the system's earth star point. Install protectors either within an existing cabinet/ cubicle or in a separate enclosure.

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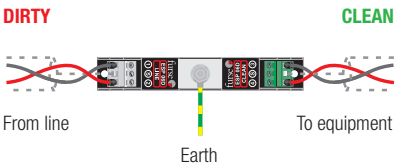
Accessories

Combined Mounting/Earthing kits:
CME 4 Mount & earth up to 4 protectors
CME 8 Mount & earth up to 8 protectors
CME 16 Mount & earth up to 16 protectors
CME 32 Mount & earth up to 32 protectors

Weatherproof enclosures:
WBX 2/G
For use with up to 2 protectors
WBX 3, WBX 3/G
For use with up to 3 protectors
WBX 4, WBX 4/GS
For use with a CME 4 and up to 4 protectors
WBX 8, WBX 8/GS
For use with a CME 8 and up to 8 protectors
WBX 16/2/G
For use with one or two CME 16 and up to 32 protectors

Full product range order codes can be found on pages 17/8-17/9

Install in series (in-line)



NOTE: For some data and signal applications with lower current, higher in-line resistance or higher bandwidth requirements, the ESP D or E Series protectors or the Slim Line ESP SL Series may be more suitable. If the protector is to be mounted directly onto a PCB, use the ESP PCB/**D or ESP PCB/**E protectors.

Data & signal protection
ESP H Series

ESP H Series - Technical specification

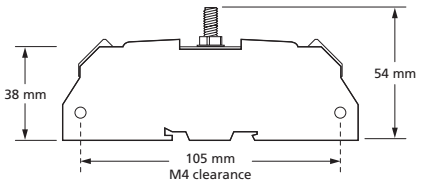
Electrical specification	ESP 06H	ESP 15H	ESP 30H	ESP 50H	ESP 110H
ABB order code	7TCA085400R0003	7TCA085400R0009	7TCA085400R0011	7TCA085400R0012	7TCA085400R0008
Nominal voltage[1]	6 V	15 V	30 V	50 V	110 V
Maximum working voltage *Uc* (RMS/DC)[2]	5 V / 7.79 V	11 V / 16.7 V	25 V / 36.7 V	40 V / 56.7 V	93 V / 132 V
Current rating (signal)	4 A				
In-line resistance (per line ±10%)	0.05 Ω				
Bandwidth (-3 dB 50 Ω system)	160 KHz	140 KHz	130 KHz	120 KHz	120 KHz
Transient specification	**ESP 06H**	**ESP 15H**	**ESP 30H**	**ESP 50H**	**ESP 110H**
Let-through voltage (all conductors)[3] *Up*					
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21	12.0 V	27.5 V	46.0 V	67.0 V	150 V
C1 test 1 kV, 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21	11.0 V	26.5 V	45.0 V	66.5 V	145 V
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21	10.5 V	25.5 V	43.5 V	65.0 V	140 V
5 kV, 10/700 µs[4]	10.8 V	26.2 V	44.3 V	65.8 V	145 V
Maximum surge current					
D1 test 10/350 µs to – Per signal wire	2.5 kA				
BS EN/EN/IEC 61643-21: – Per pair	5 kA				
8/20 µs to ITU-T K.45:2003, – Per signal wire	10 kA				
IEEE C62.41.2:2002: – Per pair	20 kA				
Mechanical specification	**ESP 06E**	**ESP 15E**	**ESP 30E**	**ESP 50E**	**ESP 110E**
Temperature range	-40 to +80 °C				
Connection type	Screw terminal - maximum torque 0.5 Nm				
Conductor size (stranded)	2.5 mm^2				
Earth connection	M6 stud - maximum torque 0.5 Nm				
Case material	FR Polymer UL-94 V-0				
Weight: – Unit	0.08 kg				
– Packaged (per 10)	0.85 kg				
Dimensions	See diagram below				

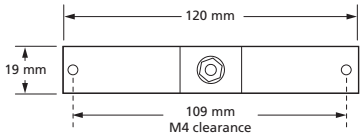
[1] Nominal voltage (RMS/DC or AC peak) measured at < 10 µA (ESP 15H, ESP 30H, ESP 50H, ESP 110H) and < 200 µA (ESP 06H)

[2] Maximum working voltage (RMS/DC or AC peak) measured at < 5 mA leakage (ESP 15H, ESP 30H, ESP 50H, ESP 110H) and < 10 mA (ESP 06H)

[3] The maximum transient voltage let-through of the protector throughout the test (±10%), line to line & line to earth, both polarities. Response time < 10 ns

[4] Test to 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)





Data & signal protection
ESP D/BX Series

LPZ 0→3 | FULL MODE Bonding + Equipment Protection | CURRENT RATING 300 mA | SIGNAL/ TELECOM TEST CAT D + C + B | ENHANCED Low let-through voltage | BX IP66 | LOW IN-LINE RESISTANCE 9.4 Ω

Combined Category D, C, B tested protector (to BS EN 61643) based on the ESP D Series and ESP TN but ready-boxed to IP66 for use in damp or dirty environments. Suitable for most twisted pair signalling applications. Available for working voltages of up to 6, 15, 30, 50 and 110 Volts. ESP TN suitable for Broadband, POTS, dial-up, T1/E1, lease line and *DSL telephone applications. For use at boundaries up to LPZ *0* to protect against flashover (typically the service entrance location) 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 lines - 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
- Low in-line resistance minimizes unnecessary reductions in signal strength
- Ready-boxed to IP66 and supplied ready for flat mounting
- Available with screw terminals or with IDC terminals (by adding /I suffix to part number)
- Colour coded terminals for quick and easy installation check - grey for the dirty (line) end and green for clean
- Screen terminal enables easy connection of cable screen to earth
- Substantial earth stud to enable effective earthing
- ESP TN/BX and ESP TN/2BX are suitable for telecommunication applications in accordance with Telcordia and ANSI Standards (see Application Note AN005)
- Supplied as standard with screw terminals - for IDC terminals order part code plus /I (e.g. ESP TN/BX/I)
- ESP TN/BX has Network Rail Approval PA05/02877. NRS PADS reference 087/037286

Application

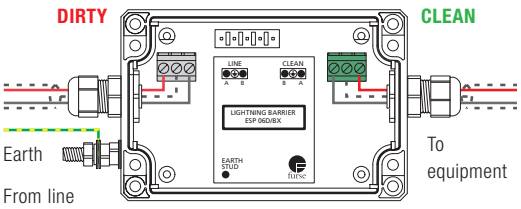
Use these ready-boxed protectors on twisted pair lines in dirty or damp environments. For two wire lines, use /BX versions. For four wire lines, use /2BX versions.

Full product range order codes can be found on pages 17/8-17/9

Installation

Connect in series with the data communication, signal or telephone line either near where it enters/leaves the building or close to the equipment being protected. Either way, it must be very close to the system's earth star point.

Install in series (in-line)



NOTE: For installation in the equipment panel, protectors which are not boxed may be more suitable. If your system requires a protector with a very low resistance, higher current or higher bandwidth use the ESP E or H Series. Unboxed protectors for 3-wire RTD systems are available - as are plug-in protectors for telephone lines and compact Slim Line protectors.

Data & signal protection
ESP D/BX Series

ESP D/BX Series - Technical specification

Electrical specification	ESP 06D/BX ESP 06D/2BX	ESP 15D/BX ESP 15D/2BX	ESP 30D/BX ESP 30D/2BX	ESP 50D/BX ESP 50D/2BX	ESP 110D/BX ESP 110D/2BX	ESP TN/BX ESP TN/2BX
ABB order code	7TCA085400R0081	7TCA085400R0091	7TCA085400R0101	7TCA085400R0113	7TCA085400R0006	7TCA085400R0175
	7TCA085400R0080	7TCA085400R0090	7TCA085400R0100	7TCA085400R0111	7TCA085460R0343	7TCA085400R0172
Nominal voltage[1]	6 V	15 V	30 V	50 V	110 V	–
Maximum working voltage *Uc* (RMS/DC)[2]	5 V / 7.79 V	13 V / 19 V	26 V / 37.1 V	41 V / 58 V	93 V / 132 V	– / 296 V
Current rating (signal)	300 mA					
In-line resistance (per line ±10%)	9.4 Ω	9.4 Ω	9.4 Ω	9.4 Ω	9.4 Ω	4.4 Ω
Bandwidth (-3 dB 50 Ω system)	800 kHz	2.5 MHz	4 MHz	6 MHz	9 MHz	20 MHz

Transient specification	ESP 06D/BX ESP 06D/2BX	ESP 15D/BX ESP 15D/2BX	ESP 30D/BX ESP 30D/2BX	ESP 50D/BX ESP 50D/2BX	ESP 110D/BX ESP 110D/2BX	ESP TN/BX ESP TN/2BX
Let-through voltage (all conductors)[3] *Up*						
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21	12.0 V	25.0 V	44.0 V	78.0 V	155 V	395 V
C1 test 1 kV, 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21	11.5 V	24.5 V	43.5 V	76.0 V	150 V	390 V
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21	10.0 V	23.0 V	42.5 V	73.0 V	145 V	298 V
5 kV, 10/700 µs[4]	10.5 V	23.8 V	43.4 V	74.9 V	150 V	300 V
Maximum surge current						
D1 test 10/350 µs to – Per signal wire	2.5 kA					
BS EN/EN/IEC 61643-21: – Per pair	5 kA					
8/20 µs to ITU-T K.45:2003, – Per signal wire	10 kA					
IEEE C62.41.2:2002: – Per pair	20 kA					

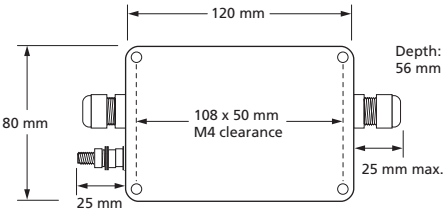
Mechanical specification	ESP 06D/BX ESP 06D/2BX	ESP 15D/BX ESP 15D/2BX	ESP 30D/BX ESP 30D/2BX	ESP 50D/BX ESP 50D/2BX	ESP 110D/BX ESP 110D/2BX	ESP TN/BX ESP TN/2BX
Temperature range	-40 to +80 °C					
Connection type	Screw terminal - for IDC terminal use part number with /I - maximum torque 0.5 Nm					
Conductor size (stranded)	1.5 mm^2					
Earth connection	M6 stud - maximum torque 0.5 Nm					
Cable glands	Accommodate 2.3-6.7 mm diameter cable (PG7)					
Degree of protection (IEC 60529)	M6 stud					
Case material	PVC					
Weight: – Unit	0.3 kg					
– Packaged (per 10)	0.35 kg					
Dimensions	See diagram below					

[1] Nominal voltage (RMS/DC or AC peak) measured at < 10 µA (ESP 15D/BX, ESP 15D/2BX, ESP 30D/BX, ESP 30D/2BX, ESP 50D/BX, ESP 50D/2BX, ESP 110D/BX, ESP 110D/2BX) and < 200 µA (ESP 06D/BX & ESP 06D/2BX)

[2] Maximum working voltage (RMS/DC or AC peak) measured at < 1 mA leakage (ESP 15D/BX, ESP 15D/2BX, ESP 30D/BX, ESP 30D/2BX, ESP 50D/BX, ESP 50D/2BX, ESP 110D/BX, ESP 110D/2BX), < 10 mA (ESP 06D/BX, ESP 06D/2BX) and < 10 µA (ESP TN/BX, ESP TN/2BX)

[3] The maximum transient voltage let-through of the protector throughout the test (±10%), line to line & line to earth, both polarities. Response time < 10 ns

[4] Test to 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)



Data & signal protection
ESP SL Series

LPZ 0→3 | FULL MODE Bonding + Equipment Protection | LED OPTIONAL INDICATION | SIGNAL/ TELECOM TEST CAT D + C + B | ENHANCED Low let-through voltage

REPLACEABLE PROTECTION MODULE | LOW IN-LINE RESISTANCE 1 Ω | CURRENT RATING 750 mA | HIGH BANDWIDTH | ULTRA SLIM 7 mm WIDTH

Combined Category D, C, B tested protector (to BS EN 61643) suitable for twisted pair signalling applications which require either a lower in-line resistance, an increased current and/or higher bandwidth. Also suitable for DC power applications less than 0.75 Amps. Available for working voltages of up to 6, 15, 30, 50 and 110 Volts. For use at boundaries up to LPZ *0* to protect against flashover (typically the service entrance location) through to LPZ 3 to protect sensitive electronic equipment.

Features & benefits

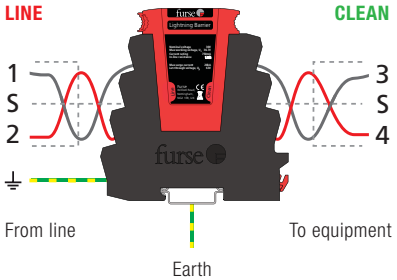
- Very low let-through voltage (enhanced protection to IEC/BS EN 62305) between all lines - Full Mode protection
- Full Mode design capable of handling partial lightning currents as well as allowing continual operation of protected equipment
- Repeated protection in lightning intense environments
- Ultra slim 7 mm width ideal for compact protection of large numbers of lines (e.g. process control installations)
- Optional LED status indication versions available for low current DC power applications - add L suffix to part number - e.g. ESP SL30L
- Two stage removable protection module with simple quick release mechanism allowing partial removal for easy line commissioning and maintenance as well as full removal for protection replacement
- Strong, flame retardant, polycarbonate housing
- High (750 mA) maximum running current
- High bandwidth enables higher frequency (high traffic or bit rate) data communications
- Screen terminal enables easy connection of cable screen to earth
- Suitable for earthed or isolated screen systems - add /I suffix to part number for versions that require isolated screens - e.g. ESP SL30/I
- Built-in innovative DIN rail foot with locking feature for simple positioning and clip-on mounting to top hat DIN rails
- 4 mm² terminals allow for larger cross section wiring, stranded wires terminated with ferrules or fitting two wires into a single terminal
- Convenient earthing through DIN foot and/or earth terminal
- Very low (1 Ω) in-line resistance allows resistance critical applications (e.g. alarm loops) to be protected

Application

Use these protectors where installation space is at a premium and large numbers of lines require protection (e.g. process control, high speed digital communication equipment or systems with long signal lines).

Installation

Connect in series with the data communication or signal line either near where it enters or leaves the building or close to the equipment being protected (e.g. within its control panel). Either way, it must be very close to the system's earth star point. Install protectors either within an existing cabinet/ cubicle or in a separate enclosure.



Accessories

Replacement modules:

ESP SLXX/M
Standard module replacement where XX is voltage rating (06, 15, 30, 50 or 110)

ESP SLXXL/M
LED module replacement where XX is voltage rating, as above

ESP SL/B
Base replacement (common for standard and LED modules)

ESP SL/I/B
Base replacement with isolated screen from earth

Full product range order codes can be found on pages 17/8-17/9

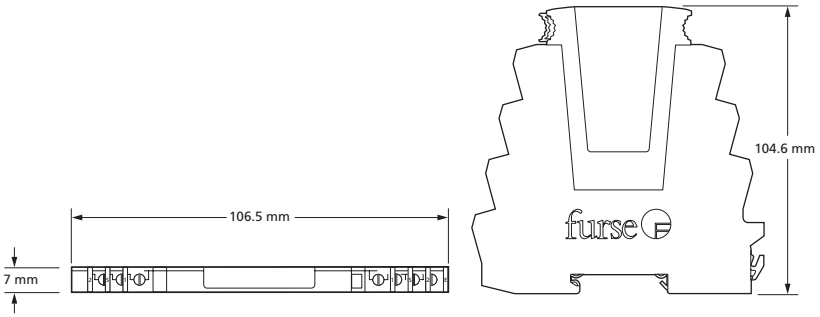
NOTE: The ESP SL 'Slim Line' Series is also available for protection of 3-wire, RS 485 and RTD applications (ESP SL/3W, ESP SL RS485 & ESP SL RTD). The ESP SL X Series has approvals for use in hazardous areas.

Data & signal protection
ESP SL Series

ESP SL Series - Technical specification

Electrical specification	ESP SL06	ESP SL15	ESP SL30	ESP SL50	ESP SL110	ESP SL TN
ABB order code	7TCA085400R0058	7TCA085400R0063	7TCA085400R0067	7TCA085400R0074	7TCA085400R0061	7TCA085400R0195
Nominal voltage[1]	6 V	15 V	30 V	50 V	110 V	–
Maximum working voltage *Uc* (RMS/DC)[2]	5 V / 7.79 V	11 V / 16.7 V	25 V / 36.7 V	40 V / 56.7 V	93 V / 132 V	– / 296 V
Current rating (signal)	750 mA					
In-line resistance (per line ±10%)	1.0 Ω					
Bandwidth (-3 dB 50 Ω system)	45 MHz	45 MHz	45 MHz	45 MHz	45 MHz	20 MHz
Transient specification	**ESP SL06**	**ESP SL15**	**ESP SL30**	**ESP SL50**	**ESP SL110 E**	**SP SL TN**
Let-through voltage (all conductors)[3] *Up*						
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21	36.0 V	38.4 V	63.0 V	90.3 V	185 V	395 V
C1 test 1 kV, 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21	26.2 V	29.4 V	51.3 V	77.2 V	175 V	390 V
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21	16.0 V	26.8 V	45.4 V	68.3 V	165 V	298 V
5 kV, 10/700 µs[4]	17.0 V	27.5 V	46.3 V	69.1 V	170 V	300 V
Maximum surge current						
D1 test 10/350 µs to BS EN/EN/IEC 61643-21: – Per signal wire	1.25 kA					
– Per pair	2.5 kA					
8/20 µs to ITU-T K.45:2003, IEEE C62.41.2:2002: – Per signal wire	10 kA					
– Per pair	20 kA					
Mechanical specification	**ESP SL06**	**ESP SL15**	**ESP SL30**	**ESP SL50**	**ESP SL110**	**ESP SL TN**
Temperature range	-40 to +80 °C					
Connection type	Screw terminal - maximum torque 0.8 Nm					
Conductor size (stranded)	4 mm²					
Earth connection	Via DIN rail or 4 mm² earth terminal - maximum torque 0.8 Nm					
Case material	FR Polymer UL-94 V-0					
Weight: – Unit	0.08 kg					
– Packaged (per 10)	0.85 kg					
Dimensions	See diagram below					

[1] Nominal voltage (RMS/DC or AC peak) measured at < 10 µA (ESP SL15, ESP SL30, ESP SL50, ESP SL110 and LED variants) and < 200 µA (ESP SL06 and ESP SL06L)
[2] Maximum working voltage (RMS/DC or AC peak) measured at < 1 mA leakage
[3] The maximum transient voltage let-through of the protector throughout the test (±10%), line to line & line to earth, both polarities. Response time < 10 ns
[4] Test to 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)



Data & signal protection
ESP SL X Series

LPZ 0→3 | FULL MODE Bonding + Equipment Protection | LED OPTIONAL INDICATION | SIGNAL/ TELECOM TEST CAT D + C + B | ENHANCED Low let-through voltage | REPLACEABLE PROTECTION MODULE

LOW IN-LINE RESISTANCE 1 Ω | CURRENT RATING 750 mA | ATEX/IEC APPROVED | HIGH BANDWIDTH | ULTRA SLIM 7 mm WIDTH

Combined Category D, C, B tested protector (to BS EN 61643) suitable for twisted pair signalling applications within hazardous environments (ATEX/IECEx approved). Available for working voltages of up to 15 and 30 Volts. For use at boundaries up to LPZ *0* to protect against flashover through to LPZ 3 to protect sensitive electronic equipment.

Features & benefits

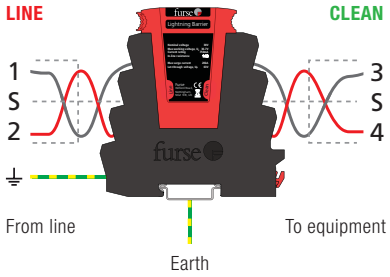
- Approved for use in hazardous environments for the protection of Intrinsically Safe circuits (Classification: II 2(1) G, Ex ia (ia Ga) IIC T4 Gb)
- Very low let-through voltage (enhanced protection to IEC/BS EN 62305) between all lines - Full Mode protection
- Full Mode design capable of handling partial lightning currents as well as allowing continual operation of protected equipment
- Repeated protection in lightning intense environments
- Ultra slim 7 mm width ideal for compact protection of large numbers of lines (e.g. process control installations)
- Optional LED status indication versions available for low current DC power applications
- Negligible self-capacitance and self-inductance offering minimal interference when protecting Intrinsically Safe circuits
- Very low (1 Ω) in-line resistance allows resistance critical applications (e.g. alarm loops) to be protected
- High (750 mA) maximum running current
- High bandwidth enables higher frequency (high traffic or bit rate) data communications
- Screen terminal enables easy connection of cable screen to earth
- Suitable for earthed or isolated screen systems - add /I suffix to part number for versions that require isolated screens
- Built-in innovative DIN rail foot with locking feature for simple positioning and clip-on mounting to top hat DIN rails
- 4 mm^2 terminals allow for larger cross section wiring, stranded wires terminated with ferrules or fitting two wires into a single terminal
- Approval references for ESP SL X Series: IECEx SIR 10.0030X, Sira 10ATEX2063X

Application

Use these protectors in hazardous environments where installation space is at a premium and large numbers of lines require protection (e.g. process control, 4-20 mA loops, fire and gas detectors and shut-down systems). Suitable for high speed digital communication equipment or systems with long signal lines. See Furse Application Note AN013.

Installation

Connect in series with the data communication or signal line either near where it enters or leaves the building or close to the equipment being protected (e.g. within its control panel). Either way, it must be very close to the system's earth star point. Install protectors either within an existing cabinet/cubicle or in a separate enclosure.



Accessories

Replacement modules:

ESP SL15X/M, ESP30X/M
Standard module replacement for 15 and 30 V protectors respectively

ESP SL15XL/M, ESP30XL/M
LED module replacement for 15 and 30 V protectors respectively

ESP SLX/B
Base replacement (common for standard and LED modules)

ESP SLX/I/B
Base replacement with isolated screen from earth

Full product range order codes can be found on pages 17/8-17/9

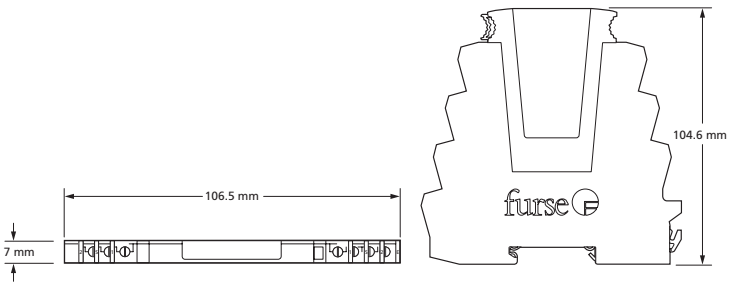
NOTE: Use the standard ESP SL 'Slim Line' Series for non-hazardous areas. The ESP SL Series is also available for protection of 3-wire, RS 485, RTD & telecommunication applications (ESP SL/3W, ESP SL RS485, ESP SL RTD & ESP SL TN).

Data & signal protection
ESP SL X Series

ESP SL X Series - Technical specification

Electrical specification		ESP SL15X	ESP SL30X
ABB order code		7TCA085400R0065	7TCA085400R0071
Nominal voltage[1]		15 V	30 V
Maximum working voltage *Uc* (RMS/DC)[2]		11 V / 16.7 V	25 V / 36.7 V
Current rating (signal)		750 mA	
In-line resistance (per line ±10%)		1.0 Ω	
Bandwidth (-3 dB 50 Ω system)		45 MHz	
Intrinsically safe specification		**ESP SL15X**	**ESP SL30X**
Maximum voltage U_i		30 V	
Maximum power P_i:	– Per -40 °C < Ta < 40 °C	1.3 W	
	– Per -40 °C < Ta < 60 °C	1.2 W	
	– Per -40 °C < Ta < 80 °C	1.0 W	
Capacitance C_i		0 µF	
Inductance L_i		0 µH	
Certificate number		IECEx SIR 10.0030X, Sira 10ATEX2063X	
Classification		Ex II 2 (1) G, Ex ia (ia Ga) IIC T4 Gb	
Transient specification		**ESP SL15X**	**ESP SL30X**
Let-through voltage (all conductors)[3] *Up*			
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21		38.4 V	63.0 V
C1 test 1 kV, 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21		29.4 V	51.3 V
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21		26.8 V	45.4 V
5 kV, 10/700 µs[4]		27.5 V	46.3 V
Maximum surge current			
D1 test 10/350 µs to BS EN/EN/IEC 61643-21:	– Per signal wire	1.25 kA	
	– Per pair	2.5 kA	
8/20 µs to ITU-T K.45:2003, IEEE C62.41.2:2002:	– Per signal wire	10 kA	
	– Per pair	20 kA	
Mechanical specification		**ESP SL15X**	**ESP SL30X**
Temperature range		-40 to +80 °C	
Connection type		Screw terminal - maximum torque 0.8 Nm	
Conductor size (stranded)		4 mm²	
Earth connection		Via DIN rail or 4 mm² earth terminal - maximum torque 0.8 Nm	
Case material		FR Polymer UL-94 V-0	
Weight:	– Unit	0.08 kg	
	– Packaged (per 10)	0.85 kg	
Dimensions		See diagram below	

[1] Nominal voltage (RMS/DC or AC peak) measured at < 10 µA
[2] Maximum working voltage (RMS/DC or AC peak) measured at < 1 mA leakage
[3] The maximum transient voltage let-through of the protector throughout the test (±10%), line to line & line to earth, both polarities. Response time < 10 ns
[4] Test to 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)



Data & signal protection
ESP SL LED 4-20 mA Series

LPZ 0→3 | FULL MODE Bonding + Equipment Protection | REPLACEABLE PROTECTION MODULE | SIGNAL/ TELECOM TEST CAT D + C + B | ENHANCED Low let-through voltage | LOW IN-LINE RESISTANCE 1 Ω | CURRENT RATING 75 mA | ULTRA SLIM 7 mm WIDTH | LED INDICATION

Combined Category D, C, B tested protector (to BS EN 61643) suitable for twisted pair 4-20 mA loop systems with innovative LED protector status indication. For use at boundaries up to LPZ *0* to protect against flashover (typically the service entrance location) through to LPZ 3 to protect sensitive electronic equipment (e.g. transmitters, monitors, controllers).

Features & benefits

- Very low let-through voltage (enhanced protection to IEC/BS EN 62305) between all lines - 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 LED indication of protection status provides easy visual checking and quick maintenance
- Ultra slim 7 mm width ideal for compact protection of large numbers of lines (e.g. process control installations)
- Two stage removable protection module with simple quick release mechanism allowing partial removal for easy line commissioning and maintenance as well as full removal for protection replacement
- Very low (1 Ω) in-line resistance for minimal system interference
- High (75 mA) maximum running current - can also be used on 10-50 mA systems (e.g. process control)
- Screen terminal enables easy connection of cable screen to earth
- Strong, flame retardant, polycarbonate housing
- Built-in innovative DIN rail foot with locking feature for simple positioning and clip-on mounting to top hat DIN rails
- 4 mm² terminals allow for larger cross section wiring, stranded wires terminated with ferrules or fitting two wires into a single terminal
- Convenient earthing through DIN foot and/or earth terminal

Application

Use these protectors on 4-20 mA loop systems - ideal where installation space is at a premium and large numbers of lines require protection, or for systems with long signal lines.

Installation

Connect in series with the 4-20 mA current loop either near where it enters or leaves the building or close to the equipment being protected (e.g. within its control panel). Either way, it must be very close to the system's earth star point. Install protectors either within an existing cabinet/ cubicle or in a separate enclosure.

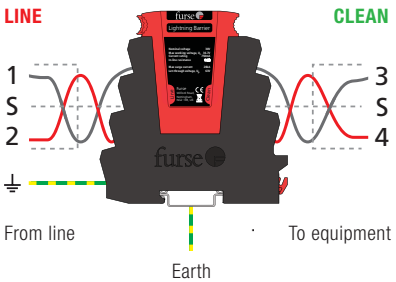
Accessories

ESP SL30L/4-20/M
Module replacement

ESP SL/B
Base replacement

Full product range order codes can be found on pages 17/8-17/9

TECHNICAL NOTE: 4-20 mA current loops can serve multiple devices over a long distance. The devices and wiring produce a voltage drop (also known as "loop drops") but these do not reduce the 4-20 mA current as long as the power supply voltage is greater than the sum of the voltage drops around the loop at the maximum signalling current of 20 mA. For design considerations, each ESP SL30L/4-20 device installed within the loop introduces a 1.7 V loop drop.



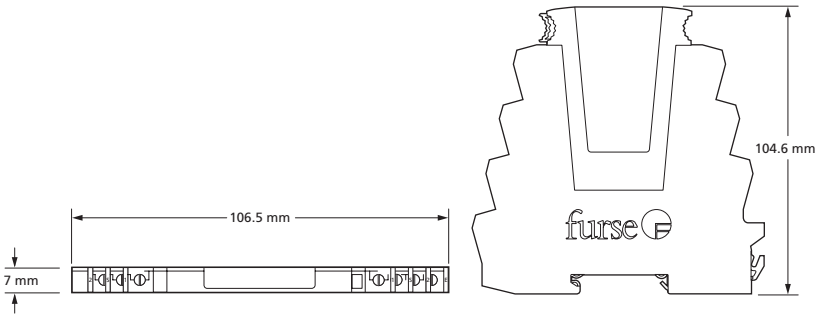
NOTE: The ESP SL 'Slim Line' Series is also available for protection of systems up to 110 V as well as 3-wire, RS 485, RTD & telecommunication applications (ESP SL/3W, ESP SL RS485, ESP SL RTD & ESP SL TN). The ESP SL X Series has approvals for use in hazardous areas.

Data & signal protection
ESP SL LED 4-20 mA Series

ESP NEW SL LED 4-20 mA Series - Technical specification

Electrical specification		ESP SL30L/4-20
ABB order code		7TCA085400R0070
Nominal voltage[1]		30 V
Maximum working voltage *Uc* (RMS/DC)[2]		25 V / 36.7 V
Current rating (signal)[3]		75 mA
In-line resistance (per line ±10%)		1.0 Ω
Series voltage drop[4]		1.7 V
Transient specification		**ESP SL30L/4-20**
Let-through voltage (all conductors)[5] *Up*		
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21		63.0 V
C1 test 1 kV, 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21		51.3 V
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21		45.4 V
5 kV, 10/700 µs[6]		46.3 V
Maximum surge current		
D1 test 10/350 µs to	– Per signal wire	1.25 kA
BS EN/EN/IEC 61643-21:	– Per pair	2.5 kA
8/20 µs to ITU-T K.45:2003,	– Per signal wire	10 kA
IEEE C62.41.2:2002:	– Per pair	20 kA
Mechanical specification		**ESP SL30L/4-20**
Temperature range		-40 to +80 °C
Connection type		Screw terminal - maximum torque 0.8 Nm
Conductor size (stranded)		4 mm²
Earth connection		Via DIN rail or 4 mm² earth terminal - maximum torque 0.8 Nm
Case material		FR Polymer UL-94 V-0
Weight: – Unit		0.08 kg
– Packaged (per 10)		0.85 kg
Dimensions		See diagram below

[1] Nominal voltage (RMS/DC or AC peak) measured at < 10 µA
[2] Maximum working voltage (RMS/DC or AC peak) measured at < 1 mA leakage
[3] The minimum current for LED indicator operation is 2 mA
[4] At 20 mA
[5] The maximum transient voltage let-through of the protector throughout the test (±10%), line to line & line to earth, both polarities. Response time < 10 ns
[6] Test to 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)



Data & signal protection
ESP SL 3-Wire Series

LPZ *0*→3 | FULL MODE Bonding + Equipment Protection | REPLACEABLE PROTECTION MODULE | SIGNAL/ TELECOM TEST CAT D + C + B | ENHANCED Low let-through voltage | LOW IN-LINE RESISTANCE 1 Ω | CURRENT RATING 500 mA | HIGH BANDWIDTH | ULTRA SLIM 7 mm WIDTH

Combined Category D, C, B tested protector (to BS EN 61643) suitable for 3-wire signalling applications which require either a lower in-line resistance, an increased current and/or higher bandwidth. Also suitable for DC power applications less than 0.5 Amps. Available for working voltages of up to 6, 15, 30, 50 and 110 Volts. For use at boundaries up to LPZ *0* to protect against flashover (typically the service entrance location) 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 lines - 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
- Ultra slim 7 mm width ideal for compact protection of large numbers of lines (e.g. process control installations)
- Two stage removable protection module with simple quick release mechanism allowing partial removal for easy line commissioning and maintenance as well as full removal for protection replacement
- Very low (1 Ω) in-line resistance allows resistance critical applications (e.g. alarm loops) to be protected
- High (500 mA) maximum running current
- High bandwidth enables higher frequency (high traffic or bit rate) data communications
- Strong, flame retardant, polycarbonate housing
- Built-in innovative DIN rail foot with locking feature for simple positioning and clip-on mounting to top hat DIN rails
- 4 mm² terminals allow for larger cross section wiring, stranded wires terminated with ferrules or fitting two wires into a single terminal
- Convenient earthing through DIN foot and/or earth terminal

Application

Use these protectors for 3-wire systems where installation space is at a premium and large numbers of lines require protection (e.g. process control, high speed digital communication equipment or systems with long signal lines).

Installation

Connect in series with the data communication or signal line either near where it enters or leaves the building or close to the equipment being protected (e.g. within its control panel). Either way, it must be very close to the system's earth star point. Install protectors either within an existing cabinet/ cubicle or in a separate enclosure.

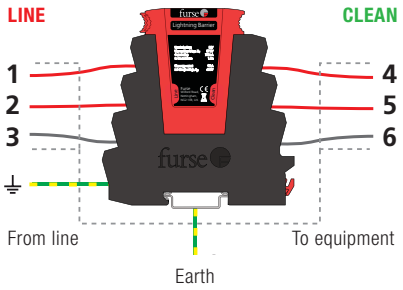
Accessories

Replacement modules:

ESP SLXX/3W/M
Standard module replacement where XX is voltage rating (06, 15, 30, 50 or 110)

ESP SL/3W/B
Base replacement

Full product range order codes can be found on pages 17/8-17/9



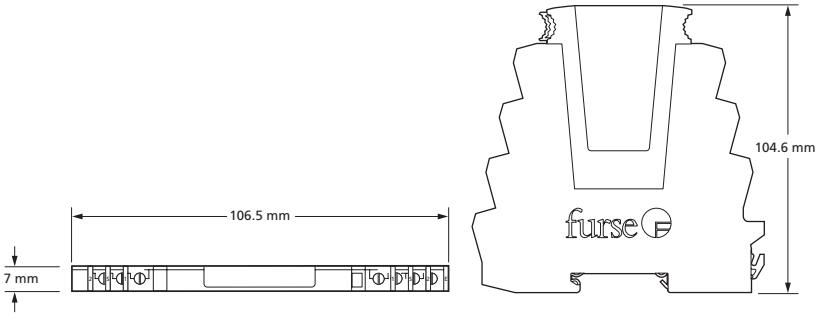
NOTE: The ESP SL 'Slim Line' Series is also available for protection of 2-wire systems up to 110 V, RS 485, RTD and telecommunication applications (ESP SL Series, ESP SL RS485, ESP SL RTD and ESP SL TN). The ESP SL X Series has approvals for use in hazardous areas.

Data & signal protection
ESP SL 3-Wire Series

ESP SL 3-Wire Series - Technical specification

Electrical specification	ESP SL06/3W	ESP SL15/3W	ESP SL30/3W	ESP SL50/3W	ESP SL110/3W
ABB order code	7TCA085400R0238	7TCA085400R0269	7TCA085400R0268	7TCA085400R0267	7TCA085400R0266
Nominal voltage[1]	6 V	15 V	30 V	50 V	110 V
Maximum working voltage *Uc* (RMS/DC)[2]	5 V / 7.79 V	11 V / 16.7 V	25 V / 36.7 V	40 V / 56.7 V	93 V / 132 V
Current rating (signal)	500 mA				
In-line resistance (per line ±10%)	1.0 Ω				
Series voltage drop	45 MHz				
Transient specification	**ESP SL06/3W**	**ESP SL15/3W**	**ESP SL30/3W**	**ESP SL50/3W**	**ESP SL110/3W**
Let-through voltage (all conductors)[3] *Up*					
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21	36.0 V	38.4 V	63.0 V	90.3 V	185 V
C1 test 1 kV, 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21	26.2 V	29.4 V	51.3 V	77.2 V	175 V
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21	16.0 V	26.8 V	45.4 V	68.3 V	165 V
5 kV, 10/700 µs[4]	17.0 V	27.5 V	46.3 V	69.1 V	170 V
Maximum surge current					
D1 test 10/350 µs to BS EN/EN/IEC 61643-21: – Per signal wire	1.25 kA				
– Per pair	2.5 kA				
8/20 µs to ITU-T K.45:2003, IEEE C62.41.2:2002: – Per signal wire	10 kA				
– Per pair	20 kA				
Mechanical specification	**ESP SL06/3W**	**ESP SL15/3W**	**ESP SL30/3W**	**ESP SL50/3W**	**ESP SL110/3W**
Temperature range	-40 to +80 °C				
Connection type	Screw terminal - maximum torque 0.8 Nm				
Conductor size (stranded)	4 mm²				
Earth connection	Via DIN rail or 4 mm² earth terminal - maximum torque 0.8 Nm				
Case material	FR Polymer UL-94 V-0				
Weight: – Unit	0.08 kg				
– Packaged (per 10)	0.85 kg				
Dimensions	See diagram below				

[1] Nominal voltage (RMS/DC or AC peak) measured at < 10 µA (ESP SL15/3W, ESP SL30/3W, ESP SL50/3W, ESP SL110/3W) and < 200 µA (ESP SL06/3W)
[2] Maximum working voltage (RMS/DC or AC peak) measured at < 1 mA leakage
[3] The maximum transient voltage let-through of the protector throughout the test (±10%), line to line & line to earth, both polarities. Response time < 10 ns
[4] Test to 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)



Data & signal protection
ESP Q & TNQ Series

LPZ 0→3 | FULL MODE Bonding + Equipment Protection | SIGNAL/ TELECOM TEST CAT D + C + B | ENHANCED Low let-through voltage | CURRENT RATING 750 mA | ULTRA COMPACT DESIGN

Combined Category D, C, B tested protector (to BS EN 61643) suitable for 4 twisted pair lines. Available for working voltages of up to 6, 15, 30, 50 and 110 Volts. ESP TNQ suitable for Broadband, POTS, dial-up, T1/E1, lease line and *DSL telephone applications. For use at boundaries up to LPZ *0* to protect against flashover (typically the service entrance location) through to LPZ 3 to protect sensitive

Features & benefits

- Very low let-through voltage (enhanced protection to IEC/BS EN 62305) between all lines - 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
- Almost twice as space efficient as smallest competitor
- Standard DIN module (18 mm) depth
- Removable (plug-in) terminals allow pre-wiring of cable looms, for easier installation
- Suitable for earthed or isolated screen systems
- Built-in DIN rail foot for clip-on mounting to top hat or G DIN rails
- Optional flat mounting on side
- 2.5 mm^2 terminals allow for larger cross section wiring, stranded wires terminated with ferrules or fitting two wires into a single terminal
- Very low resistance to minimizes unwanted signal strength reductions
- Strong, flame retardant, ABS housing
- Colour coded terminals (grey for line, green for clean) give a quick and easy installation check
- Screen terminal enables easy connection of cable screen to earth
- Simple, yet substantial, connection to earth via DIN rail
- ESP TNQ is suitable for telecommunication applications in accordance with Telcordia and ANSI Standards (see Application Note AN005)
- Available as a ‘UL Listed’ version, add /UL to part code (ESP 06Q, ESP 15Q, ESP 30Q and ESP 50Q only)

Application

Use these protectors where installation space is at a premium and large numbers of lines require protection.

Installation

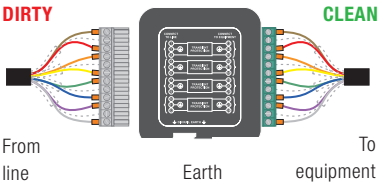
Connect in series with the signal or data line either near where it enters or leaves the building or close to the equipment being protected. Install in a cabinet/cubicle close to the system’s earth star point.

Accessories

For suitable enclosures for the ESP Q & TNQ Series, please contact us.

Full product range order codes can be found on pages 17/8-17/9

ESP 06Q, ESP 15Q, ESP 30Q, ESP 50Q, ESP 110Q and ESP TNQ installed in series (in-line)



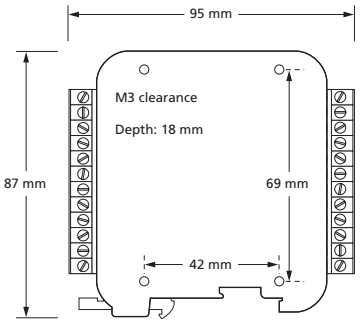
NOTE: The ESP Q Series is also available for protection of RS 485 and RTD applications (ESP RS485Q, ESP RTDQ). Protectors for individual data and signal lines are available (ESP D Series and Slim Line ESP SL Series), or ready-boxed to IP66 (ESP **D/BX etc). Alternatively, for individual protectors with higher current or bandwidth use the ESP E and ESP H Series.

Data & signal protection
ESP Q & TNQ Series

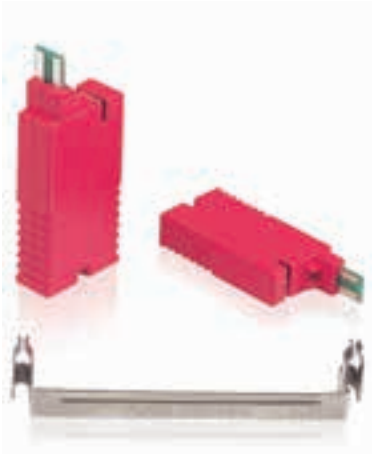
ESP Q & TNQ Series - Technical specification

Electrical specification	ESP 06Q	ESP 15Q	ESP 30Q	ESP 50Q	ESP 110Q	ESP TNQ
ABB order code	7TCA085400R0087	7TCA085400R0098	7TCA085400R0107	7TCA085400R0118	7TCA085400R0088	7TCA085400R0183
Nominal voltage[1]	6 V	15 V	30 V	50 V	110 V	–
Maximum working voltage *Uc* (RMS/DC)[2]	5 V / 7.79 V	13 V / 18.8 V	26 V / 37.8 V	41 V / 57.8 V	93 V / 132 V	– / 296 V
Current rating (signal)	750 mA	750 mA	750 mA	750 mA	750 mA	300 mA
In-line resistance (per line ±10%)	1.0 Ω	1.0 Ω	1.0 Ω	1.0 Ω	1.0 Ω	4.3 Ω
Bandwidth (-3 dB 50 Ω system)	1 MHz	2.5 MHz	6 MHz	5 MHz	15 MHz	20 MHz
Transient specification	**ESP 06Q**	**ESP 15Q**	**ESP 30Q**	**ESP 50Q**	**ESP 110Q**	**ESP TNQ**
Let-through voltage (all conductors)[3] *Up*						
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21	15.0 V	28.0 V	53.0 V	84.0 V	188 V	395 V
C1 test 1 kV, 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21	12.5 V	26.5 V	48.0 V	76.0 V	175 V	390 V
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21	10.0 V	23.0 V	43.5 V	64.5 V	145 V	298 V
5 kV, 10/700 µs[4]	10.8 V	26.2 V	44.3 V	65.8 V	150 V	300 V
Maximum surge current						
D1 test 10/350 µs to BS EN/EN/IEC 61643-21: – Per signal wire	2.5 kA					
– Per pair	5 kA					
8/20 µs to ITU-T K.45:2003, IEEE C62.41.2:2002: – Per signal wire	10 kA					
– Per pair	20 kA					
Mechanical specification	**ESP 06Q**	**ESP 15Q**	**ESP 30Q**	**ESP 50Q**	**ESP 110Q**	**ESP TNQ**
Temperature range	-40 to +80 °C					
Connection type	Pluggable 12 way screw terminal - maximum torque 0.6 Nm					
Conductor size (stranded)	2.5 mm^2					
Earth connection	Via DIN rail or M5 threaded hole in base of unit					
Case material	FR Polymer UL-94 V-0					
Weight: – Unit	0.1 kg					
– Packaged (each)	0.12 kg					
– Packaged (per 10)	1.3 kg					
Dimensions	See diagram below					

[1] Nominal voltage (RMS/DC or AC peak) measured at < 5 µA (ESP 15Q, ESP 30Q, ESP 50Q, ESP 110Q) and < 200 µA (ESP 06Q)
[2] Maximum working voltage (RMS/DC or AC peak) measured at < 5 mA leakage (ESP 15Q, ESP 30Q, ESP 50Q, ESP 110Q) and < 10 µA (ESP TNQ)
[3] The maximum transient voltage let-through of the protector throughout the test (±10%), line to line & line to earth, both polarities. Response time < 10 ns
[4] Test to 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)



Data & signal protection
ESP KS & KE Series



LPZ 0→3 | FULL MODE Bonding + Equipment Protection | SIGNAL/ TELECOM TEST CAT D + C + B | ENHANCED Low let-through voltage | CURRENT RATING 150 mA

Combined Category D, C, B tested protector (to BS EN 61643) suitable for use on ten line LSA-PLUS disconnection modules to protect individual twisted pair data or signal lines. For use at boundaries up to LPZ *0* to protect against flashover (typically the service entrance location) through to LPZ 3 to protect sensitive electronic equipment.

Features & benefits
- Low cost protection for large numbers of data and signal lines
- Very low let-through voltage (enhanced protection to IEC/BS EN 62305) between all lines - 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
- Quick and easy plug-in installation
- Colour of housing distinguishes electrically different protectors to help avoid confusion when installed with other protectors (e.g. the ESP KT1/2) on the same distribution frame
- Protect only the lines you need
- Ridged finger holds make it easy to obtain a firm grip for installation or removal
- Use the ESP KE10 to provide trouble free earthing for up to ten protectors (per disconnection module)

Application
Use these units to protect signal, data, control and instrumentation systems with LSA-PLUS disconnection modules.

Full product range order codes can be found on pages 17/8-17/9

Installation
Install protectors on all data communication and signal lines that enter or leave each building. All protectors must be installed via the ESP KE10 earth bar. Identify the lines requiring protection and clip the ESP KE10 on to the disconnection modules' earth points. Plug the protector directly into each disconnection module requiring protection (ensuring the correct orientation) for a series connection.

In the unlikely situation that the protector is damaged, it will sacrifice itself and fail short circuit, taking the line out of commission. In addition to indicating that the protector needs replacing, this will also prevent subsequent transients from damaging the equipment.

NOTE: For PSTN and U interface ISDN lines on LSA-PLUS modules, use the ESP KT1 or ESP K10T1. For S/T interface ISDN lines on LSA-PLUS modules, use the ESP KT2 or ESP K10T2. For individual twisted pair data or signal lines, use the ESP D, E or H Series Lightning Barriers. The ESP SL and ESP Q Series Lightning Barriers are suitable for high density data and signal lines.

Data & signal protection
ESP KS & KE Series

ESP KS & KE Series - Technical specification

Electrical specification	ESP KS06	ESP KS15	ESP KS30	ESP KS50
ABB order code	7TCA085400R0029	7TCA085400R0030	7TCA085400R0032	7TCA085400R0033
Nominal voltage[1]	6 V	15 V	30 V	50 V
Maximum working voltage *Uc* (RMS/DC)[2]	5 V / 7.79 V	11 V / 16.7 V	24 V / 33.4 V	41 V / 58 V
Current rating (signal)	150 mA			
In-line resistance (per line ±10%)	1 Ω	22 Ω	22 Ω	22 Ω
Bandwidth (-3 dB 50 Ω system)	2 MHz	5 MHz	5 MHz	5 MHz
Transient specification	**ESP KS06**	**ESP KS15**	**ESP KS30**	**ESP KS50**
Let-through voltage (all conductors)[3] *Up*				
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21	16.0 V	26.5 V	48.0 V	98.0 V
C1 test 1 kV, 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21	14.5 V	24.0 V	46.5 V	84.5 V
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21	11.5 V	23.0 V	45.0 V	75.0 V
5 kV, 10/700 µs[4]	12.0 V	24.4 V	48.8 V	80.0 V
Maximum surge current[5]				
D1 test 10/350 µs to BS EN/EN/IEC 61643-21: – Per signal wire	1 kA			
– Per pair	2 kA			
8/20 µs to ITU-T K.45:2003, IEEE C62.41.2:2002: – Per signal wire	5 kA			
– Per pair	10 kA			

Mechanical specification	ESP KS06	ESP KS1	ESP KS30	ESP KS50	ESP KE10
Temperature range	-40 to +80 °C				–
Connection type	To LSA-PLUS disconnection modules (BT part number 237A)				
Earth connection	Via ESP KE10 earth bar				–
Material	FR Polymer UL-94 V-0				Stainless Steel
Weight: – Unit	0.01 kg				0.01 kg
– Packaged	0.10 kg (per 10)				0.12 kg (per 10)
Dimensions	See diagram below				

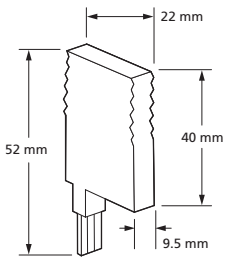
[1] Nominal voltage (RMS/DC or AC peak) at 200 µA for ESP KS06 and at 5 µA for ESP KS15, ESP KS30 and ESP KS50

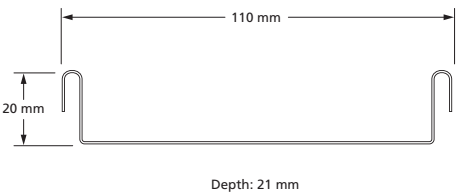
[2] Maximum working voltage (RMS/DC or AC peak) at 10 mA for ESP KS06, at 1 mA for ESP KS15 and ESP KS30, and at 5 µA for ESP KS50.

[3] The maximum transient voltage let-through of the protector throughout the test (±10%), line to line & line to earth, both polarities. Response time < 10 ns

[4] Test to 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)

[5] The installation and connections external to the protector may limit the capability of the protector





Data & signal protection
ESP PCB/D & PCB/TN Series

LPZ 0→3 | **FULL MODE** Bonding + Equipment Protection | **SIGNAL/ TELECOM** TEST CAT D + C + B | **ENHANCED** Low let-through voltage | **LOW IN-LINE RESISTANCE** 9.4 Ω | **CURRENT RATING** 300 mA

Combined Category D, C, B tested protector (to BS EN 61643) for 'through hole' mounting directly onto the PCB of data communication, signal or telephone equipment. Available for working voltages of up to 110 Volts. ESP PCB/TN suitable for Broadband, POTS, dial-up, T1/E1, lease line and *DSL telephone applications. For use at boundaries up to LPZ *0* to protect against flashover (typically the service entrance location) through to LPZ 3 to protect sensitive electronic equipment.

Features & benefits

- Suitable for wave soldering
- Very low let-through voltage (enhanced protection to IEC/BS EN 62305) between all lines - 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
- Low in-line resistance minimizes unnecessary reductions in signal strength
- 2 pin clean end and 3 pin line end to ensure correct insertion
- ESP PCB/TN is suitable for telecommunication applications in accordance with Telcordia and ANSI Standards (see Application Note AN005)

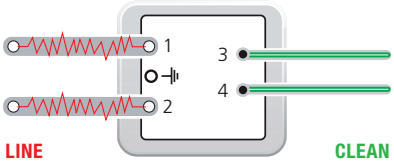
Installation

Connect in series, soldering pins direct onto PCB. Tracks to line and earth pins should be as wide as practical (see Furse Application Note AN003). Dirty (line) tracks should be routed parallel and as close together as possible. This should also be implemented on clean tracks, however clean tracks should never be routed close and parallel to line tracks or dirty barrier earth connections as transients can be re-introduced after the protector due to electromagnetic coupling.

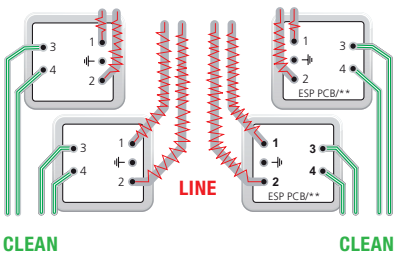
The use of an earth layer or plane is highly recommended as this reduces the electromagnetic field produced by a transient discharging to earth considerably, and hence the chance of the transient being picked up on clean tracks.

Full product range order codes can be found on pages 17/8-17/9

Maximum line to clean separation. Large input tracks and pads (using top and bottom copper layers). Earth pin is bonded to an earth layer/plane.



All dirty (line) incoming tracks are separated from the clean output tracks, individual line and clean tracks are routed close together. Earth pins are bonded to an earth layer/plane.

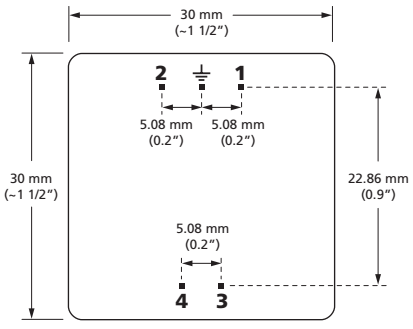


Data & signal protection
ESP PCB/D & PCB/TN Series

ESP PCB/D & PCB/TN Series - Technical specification

Electrical specification	ESP PCB/06D	ESP PCB/15D	ESP PCB/30D	ESP PCB/50D	ESP PCB/110D	ESP PCB/TN
ABB order code	7TCA085400R0038	7TCA085400R0042	7TCA085400R0154	7TCA085400R0155	7TCA085400R0040	7TCA085400R0157
Nominal voltage[1]	6 V	15 V	30 V	50 V	110 V	–
Maximum working voltage *Uc* (RMS/DC)[2]	5 V / 7.79 V	13 V / 19 V	26 V / 37.1 V	41 V / 58 V	93 V / 132 V	– / 296 V
Current rating (signal)	300 mA					
In-line resistance (per line ±10%)	9.4 Ω	9.4 Ω	9.4 Ω	9.4 Ω	9.4 Ω	4.4 Ω
Bandwidth (-3 dB 50 Ω system)	800 kHz	2.5 MHz	4 MHz	6 MHz	9 MHz	20 MHz
Transient specification	**ESP PCB/06D**	**ESP PCB/15D**	**ESP PCB/30D**	**ESP PCB/50D**	**ESP PCB/110D**	**ESP PCB/TN**
Let-through voltage (all conductors)[3] *Up*						
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21	12.0 V	25.0 V	44.0 V	78.0 V	155 V	395 V
C1 test 1 kV, 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21	11.5 V	24.5 V	43.5 V	76.0 V	150 V	390 V
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21	10.0 V	23.0 V	42.5 V	73.0 V	145 V	298 V
5 kV, 10/700 µs[4]	10.5 V	23.8 V	43.4 V	74.9 V	150 V	300 V
Maximum surge current[5]						
D1 test 10/350 µs to – Per signal wire	2.5 kA					
BS EN/EN/IEC 61643-21: – Per pair	5 kA					
8/20 µs to ITU-T K.45:2003, – Per signal wire	10 kA					
IEEE C62.41.2:2002: – Per pair	20 kA					
Mechanical specification	**ESP PCB/D & PCB/TN Series**					
Temperature range	-40 to +80 °C					
Connection type	0.64 mm (0.025") square PCB pins, 1.2 mm diameter PCB holes recommended					
Case Material	FR Polymer UL-94 V-0					
Dimensions	See diagram below					

[1] Nominal voltage (RMS/DC or AC peak) measured at < 5 µA (ESP PCB/15D, ESP PCB/30D, ESP PCB/50D, ESP PCB/110D) and <200 µA (ESP PCB/06D)
[2] Maximum working voltage (RMS/DC or AC peak) measured at < 1 mA leakage (ESP PCB/15D, ESP PCB/30D, ESP PCB/50D, ESP PCB/110D), < 10 mA (ESP PCB/06D) and < 10 µA (ESP PCB/TN)
[3] The maximum transient voltage let-through of the protector throughout the test (±10%), line to line & line to earth, both polarities. Response time < 10 ns
[4] Test to 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)
[5] The installation and connections external to the protector may limit the capability of the protector



Depth: 20 mm (~0.8")
Weight: 35 g

Pins are positioned centrally
Pin 1 connects through Pin 3
Pin 2 connects through Pin 4

(Underside pin view)

Data & signal protection
ESP PCB/E Series

LPZ 0→3 | FULL MODE Bonding + Equipment Protection | HIGH BANDWIDTH | SIGNAL/ TELECOM TEST CAT D + C + B | ENHANCED Low let-through voltage | LOW IN-LINE RESISTANCE 1 Ω | CURRENT RATING 1.25 A

Combined Category D, C, B tested protector (to BS EN 61643) for 'through hole' mounting directly onto the PCB of data communication, signal or telephone equipment which require a lower in-line resistance, an increased current or a higher bandwidth than the PCB/D Series. Available for working voltages of up to 110 Volts for AC & DC power applications up to 125 Amps. For use at boundaries up to LPZ *0* to protect against flashover (typically the service entrance location) through to LPZ 3 to protect sensitive electronic equipment.**

Features & benefits

- Suitable for wave soldering
- Very low let-through voltage (enhanced protection to IEC/BS EN 62305) between all lines - 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
- Very low (1 Ω) in-line resistance for resistance critical applications
- High (1.25 A) maximum running current
- Higher bandwidth enables higher frequency data communications
- 2 pin clean end and 3 pin line end to ensure correct insertion

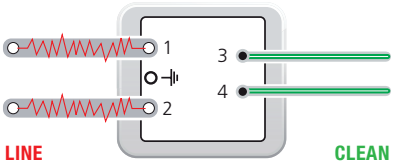
Installation

Connect in series, soldering pins direct onto PCB. Tracks to line and earth pins should be as wide as practical (see Furse Application Note AN003). Dirty (line) tracks should be routed parallel and as close together as possible. This should also be implemented on clean tracks, however clean tracks should never be routed close and parallel to line tracks or dirty barrier earth connections as earth connections as transients can be re-introduced after the protector due to electromagnetic coupling.

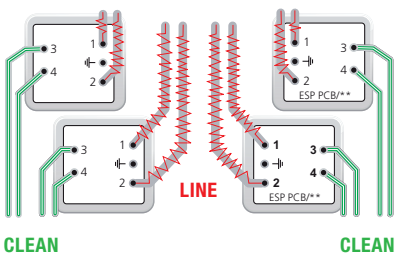
The use of an earth layer or plane is highly recommended as this reduces the electromagnetic field produced by a transient discharging to earth considerably, and hence the chance of the transient being picked up on clean tracks.

Full product range order codes can be found on pages 17/8-17/9

Maximum line to clean separation. Large input tracks and pads (using top and bottom copper layers). Earth pin is bonded to an earth layer/plane.



All dirty (line) incoming tracks are separated from the clean output tracks, individual line and clean tracks are routed close together. Earth pins are bonded to an earth layer/plane.

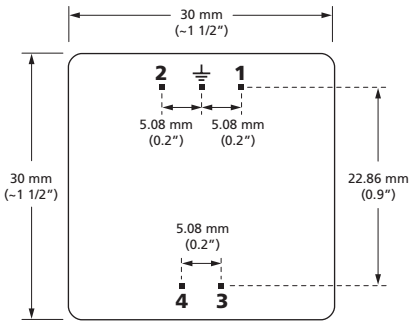


Data & signal protection
ESP PCB/E Series

ESP PCB/E Series - Technical specification

Electrical specification	ESP PCB/06E	ESP PCB/15E	ESP PCB/30E	ESP PCB/50E	ESP PCB/110E
ABB order code	7TCA085400R0039	7TCA085400R0153	7TCA085400R0043	7TCA085400R0156	7TCA085400R0041
Nominal voltage[1]	6 V	15 V	30 V	50 V	110 V
Maximum working voltage *Uc* (RMS/DC)[2]	5 V / 7.79 V	11 V / 16.7 V	25 V / 36.7 V	40 V / 56.7 V	93 V / 132 V
Current rating (signal)	1.25 A				
In-line resistance (per line ±10%)	1.0 Ω				
Bandwidth (-3 dB 50 Ω system)	45 MHz				
Transient specification	**ESP PCB/06E**	**ESP PCB/15E**	**ESP PCB/30E**	**ESP PCB/50E**	**ESP PCB/110E**
Let-through voltage (all conductors)[3] *Up*					
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21	36.0 V	39.0 V	60.0 V	86.0 V	180 V
C1 test 1 kV, 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21	26.2 V	28.0 V	49.0 V	73.5 V	170 V
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21	16.0 V	25.5 V	43.5 V	65.0 V	160 V
5 kV, 10/700 µs[4]	17.0 V	26.2 V	44.3 V	65.8 V	165 V
Maximum surge current[5]					
D1 test 10/350 µs to BS EN/EN/IEC 61643-21: – Per signal wire	2.5 kA				
– Per pair	5 kA				
8/20 µs to ITU-T K.45:2003, IEEE C62.41.2:2002: – Per signal wire	10 kA				
– Per pair	20 kA				
Mechanical specification	**ESP PCB/E Series**				
Temperature range	-40 to +80 °C				
Connection type	0.64 mm (0.025") square PCB pins, 1.2 mm diameter PCB holes recommended				
Case Material	FR Polymer UL-94 V-0				
Dimensions	See diagram below				

[1] Nominal voltage (RMS/DC or AC peak) measured at < 10 µA (ESP PCB/15E, ESP PCB/30E, ESP PCB/50E, ESP PCB/110E) and < 200 µA (ESP PCB/06E)
[2] Maximum working voltage (RMS/DC or AC peak) measured at < 5 mA leakage (ESP PCB/15E, ESP PCB/30E, ESP PCB/50E, ESP PCB/110E), < 10 mA (ESP PCB/06E)
[3] The maximum transient voltage let-through of the protector throughout the test (±10%), line to line & line to earth, both polarities. Response time < 10 ns
[4] Test to 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).
[5] The installation and connections external to the protector may limit the capability of the protector



Depth: 20 mm (~0.8")
Weight: 35 g

Pins are positioned centrally
Pin 1 connects through Pin 3
Pin 2 connects through Pin 4

(Underside pin view)

Data & signal protection
ESP RTD, RTDQ & SL RTD Series

LPZ 0→3 | FULL MODE Bonding + Equipment Protection | ESP SL RTD ULTRA SLIM 7 mm WIDTH | SIGNAL/ TELECOM TEST CAT D + C + B | ENHANCED Low let-through voltage | ESP RTDQ ULTRA COMPACT 18 mm WIDTH | LOW IN-LINE RESISTANCE | ESP SL RTD HIGH BANDWIDTH

Combined Category D, C, B tested protector (to BS EN 61643) suitable for 3-wire RTD systems to protect monitoring equipment. For use at boundaries up to LPZ *0* (ESP RTD & ESP RTDQ) or LPZ *0* (ESP SL RTD) to protect against flashover (typically the service entrance location) through to LPZ 3. Available as standard ESP RTD format, or compact ESP RTDQ and Slim Line ESP SL RTD versions for installations where a high number of lines require protection.

Features & benefits

- Protects all three wires on a 3-wire RTD system with a single protector
- Very low let-through voltage (enhanced protection to IEC/BS EN 62305) between all lines - 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
- Low in-line resistance minimizes reductions in signal strength
- Built-in DIN rail foot for simple mounting to top hat DIN rails
- Convenient earthing through DIN foot and/or earth terminal
- ESP RTD can be flat mounted on base or side
- ESP RTD and ESP RTDQ have colour coded terminals for quick and easy installation check
- ESP SL RTD has ultra slim 7 mm width ideal for compact protection of large numbers of lines (e.g. process control installations)
- ESP SL RTD includes two stage removable protection module with simple quick release mechanism allowing partial removal for easy line commissioning and maintenance as well as full removal for protection replacement

For further information on RTD applications, see separate Application Note AN001 (contact us for a copy).

Installation

Connect in series with the signal line either near where it enters or leaves the building or close to the equipment being protected ensuring it is very close to the system's earth star point. Install protectors either within an existing cabinet/ cubicle or in a separate enclosure.

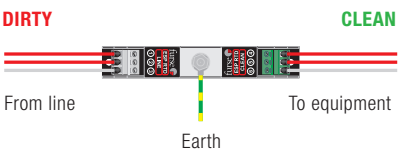
Accessories

Replacement module for ESP SL RTD:
ESP SLRTD/M
Standard module replacement
ESP SLRTD/B
Base replacement

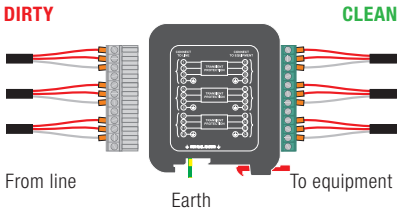
Combined Mounting/Earthing kits for ESP RTD:
CME 4 For up to 4 x ESP RTD
CME 8 For up to 8 x ESP RTD
CME 16 For up to 16 x ESP RTD
CME 32 For up to 32 x ESP RTD

Full product range order codes can be found on pages 17/8-17/9

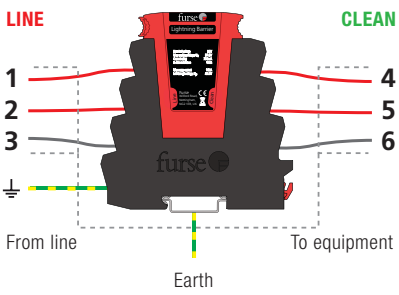
ESP RTD installed in series



ESP RTDQ installed in series (in-line)



ESP SL RTD installed in series



NOTE: For 2-wire or 4-wire RTD applications, use one or two ESP 06D or ESP SL06 protectors respectively.

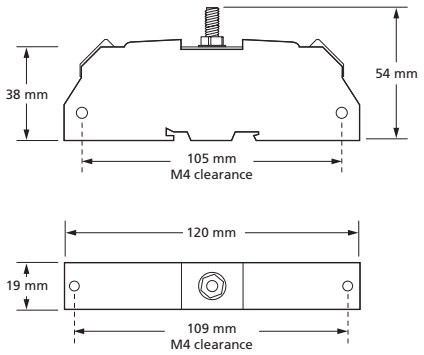
Data & signal protection
ESP RTD, RTDQ & SL RTD Series

ESP RTD, RTDQ & SL RTD Series - Technical specification

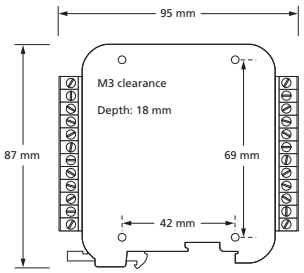
Electrical specification		ESP RTD	ESP SL RTD	ESP RTDQ
ABB order code		7TCA085460R0157	7TCA085400R0232	7TCA085400R0158
Nominal voltage[1]		6 V		
Maximum working voltage *Uc* (RMS/DC)[2]		5 V / 7.79 V		
Current rating (signal)		200 mA	500 mA	700 mA
In-line resistance (per line ±10%)		10 Ω	1.0 Ω	1.0 Ω
Bandwidth (-3 dB 50 Ω system)		800 kHz	1.5 MHz	800 kHz
Transient specification		**ESP RTD**	**ESP SL RTD**	**ESP RTDQ**
Let-through voltage (all conductors)[3] *Up*				
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21		12.0 V	17.9 V	15.0 V
C1 test 1 kV, 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21		11.5 V	12.1 V	12.5 V
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21		10.0 V	11.0 V	10.0 V
5 kV, 10/700 µs[4]		10.5 V	11.3 V	10.5 V
Maximum surge current				
D1 test 10/350 µs to	– Per signal wire	2.5 kA	1.25 kA	2.5 kA
BS EN/EN/IEC 61643-21:	– Per pair	5 kA	2.5 kA	5 kA
8/20 µs to ITU-T K.45:2003,	– Per signal wire	10 kA		
IEEE C62.41.2:2002:	– Per pair	20 kA		
Mechanical specification		**ESP RTD**	**ESP SL RTD**	**ESP RTDQ**
Temperature range		-40 to +80 °C		
Connection type		Screw terminal - max. torque 0.5 Nm	Screw terminal -max. torque 0.8 Nm	Pluggable 12 way screw terminal
Conductor size (stranded)		2.5 mm^2	4 mm^2	2.5 mm^2
Earth connection		M6 stud - max. torque 0.5 Nm	Via DIN rail or 4 mm^2 earth terminal - max. torque 0.8 Nm	Via DIN rail or M5 threaded hole in base of unit - max. torque 0.6 Nm
Case Material		FR Polymer UL-94 V-0		
Weight:	– Unit	0.08 kg	0.08 kg	0.1 kg
	– Packaged (per 10)	0.85 kg	0.85 kg	1.3 kg
Dimensions		See diagram below		

[1] Nominal voltage (RMS/DC or AC peak) measured at < 200 µA
[2] Maximum working voltage (RMS/DC or AC peak) measured at < 10 mA
[3] The maximum transient voltage let-through of the protector throughout the test (±10%), line to line & line to earth, both polarities. Response time < 10 ns
[4] Test to 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)

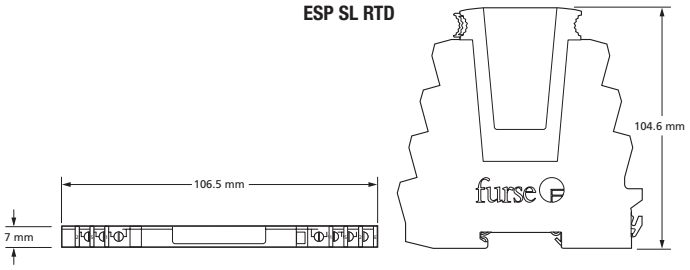
ESP RTD



ESP RTDQ



ESP SL RTD



Data & signal protection
ESP RS485, RS485Q & SL RS485 Series

FULL MODE Bonding + Equipment Protection | ESP SL RTD ULTRA SLIM 7 mm WIDTH | LPZ 0→3 | ENHANCED Low let-through voltage | ESP RTDQ ULTRA COMPACT 18 mm WIDTH | SIGNAL/ TELECOM TEST CAT D + C + B | LOW IN-LINE RESISTANCE | HIGH BANDWIDTH

Combined Category D, C, B tested protector (to BS EN 61643) specifically designed for RS 485 and Fieldbus applications, such as Profibus DP. For use at boundaries up to LPZ *0* (ESP RS485 & ESP RS485Q), or LPZ *0* (ESP SL RS485) protect against flashover (typically the service entrance location) through to LPZ 3. Available as standard ESP RS485 format, or compact ESP RS485Q and Slim Line ESP SL RS485 versions for installations where a high number of lines require protection.

Features & benefits

- Very low let-through voltage (enhanced protection to IEC/BS EN 62305) between all lines - 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
- 45 MHz bandwidth greatly exceeds 12 Mbps maximum speeds
- Low in-line resistance minimizes reductions in signal strength
- Suitable for earthed or isolated screen systems
- Built-in DIN rail foot for simple mounting to top hat DIN rails
- Convenient earthing through DIN foot and/or earth terminal
- ESP RS485 can be flat mounted on base or side
- ESP RS485 and ESP RS485Q have colour coded terminals for quick and easy installation check
- ESP SL RS485 has ultra slim 7 mm width ideal for compact protection of large numbers of lines (e.g. process control installations)
- ESP SL RS485 includes two stage removable protection module with simple quick release mechanism allowing partial removal for easy line commissioning and maintenance as well as full removal for protection replacement
- ESP SL RS485 includes optional LED status indication
- Add L suffix to part number - i.e. ESP SL RS485L

Application

Connect in series with the signal line either near where it enters or leaves the building or close to the equipment being protected ensuring it is very close to the system's earth star point. Install protectors either within an existing cabinet/ cubicle or in a separate enclosure.

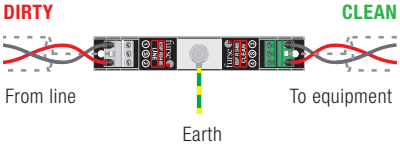
Accessories

Replacement module for ESP SL RS485:
ESP SLRS485/M
Standard module replacement
ESP SLRS485/B
Base replacement

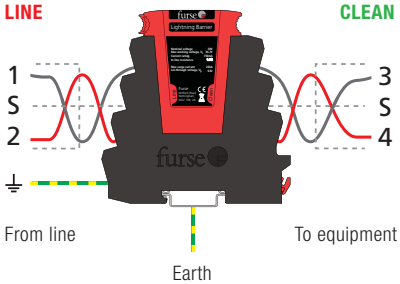
Combined Mounting/Earthing kits for ESP RS485:
CME 4 For up to 4 x ESP RS485
CME 8 For up to 8 x ESP RS485
CME 16 For up to 16 x ESP RS485
CME 32 For up to 32 x ESP RS485

Full product range order codes can be found on pages 17/8-17/9

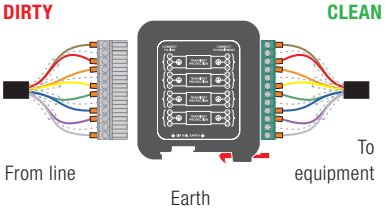
ESP RS485 installed in series



ESP SL RS485 installed in series



ESP RS485Q installed in series (in-line)



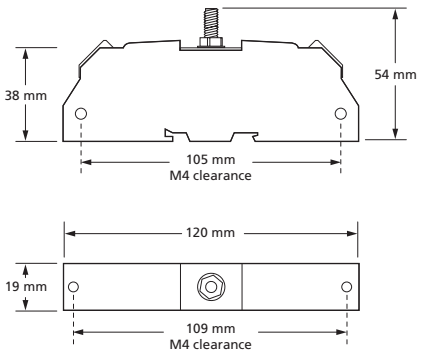
NOTE: The ESP SL 'Slim Line' Series is also available for protection of 3-wire and RTD applications (ESP SL/3W & ESP SL RTD). The ESP SL X Series has approvals for use in hazardous areas.

ESP RS485, RS485Q & SL RS485 Series - Technical specification

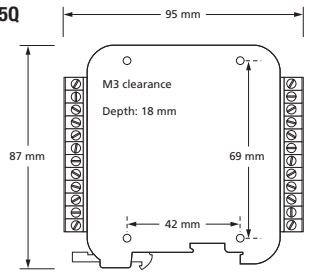
Electrical specification		ESP RS485	ESP SL RS485	ESP RS485Q
ABB order code		7TCA085400R0191	7TCA085400R0193	7TCA085400R0192
Nominal voltage[1]		15 V		
Maximum working voltage *Uc* (RMS/DC)[2]		11 V / 16.7 V		
Current rating (signal)		300 mA		
In-line resistance (per line ±10%)		1 Ω		
Bandwidth (-3 dB 50 Ω system)		45 MHz		
Transient specification		**ESP RS485**	**ESP SL RS485**	**ESP RS485Q**
Let-through voltage (all conductors)[3] *Up*				
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21		55.0 V		
C1 test 1 kV, 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21		42.0 V		
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21		27.2 V		
5 kV, 10/700 µs[4]		28.2 V		
Maximum surge current				
D1 test 10/350 µs to	– Per signal wire	2.5 kA	1.25 kA	2.5 kA
BS EN/EN/IEC 61643-21:	– Per pair	5 kA	2.5 kA	5 kA
8/20 µs to ITU-T K.45:2003,	– Per signal wire	10 kA		
IEEE C62.41.2:2002:	– Per pair	20 kA		
Mechanical specification		**ESP RS485**	**ESP SL RS485**	**ESP RS485Q**
Temperature range		-40 to +80 °C		
Connection type		Screw terminal - max. torque 0.5 Nm	Screw terminal - max. torque 0.8 N	Pluggable 12 way screw terminal
Conductor size (stranded)		2.5 mm²	4 mm²	2.5 mm²
Earth connection		M6 stud	Via DIN rail or 4 mm² earth terminal - max. torque 0.8 Nm	Via DIN rail or M5 threaded hole in base of unit
Case Material		FR Polymer UL-94 V-0		
Weight:	– Unit	0.08 kg		0.1 kg
	– Packaged (per 10)	0.85 kg		1.3 kg
Dimensions		See diagram below		

[1] Nominal voltage (RMS/DC or AC peak) measured at < 10 µA
[2] Maximum working voltage (RMS/DC or AC peak) measured at < 5 mA
[3] The maximum transient voltage let-through of the protector throughout the test (±10%), line to line & line to earth, both polarities. Response time < 10 ns
[4] Test to 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)

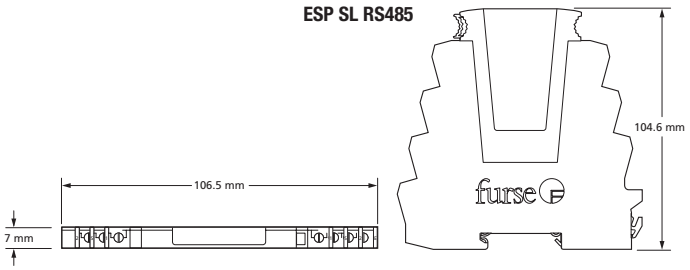
ESP RS485



ESP RS485Q



ESP SL RS485

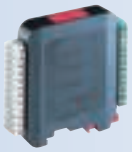
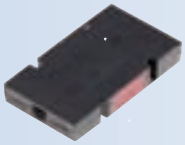
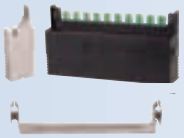


Electronic systems protection
Telecoms & computer line protection

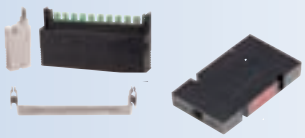
Telecoms & computer lne protection

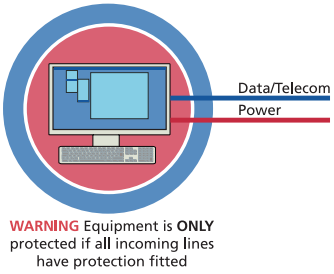
13

Telecoms & computer line protection
Product selector - Telecommunications / Computer systems

Selection guide - Telecommunications /Computer systems		Installation locations
Common applications	**Service entrance**	**Critical terminal equipment - located >20 m from service entrance**
Analogue Telecom systems Twisted pair data protection see Furse Application Note AN005) Standard, for twisted pair lines	 **ESP TN Series** **ESP TN/BX Series** **ESP TN/2BX Series** See pages 12/4 & 12/10	
Compact, ideal where space is a premium	 **ESP SL TN Series** See page 12/12	
Multiple line protection in a single unit	 **ESP TNQ Series** See page 12/20	**ESP MC/TN/RJ11 Series** e.g. Fax machines / Modems See page 12/24
For BT type socket systems	 **ESP TN/JP Series** See page 13/4	
For PBX systems terminating of LSA-Plus disconnection modules	 **ESP KT Series** See page 13/6	

Protectors for specific systems

System	Protector	
ISDN telecom systems see Furse Application Note, Note AN002, AN005)		**ESP KT2 Series** **ESP ISDN Series** See pages 13/6 & 13/4
Coaxial CCTV systems		**ESP CCTV/B Series** See pages 4/14
Cable TV systems (see Furse Application Note AN006)		**ESP TV Series** See pages 14/12
Telecom interfaces at PCB level (see Furse Application Note AN003)		**ESP PCB Series** See pages 12/24 & 12/26



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Telecoms & computer line protection
ESP TN/JP, TN/RJ11 & ISDN/RJ45 Series

LPZ 0→3 | FULL MODE Bonding + Equipment Protection | SIGNAL/TELECOM TEST CAT D + C + B | ENHANCED Low let-through voltage | LOW IN-LINE RESISTANCE 4.4 Ω | CURRENT RATING 300 mA

Combined Category D, C, B tested protector (to BS EN 61643) suitable to protect telephony equipment plugged into a BT telephone (BS 6312), Modem (RJ11) or ISDN (RJ45) socket. For use at boundaries up to LPZ *0* to protect against flashover (typically the service entrance location) 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 lines - 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
- Substantial earth connection to enable effective earthing
- Supplied in a sturdy ABS housing ready for flat mounting, or vertically via TS35 'Top Hat' DIN rail
- ESP TN/JP, ESP TN/RJ11-2/6, ESP TN/RJ11-4/6 and ESP TN/RJ11-6/6 are suitable for telecommunication applications in accordance with Telcordia and ANSI Standards (see Application Note AN005)

Application

- For PSTN (e.g. POTS, dial-up, lease line, T1/E1, *DSL and Broadband) use ESP TN/JP or TN/RJ11
- ESP TN/JP and ESP TN/RJ11… are suitable for use on telephone lines with a maximum (or ringing) voltage of up to 296 Volts
- For telephone lines with a British style, jack plug and socket connection, use ESP TN/JP
- For telephone lines with RJ11 connections protect the middle 2 (of 6) conductors with ESP TN/RJ11-2/6, the middle 4 (of 6) with ESP TN/RJ11-4/6 or all 6 with ESP TN/RJ11-6/6
- For S/T interface ISDN lines, use ESP ISDN/RJ45-4/8 and ESP ISDN/RJ45-8/8
- For S/T interface ISDN lines with RJ45 connections protect the middle 4 (of 8) conductors (paired 3&6, 4&5) with ESP ISDN/RJ45-4/8, or all 8 (outside pairs 1&2, 7&8) with ESP ISDN/RJ45-8/8

For further information on RJ45 ISDN applications, see separate Application Note AN002 and for global telephony applications, see separate Application Note AN005 (contact us for a copy).

Installation

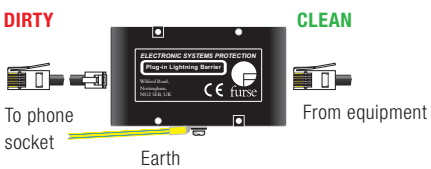
Connect in series with the telephone or ISDN line. These units are usually installed close to the equipment being protected and within a short distance of a good electrical earth.

Accessories

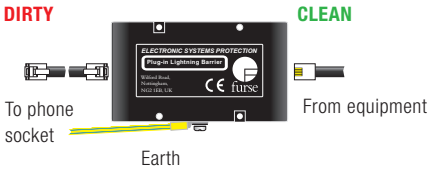
ESP CAT5e/UTP-1
1 metre cable with RJ45 connections

Full product range order codes can be found on pages 17/8-17/9

Plug-in series connection for ESP TN/JP



Plug-in series connection for ESP TN/RJ11-2/6, 4/6 & 6/6



Plug-in series connection for ESP ISDN/RJ45-4/8 & 8/8

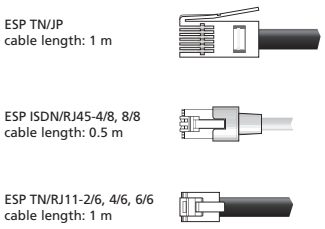
NOTE: For non-ISDN wire-in applications the high performance ESP TN or readyboxed derivative ESP TN/BX or ESP TN/2BX can be used. Protect PBX telephone exchanges and other equipment with LSA-PLUS connections.

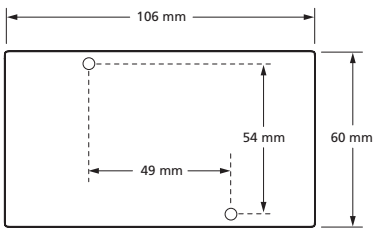
Telecoms & computer line protection
ESP TN/JP, TN/RJ11 & ISDN/RJ45 Series

ESP TN/JP, TN/RJ11 & ISDN/RJ45 Series - Technical specification

Electrical specification		ESP TN/JP	ESP TN/ RJ11-2/6	ESP TN/ RJ11-4/6	ESP TN/ RJ11-6/6	ESP ISDN/ RJ45-4/8	ESP ISDN/ RJ45-8/8
ABB order code		7TCA085400R0177	7TCA085400R0178	7TCA085400R0179	7TCA085400R0180	7TCA085460R0170	7TCA085460R0171
Nominal voltage		296 V	296 V	296 V	296 V	5 V	5 V/58 V[2]
Maximum working voltage *Uc*[1]		296 V	296 V	296 V	296 V	58 V	58 V
Current rating (signal)		300 mA					
In-line resistance (per line ±10%)		4.4 Ω					
Bandwidth (-3 dB 50 Ω system)		20 MHz	20 MHz	20 MHz	20 MHz	19 MHz	19 MHz
Transient specification		**ESP TN/JP**	**ESP TN/ RJ11-2/6**	**ESP TN/ RJ11-4/6**	**ESP TN/ RJ11-6/6**	**ESP ISDN/ RJ45-4/8**	**ESP ISDN/ RJ45-8/8**
Let-through voltage (all conductors)[3] *Up*							
C2 test 4 kV 1.2/50 µs,	– line to line	395 V	395 V	395 V	395 V	28 V	28 V/88 V[5]
2 kA 8/20 µs to							
BS EN/EN/IEC 61643-21	– line to earth	395 V	395 V	395 V	395 V	88 V	88 V
C1 test 1 kV, 1.2/50 µs,	– line to line	390 V	390 V	390 V	390 V	23 V	23 V/63 V[5]
0.5 kA 8/20 µs to							
BS EN/EN/IEC 61643-21	– line to earth	390 V	390 V	390 V	390 V	63 V	63 V
B2 test 4 kV 10/700 µs to	– line to line	298 V	298 V	298 V	298 V	26 V	26 V/65 V[5]
BS EN/EN/IEC 61643-21	– line to earth	298 V	298 V	298 V	298 V	65 V	65 V
5 kV, 10/700 µs[4]	– line to line	300 V	300 V	300 V	300 V	27 V	27 V/80 V[5]
	– line to earth	300 V	300 V	300 V	300 V	80 V	80 V
Maximum surge current[6]							
D1 test 10/350 µs to BS EN/EN/IEC 61643-21		1 kA					
8/20 µs to ITU-T K.45:2003, IEEE C62.41.2:2002:		10 kA					
Mechanical specification		**ESP TN/JP**	**ESP TN/ RJ11-2/6**	**ESP TN/ RJ11-4/6**	**ESP TN/ RJ11-6/6**	**ESP ISDN/ RJ45-4/8**	**ESP ISDN/ RJ45-8/8**
Temperature range		-40 to +80 °C					
Connection type		Standard BT jack plug and socket (to BS 6312)	RJ11 plug and socket	RJ11 plug and socket	RJ11 plug and socket	RJ45 plug and socket	RJ45 plug and socket
Earth connection		M4/DIN rail					
Case Material		FR Polymer UL-94 V-0					
Weight: – Unit		0.15 kg					
– Packaged		0.2 kg					
Dimensions		See diagram below					

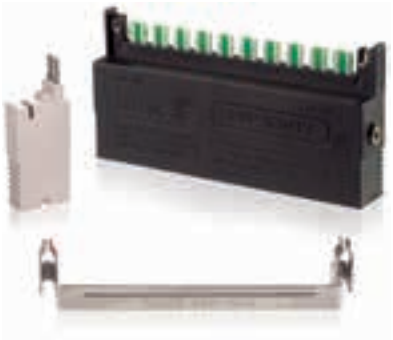
[1] Maximum working voltage (DC or AC peak) measured at < 10 µA leakage for ESP TN/JP and ESP TN/RJ11 products and µA for ESP ISDN/RJ45 products
[2] Maximum working voltage is 5 V for pairs 3/6 & 4/5, and 58 V for pairs 1/2 & 7/8
[3] The maximum transient voltage let-through of the protector throughout the test (±10%), line to line & line to earth, both polarities. Response time < 10 ns
[4] Test to 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)
[5] The first let-through voltage value is for pairs 3/4 & 5/6, and the second value is for pairs 1/2 & 7/8
[6] The installation and connectors external to the protector may limit the capability of the protector





Depth: 24 mm
Fixing centres 49 x 54 mm, M3 clearance

Telecoms & computer line protection
ESP KT & KE Series



LPZ 0→3 | FULL MODE Bonding + Equipment Protection | SIGNAL/ TELECOM TEST CAT D + C + B | ENHANCED Low let-through voltage | HIGH BANDWIDTH | LOW IN-LINE RESISTANCE 4.4 Ω

Combined Category D, C, B tested protector (to BS EN 61643) suitable for use on ten line LSA-PLUS disconnection modules to PBX telephone exchanges, ISDN and other telecoms equipment with LSA-PLUS disconnection modules. For use at boundaries up to LPZ *0* to protect against flashover (typically the service entrance location) through to LPZ 3 to protect sensitive electronic equipment.

Features & benefits

- Low cost protection for large numbers of data and signal lines
- Very low let-through voltage (enhanced protection to IEC/BS EN 62305) between all lines - 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
- Colour of housing distinguishes electrically different protectors - avoids confusion when installed together on the same distribution frame
- Quick and easy plug-in installation, with 'bump' location feedback
- Under power line cross conditions /PTC versions offer safe disconnection during fault duration. Unit auto-resets once fault corrected
- At larger installations ESP K10T1/2 and ESP K10T1/PTC provide all in one protection for all ten lines on LSA-PLUS disconnection modules
- Use the ESP KE10 to provide trouble free earthing for up to ten ESP KT1/2 and ESP KT1/PTC (per disconnection module)
- ESP K10T1/2 and ESP K10T1/PTC have an integral earth connection, and an external M4 earth bush for use with non-metallic LSA-Plus frames
- ESP KT1/PTC and ESP K10T1/PTC have resettable overcurrent protection and are rated for power cross faults
- ESP KT1, ESP KT1/PTC, ESP K10T1 and ESP K10T1/PTC are suitable for telecoms applications in accordance with Telcordia and ANSI Standards

Application

- For PSTN (e.g POTS, dial-up, lease line, T1/E1, *DSL and Broadband) and U interface ISDN lines, use ESP KT1 (or ESP KT1/PTC) and ESP K10T1 (or ESP K10T1/PTC)
- For S/T interface ISDN lines, use ESP KT2 and ESP K10T2
- Protect single lines with ESP KT1, ESP KT2 or ESP KT1/PTC
- Protect all ten lines on a disconnection module with ESP K10T1/2

Full product range order codes can be found on pages 17/8-17/9

Installation

Install protectors on all lines that enter or leave each building (including extensions to other buildings). Identify the lines requiring protection and plug-in the protector (ensuring the correct orientation) for a series connection. Plug ESP K10T1/2 directly into each disconnection module requiring protection.

ESP KT1/2 and ESP KT1/PTC must be installed via the ESP KE10 earth bar. Clip an ESP KE10 on to the disconnection module and plug an ESP KT1/2 or ESP KT1/PTC in to each line on the module that needs protecting. In the unlikely situation that the protector is damaged, it will sacrifice itself and fail short circuit, taking the line out of commission, indicating it needs replacing and preventing subsequent transients from damaging equipment.

For further information on global telephony applications, see separate Application Note AN005 (contact us for a copy).

NOTE: For individual telephone lines and lines at unmanned sites the high performance ESP TN, ready-boxed derivative ESP TN/BX or ESP TN/2BX, or plug-in ESP TN/JP or ESP TN/RJ11 Series should be used. For plug-in S/T interface ISDN protection, use the ESP TN or ISDN Series protectors.

Telecoms & computer line protection
ESP KT & KE Series

ESP KT & KE Series - Technical specification

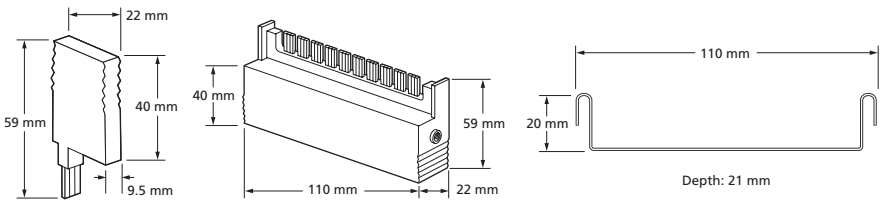
Electrical specification		ESP KT1	ESP KT1/PTC	ESP KT2	ESP K10T1	ESP K10T1/PTC	ESP K10T2
ABB order code		7TCA085400R0135	7TCA085400R0034	7TCA085400R0136	7TCA085400R0130	7TCA085400R0131	7TCA085400R0133
Maximum working voltage *Uc*[1]	– line to line	296 V	296 V	5 V	296 V	296 V	5 V
	– line to earth	296 V	296 V	58 V	296 V	296 V	58 V
Current rating (signal)		300 mA	145 mA	300 mA	300 mA	145 mA	300 mA
In-line resistance (per line ±10%)		4.4 Ω					
Bandwidth (-3 dB 50 Ω system)		20 MHz	20 MHz	20 MHz	20 MHz	19 MHz	19 MHz
Transient specification		**ESP KT1**	**ESP KT1/PTC**	**ESP KT2**	**ESP K10T1**	**ESP K10T1/PTC**	**ESP K10T2**
Let-through voltage (all conductors)[2] *Up*							
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21	– line to line	395 V	395 V	28 V	395 V	395 V	28 V
	– line to earth	395 V	395 V	88 V	395 V	395 V	88 V
C1 test 1 kV, 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21	– line to line	390 V	390 V	23 V	390 V	390 V	23 V
	– line to earth	390 V	390 V	63 V	390 V	390 V	63 V
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21	– line to line	298 V	298 V	26 V	298 V	298 V	26 V
	– line to earth	298 V	298 V	65 V	298 V	298 V	65 V
5 kV, 10/700 µs[3]	– line to line	300 V	300 V	27 V	300 V	27 V	27 V
	– line to earth	300 V	300 V	80 V	300 V	80 V	80 V
Maximum surge current[4]							
D1 test 10/350 µs to BS EN/EN/IEC 61643-21:	– line to line	1 kA					
	– line to earth	2 kA					
8/20 µs to ITU-T K.45:2003, IEEE C62.41.2:2002:	– line to line	5 kA					
	– line to earth	10 kA					
Power Faults specification		**ESP KT1**	**ESP KT1/PTC**	**ESP KT2**	**ESP K10T1**	**ESP K10T1/PTC**	**ESP K10T2**
Power/Line Cross and Power Induction - tests to: ITU-T (formerly CCITT) K.20, K.21 and K.45, Telcordia GR-1089-CORE, Issue 2:2002, UL 60950/IEC 950							
Power/line cross		–	110/230 Vac (15 min)	–	–	110/230 Vac (15 min)	–
Power induction		–	600 V, 1 A (0.2 sec)	–	–	600 V, 1 A (0.2 sec)	–
Mechanical specification		**ESP KT1, ESP KT2, ESP KT1/PTC**		**ESP K10T1, ESP K10T2, ESP K10T1/PTC**		**ESP KE10**	
Temperature range		-40 to +80 °C				–	
Connection type		To LSA-PLUS disconnection modules (BT part number 237A)				–	
Earth connection		Via ESP KE10 earth bar		Via integral earth clip/external M4 bush		–	
Material		FR Polymer UL-94 V-0				Stainless Steel	
Weight: – Unit		0.01 kg		0.10 kg		0.01 kg	
– Packaged		0.12 kg (per 10)		0.12 kg		0.10 kg (per 10)	
Dimensions		See diagram below					

[1] Maximum working voltage (DC or AC peak) at 10 µA for ESP KT1, ESP KT1/PTC, ESP K10T1, ESP K10T1/PTC and at 5 µA for ESP KT2 and ESP K10T2

[2] The maximum transient voltage let-through of the protector throughout the test (±10%), line to line & line to earth, both polarities. Response time < 10 ns

[3] Test to 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)

[4] The installation and connections external to the protector may limit the capability of the protector



13

Telecoms & computer line protection
ESP Cat-5 & Cat-6 Series

LPZ 0→3 | FULL MODE Bonding + Equipment Protection | SIGNAL/ TELECOM TEST CAT D + C + B | ENHANCED Low let-through voltage | LOW IN-LINE RESISTANCE 1.5 Ω | HIGH CURRENT RATING | PoE+ Compliant IEEE 802.3at | PoE Modes A & B

Combined Category D, C, B tested protector (to BS EN 61643) suitable to protect twisted pair Ethernet networks, including Power over Ethernet (PoE), with RJ45 connections. For use at boundaries up to LPZ *0* to protect against flashover (typically the service entrance location) through to LPZ 3 to protect sensitive electronic equipment.

Features & benefits

- Suitable for systems signalling on up to eight wires of either shielded or unshielded twisted pair cable
- Very low let-through voltage (enhanced protection to IEC/BS EN 62305) between all lines - Full Mode design capable of handling partial lightning currents as well as allowing continual operation of protected equipment
- Repeated protection in lightning intense environments
- Unlike some competing devices, the ethernet SPDs provide effective protection without impairing the system's normal operation
- Low capacitance circuitry prevents the start-up signal degradation associated with other types of network protector
- Low in-line resistance minimizes unnecessary reductions in signal strength to maximize signalling distance
- Sturdy ABS housing with convenient holes for flat mounting, or vertically via TS35 'Top Hat' DIN rail
- Substantial earth connection to enable effective earthing
- Will protect all PoE powering modes A and B.

Application

Use these protectors on network cables that travel between buildings to prevent damage to equipment, e.g. computers, servers, repeaters and hubs. Suitable for computer networks up to Cat-6A cabling.

- To protect up to 100baseT networks with Cat-5/Cat-5e cabling use ESP Cat-5e
- To protect up to 1000baseT/ 10GbaseT networks with Cat-6/Cat-6A cabling use ESP Cat-6
- To protect up to 100baseT Power over Ethernet (PoE) networks with Cat-5/Cat-5e use ESP Cat-5e/PoE
- To protect up to 1000baseT/ 10GbaseT Power over Ethernet (PoE) networks with Cat-6/Cat-6A cabling use ESP Cat-6/PoE

For further application information, see separate Application Note AN004 (contact us for a copy).

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Installation

Connect in series with the network cable, either:
– Near to where it enters or leaves the building, or
– As it enters the network hub, or
– Close to the equipment being protected
This should be close to the system's earth star point (to enable a good connection to earth).

Accessories

ESP CAT5e/UTP-1
1 metre cable with unshielded RJ45 connections

ESP CAT6/STP-2
2 metre screened cable with shielded RJ45 connections

Full product range order codes can be found on pages 17/8-17/9

Plug-in series connection

TECHNICAL NOTE: The interfaces used in Ethernet networks incorporate an isolation transformer which gives these systems an inbuilt immunity to transients between line and earth of 1,500 Volts or more.

NOTE: To protect datacomms systems based on twisted pairs, use the ESP D, E or H Series. Local protection for networked equipment is also available. For protection of legacy coaxial Ethernet networks, please contact us for details of our ESP ThinNet and ESP ThickNet protectors.

Telecoms & computer line protection
ESP Cat-5 & Cat-6 Series

ESP Cat-5 & Cat-6 Series - Technical specification

Electrical Specification		ESP Cat-5e	ESP Cat-5e/PoE	ESP Cat-6	ESP Cat-6/PoE
ABB order code		7TCA085400R0017	7TCA085400R0021	7TCA085400R0023	7TCA085400R0024
Maximum working voltage *Uc*[1]	– data[2]	5 V			
	– power[3]	–	58 V	–	58 V
Current rating		300 mA	600 mA[4]	300 mA	600 mA[4]
In-line resistance (per line ±25%)	– data[2]	1.5 Ω			
	– power	–	1.5 Ω	–	–
Maximum data rate		100 Mbps	100 Mbps	1000 Mbps	1000 Mbps
Networking standards:		10/100baseT	10/100baseT	10/100/1000/ 10GbaseT	10/100/1000/ 10GbaseT
		TIA Cat-5e	TIA Cat-5/PoE	TIA Cat-6	TIA Cat-6
		IEEE 802.3i	IEEE 802.3i	IEEE 802.3i	IEEE 802.3i
		IEEE 802.3u	IEEE 802.3u	IEEE 802.3u	IEEE 802.3u
		–	IEEE 802.3af	IEEE 802.3ab	IEEE 802.3ab
		–	IEEE 802.3at	IEEE 802.3an	IEEE 802.3an
		–	–	–	IEEE 802.3af
		–	–	–	IEEE 802.3at
Transient specification		**ESP Cat-5e**	**ESP Cat-5e/PoE**	**ESP Cat-6**	**ESP Cat-6/PoE**
Let-through voltage (all conductors)[5] *Up*					
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21	– line to line	120 V	120 V/116 V[8]	120 V	120 V/116 V[8]
	– line to earth[6]	700 V			
C1 test 1 kV, 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21	– line to line	74 V	74 V/95 V[8]	74 V	74 V/95 V[8]
	– line to earth[6]	600 V			
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21	– line to line	21 V	21 V/87 V[8]	21 V	21 V/87 V[8]
	– line to earth[6]	550 V			
5 kV, 10/700 µs[7]	– line to line	25 V	25 V/90 V[8]	25 V	25 V/90 V[8]
	– line to earth[6]	600 V			
Maximum surge current[9]					
D1 test 10/350 µs to BS EN/EN/IEC 61643-21		1 kA			
8/20 µs to ITU-T K.45:2003, IEEE C62.41.2:2002		10 kA			
Mechanical specification		**ESP Cat-5e, ESP Cat-5e/PoE**		**ESP Cat-6, ESP Cat-6/PoE**	
Temperature range		-40 to +80 °C			
Connection type		RJ45 sockets			
Cable (supplied)		0.5 m Cat-5e UTP patch lead		0.5 m Cat-6 STP patch lead	
Earth connection		M4/DIN rail			
Case Material		FR Polymer UL-94 V-0			
Weight: – Unit		0.15 kg			
– Packaged		0.2 kg			
Dimensions		See diagram below			

[1] Maximum working voltage (DC or AC peak) measured at 1 mA leakage

[2] Data pairs 1/2 and 3/6 are protected as standard. Pairs 4/5 and 7/8 are also protected on Cat-6 barriers

[3] PoE protectors transmit power Mode A and Mode B power

[4] Based on 30W of transmitted PSE power, to IEEE 802.3at.

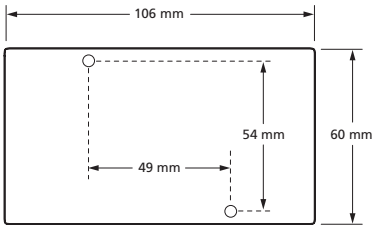
[5] The maximum transient voltage let-through of the protector throughout the test (±10%), line to line & line to earth. Response time <10 ns (on all protected pairs)

[6] The interfaces used in network systems incorporate an isolation transformer that inherently provides an inbuilt immunity to transients between line and earth of 1,500 Volts or more

[7] Test to IEC 61000-4-5:2014, ITU-T (formerly CCITT) K.20, K.21 and K.45,Telcordia GR-1089-CORE, Issue 6:2011, ANSI TIA/EIA/IS-968-A:2005 (formerly FCC Part 68).

[8] The first number is for the data pair, with the second number for the power pair

[9] The installation and connectors may limit the capability of the protector



Depth: 24 mm

Fixing centres 49 x 54 mm, M3 clearance

Telecoms & computer line protection
ESP LA & LB Series

LPZ 2→3 | FULL MODE Bonding + Equipment Protection | SIGNAL/ TELECOM TEST CAT C + B | ENHANCED Low let-through voltage | LOW IN-LINE RESISTANCE ~0 Ω | CURRENT RATING 300 mA

Combined Category C, B tested protector (to BS EN 61643) suitable to protect PCs and other computer equipment on systems using 9, 15 or 25 pins. For use on lines running within buildings at boundaries up to LPZ 2 through to LPZ 3 to protect sensitive electronic equipment.

Features & benefits

- Let-through voltage below equipment susceptibility levels
- Negligible in-line resistance
- Suitable for equipment using “D” connectors - DB-9, DB-15 and DB-25
- ESP LA-5/25 protects pins 1, 2, 3, 7 & 20 to earth/shell. Note pin 1 is connected to earth
- ESP LA-25/25 and ESP LB-25/25 protects all pins. Note pin 1 is connected to earth/shell
- ESP LA-9/9, ESP LB-9/9, ESP LA-15/15 and ESP LB-15/15 protect all pins
- Sturdy plastic housing
- Male/female connectors allow easy plug-in installation without rewiring
- Earthed via shell and supplementary earth strap

Application

Use on cables running within a building to protect equipment locally from transients induced on to data cables from the magnetic field caused by a lightning strike.

- For Asynchronous RS 232 systems, use ESP LA-5/25
- For RS 232 systems, use ESP LA-25/25, ESP LA-9/9 or ESP LA-15/15
- For RS 422, RS 423 and RS 485 systems, use ESP LB-9/9, ESP LB-15/15 or ESP LB-25/25

Installation

Simple plug-in connection to the communication port, between the equipment to be protected and its incoming data cable. Make suitable attachment to earth.

Full product range order codes can be found on pages 17/8-17/9

TECHNICAL NOTE: ESP LA... and ESP LB... protectors are designed only for use on cables running within a building (typically LPZ 2) to offer local protection to equipment. They therefore will not be able to handle the higher level transients that occur when lines between buildings are protected. ESP LA... and ESP LB... protectors should not be used in such an application (up to LPZ *0*) where high energy ESP lightning barriers (such as ESP E Series) should be employed. If they are used in lines between buildings, there is a high risk of the protector being overloaded and destroyed during transient activity. Connected equipment will, in most cases, still be protected, but there is a small risk that equipment will suffer damage in such circumstances.

NOTE: For cabling up to Cat-6 with RJ45 connections (running external to the building) and local protection for up to Cat-6 with RJ45 connections, (running within a building) products are also available. For protection of legacy coaxial Ethernet networks, please contact us for details of our ESP ThinNet and ESP ThickNet protectors.

Telecoms & computer line protection
ESP LA & LB Series

ESP LA & LB Series - Technical specification

Electrical specification	ESP LA-5/25	ESP LA-25/25	ESP LA-9/9	ESP LB-9/9	ESP LA-15/15	ESP LB-15/15	ESP LB-25/25
ABB order code	7TCA085400R0139	7TCA085400R0138	7TCA085400R0140	7TCA085400R0143	7TCA085400R0137	7TCA085400R0141	7TCA085400R0142
Nominal voltage[1]	23.1 V	23.1 V	23.1 V	5.8 V	15.3 V	6.4 V	5.8 V
Maximum working voltage *Uc* (RMS/DC)[2]	25.7 V	25.7 V	25.7 V	6.4 V	17.1 V	7.13 V	6.4 V
Capacitance	< 500 pF	< 500 pF	< 500 pF	< 2000 pF	< 50 pF	< 50 pF	< 2000 pF
Current rating	300 mA						
In-line resistance	~ 0 Ω						
Transient specification	**ESP LA-5/25**	**ESP LA-25/25**	**ESP LA-9/9**	**ESP LB-9/9**	**ESP LA-15/15**	**ESP LB-15/15**	**ESP LB-25/25**
Let-through voltage[3] *Up*							
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21	–	–	–	12.5 V	31.5 V	16.0 V	12.5 V
B2 test 1 kV 10/700 µs to BS EN/EN/IEC 61643-21	36.5 V	36.5 V	36.5 V	10.0 V	27.5 V	14.0 V	10.0 V
5 kV, 10/700 µs[4]	37.5 V	37.5 V	37.5 V	10.5 V	28.5 V	14.6 V	10.5 V
Protection provided	Pins 1, 2, 3, 7 and 20 to earth/shell[5]	Pins 1-25 to earth/shell[5]	Pins 1-9 to earth/shell	Pins 1-9 to earth/shell	Pins 1-15 to earth and each other	Pins 1-15 to earth and each other	Pins 1-25 to earth/shell[5]
Maximum surge current							
8/20 µs to ITU-T K.45:2003, IEEE C62.41.2:2002	200 A	200 A	200 A	300 A	350 A	700 A	300 A
Mechanical specification	**ESP LA-5/25**	**ESP LA-25/25**	**ESP LA-9/9**	**ESP LB-9/9**	**ESP LA-15/15**	**ESP LB-15/15**	**ESP LB-25/25**
Temperature range	-40 to +80 °C						
Connection type	DB-25 m-f	DB-25 m-f	DB-9 m-f	DB-9 m-f	DB-15 m-f	DB-15 m-f	DB-25 m-f
Earth connection	Shell or 150 mm earth lead (supplied)						
Case Material	FR Polymer UL-94 V-0						
Weight: – Unit	50 g	50 g	40 g	40 g	50 g	50 g	50 g
– Packaged	70 g	70 g	50 g	50 g	60 g	60 g	70 g
Dimensions	See diagram below						

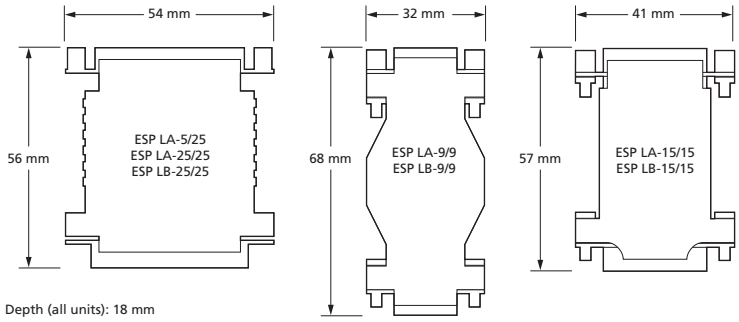
[1] Nominal voltage (RMS/DC or AC peak) measured at 5 µA (ESP LA-5/25, ESP LA-9/9, ESP LA-25/25, ESP LA-15/15), 0.5 mA (ESP LB-15/15) and 1 mA (ESP LB-9/9, ESP LB-25/25)

[2] Maximum working voltage (RMS/DC or AC peak) measured at 1 mA leakage (ESP LA-5/25, ESP LA-9/9, ESP LA-25/25, ESP LA-15/15) and 10 mA (ESP LB-15/15, ESP LB-9/9 and ESP LB-25/25)

[3] The maximum transient voltage let-through of the protector throughout the test (±10%). Response time < 10 ns.

[4] Test to 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)

[5] Pin 1 connected to earth/shell



Telecoms & computer line protection
ESP LN Series

LPZ 2→3 | FULL MODE Bonding + Equipment Protection | SIGNAL/ TELECOM TEST CAT C + B | ENHANCED Low let-through voltage | LOW IN-LINE RESISTANCE ~0 Ω | CURRENT RATING 300 mA

Combined Category C, B tested protector (to BS EN 61643) suitable to protect equipment on twisted pair applications using Cat-5 wiring with RJ45 connectors. For use on lines running within buildings at boundaries up to LPZ 2 through to LPZ 3 to protect sensitive electronic equipment.

Features & benefits

- Suitable for systems signalling on up to 8 wires of unshielded twisted pair cable - protects all 8 pins in each line
- Use to protect 1, 4, 8 or 16 lines
- Suitable for RS 422/423, 10baseT, 100baseT, Token Ring and Fast Ethernet systems
- Available for individual connections or for multiport applications
- Free-standing or 19" rack mounted versions available for multiport applications
- Let-through voltage below equipment susceptibility levels
- Protects twisted pair lines operating at speeds up to 100 Mbps
- Available as 4 or 8 port free-standing versions (ESP LN-4 and ESP LN-8) and 8 or 16 port 19" rack mounted panels (ESP LN-8/16 and ESP LN-16/16)
- Negligible in-line resistance
- Sturdy housing and simple plug-in installation
- Simple earthing via single braided metal strap

Application

Use on network cables running within a building to protect systems locally from transients induced on to data cables from the magnetic field caused by a lightning strike.
Suitable for internal cabling Cat-5.

- Protect the network connection to individual pieces of equipment with the ESP LN
- Protect multiport applications such as hubs, switches and patch panels with the ESP LN-4, ESP LN-8, ESP LN-8/16 or ESP LN-16/16

Installation

Plug-in connection between incoming data cables and equipment to be protected. Make suitable attachment to earth.

Full product range order codes can be found on pages 17/8-17/9

TECHNICAL NOTE: ESP LN... range of protectors are designed only for use on cables running within a building (typically LPZ 2) to offer local protection to equipment. They therefore will not be able to handle the higher level transients that occur when lines between buildings are protected. ESP LN... range of protectors should not be used in such an application (up to LPZ *0*) where high energy ESP lightning barriers (such as ESP E and ESP Cat-5 & Cat-6 Series) should be employed. If they are used in lines between buildings, there is a high risk of the protector being overloaded and destroyed during transient activity. Connected equipment will, in most cases, still be protected, but there is a small risk that equipment will suffer damage in such circumstances.

NOTE: Protectors for coaxial (or twisted pair) CCTV Lines are available. For coaxial RF lines, use the ESP RF Series. Transients can also be conduced into TV systems via the mains power supplies - use suitable ESP mains protection.

Telecoms & computer line protection
ESP LN Series

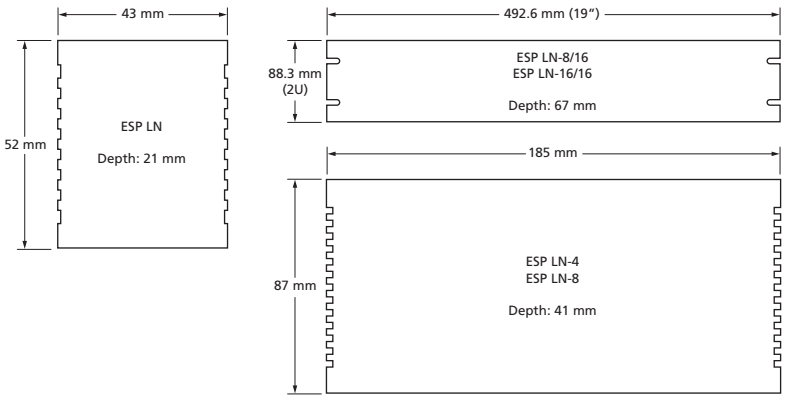
ESP LN Series - Technical specification

Electrical specification	ESP LN	ESP LN-4	ESP LN-8	ESP LN-8/16	ESP LN-16/16
ABB order code	7TCA085400R0145	7TCA085400R0147	7TCA085400R0148	7TCA085400R0149	7TCA085400R0146
Maximum working voltage *Uc* (RMS/DC)[1]	4 V				
Current rating	300 mA				
In-line resistance	~ 0 Ω				
Bandwidth (-3 dB 50 Ω system)	100 Mbps				
Transient specification	**ESP LN**	**ESP LN-4**	**ESP LN-8**	**ESP LN-8/16**	**ESP LN-16/16**
Let-through voltage[2] *Up*					
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21	13.5 V				
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21	12.0 V				
1.5 kV, 10/700 µs[3]	12.5 V				
Maximum surge current					
8/20 µs to ITU-T K.45:2003, IEEE C62.41.2:2002	350 A				
Mechanical specification	**ESP LN**	**ESP LN-4**	**ESP LN-8**	**ESP LN-8/16**	**ESP LN-16/16**
Temperature range	-40 to +80 °C				
Connection type	RJ45 sockets				
Earth connection	External earth strap	External earth strap on front fascia panel	External earth strap on front fascia panel	External earth strap through mounting screws	External earth strap through mounting screws
Case Material	FR Polymer UL-94 V-0			Steel	Steel
Weight: – Unit	0.05 kg	0.29 kg	0.32 kg	0.75 kg	1 kg
– Packaged	0.09 kg	0.58 kg	0.61 kg	1.1 kg	1.35 kg
Dimensions	See diagram below				

[1] Maximum working voltage (RMS/DC or AC peak) measured at 1 mA leakage

[2] The maximum transient voltage let-through of the protector throughout the test (±10%). Response time < 10 ns

[3] Test to 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)



Electronic systems protection
Specific systems protection

Specific systems protection

Specific systems protection
Introduction

Protecting wind turbines - Wind turbines contain a vast array of electronic systems, including power, control and telecoms, which require transient overvoltage protection.

Protection follows the Lightning Protection Zones (LPZ) concept established in IEC/BS EN 62305 and IEC 61400, with equipment sited in internal zones up to LPZ 2 (see Figure 8 & Table 3 for specific locations).

Power line protection

Lightning current/equipotential bonding SPDs (minimum Type 1) are required at LPZ boundary LPZ 0 to LPZ 1 to counter partial lightning currents resulting from a direct lightning strike. Transient overvoltage SPDs (minimum Type 2) are required at LPZ boundary LPZ 1 to LPZ 2 to protect critical electronic systems.

The SPD selected should be suitable for the voltage of the line. Furse ESP WT Series protectors apply at 690 V with Furse ESP D1 Series or Furse ESP M1 Series protectors covering 230 V/400 V lines (see Table 3).

These power line protectors offer low let-through voltage protection creating a safe area downstream of minimum LPZ 2, meeting the requirements for wind turbines.

SPDs should be installed on the line side, as close as possible to the equipment being protected. Where connected downstream equipment is > 10 m away, a second SPD should be installed at the subsequent equipment (in line with guidance in DD CLC/TS 50539-22:2010).

If the main HV transformer is housed separately from the wind turbine, incoming/outgoing lines from the turbine and the HV transformer should be protected (minimum LPZ 0 to LPZ 1, or where control system electronics are installed LPZ 0 to LPZ 2).

Data/signal/telecoms line protection

SPDs should be installed to protect data, signal and telecoms lines in the wind turbine and where appropriate, the HV transformer. A wide range of Furse SPDs are available for this purpose, including the the ESP SL Series and ESP D, E, H Series protectors (see Table 3 for specific application).

The SPD selected should be compatible with the system to be protected, and offer sufficient protection to reduce overvoltages below the immunity threshold of the protected equipment. The SPD must not impede system performance and must be able to survive repeated transients.

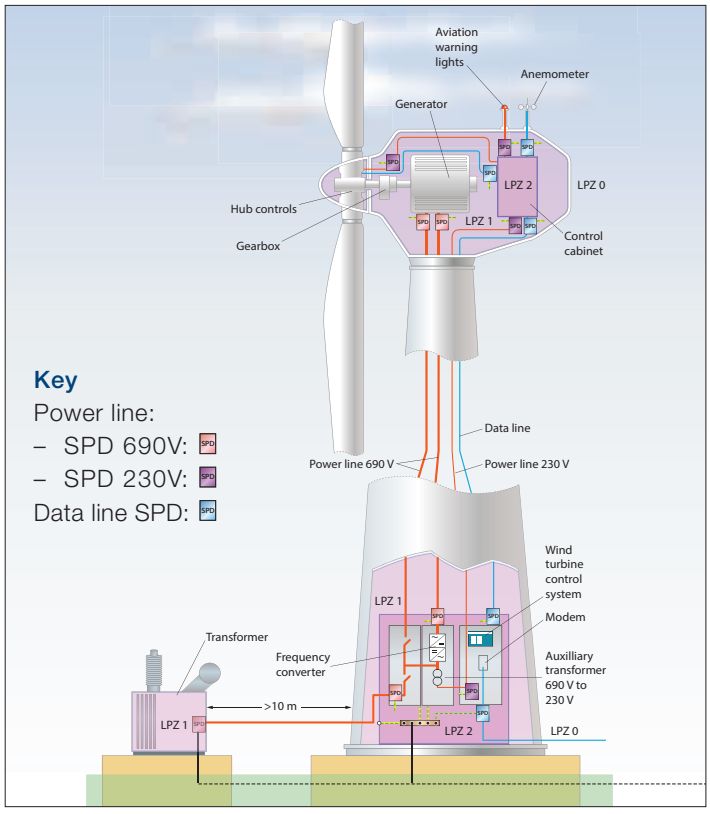
Table 3: SPD requirement according to component to be protected

Location	LPZ	SPD required
Generator (690 V)	LPZ 0 to LPZ 1	ESP WT Series protector
Frequency converter (690 V)	LPZ 0 to LPZ 2	ESP WT Series protector
Transformer (690 V)	LPZ 0 to LPZ 1*	ESP WT Series protector
Control system (230 V)	LPZ 0 to LPZ 1	ESP 240 D1 or ESP 240 M1
Aviation warning light (230 V)	LPZ 0 to LPZ 1	ESP 240 D1 or ESP 240 M1
Hub control: – (230 V)	LPZ 0 to LPZ 1	ESP 240 D1 or ESP 240 M1
– (4-20 mA loop)	LPZ 0 to LPZ 1	ESP SL RS485
– (RS 485 line)	LPZ 0 to LPZ 1	ESP SL RS485
Anemometer (24 V)	LPZ 0 to LPZ 1	ESP SL30
Modem	LPZ 0 to LPZ 1	ESP TN or ESP SL TN

*Where the transformer includes process control/data lines, protect to LPZ 2

The SPD should be installed as close as possible to the point of entry/exit of the incoming/outgoing line. Where connected equipment is > 10 m from the incoming/outgoing line, a second SPD should be installed at any subsequent connected equipment.

Application of SPDs within a typical wind turbine environment



Specific systems protection
Introduction

Table 4: SPD requirement according to structural LPS configuration

Status of Structural LPS	DC side, distance PV array to inverter		AC side of inverter
	< 10 m	> 10 m	
No structural LPS	ESP PV Series protector (min. Type 2 performance)	ESP PV Series protector (min. Type 2 performance)	ESP AC mains power protector (min. Type 2 performance)
Structural LPS (separation distance kept)	ESP PV Series protector (min. Type 2 performance)	ESP WT Series protector (min. Type 2 performance)	ESP AC mains power protector (min. Type 2 performance - inverter) (min. Type 1 performance - MDB)
Structural LPS (separation distance not kept)	ESP PV Series protector (min. Type 1 performance)	ESP PV Series protector (min. Type 1 performance)	ESP AC mains power protector (min. Type 1 performance)

Photovoltaic (PV) systems are at risk from transient overvoltages which may enter the system following a direct lightning strike to a structural LPS, or via the wider electrical network.

Protection against transient overvoltages is achieved through installation of appropriate SPDs on the DC and AC side of the DC-AC inverter in the PV system. Installation should follow the guidance provided in Technical Specification DD CLC/TS 50539-12.

Installation on the DC side of the DC-AC inverter

An SPD specifically designed for use on the DC side of a PV system should be installed. Where the distance between the PV array and the inverter is < 10 m, a single SPD suffices, mounted as close as possible to the inverter. Where the distance > 10 m, two SPDs should be installed, one close to the inverter and the other close to the PV array. The minimum Type of SPD is dependent on presence of structural LPS/ separation distance (see Table 4).

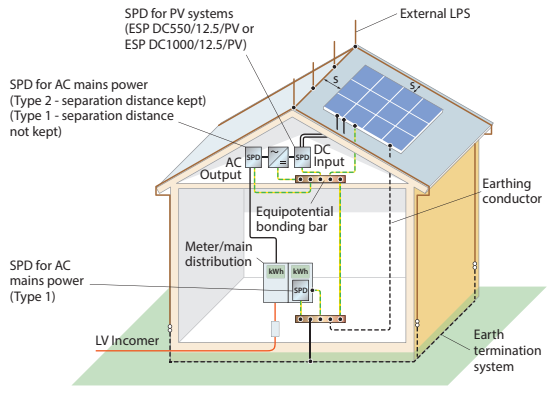
Installation on the AC side of the DC-AC inverter

The presence (or lack) of a structural LPS, plus whether sufficient separation distance has been kept between the LPS and the PV array, defines the SPD requirement on the AC side of the inverter (see Table 4). Where the distance between service entrance (Main Distribution Board (MDB)) and inverter is < 10 m, a single SPD should be installed at the service entrance (MDB). Where > 10 m, two SPDs should be installed, one at the MDB and the other close to the inverter.

Furse Combined Type SPDs for AC mains power circuits are applicable here. The SPD to be installed will be dependent on the Class of LPS around the structure, and the location of the metallic services connected to it (i.e. underground/ exposed overhead supply).

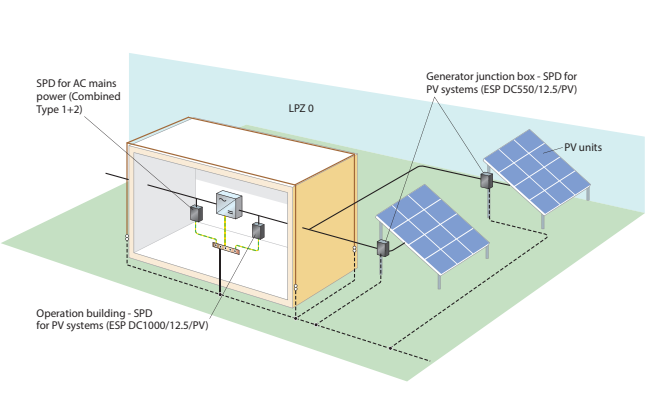
IMPORTANT: This page refers to protection of PV power circuits only. Ensure any data/signal/ telecoms lines connected to the PV system are also appropriately protected.
NOTE: Furse ESP PV Series SPDs offer combined Type 1+2 protection, and therefore apply across all scenarios.

Roof mounted PV array, with external LPS



s = separation distance. This installation shows the separation distance is kept. Where the separation distance is not kept, the PV array should be bonded directly to the external LPS.

Protection of solar park/PV array



Transient overvoltage protection for rail networks

Location	Requirement	Protection measure (SPD)
Main terminals & stations	Protect 3-phase & 1-phase power supplies	ESP M1 Series ESP D1 Series ESP M2/M4 Series ESP 415/XXX Series
	Protect critical systems (e.g. fire fighting equipment)	ESP 5A/BX & ESP 16A/BX Series
	Protect telecoms systems	ESP D, E, H Series ESP SL Series
Trackside location Cabinets (LOCS)	Protect trackside signalling equipment (SSI systems) & radio network	ESP SSI/M & ESP SSI/B ESP RF Series
	Protect power supplies	SSI/120AC & ESP SSI/140AC ESP M1 Series ESP D1 Series
	Maintain TFMs/SSI datalinks	ESP PTE002 Tester
Level crossings	Protect CCTV systems	ESP 5A/BX & ESP 16A/BX Series ESP CCTV Series ESP D Series
	Signalling equipment & radio network	ESP SSI Series ESP RF Series

Note: list of Surge Protection Measures shown above is not exhaustive. Additional electronic systems may require transient overvoltage protection on a case-by-case basis
Please contact us to discuss particular project requirements

Safety, reliability and availability of service are essential prerequisites for a rail network.

For all types of network, from mass transit systems and mainline services to metros, airport links and light rail, this has clear implications for the sensitive and critical electronic systems installed throughout.

These systems manage network performance, and ensure its continuous safe and practical operation. Yet they can easily be damaged or degraded by transient overvoltages, caused by:

- Partial lightning currents entering an electrical system following a direct lightning strike to a network location
- Indirect lightning (nearby lightning strikes) to the rail network, leading to transient overvoltages entering an electrical system via a local earthing arrangement (resistive coupling), or via overhead metallic service lines (inductive coupling)

Outright damage to electronic systems causes service interruptions and network downtime leading to customer dissatisfaction and maintenance costs.

Degradation leads to reduced equipment reliability and lower equipment lifetimes, risking sudden, unpredictable or intermittent failures.

Installing protection against transient overvoltages throughout the network is therefore critical. Transient overvoltage protection should be applied on (but not limited to):

- Power supplies throughout the network, including trackside cabinets, level crossings and at stations and terminals
- Signalling networks including trackside Solid State Interlocking (SSI) systems
- Telecommunications equipment and trackside telephones
- CCTV monitoring systems
- Passenger information systems, ticketing and gating operations
- Security systems and critical safety equipment such as fire detection and fire alarm systems

Effective, repeat protection against transient overvoltages can be achieved through installation of Furse Surge Protective Devices as part of an overall Lightning Protection System to IEC/BS EN 62305.

Key protection locations together with the appropriate Furse SPD are shown in the table below. Many of these SPDs have Network Rail approval (see individual product pages for further reference).

Specific systems protection
ESP WT 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 within wind turbines, 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 IEC/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 (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 690 V three phase mains power supplies and power distribution boards for protection against partial direct and indirect lightning strikes. The services (typically 3 phase 400 V mains, UPS, data, signal and telecom lines) to the cabinet within the wind turbine nacelle will require additional protection.

- For a 3 phase TN-S supply, install 4 ESP WT units together with ESP CE10 or ESP CE13 connecting and earthing bar (see installation)
- For a 3 phase TN-C supply, install 3 ESP WT units together with ESP CE7 or ESP CE9 connecting and earthing bar (see installation)

Installation

Protector should 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

Connecting and earthing bars

ESP CE7
Use with 3 of ESP 690/12.5/WT for TN-C supplies

ESP CE9
Use with 3 of ESP 690/25/WT for TN-C supplies

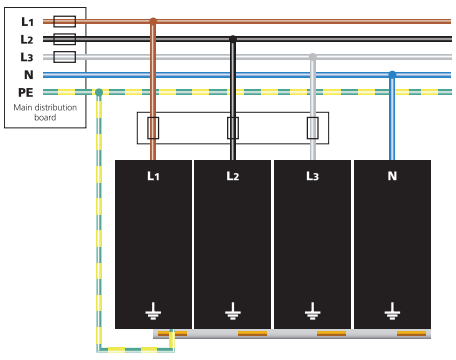
ESP CE10
Use with 4 of ESP 690/12.5/WT for TN-S supplies

ESP CE13
Use with 4 of ESP 690/25/WT for TN-S supplies

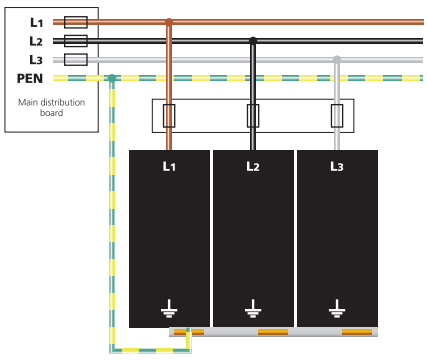
For suitable enclosures for the ESP WT series, please contact us.

Full product range order codes can be found on pages 17/8-17/9

TN-S earthing system (ESP WT x 4 with ESP CE10 or ESP CE13 earthing bars



TN-C earthing system (ESP WT x 3) with ESP CE7 or ESP CE9 earthing bars



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. IEC/BS EN 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.

Specific systems protection
ESP WT Series

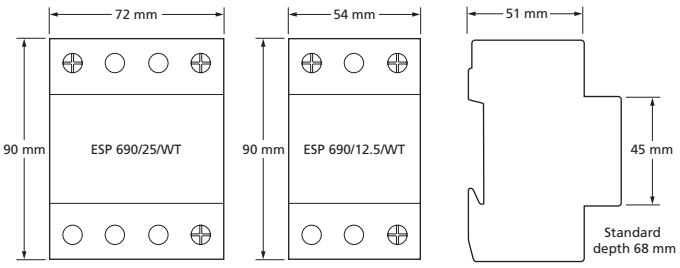
ESP WT Series - Technical specification

Electrical specification	ESP 690/25/WT	ESP 690/12.5/WT
ABB order code	7TCA085460R0028	7TCA085460R0027
Nominal voltage - Phase-Neutral *Uo* (RMS)	690 V	
Maximum voltage - Phase-Neutral *Uc* (RMS/DC)	750 V/1000 V	
Short circuit withstand capability	25 kA/50 Hz	
Max. back-up fuse (see installation instructions)	250 A	
Leakage current (to earth)	< 3.5 mA	< 2.5 mA
Volt free contact:	Screw terminal	
– current rating	0.5 A	
– nominal voltage (RMS)	250 V	
Transient specification	**ESP 690/25/WT**	**ESP 690/12.5/WT**
Type 1 (BS EN/EN), Class I (IEC)		
Nominal discharge current 8/20 µs (per mode) *In*	40 kA	20 kA
Let-through voltage *Up* at In[1]	< 2.5 kV	
Impulse discharge current 10/350 µs *Iimp* (per mode)[2]	25 kA	12.5 kA
Let-through voltage *Up* at *Iimp*[1]	< 2.0 kV	
Type 2 (BS EN/EN), Class II (IEC)		
Nominal discharge current 8/20 µs (per mode) *In*	40 kA	20 kA
Let-through voltage Up at *In*[1]	< 2.5 kV	
Maximum discharge current *Imax* (per mode)[2]	80 kA	40 kA
Mechanical specification	**ESP 690/25/WT**	**ESP 690/12.5/WT**
Temperature range	-40 to +80 °C	
Connection type	Screw terminal	
Conductor size (stranded)	25 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	FR Polymer UL-94 V-0	
Mounting	Indoor, 35 mm top hat DIN rail	
Weight: – Unit	0.5 kg	0.33 kg
– Packaged	0.6 kg	0.43 kg
Dimensions to DIN 43880 – Per module	90 mm x 68 mm x 72 mm (4TE)	90 mm x 68 mm x 216 mm (total: 3 x ESP 690/25/WT)
- HxDxW:[3] – for 3ph TN-C supplies	90 mm x 68 mm x 216 mm (total: 3 x ESP 690/25/WT)	90 mm x 68 mm x 162 mm (total: 3 x ESP 690/12.5/WT)
– for 3ph TN-S supplies	90 mm x 68 mm x 288 mm (total: 4 x ESP 690/25/WT)	90 mm x 68 mm x 216 mm (total: 4 x ESP 690/12.5/WT)

[1] The maximum transient voltage let-through of the protector throughout the test, per mode

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

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



Specific systems protection
ESP PV 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 a Photovoltaic PV solar panel system that is on a building where a structural Lightning Protection System (LPS) is employed, for equipotential bonding. For use at boundaries up to LPZ *0* to protect against flashover (on the DC side of the DC-AC inverter) through to LPZ 2 to protect the PV system from damage.

Features & benefits

- Enhanced protection (to IEC/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 the DC side of the DC-AC inverter for protection against partial direct or indirect lightning strikes. ESP Type 1 AC mains protectors (e.g. ESP 415/III/TNS) are further required at the AC side of the DC-AC inverter.

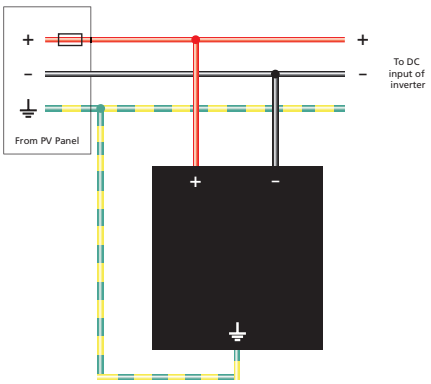
Installation

Protector should 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. Install in parallel to the DC supply of the DC-AC inverter via fuses.

Accessories

WBX D4
Weatherproof enclosure

Full product range order codes can be found on pages 17/8-17/9



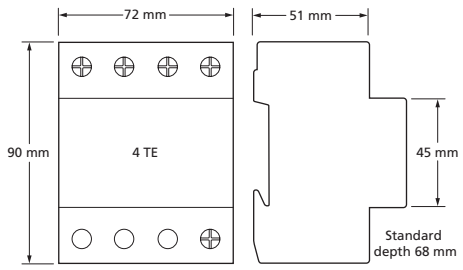
IMPORTANT: The primary purpose of lightning current or equipotential bonding mains Type 1 Surge Protective Devices (SPDs) is to prevent dangerous sparking caused by flashover to protect against the loss of human life. In order to protect electronic equipment and ensure the continual operation of systems, transient overvoltage mains Type 2 and 3 SPDs such as the ESP M1 or ESP D1 Series are further required, typically installed at downstream sub-distribution boards feeding sensitive equipment. IEC/BS EN 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.

Specific systems protection
ESP PV Series

ESP PV Series - Technical specification

Electrical specification	ESP DC550/12.5/PV	ESP DC1000/12.5/PV
ABB order code	7TCA085460R0147	7TCA085460R0146
Maximum DC voltage (RMS/DC)	550 V	1000 V
Short circuit withstand capability	25 kA/50 Hz	
Leakage current (to earth)	< 2.5 mA	
Volt free contact:	Screw terminal	
– current rating	0.5 A	
– nominal voltage (RMS)	250 V	
Back up fuse	Fuses specifically designed for use on PV systems are recommended. Determine the most appropriate back up fuse from assessment of the nominal current of the PV module, and the open circuit voltage of the PV array: – Multiply the nominal current of the photovoltaic module by a factor of 1.4 and select the closest, higher value fuse to the calculated figure. – Multiply the open circuit voltage of the PV array by a factor of 1.2 and ensure that the selected fuse has a higher voltage withstand than the calculated figure.	
Transient specification	**ESP DC550/12.5/PV**	**ESP DC1000/12.5/PV**
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[1]	< 2.0 kV	< 2.6 kV
Impulse discharge current 10/350 µs *Iimp* (per mode)[2]	12.5 kA	
Let-through voltage *Up* at *Iimp*[1]	< 1.7 kV	< 2.4 kV
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*[1]	< 2.0 kV	< 2.6 kV
Maximum discharge current *Imax* (per mode)[2]	40 kA	
Mechanical specification	**ESP DC550/12.5/PV**	**ESP DC1000/12.5/PV**
Temperature range	-40 to +80 °C	
Connection type	Screw terminal	
Conductor size (stranded)	25 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	FR Polymer UL-94 V-0	
Mounting	Indoor, 35 mm top hat DIN rail	
Weight: – Unit	0.38 kg	0.59 kg
– Packaged	0.48 kg	0.69 kg
Dimensions to DIN 43880 - HxDxW:[3]	90 mm x 68 mm x 72 mm (4TE)	

[1] The maximum transient voltage let-through of the protector throughout the test, per mode
[2] The electrical system, external to the unit, may constrain the actual current rating achieved in a particular installation
[3] The remote signal contact (removable) adds 10 mm to height



Specific systems protection
ESP SSI Series

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

Combined Category C, B tested data link protector and Combined Type 2 and Type 3 tested mains protector (to BS EN 61643) suitable for Solid State Interlocking (SSI) mains power and data links. Protectors are Network Rail approved. For use on lines running within buildings at boundaries up to LPZ 1 through to LPZ 3 to protect sensitive electronic equipment.

Features & benefits

- Accepted for use on Network Rail infrastructure. NRS PADS references: ESP SSI/M - 086/047066; ESP SSI/B - 086/047067; ESP SSI/120AC - 086/047058 and ESP SSI/140AC - 086/047059 (Network Rail Approval PA05/00471)
- Very low let-through voltage (enhanced protection to IEC/BS EN 62305) between all sets of conductors - Full Mode protection (ESP SSI/120AC and ESP SSI/140AC) and all signal lines (ESP SSI/M)
- ESP SSI/B (or ESP SSI/B/G) modified base can be permanently wired into the system
- ESP SSI/M plug-in protection module can be replaced without interfering with the operation of the system
- ESP SSI/B (or ESP SSI/B/G) incorporates a 100 Ω terminating resistance that can be connected if required
- ESP SSI/B (or ESP SSI/B/G) can be flat mounted, or a built-in DIN rail foot allows simple clip-on mounting to top-hat (ESP SSI/B) or G DIN rails (ESP SSI/B/G)
- ESP SSI/120AC and ESP SSI/140AC are a compact size for easy installation in trackside cabinets and control rooms
- ESP SSI/120AC and ESP SSI/140AC have three way visual indication of protector status and advanced pre-failure warning

Application

To prevent transient overvoltage damage to Solid State Interlocking (SSI) systems, protectors should be fitted in trackside cabinets and equipment rooms, on both the data link and the mains power lines.

- For single phase mains power supplies of 90-150 Volts, use the ESP SSI/120AC (formerly ESP 120X)
- For single phase mains power supplies of 90-165 Volts, use the ESP SSI/140AC (formerly S065)
- For SSI data links, use the ESP SSI/B (or ESP SSI/B/G) base unit with the ESP SSI/M protection module

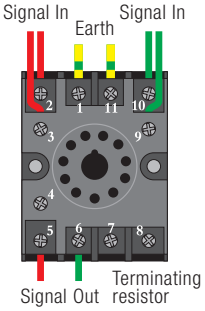
Use ESP PTE002 SSI tester for line-side testing of SSI/M modules.

Installation

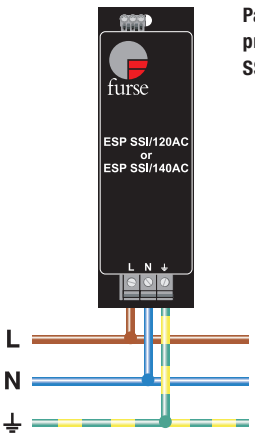
ESP SSI/B: Connect in series with the data link either near where it enters the trackside location cabinet or the equipment room.

ESP SSI/120AC and ESP SSI/140AC: Install in parallel, within the trackside cabinet or equipment room. The protector should be installed on the load side of the fuses, at the secondary side of the step-down transformer. Connect, with very short leads, to phase (BX), neutral (NX or CNX) and earth.

Full product range order codes can be found on pages 17/8-17/9



1 - Earth in Line
2 - Primary signal in + Line
3 - Secondary signal in + Line
4 - Not connected
5 - Signal out + (to DLM) Clean
6 - Signal out - (to DLM) Clean
7 - Not connected
8 - 100 Ω terminating Clean resistor
9 - Primary signal in - Line
10 - Secondary signal in - Line
11 - Earth in Line



Parallel connection of single phase protectors ESP SSI/120AC and ESP SSI/140AC (fuses not shown for clarity)

Specific systems protection
ESP SSI Series

ESP SSI Series - Technical specification

Electrical specification	ESP SSI/M	ESP SSI/B
ABB order code	7TCA085400R0168	7TCA085400R0166
Maximum signal voltage[1]	7 V	
Maximum common mode stand-off voltage	90 Vrms	
Current rating	100 mA	10 A, 250 V
In-line resistance (per line, ±10%)	4.5 Ω	
Leakage: – (Line to line impedance)	> 1 MΩ	
– (Line to earth impedance)	> 10 kΩ	
Differential bandwidth (50 Ω system)	10 MHz	
ESP SSI/B: This is a modified 11 pin 'relay type' socket containing a 100 Ω ±5% wire-wound 2.5 W resistor connected between terminals 8 and 9. Internal links between terminals 2 & 3, 9 & 10, and 1 & 11.		

Transient specification	ESP SSI/M	ESP SSI/B
Transverse (Differential) 'let-through' voltage[2] *Up*	15 V	
Common mode 'let-through' voltage[3] *Up*	250 V	

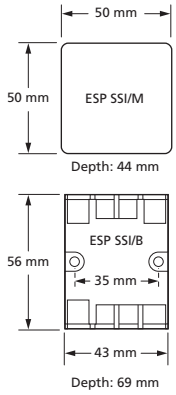
Mechanical specification	ESP SSI/M	ESP SSI/B
Temperature range	-40 to +80 °C	
Connection type	–	Screw terminal
Fixing connection: – Flat mount	–	2 x M4 fixing holes with 33 mm centres
– Top Hat Din rail mount (ESP SSI/B)	–	An integral clip
– G Din rail mount (ESP SSI/B/G)	–	2 x mounting clips with screws
Case material	FR Polymer UL-94 V-0	
Weight: – Unit	0.065 kg	0.075 kg
– Packaged (per 50)	3.25 kg	3.9 kg
Dimensions	See diagram below	

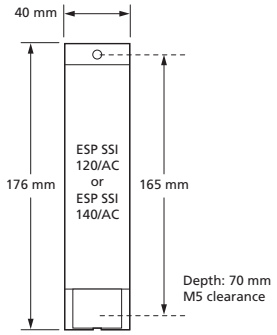
Electrical specification	ESP SSI/120AC	ESP SSI/140AC
ABB order code	7TCA085460R0059	7TCA085460R0060
Nominal voltage - Phase - Neutral *Uo* (RMS)	120 V	140 V
Maximum working voltage - Phase - Neutral *Uc* (RMS)	150 V	165 V
Working voltage (RMS)	90-150 V	90-165 V
Frequency range	47-63 Hz	
Current rating (supply) - see installation instructions	100 A	
Leakage current (to earth)	< 60 µA	
Indicator circuit current	< 10 mA	
Volt free contact:[4]	Screw terminal	
– Current rating	> 1 MΩ	
– Nominal voltage (RMS)	> 10 kΩ	

Transient specification	ESP SSI/120AC	ESP SSI/140AC
Let-through voltage (all conductors) 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*[5]	460 V	540 V
Maximum discharge current *Imax* (per mode)[6]	20 kA	
Type 3 (BS EN/EN), Class III (IEC)		
Let-through voltage at U_{OC} of 6 kV 1.2/50 µs and I_{SC} of 3 kA 8/20 µs (per mode)[7]	400 V	500 V

Mechanical specification	ESP SSI/120AC	ESP SSI/140AC
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)	
Case material	Steel	
Weight: – Unit	0.5 kg	
– Packaged	0.6 kg	
Dimensions	See diagram below	

[1] Maximum signal voltage (DC or AC peak) measured at 200 µA
[2] 'Let-through' voltage is the maximum transient voltage 'let-through' to the equipment to be protected. C2 test (to BS EN/EN/IEC 61643-21) 2 kV 1.2/50 µs. 1 kA 8/20 µs. 'Let-through' voltage (±10%)
[3] 'Let-through' voltage is the maximum transient voltage 'let-through' to the equipment to be protected. C2 test (to BS EN/EN/IEC 61643-21) 4 kV 1.2/50 µs. 2 kA 8/20 µs. 'Let-through' voltage (±20%)
[4] Minimum permissible load is 5 V DC, 10 mA to ensure reliable contact operation
[5] The maximum transient voltage let-through of the protector throughout the test (±10%), per mode
[6] The electrical system, external to the unit, may constrain the actual current rating achieved in a particular installation
[7] Combination wave test within IEEE C62.41-2002 Location Cats C1 & B3, SS CP 33:1996 App. F, AS 1768-1991 App. B, Cat B, UL1449 mains wire-in





Specific systems protection
ESP TV Series

LPZ 1→3 | FULL MODE Bonding + Equipment Protection | SIGNAL/ TELECOM TEST CAT C + B | ENHANCED Low let-through voltage | HIGH BANDWIDTH

Combined Category C, B tested protector (to BS EN 61643) suitable to protect Cable, Terrestrial and Satellite TV systems. For use on lines running within buildings at boundaries up to LPZ 1 to 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 lines - Full Mode protection
- Low attenuation and high return loss over a wide range of frequencies ensures the protectors do not impair system performance
- Substantial earth termination
- Supplied ready for flat mounting
- Strong metal housing

Application

Use to protect analogue and digital Cable, Terrestrial and Satellite TV installations. ESP CATV/F, ESP MATV/F, ESP SMATV/F and ESP TV/F are suitable for systems using F connectors. ESP TV/EURO is suitable for systems using EURO-TV connectors.

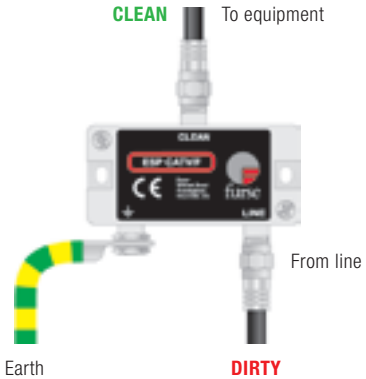
- For protecting terrestrial antenna feeds use ESP TV/F or ESP TV/EURO
- For protecting satellite feeds use ESP SMATV/F
- For protecting distributed combined TV feeds use ESP MATV/F
- For protecting cable TV feeds use ESP CATV/F

For further information on TV applications, see separate Application Note AN006 (contact us for a copy).

Installation

Connect in series with the coaxial cable either near where it enters or leaves each building or close to equipment being protected.

Full product range order codes can be found on pages 17/8-17/9



NOTE: Protectors for coaxial (or twisted pair) CCTV Lines are available. For coaxial RF lines, use the ESP RF Series. Transients can also be conduced into TV systems via the mains power supplies - use suitable ESP mains protection.

Specific systems protection
ESP TV Series

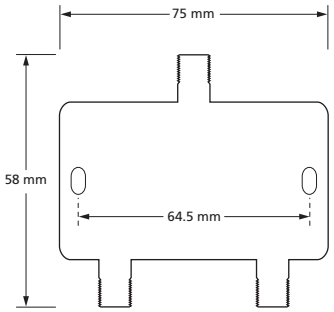
ESP TV Series - Technical specification

Electrical specification		ESP CATV/F	ESP MATV/F	ESP SMATV/F	ESP TV/F	ESP TV/EURO
ABB order code		7TCA085400R0122	7TCA085450R0000	7TCA085450R0026	7TCA085450R0028	7TCA085450R0027
Maximum working voltage[1]		140 V	18.9 V	18.9 V	6.4 V	6.4 V
Maximum operating current		4 A	800 mA	800 mA	300 mA	300 mA
Characteristic impedance		75 Ω				
Bandwidth		5-860 MHz	5-2450 MHz	860-2450 MHz	5-860 MHz	5-860 MHz
Insertion loss:	– 5-860 MHz	< 0.5 dB	< 0.3 dB	–	< 0.3 dB	< 0.3 dB
	– 860-2150 MHz	–	< 1.5 dB	< 1.5 dB	–	–
	– 2150-2450 MHz	–	< 2.2 dB	< 2.2 dB	–	–
Return loss (VSWR):	– 5-860 MHz	> 20 dB (< 1.2:1)	> 32 dB (< 1.05:1)	–	> 32 dB (< 1.05:1)	> 32 dB (< 1.05:1)
	– 860-2150 MHz	–	> 20 dB (< 1.2:1)	> 20 dB (< 1.2:1)	–	–
	– 2150-2450 MHz	–	< 2.2 dB	< 2.2 dB	–	–
Transient specification		**ESP CATV/F**	**ESP MATV/F**	**ESP SMATV/F**	**ESP TV/F**	**ESP TV/EURO**
Let-through voltage (all conductors)[2] *Up*						
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21		270 V	70 V	70 V	65 V	65 V
C1 test 1 kV 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21		265 V	60 V	60 V	50 V	50 V
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21		245 V	45 V	45 V	30 V	30 V
5 kV, 10/700 µs[3]		250 V	50 V	50 V	35 V	35 V
Maximum surge current						
8/20 µs to ITU-T K.45:2003, IEEE C62.41.2:2002		3 kA				
Mechanical specification		**ESP CATV/F**	**ESP MATV/F**	**ESP SMATV/F**	**ESP TV/F**	**ESP TV/EURO**
Temperature range		-40 to +80 °C				-40 to +80 °C
Connection type		F female				Euro-TV
Earth connection		~ 9.5 mm (⅜") diameter earth stud				~ 9.5 mm (3/8") diameter earth stud
Case Material		Diecast				Diecast
Weight:	– Unit	0.14 kg				0.14 kg
	– Packaged	0.15 kg				0.15 kg
Dimensions		See diagram below				

[1] Maximum working voltage (DC or AC peak) measured at < 5 µA (ESP CATV/F) and < 50 mA (ESP MATV/F, ESP SMATV/F, ESP TV/EURO, ESP TV/F)

[2] The maximum transient voltage let-through of the protector throughout the test (±10%), line to line & line to earth. Response time < 10 ns

[3] Test to 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)



Specific systems protection
ESP CCTV Series

LPZ 0→3 | FULL MODE Bonding + Equipment Protection | HIGH BANDWIDTH | SIGNAL/ TELECOM TEST CAT D + C + B | ENHANCED Low let-through voltage | LOW IN-LINE RESISTANCE 1 Ω | CURRENT RATING 300 mA

Combined Category D, C, B tested protector (to BS EN 61643) suitable for coaxial CCTV cables with BNC connectors (ESP CCTV/B) or twisted pair CCTV lines (ESP CCTV/T) on systems with either an earthed or an isolated screen. Not suitable for use on broadcast, satellite or cable TV systems. For use at boundaries up to LPZ *0* to protect against flashover (typically the service entrance location) 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 lines - 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
- 100 MHz bandwidth prevents the degradation of high frequency signals
- Low in-line resistance to minimize unnecessary reductions in signal strength and maximizes signalling distance
- Very low reflection coefficient/VSWR ensure that the protector doesn't disrupt system operations
- Suitable for either earthed or isolated screen systems
- Sturdy, conductive ABS housing for 2 way shielding - preventing emissions & providing signals with immunity from external interference
- Convenient holes for flat mounting on base or side
- Built-in DIN rail foot for easy installation on a top hat DIN rail
- ESP CCTV/T has colour coded terminals for a quick and easy installation check - grey for the dirty (line) end and green for the clean end
- Substantial earth stud to enable effective earthing
- Integral earthing plate for enhanced connection to earth via CME kit
- ESP CCTV/B has Network Rail Approval PA05/02510. NRS PADS reference 086/023410

Application

Use these protectors on the video cable to outdoor CCTV cameras and central control and monitoring equipment.

Installation

Connect in series with the CCTV cable in a convenient place close to the equipment being protected. For outdoor CCTV cameras, protectors should be mounted in the junction box, or in a separate enclosure, close to the camera. Protect central control and monitoring equipment inside the building by installing protectors on all incoming or outgoing lines, either:
a) near where they enter or leave the building, or
b) close to the equipment being protected (or actually within its control panel).

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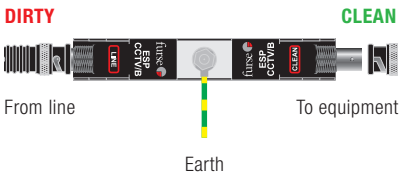
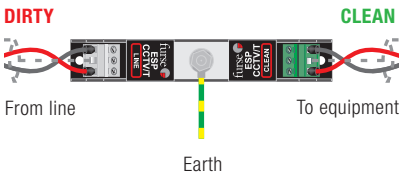
Accessories

When CCTV protectors are installed in groups, or alongside protectors for signal and mains power lines, these can be mounted and earthed simultaneously on a CME kit. A CME 4 will accommodate the video, telemetry and power protectors to a camera. If protectors cannot be incorporated within an existing panel or enclosure, WBX enclosures are available for up to 4, 8, 16 or 32 protectors and their associated CME kit. The WBX 4/GS is a secure IP66 enclosure suitable for a CME 4 and associated protectors.

Series connection for ESP CCTV/B



Series connection for ESP CCTV/T



Full product range order codes can be found on pages 17/8-17/9

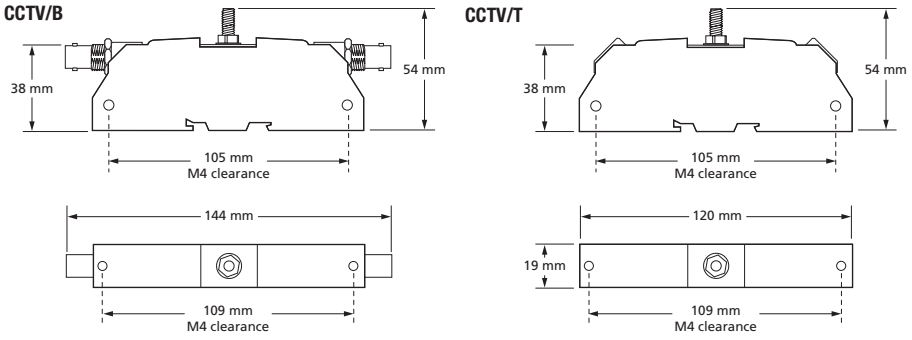
NOTE: Camera telemetry or control lines should be protected with a suitable Lightning Barrier from the ESP D or E Series. Protectors for the power supply to individual cameras (e.g. ESP 240-16A) and the mains supply to the control room (e.g. ESP 240 D1) are available. For coaxial RF (ESP RF Series) cable protectors and CATV systems (ESP CATV/F) are also available.

Specific systems protection
ESP CCTV Series

ESP CCTV Series - Technical specification

Electrical specification	ESP CCTV/B	ESP CCTV/B-15V	ESP CCTV/B-30V	ESP CCTV/B-50V	ESP CCTV/T	ESP CCTV/T-15V	ESP CCTV/T-30V	ESP CCTV/T-50V
ABB order code	7TCA085400R0123	7TCA085400R0124	7TCA085400R0125	7TCA085400R0126	7TCA085400R0129	7TCA085400R0270	7TCA085400R0271	7TCA085400R0027
Nominal voltage[1] (peak-peak)	1 V				2 V			
Maximum working voltage *Uc*[2] (peak)	7.79 V	16.7 V	36.7 V	56.7 V	7.79 V	16.7 V	36.7 V	56.7 V
Current rating (signal)	300 mA							
In-line resistance (±10%)	1 Ω inserted in coax inner				1 Ω per line			
Bandwidth (-3 dB 75 Ω system)[3]	> 100 MHz							
Voltage standing wave ratio	< 1.2:1							
Transient specification	**ESP CCTV/B**	**ESP CCTV/B-15V**	**ESP CCTV/B-30V**	**ESP CCTV/B-50V**	**ESP CCTV/T**	**ESP CCTV/T-15V**	**ESP CCTV/T-30V**	**ESP CCTV/T-50V**
Let-through voltage (all conductors)[4] *Up*								
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21	39.5 V	55.0 V	78.0 V	105.0 V	39.5 V	55.0 V	78.0 V	105.0 V
C1 test 1 kV 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21	26.0 V	42.0 V	66.5 V	93.5 V	26.0 V	42.0 V	66.5 V	93.5 V
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21	16.0 V	27.2 V	47.5 V	73.6 V	16.0 V	27.2 V	47.5 V	73.6 V
5 kV, 10/700 µs[5]	17.0 V	28.2 V	49.5 V	76.2 V	17.0 V	28.2 V	49.5 V	76.2 V
Maximum surge current[6]								
D1 test 10/350 µs to BS EN/EN/IEC 61643-21: – Per signal wire	2.5 kA				2.5 kA			
– Per pair	–				5 kA			
8/20 µs to ITU (formerly CCITT): – Per signal wire	10 kA				10 kA			
– Per pair	–				20 kA			
Mechanical specification	**ESP CCTV/B variants**				**ESP CCTV/T variants**			
Temperature range	-40 to +80 °C							
Connection type	Coaxial BNC female				Screw terminal			
Conductor size (stranded)	Not applicable				2.5 mm²			
Earth connection	M6 stud							
Case Material	Conductive ABS UL94 V-0				Conductive ABS UL94 V-0			
Weight: – Unit	0.08 kg							
– Packaged	0.9 kg							
Dimensions	See diagram below							

[1] Nominal voltage (DC or AC peak) measured at <10 µA leakage
[2] Maximum working voltage (DC or AC peak) measured at 5 mA leakage
[3] Capacitance < 30 pF
[4] The maximum transient voltage let-through of the protector throughout the test (±10%), line to line & line to earth. Screen to earth let-through voltage will be up to 600 V (with 5 kV 10/700 test), when protector is configured for use with non-earthed or isolated screen systems. Response time < 10 ns
[5] Test to 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)
[6] The installation and connectors external to the protector may limit the capability of the protector



Specific systems protection
ESP RF Series

FULL MODE Bonding + Equipment Protection | LPZ 0→3 | ENHANCED Low let-through voltage | SIGNAL/ TELECOM TEST CAT D + C + B | HIGH BANDWIDTH

Combined Category D, C, B tested protector (to BS EN 61643) suitable for RF systems using coaxial cables at frequencies between DC and 2.7 GHz and where DC power is present. Suitable for RF systems with power up to 2.3 kW. For use at boundaries up to LPZ *0* to protect against flashover (typically the service entrance location) 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 lines - 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
- Superior transient protection to both Gas Discharge Tube (GDT) and Quarter Wave Stub (QWS) based protectors
- Wide bandwidth means a single product is suitable for a range of applications
- Very low attenuation and near unity VSWR over a wide range of frequencies ensure the protectors do not impair system performance
- Available with N, 7/16 DIN and BNC connectors
- Easily mounted and earthed via fixtures on the base of the unit that accept M3 and M5 screws or via mounting brackets
- Additional mounting plates give increased flexibility
- Robust white bronze plated aluminium housing (silver plate option)

Application

Use on coaxial cables to protect RF transmitter and receiver systems, including electronics located at the antenna or dish. Typical examples include cell sites, military communications, satellite earth stations, pager systems and emergency services communications systems.

Installation

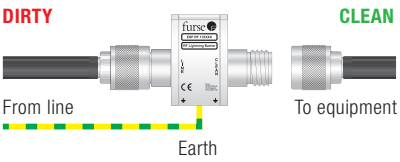
In a building, connect in series with the coaxial cable near where it enters or leaves the structure, or close to the equipment being protected. This should be as close as possible to the system's earth star point (to enable a good connection to earth). On a mast, connect in series with the coaxial cable near the antenna/dish being protected. Install in a radio communications room, an existing cabinet or a suitable enclosure.

Accessories

ESP RF BK1 Straight mounting plates
ESP RF BK2 90° angled mounting plates
ESP RF BK3 Bulkhead through mounting plate (single)
ESP RF BK4 Bulkhead through mounting plate (for 4 products)
ESP RF GDT-x Replacement gas discharge tubes (Where x is the correct GDT part code digit for your system.

Full product range order codes can be found on pages 17/8-17/9

ESP RF 111A21 with N female connectors installed in series



PART NUMBERING SYSTEM: Furse RF protectors have six digit part codes, prefixed with ESP RF. The selected digits define the exact specification of the required protector, e.g. **ESP RF AABCDE**
Connector type - ESP RF AAxxxx The first 2 digits refer to the connector type: **11** - N type female, **AA** - 7/16 DIN type female, **44** - BNC female
Line impedance - ESP RF xxBxxx 3rd digit refers to the line impedance. Currently only one option: **1** - 50 Ω transmission line.
Gas Discharge Tube (GDT) selection - ESP RF xxxCxx Select the 4th digit from the table at the bottom (opposite). Selection of the correct GDT is critical in the effectiveness of using these protectors. For the correct GDT, take the maximum RF power or voltage of the system and select a GDT with a voltage/power handling greater than the system.
IMPORTANT NOTE: When using the peak RF voltage to select the GDT, if the system is a multi-carrier system the (in phase) peak RF voltage can be calculated as the total of all the single carrier peak voltages on the transmission line.
Protector rating - ESP RF xxxxDx 5th digit specifies the protector rating: **1** - Higher specification, **2** - Standard specification **Case plating - ESP RF xxxxxE** 6th digit specifies the case plating: **1** - White bronze, **2** - Silver

NOTE: These protectors are based on a continuous transmission line with a GDT connected between this line and screen/earth, and are suited for applications where DC is required to pass to the equipment. For RF applications where the connected equipment is very sensitive to transient overvoltages, use the higher specification RF protectors. ESP CCTV/B and ESP CCTV/T are suitable for use on coaxial (or twisted pair) CCTV lines. For coaxial CATV lines, use the CATV/F.

Specific systems protection
ESP RF Series

ESP RF Series - Technical specification

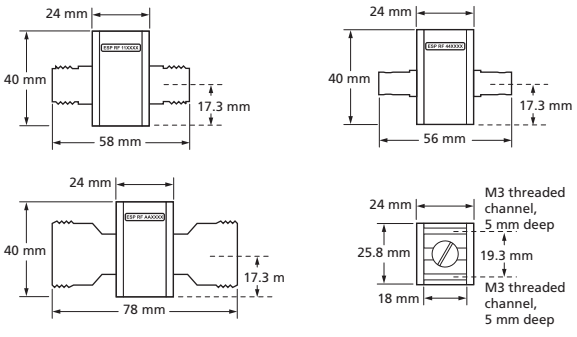
Electrical specification	ESP RF xx1x21					
ABB order code	** See table at the bottom of the page for Part no./ABB order code **					
Gas Discharge Tube voltage	90 V	150 V	230 V	350 V	470 V	600 V
Maximum working voltage *Uc* (RMS)[1]	51 V	85 V	130 V	200 V	265 V	340 V
Characteristic impedance	50 Ω					
Bandwidth	DC-2.7 GHz					
Voltage standing wave ratio	≤ 1.1					
Insertion loss over bandwidth	≤ 0.1 dB					
Maximum power[1]	40 W	120 W	280 W	650 W	1.15 kW	1.90 kW
Transient specification	**ESP RF xx1x21**					
Let-through voltage (all conductors)[2] *Up*						
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21	< 700 V	< 650 V	< 700 V	< 800 V	< 900 V	< 1050 V
C1 test 1 kV 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21	< 550 V	< 450 V	< 550 V	< 650 V	< 800 V	< 950 V
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21	< 400 V	< 350 V	< 450 V	< 550 V	< 730 V	< 800 V
5 kV, 10/700 µs[3]	< 430 V	< 370 V	< 470 V	< 580 V	< 750 V	< 830 V
Maximum surge current[4]						
D1 test 10/350 µs to BS EN/EN/IEC 61643-21	2.5 kA					
8/20 µs to ITU-T K.45:2003, IEEE C62.41.2:2002	20 kA					
Mechanical specification	**ESP RF 111x21**		**ESP RF AA1x21**		**ESP RF 441x21**	
Temperature range	-40 to +80 °C					
Connection type	N female		7/16 DIN female		BNC female	
Conductor size (stranded)	Via mounting fixtures					
Case Material	Aluminium, white bronze plated					
Weight: – Unit	120 g		190 g		90 g	
– Packaged	140 g		210 g		110 g	
Dimensions	See diagram below					

[1] The maximum RF working voltage and maximum power for the protectors is dependent on the GDT selected, with the power levels derated based on real life 'worst case' conditions with VSWR=2:1. See 'Gas Discharge Tube selection' below

[2] The maximum transient voltage let-through of the protector throughout the test (±10%) (±10%). Response time < 10 ns. This let-through voltage represents a deviation from the applied signal voltage, present at the time of the test

[3] Test to 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)

[4] The installation and connections external to the protector may limit the capability of the protector



ESP RF BK1 (ABB order code: 7TCA085450R0017)
Straight mounting bracket, 53 x 26.3 x 3 mm
2 x M4 clearance mounting holes, 16.3 mm apart
ESP RF BK2 (ABB order code: 7TCA085450R0018)
90° mounting bracket, 33 x 26.3 x 3 mm, 20 x 26.3 x 3 mm
2 x M4 clearance mounting holes, 16.3 mm apart, 14 mm from fold line
ESP RF BK3 (ABB order code: 7TCA085450R0020)
90° mounting bracket, 50 x 24 x 1.5 mm, 60 x 24 x 1.5 mm
2 x M5 clearance mounting holes, 40 mm apart
ESP RF BK4 (ABB order code: 7TCA085450R0046)
90° quad mounting bracket, 50 x 24 x 1.5 mm, 210 x 24 x 1.5 mm
5 x M5 clearance mounting holes, various spacings
Mounting brackets supplied with screws for fixing to protector

Gas Discharge Tube selection

Max RF voltage V_{Peak}	Max RF voltage V_{RMS}	Max RF power 50 Ω system (P_{RMS}) with VSWR = 2:1	GDT voltage code	GDT part digit
72 V	51 V	40 W	90 V	1
120 V	85 V	120 W	150 V	2
185 V	130 V	280 W	230 V	3
280 V	200 V	650 W	350 V	4
375 V	265 V	1.15 kW	470 V	5
480 V	340 V	1.90 kW	600 V	6

Power levels have been de-rated to allow for real life 'worst case' conditions, calculated with VSWR as 2:1

Specific systems protection
ESP RF Series

LPZ 0→3 | FULL MODE Bonding + Equipment Protection | SIGNAL/TELECOM TEST CAT D + C + B | ENHANCED Low let-through voltage | HIGH BANDWIDTH

Combined Category D, C, B tested protector (to BS EN 61643) suitable for RF systems (of power up to 150 W) using coaxial cables at frequencies between 50 MHz and 2.7 GHz to provide effective protection without impairing system performance. For use at boundaries up to LPZ *0* to protect against flashover (typically the service entrance location) 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 lines - 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
- Superior transient protection to both Gas Discharge Tube (GDT) and Quarter Wave Stub (QWS) based protectors
- Very low attenuation and near unity VSWR over a wide range of frequencies ensure the protectors do not impair system performance
- Wide bandwidth means a single product is suitable for a range of applications
- Available with N, 7/16 DIN and BNC connectors
- Easily mounted and earthed via fixtures on the base of the unit that accept M3 and M5 screws or via mounting brackets
- Additional mounting plates give increased flexibility
- Robust white bronze plated aluminium housing (silver plate option)

Application

Use on coaxial cables to protect RF transmitter and receiver systems, including electronics located at the antenna or dish. Typical examples include cell sites, military communications, satellite earth stations, pager systems and emergency services communications systems.

Installation

In a building, connect in series with the coaxial cable near where it enters or leaves the structure, or close to the equipment being protected. This should be as close as possible to the system's earth star point (to enable a good connection to earth). On a mast, connect in series with the coaxial cable near the antenna/dish being protected. Install in a radio communications room, an existing cabinet or a suitable enclosure.

Accessories

ESP RF BK1
Straight mounting plates

ESP RF BK2
90° angled mounting plates

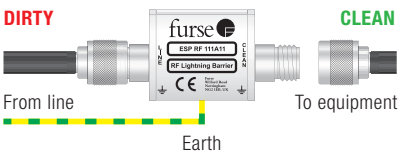
ESP RF BK3
Bulkhead through mounting plate (single)

ESP RF BK4
Bulkhead through mounting plate (for 4 products)

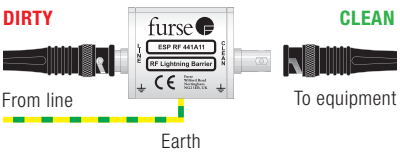
ESP RF GDT-A
Replacement gas discharge tube

Full product range order codes can be found on pages 17/8-17/9

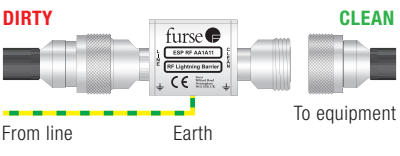
ESP RF 111A11 with N female connectors installed in series



ESP RF 441A11 with BNC female connectors installed in series



ESP RF AA1A11 with 7/16 DIN female connectors installed in series



NOTE: The high level of protection offered by these units comes from the addition of a high pass filter circuit which gives a very low letthrough voltage. It should be noted that due to this high pass filter circuit no DC power can pass along the transmission line. This is referred to as "DC blocked". Protectors with other connectors are available. For RF applications where DC power is present on the coaxial cable, use the alternative RF protectors. The ESP CCTV/B and ESP CCTV/T are suitable for use on coaxial (or twisted pair) CCTV lines. For coaxial CATV lines, use the ESP CATV/F.

Specific systems protection
ESP RF Series

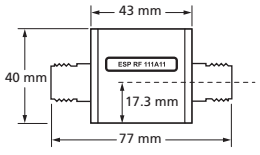
ESP RF Series - Technical specification

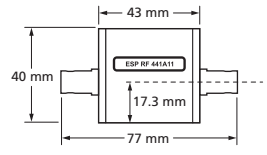
Electrical specification		ESP RF 111A11	ESP RF AA1A11	ESP RF 441A11
ABB order code		7TCA085450R0007	7TCA085450R0016	7TCA085450R0014
Maximum working voltage *Uc* (RMS)		86 V		
Maximum transmitted power (RMS)		150 W		
Characteristic impedance		50 Ω		
Bandwidth		50-2700 MHz		
Voltage standing wave ratio		≤ 1.2		
Insertion loss over bandwidth:	– 50-500 MHz	≤ 0.4 dB		
	– 500-1,600 MHz	≤ 0.2 dB		
	– 1.6-2.7 GHz	≤ 0.4 dB		
Maximum power		150 W		
Transient specification		**ESP RF 111A11**	**ESP RF AA1A11**	**ESP RF 441A11**
Let-through voltage (all conductors)[1] *Up*				
C2 test 4 kV 1.2/50 µs, 2 kA 8/20 µs to BS EN/EN/IEC 61643-21		24 V		
C1 test 1 kV 1.2/50 µs, 0.5 kA 8/20 µs to BS EN/EN/IEC 61643-21		15 V		
B2 test 4 kV 10/700 µs to BS EN/EN/IEC 61643-21		15 V		
5 kV, 10/700 µs[2]		20 V		
Maximum surge current[3]				
D1 test 10/350 µs to BS EN/EN/IEC 61643-21		1 kA		
8/20 µs to ITU-T K.45:2003, IEEE C62.41.2:2002		10 kA		
Mechanical specification		**ESP RF 111A11**	**ESP RF AA1A11**	**ESP RF 441A11**
Temperature range		-40 to +80 °C		
Connection type		N female	7/16 DIN female	BNC female
Conductor size (stranded)		Via mounting fixtures		
Case Material		Aluminium, white bronze plated		
Weight:	– Unit	150 g	220 g	120 g
	– Packaged	170 g	240 g	160 g
Dimensions		See diagram below		

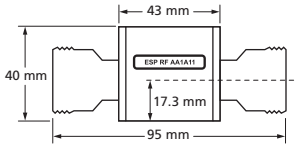
[1] The maximum transient voltage let-through of the protector throughout the test (±10%). Response time < 10 ns. This let-through voltage represents a deviation from the applied signal voltage, present at the time of the test

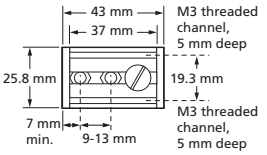
[2] Test to IEC 61000-4-5:2006, ITU-T (formerly CCITT) K.20, K.21 and K.45,Telcordia GR-1089-CORE, Issue 2:2002, ANSI TIA/EIA/IS-968-A:2002 (formerly FCC Part 68)

[3] The installation and connectors external to the protector may limit the capability of the protector









ESP RF BK1 (ABB order code: 7TCA085450R0017)
Straight mounting bracket, 53 x 26.3 x 3 mm
2 x M4 clearance mounting holes, 16.3 mm apart
ESP RF BK2 (ABB order code: 7TCA085450R0018)
90° mounting bracket, 33 x 26.3 x 3 mm, 20 x 26.3 x 3 mm
2 x M4 clearance mounting holes, 16.3 mm apart, 14 mm from fold line
ESP RF BK3 (ABB order code: 7TCA085450R0020)
90° mounting bracket, 50 x 24 x 1.5 mm, 60 x 24 x 1.5 mm
2 x M5 clearance mounting holes, 40 mm apart
ESP RF BK4 (ABB order code: 7TCA085450R0046)
90° quad mounting bracket, 50 x 24 x 1.5 mm, 210 x 24 x 1.5 mm
5 x M5 clearance mounting holes, various spacings
Mounting brackets supplied with screws for fixing to protector