

Introduction

This document explains how to install Furse ESP Lightning Barriers for twisted pair data communication/signal/telephone lines and RTD installations:

ESP 06Q | ESP 15Q | ESP 30Q | ESP 50Q | ESP 110Q | ESP TNQ | ESP RS485Q | ESP RTDQ

	Bandwidth (-3 dB)
ESP 06Q	1.0 MHz
ESP 15Q	2.5 MHz
ESP 30Q	6.0 MHz
ESP 50Q	5.0 MHz
ESP 110Q	15.0 MHz
ESP TNQ	20.0 MHz
ESP RS485Q	800.0 kHz
ESP RTDQ	800.0 kHz

2.3 Ensure that the current passing through the Lightning Barrier does not exceed:

	Maximum Current
ESP 06Q, ESP 15Q ESP 30Q, ESP 50Q, ESP 110Q	750 mA DC or AC RMS
ESP RTDQ	700 mA DC or AC RMS
ESP TNQ, ESP RS485Q	300 mA DC or AC RMS

1. Safety Note

1.1 ESP Lightning Barrier installation should be conducted by a qualified competent person and comply with all relevant Regulations and Legislation (including BS 7671 Wiring Regulations and Building Regulations).

1.2 Incorrect installation will impair the effectiveness of the ESP Lightning Barrier.

1.3 Always handle cables by their insulation.

1.4 Never work on Lightning Barriers, earthing or their cables during a storm.

2. Before installation

2.1 Check that the voltage drop caused by the resistance of the unit does not interfere with the normal operation of the system.

	Line Resistance
ESP 06Q, ESP 15Q ESP 30Q, ESP 50Q, ESP 110Q, ESP RS485Q, ESP RTDQ	1.0 Ω
ESP TNQ	4.3 Ω

2.2 Be sure that the Lightning Barrier's bandwidth will not restrict the system bandwidth.

2.4 Make sure that the system's maximum line voltage (DC or AC peak) will never exceed the maximum working voltage of the Lightning Barrier. Otherwise the Lightning Barrier will clamp signal voltages as though they were transient overvoltages.

	Normal Working Voltage	Maximum Working Voltage
ESP 06Q	6 V	7.78 V
ESP 15Q	15 V	18.8 V
ESP 30Q	30 V	37.8 V
ESP 50Q	50 V	57.8 V
ESP 110Q	110 V	132 V
ESP TNQ	-	296 V
ESP RS485Q	15 V	16.7 V
ESP RTDQ	6 V	7.78 V

3. Installation

3.1 Series connection

Furse ESP Lightning Barriers are connected in series with the data communication, signal, measurement, or telephone line.

Figure 1: Series connection for ESP 06Q, ESP 15Q, ESP 30Q, ESP 50Q, ESP 110Q, ESP RS485Q or ESP TNQ.

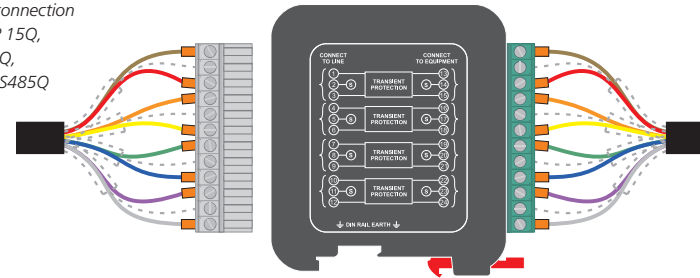
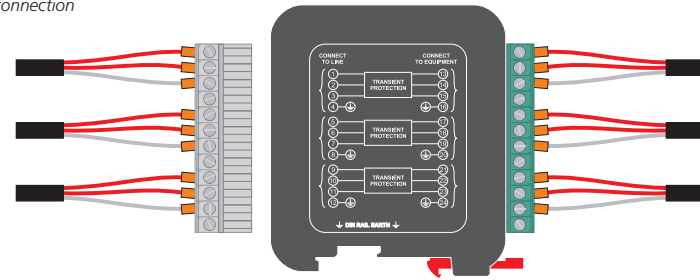


Figure 2: Series connection for ESP RTDQ.



The dirty, or *line* side of the Lightning Barrier should be connected to the cable carrying the incoming transient overvoltages.

The output or *clean* side of the Lightning Barrier ensures a transient free signal to the equipment being protected (see Figures 1 and 2).

Note: Do NOT use power driven screwdrivers to make connections to the ESP Lightning Barrier.

3.2 Lightning Barrier location

Lightning Barriers are usually located either:

- near to where the lines requiring protection enter or leave the building, or
- close to the equipment being protected (or actually within its control panel)

Either way, it is important that the Barrier's connection to earth (or barrier earth bond) is kept short (see Section 3.7 - Earthing).

3.3 Enclose the Lightning Barrier

Lightning Barriers should be installed within a panel or enclosure.

The Lightning Barrier should be ideally installed within an existing cabinet/cubicle or in an enclosure to the required IP rating.

Suitable enclosures are available from Furse.

Lightning Barriers should always be installed in a dry environment.

3.4 Fixing methods

ESP Q Series Lightning Barriers have two mounting options.

(a) Flat mounting

Fixing holes through the Lightning Barrier enable it to be screwed to flat surfaces (see Figure 3).

(b) DIN rail mounting

The Lightning Barrier has a built-in DIN rail clip for mounting to 'top hat' or G DIN rails (see Figure 4).

3.5 Line, clean, screen and earth connections

Cable wires should be terminated with a boot lace ferrule.

The *line* end of the Lightning Barrier should be connected to the dirty, incoming cable.

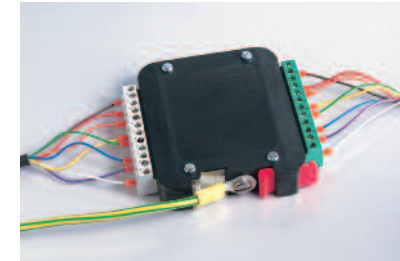


Figure 3: Flat mounting.

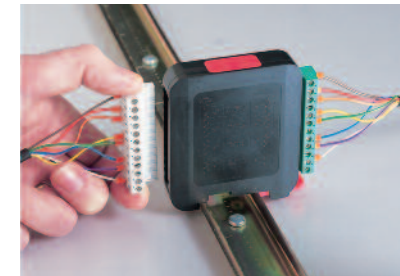


Figure 4: Mounting on top hat DIN rail.

The *clean* end of the Lightning Barrier should be connected to the cable going to the equipment.

Cable screens are connected to the screen terminals; which are galvanically isolated from earth via a GDT, which connects screen to earth only during a surge. (see Section 3.7 for earthing the unit).

The connections for each of the four twisted pair lines (three 3-wire lines with the ESP RTDQ) are labelled on the unit (see Figures 5(a) & 5(b), overleaf).

For further information on the ESP RTDQ contact Furse for Application Note AN001.

Hand tighten connections - do not use power driven screwdrivers.

3.6 Keep clean cables away from dirty cables

Cables connected to the Lightning Barrier's *clean* end should never be routed next to dirty *line* cables or dirty barrier earth bonds (see Figure 6, overleaf).

If rows of Lightning Barriers are installed close to each other, dirty *line* cables & earth bonds must be kept at least 5 cm apart from *clean* cables (See Figure 7, overleaf).

...continued overleaf

Note: When using the DIN rail mounting option in conjunction with a base plate (ie DIN rail not directly bonded on to the cabinet chassis) ensure the earth bond to the base plate (or DIN rail itself) is kept clear of the clean cables.

3.7 Earthing

Protectors for mains power supplies and Lightning Barriers for data/signal/measurement/telephone lines should be connected to the same earth point.

The Lightning Barrier should therefore be bonded to the main electrical earth or earth star point.

The Lightning Barrier must be connected to earth, either:

- (a) through installation on a 'top hat' or G DIN rail (which in turn is connected to earth), or
- (b) by connecting a crimped earth cable to the barrier via the M5 threaded hole in the unit (see Figure 3)

The best way to ensure a good earth connection when using a DIN rail is to mount the DIN rail in a metal cabinet.

The entire length of the DIN rail should be in contact with the metal of the cabinet (if the cabinet is painted this should be removed where the rail is to be mounted to give a good electrical connection).

The DIN rail should then be bonded to the cabinet at its mounting points and the chassis of the cabinet bonded to the main electrical earth or earth star point.

Alternatively if a non-metal housing is used the DIN rail should be bonded to a metal base plate. The base plate should then be bonded to the earth star point.

The following guidelines refer to non-DIN rail earthing and the earthing of DIN rail base plates.

The barrier or base plate earth bond should be less than 1 metre long (otherwise the effectiveness of the Lightning Barrier will be reduced). 10 mm² stranded green/yellow cable should be used for this bond.

Barrier or base plate earth bonds of 2, 3 or 4 metres are allowed if:

- 2, 3 or 4 parallel earth bonds are used and
- these parallel earth bonds are kept at least 5 cm apart from each other

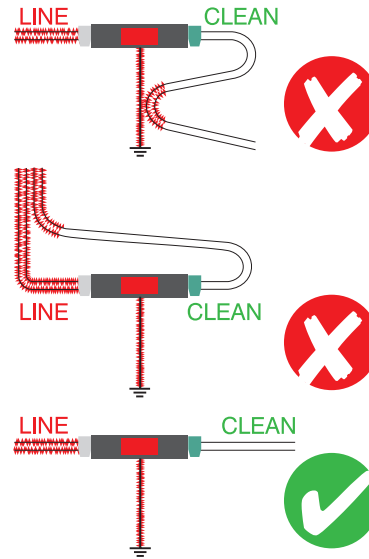


Figure 6: Cable routeing

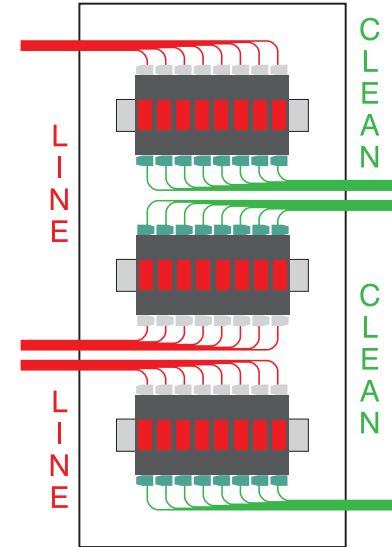


Figure 7: Positioning of adjacent rows of Lightning Barriers.

Where even 4 metres of connecting lead is not sufficient, the incoming line should be re-routed to bring it within 4 metres of the earth.

If the line cannot be re-routed the Lightning Barrier can, as a last resort, be connected to the electrical earth local to the equipment being protected (eg the earth bar of the local power distribution board) (see Figure 8).

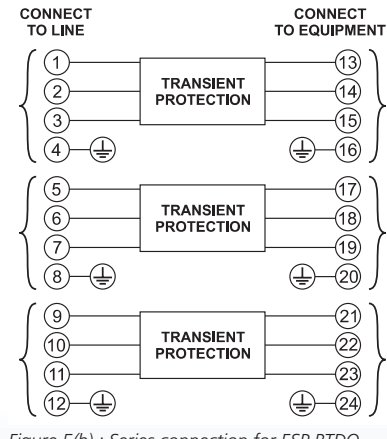
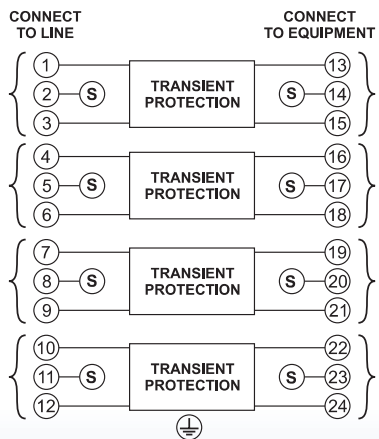


Figure 5(b) : Series connection for ESP RTDQ

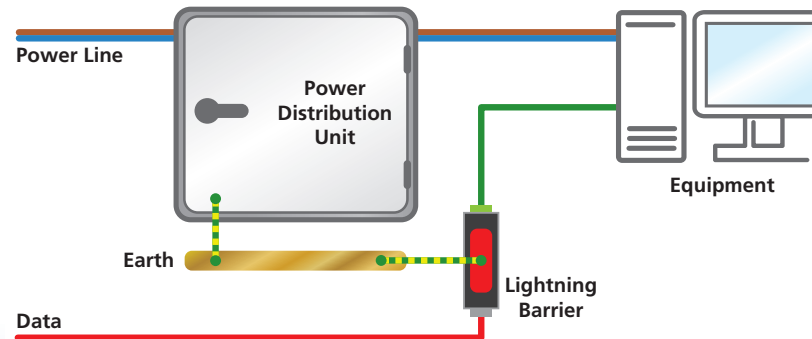
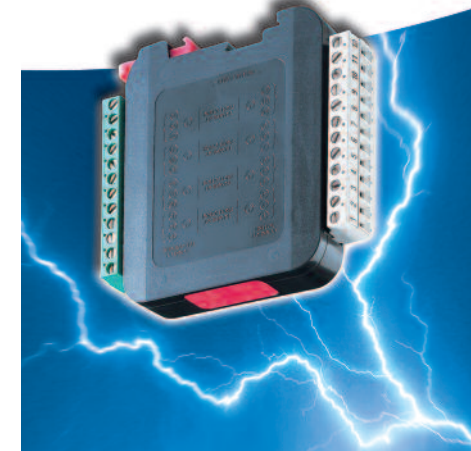


Figure 8: If connection to the main electrical earth is not possible, the Lightning Barrier can be connected to the earth local to the protected equipment.

Installation instructions for Q Series lightning barriers
ESP 06Q, ESP 15Q, ESP 30Q, ESP 50Q, ESP 110Q, ESP TNQ, ESP RS485Q & ESP RTDQ



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