1. Safety note:

Warning! Installation by person with elektrotechnische Fachkraft.

Avertissement! Installation uniquement par des personnes qualifiées en électrotechnique.

Advertencia! La instalación deberá ser realizada únicamente por electricistas especializados.

2. Before installation

2.1 Make sure that the system's maximum line voltage (DC or AC peak) will never exceed the maximum working voltage of the SPD.

Otherwise the SPD will clamp signal voltages as though they were transient overvoltages.

2.2 Be sure that the SPD’s bandwidth will not restrict the system bandwidth.

<table>
<thead>
<tr>
<th>Bandwidth (-3 dB)</th>
<th>800 kHz</th>
<th>2.5 MHz</th>
<th>4.0 MHz</th>
<th>6.0 MHz</th>
<th>9.0 MHz</th>
<th>20.0 MHz</th>
<th>45 MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESP PCB/06D</td>
<td></td>
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<tr>
<td>ESP PCB/15D</td>
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<tr>
<td>ESP PCB/30D</td>
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<tr>
<td>ESP PCB/50D</td>
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<tr>
<td>ESP PCB/110D</td>
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</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Line Resistance</th>
<th>9.4 Ω</th>
<th>1.0 Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESP PCB/D Series</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ESP PCB/E Series</td>
<td></td>
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</tr>
</tbody>
</table>

2.4 Ensure that the current passing through the SPD does not exceed:

- 300 mA DC or AC RMS (ESP PCB/06D, ESP PCB/15D, ESP PCB/30D, ESP PCB/50D, ESP PCB/110D & ESP PCB/TN),
- 1.25 A DC or AC RMS (ESP PCB/06E, ESP PCB/15E, ESP PCB/30E, ESP PCB/50E & ESP PCB/110E)

3. Installation

3.1 Track layout

The line inputs on the PCB represent the most likely entry point for transient overvoltages into the system.

To counteract risk of of damage from surge current activity, use the largest track width the board can accommodate for the line inputs.

The track width connected to the clean output pins does not affect surge current capabilities, however care must be taken to ensure the transient is not picked up on the output tracks.

When using large track widths, remember to allow sufficient track separation to ensure adequate creepage and clearance.

Additionally, consider:

- Using both the top and bottom copper layers on the PCB, and
- Using a high PCB copper plating level

As this will considerably increase the current handling of the tracks.

Note: Furse PCB protectors are capable of handling 10 ka of surge current, although track layout or choice of connectors on the PCB may restrict the unit’s performance (since the line and earth tracks need to be capable of handling 10 ka).

If the track fails before 10ka, the surge protection offered will be limited to what the track can handle before breakdown.

Dirty line tracks should be routed parallel and as close together as possible.

This should also be implemented on the clean tracks (see Figure 1).

Clean (outgoing) tracks should never be routed close and parallel to line (incoming) tracks or dirty barrier earth connections as the transient can be re-introduced after the protector due to electromagnetic coupling (see Figures 2 & 3).

If it is unavoidable the clean tracks can cross the line tracks at 90°.

Do not create large loops with the line or clean tracks as this will increase electromagnetic coupling.

If multiple SPDs are used on a PCB, dirty line and clean lines should be kept at least 20 mm apart (see Figure 4).

This separation distance must still be implemented on multi-layer PCBs, as the interference will easily pass through the board.

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**Legend for Figures:**

- **Line**
- **Clean**

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...continued overleaf
4.3 Earthing
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 the clean tracks.

Connect the earth to the main star point of the earthing system, routing away from all other connections.

The clean end of the SPD should be connected to the tracks going to the protected components.

The input/line and output/clean connections of the protector are paired as follows:

1  3
2  4

SAFETY NOTE:
1. Always handle cables by their insulation.
2. Never work on SPDs or their cables during a storm.

Environment
Consider the protection of the environment!
Used electrical and electronic equipment must NOT be disposed of with domestic waste. The device contains valuable raw materials which can be recycled. Therefore, contact ABB for disposal of this equipment.