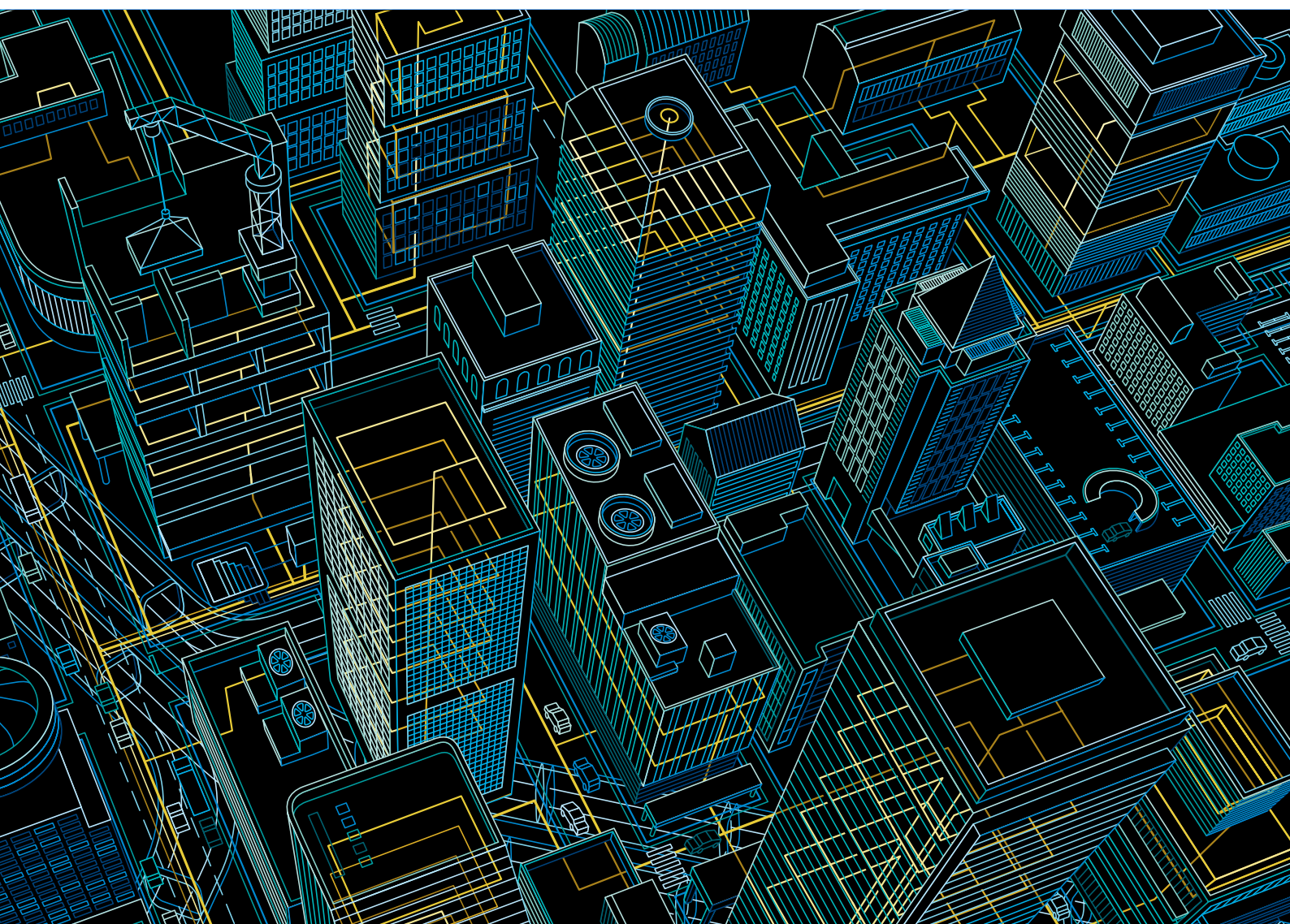


APPLICATION NOTE AN004

Protection for Local Area Networks (LAN) with PoE

ESP AN004 for ESP Cat-5e,
ESP Cat-5e/PoE, ESP Cat-6 &
ESP Cat-6/PoE



Protection for local area networks (LAN), with PoE

ESP LAN Series protectors offer combined Category D, C, B tested protection (to BS EN/IEC 61643-21), for twisted pair Ethernet networks with RJ45 connections, including Power over Ethernet (PoE).

Suitable for systems signalling on up to eight wires of either shielded or unshielded twisted pair cable, ESP protectors operate in Full Mode, capable of handling partial lightning currents as well as allowing continual operation of protected equipment.

Protectors include as standard:

- Very low let-through voltage (enhanced protection to BS EN 62305) between all lines
- Effective protection without impairing the system's normal operation
- Repeated protection in lightning
- intense environments
- Low capacitance circuitry to prevent the start-up signal degradation associated with other types of network protector
- Low in-line resistance to minimise unnecessary reductions in signal strength, to maximise signalling distance
- Convenient holes for flat mounting, or vertical mounting via TS35 'Top Hat' DIN rail

Installation

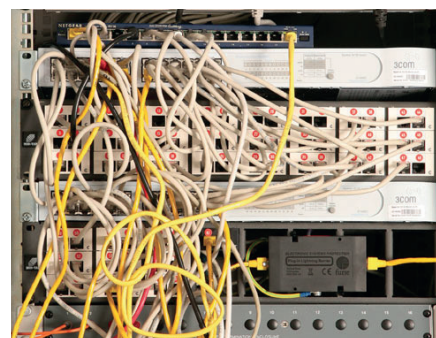
For use at boundaries up to LPZ 0 to protect against flashover (typically the service entrance location) through to LPZ 3 to protect sensitive electronic equipment.

Use these protectors on network cables that travel between buildings to prevent damage to equipment, e.g. computers, servers, repeaters and hubs.

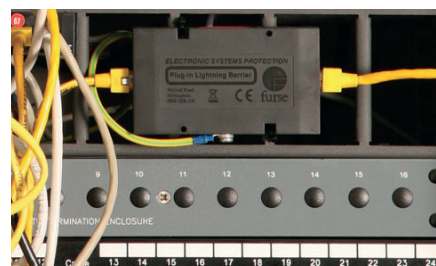
Connect in series with the network cable, either:

- a) near to where it enters or leaves the building, or
- b) as it enters the network hub, or
- c) close to the equipment being protected

This should be close to the system's earth star point (to enable a good connection to earth).



An ABB ESP Cat-6 (above and detail below) protecting a hub from transient overvoltages on a network connection with another building.



Part No.	ABB order code
ESP Cat-5e	7TCA085400R0017
ESP Cat-5e/PoE	7TCA085400R0021
ESP Cat-6	7TCA085400R0023
ESP Cat-6/PoE	7TCA085400R0024

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 U_c	– data	5 V			
	– power	–	58 V	–	58 V
Current rating		300 mA	600 mA	300 mA	600 mA
In-line resistance (per line $\pm 25\%$)	– data	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/	10/100/1000/
		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

ESP Cat-5e and ESP Cat-6

These SPDs have been designed to cater for high end networking systems that demand the increased performance of up to Cat-6A cabling.

The use of Cat-6A cabling allows the ESP Cat-6 to run up to 10G-baseT applications.



ESP Cat-5e/PoE and ESP Cat-6/PoE (Power over Ethernet)

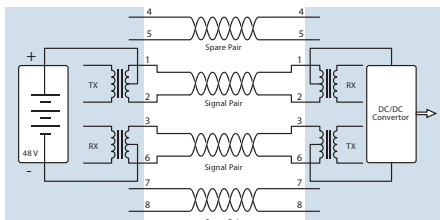
“Power-over-Ethernet” (PoE) or “Active Ethernet” is a technology that integrates both power and data over standard Cat-5e and Cat-6 Ethernet cables under IEEE 802.3af up to 15.4W. A newer IEEE standard, IEEE 802.3at (often referred to as PoE-Plus, and shown as PoE+ or PoEP) can provide up to 30W. The use of PoE+ enables the implementation of structural cabling in a much wider range of applications.

Some manufacturers of PoE equipment have proposed further increases of power up to 60W (PoE++ or PoEPP), although this has not been ratified as an IEEE standard.

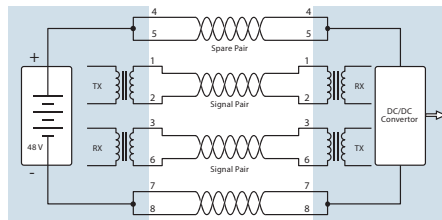
The ESP Cat-5e/PoE and ESP Cat-6/PoE will protect ALL configuration types of PoE and PoE+ as shown below, and can even support the proposed PoE++ power levels of 60W.

Cat-5e/PoE

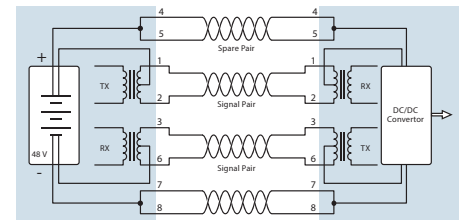
The first configuration, mode A, uses a centre tapping on the isolation transformers to inject the power on the same pairs used for data communication. The second configuration, mode B, provides power over the two ‘spare’ twisted pairs. To increase power further, both modes A and B can be applied simultaneously.



Cat-5e PoE Mode A



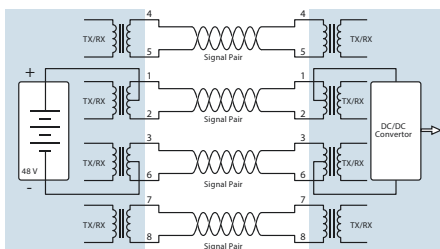
Cat-5e PoE Mode B



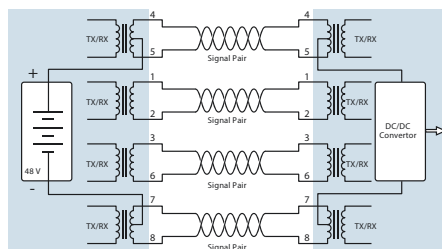
Cat-5e PoE Modes A+B

Cat-6/PoE

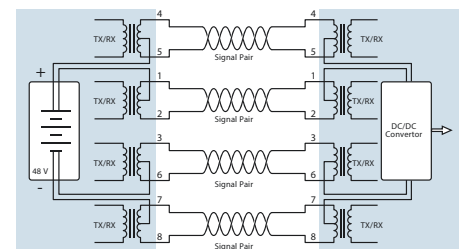
Similarly to Cat-5e, there are a few options for powering but as all 4 pairs are utilised then power must be injected via a centre tapping on the isolation transformers, on the same pairs used for data communication. To increase power further, both modes A and B can be applied simultaneously.



Cat-6 PoE Mode A



Cat-6 PoE Mode B



Cat-6 PoE Modes A+B

The key benefit of using a PoE system is that remote or power critical networking components can be powered from a central location. The PoE hub can also be tied into a UPS system, for example. This would enable networked security cameras and VoIP phones to operate in the event of a mains power loss.

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