IEEE 802.3 SPEP2P SG

Ethernet-APL Inline Connectors and Surge Protection Devices

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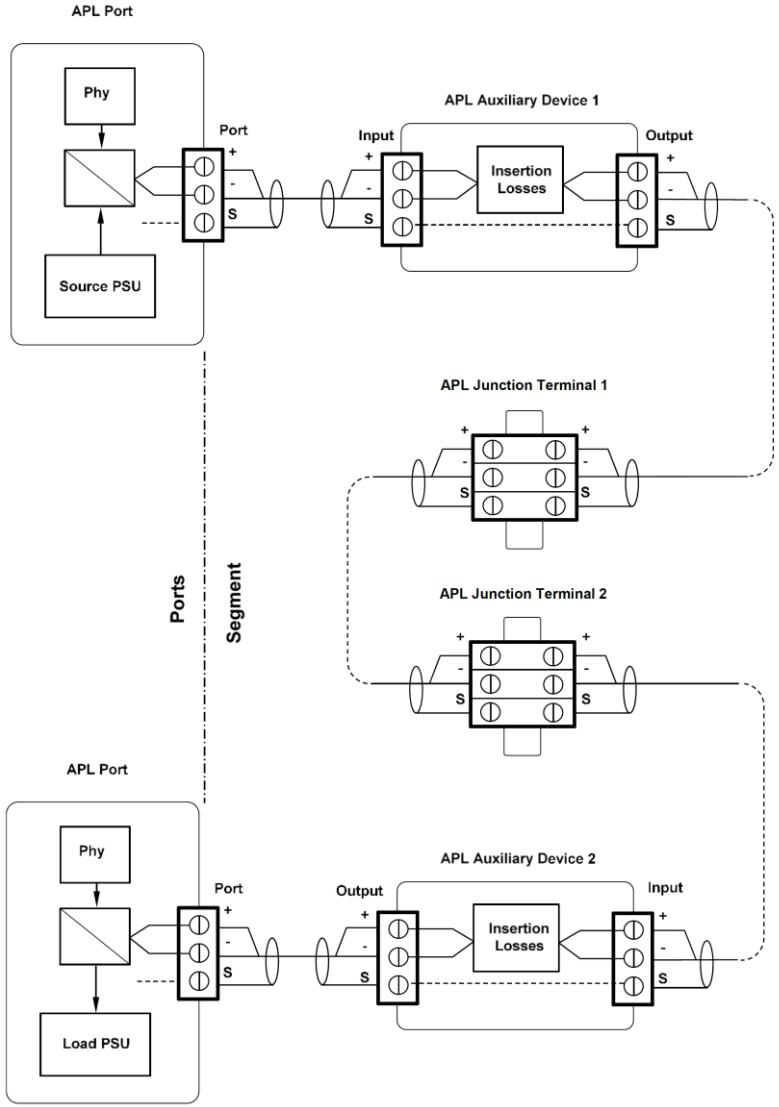
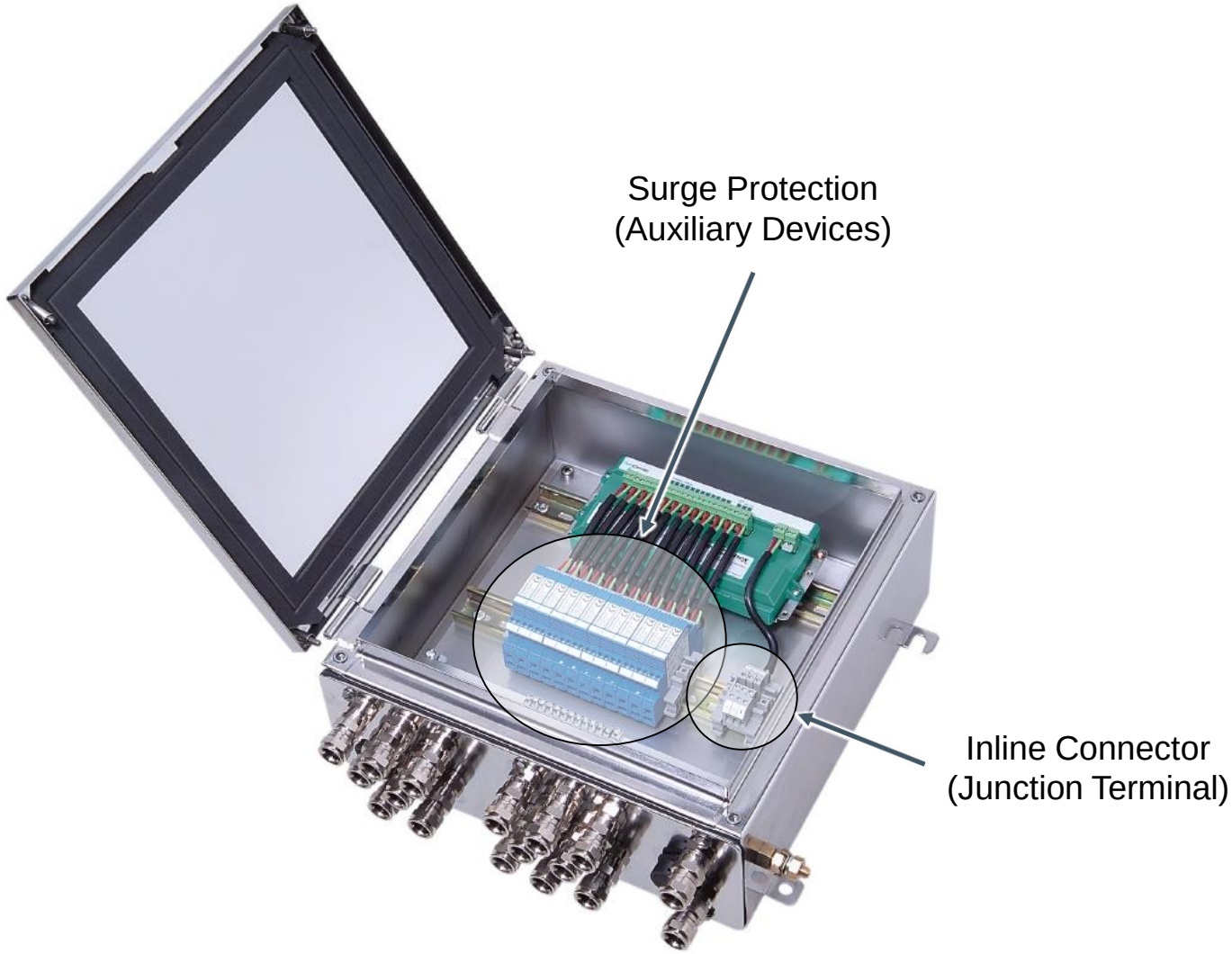
Ethernet-APL Inline Connectors

- 10BASE-T1L supports up to 10 inline connectors supporting up to 1000 m reach (1 per 100 m) or 590 m reach (1 per 59 m) depending on the used link segment.
- Ethernet-APL supports:
  - Up to 10 inline connectors for 1000 m trunk segments (1 per 100 m or 1 per 125 m + 2 additional).
  - Up to 4 inline connectors for 200 m spur segments (1 per 50 m or 1 per 100 m + 2 additional).
  - For each of up to two auxiliary devices (surge protectors) the number of allowed inline connectors has to be reduced by 1.
- Ethernet-APL port profiles have been developed after the main targets for 10BASE-T1L had already been fixed, so that Ethernet-APL was bound to the definitions done already in IEEE802.3cg.
- Thus Ethernet-APL kept the 10 inline connectors for the trunk, but for the shorter spurs specified 4 instead of 2 inline connectors to cover the additional auxiliary devices (which is within the bounds of the IEEE 802.3cg definitions).
- The inline connectors typically are not spread equally across the segment, but may concentrate at the beginning and end of the segment.

- For the 100 MBit/s enhancements project, it is suggested to either keep the 10 allowed inline connectors from 10BASE-T1L or, if it is intended to reduce the number of inline connectors depending on the reachable length define 1 inline connector per 100 m (or part thereof), plus 2 additional connectors (covering the auxiliary devices).

Ethernet-APL Inline Connectors



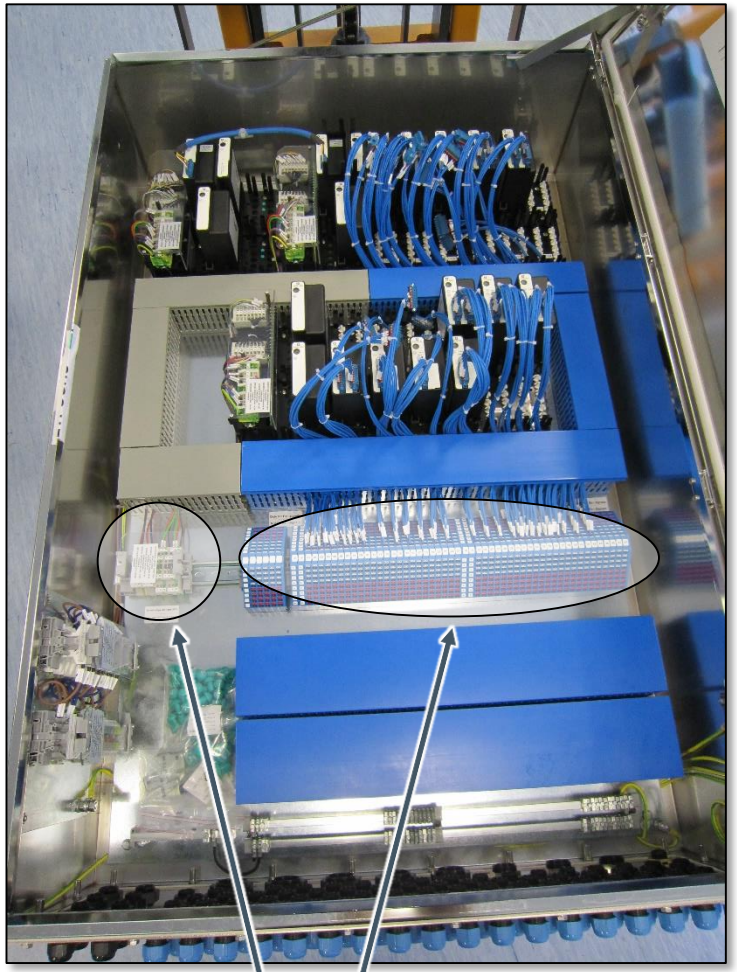


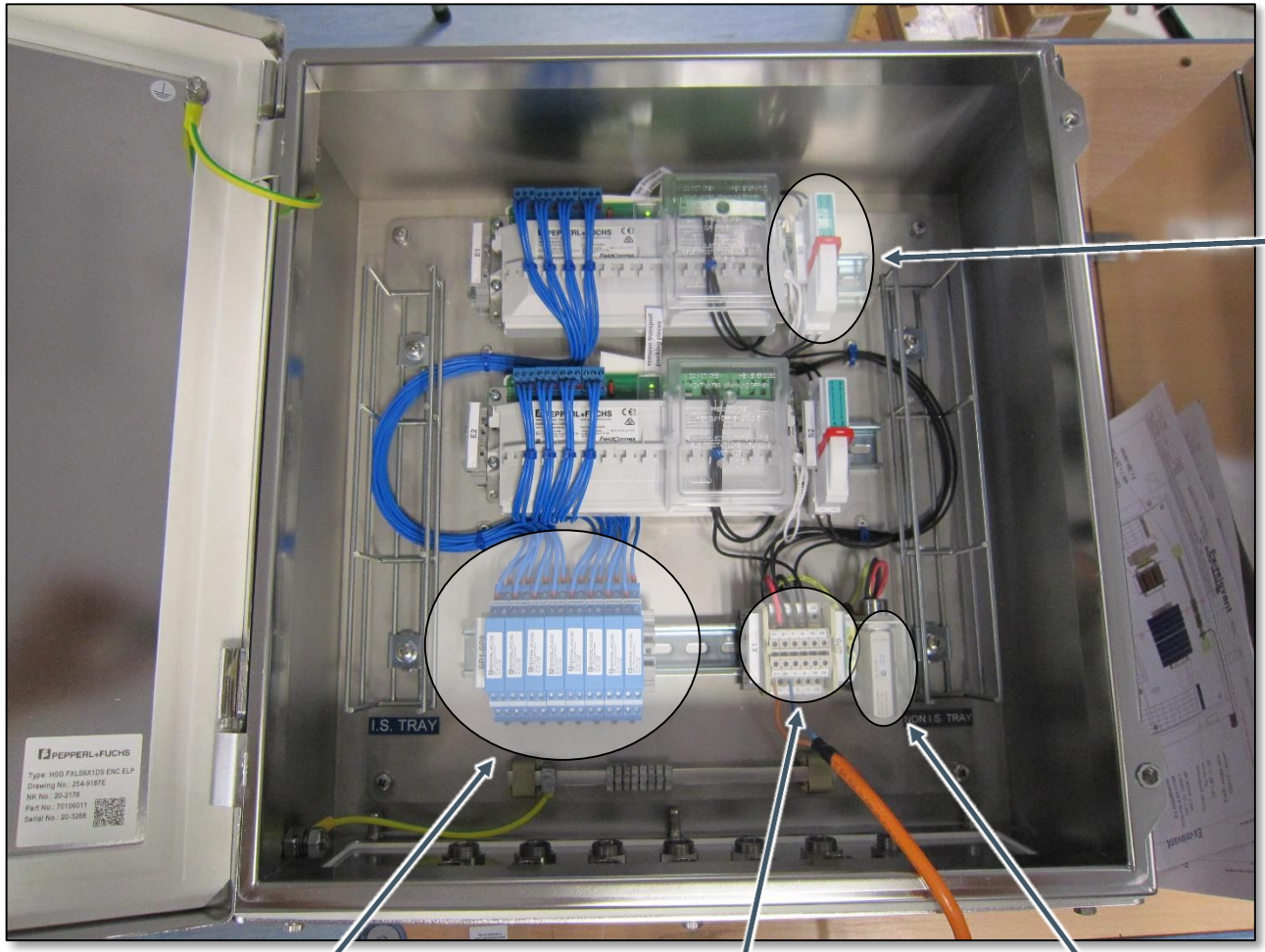
Cabinet Connector Example

Inline connectors (junction terminals) just a short distance after the device ports to allow pre-manufacturing of the cabinet and easy cable installation at the construction site.

Where necessary, instead of control devices, surge protection modules (auxiliary devices) may be placed here.

Field Distributor Box Connector Example





Ex d Switch for device disconnection during maintenance (equivalent to an inline connection)

Inline Connectors (Junction Terminals)

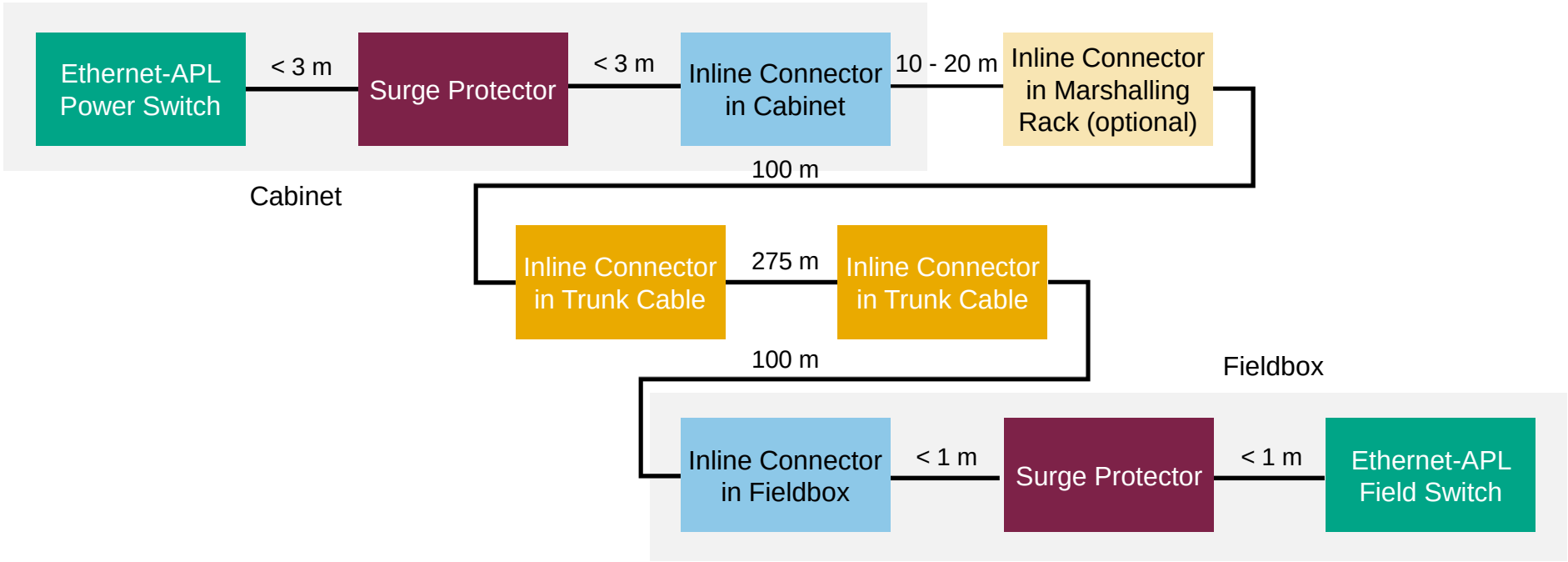
Series Surge Protection (Auxiliary Devices)

Inline Connectors (Junction Terminals)

Parallel Surge Protection using up to 10 cm long stubs (likely only possible for 10BASE-T1L)

Ethernet-APL Segment Connector Overview

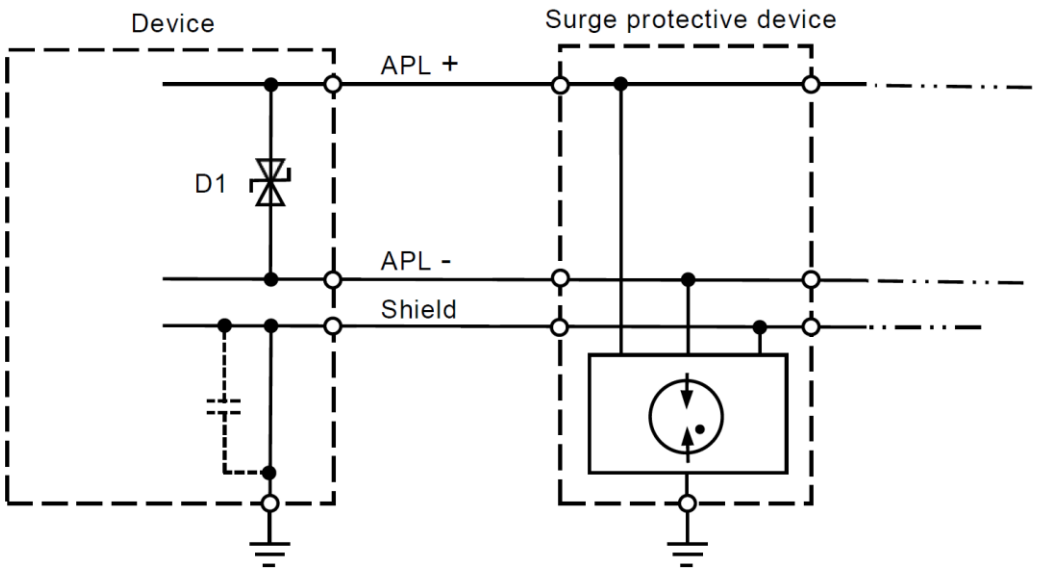
- In most Ethernet-APL segments the inline connectors will not be distributed equally, but concentrate at the beginning and end of the segments.



- Above approx. 500 m trunk segment e.g. uses 2 surge protectors, 2 inline connectors close to the switches and 3 inline connectors within the marshalling rack (typically more common in brown-field applications) and the cable itself.
- So from the suggested up to 7 inline connectors, 4 are already used up by the surge protectors and connectors located close to the switches, while for the rest of the segment length just 3 are remaining.

Ethernet-APL Surge Protection Devices (SPDs)

- Ethernet-APL Surge Protection relies on two parts:
  - A surge protection diode within the Ethernet-APL device (25 A differential 8/20 µs)
  - An external surge protection device (SPD) containing gas discharge tubes (GDTs).
- This significantly reduces the influence of the external SPD module, as the GDTs are very high impedance, if not ignited and provide a pretty low capacitance in the range of < 5 pF.
- Thus SPD modules (at least for 10BASE-T1L) have no significant influence on the link segment, but due to the higher speed more investigation might be required for 100BASE-T1L.



Thank you!