



Expertise Applied | Answers Delivered

Industrial Communication and Control Protection: RS-485 and Ethernet



Industrial

Distance and data speed influence protocol selection



RS-485



Remote I/O



Energy Meter



Factory Automation



Security System



Programmable Logic Controller



Wind Control



Human-Machine Interface



Test Equipment



Machine Vision

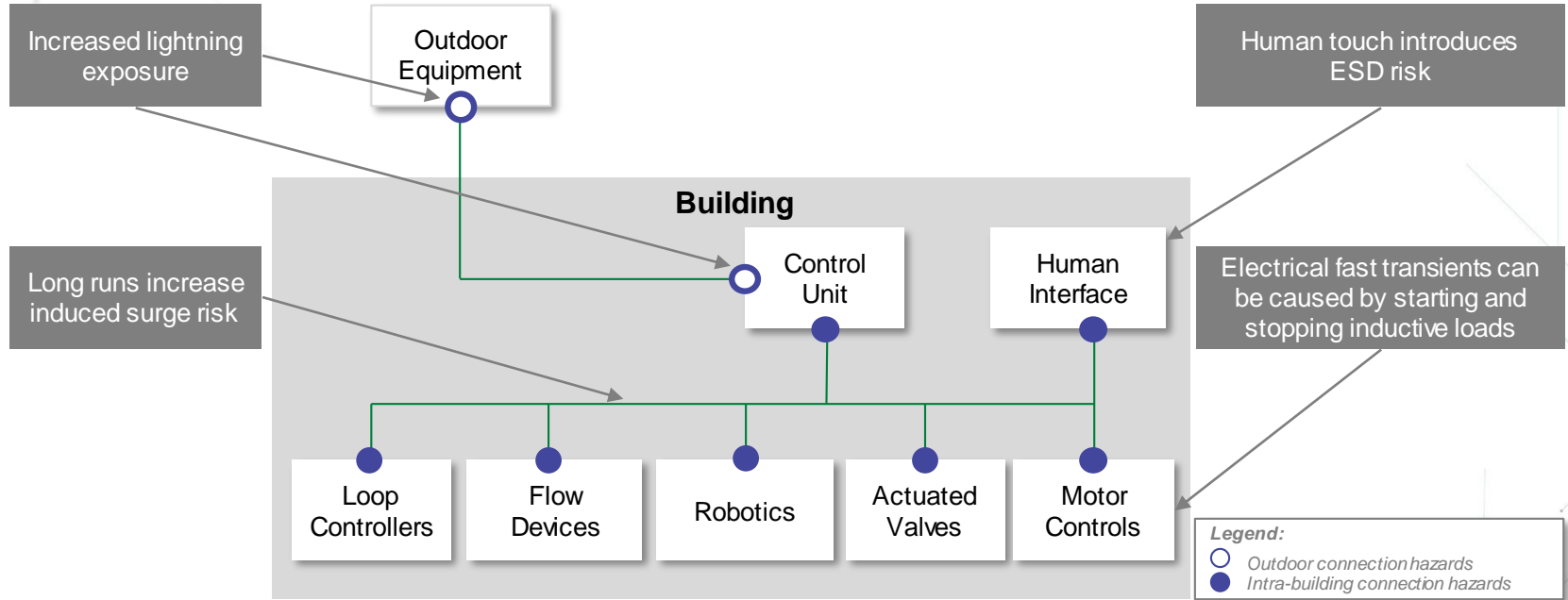


Industrial Ethernet

Increased Distance

Increased Data Speed

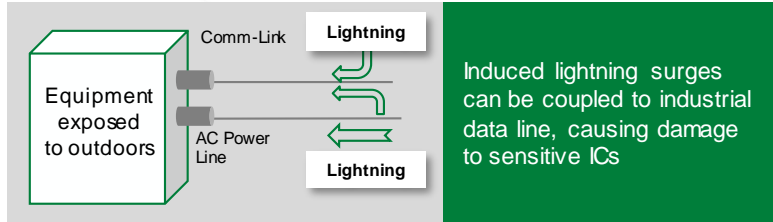
The environment impacts protection needs



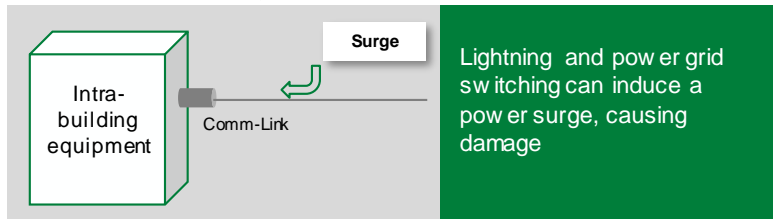
Each port requires protection from exposure to electrical hazards for long-term reliability

Electrical threats to RS-485 and ethernet

Lightning surges



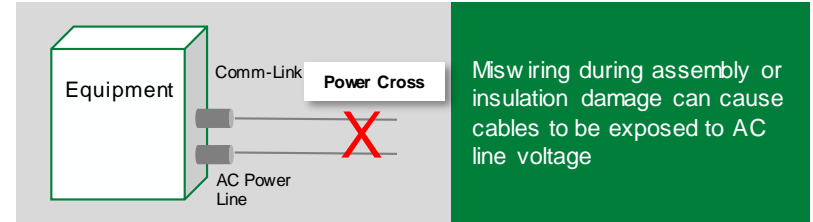
Induced power surge



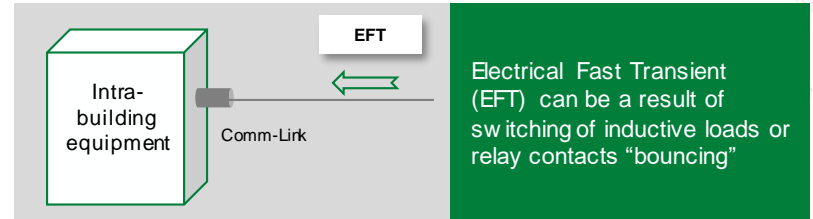
Electrostatic discharge



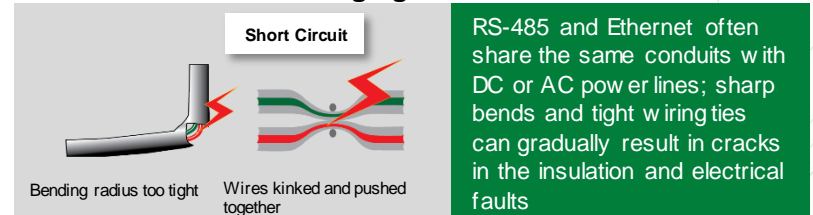
Power cross



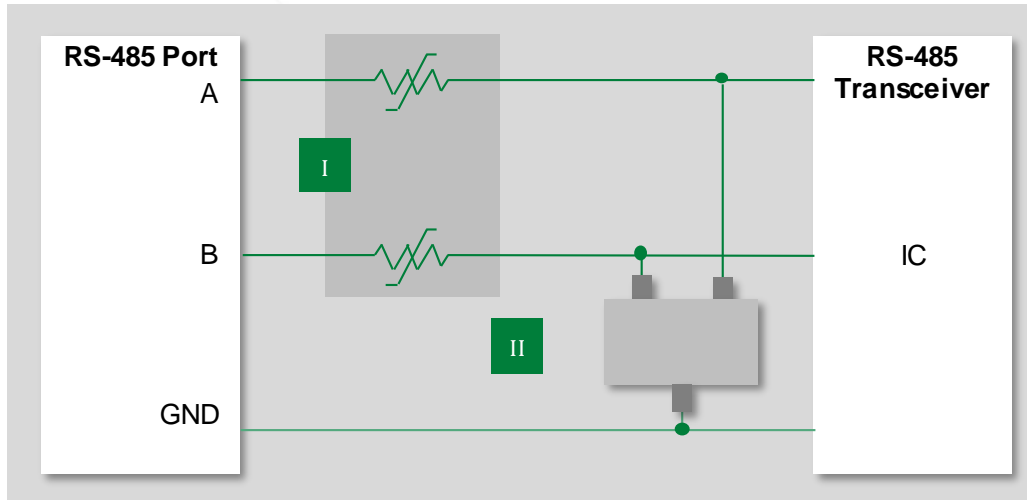
Electrical fast transient



Short circuit due to wire aging and installation



Intra-building protection recommendations – RS-485



I Resettable PPTC can increase up-time by helping to protect equipment from short circuit and power cross events.

II TVS Diode Array, SM712, is specifically designed to help protect RS-485 applications from ESD, EFT, and lightning-induced surges.

	Technology	Series
I	Resettable PPTC	TRF250/600 , TS250 , TSV250
II*	TVS Diode	SM712

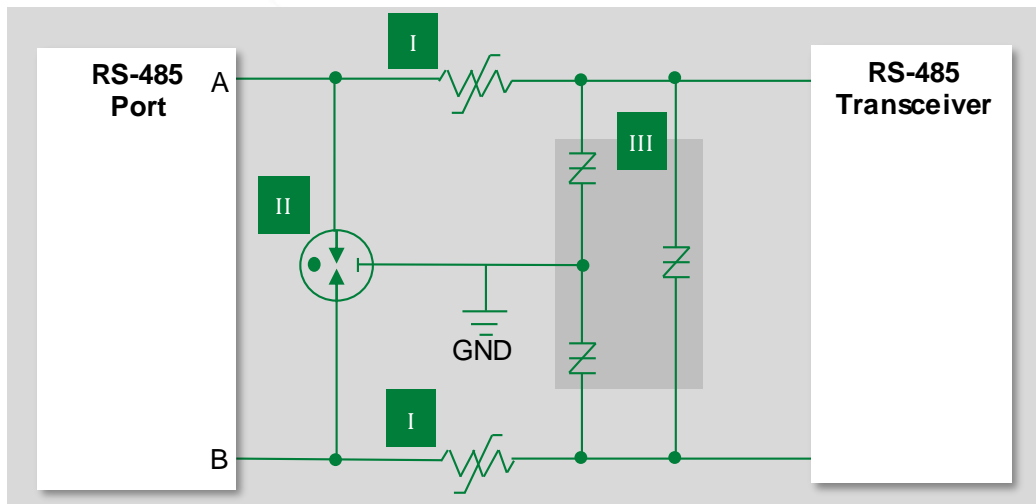
Note:

* Pulse-Guard ESD Suppressors type PGBXGD are an alternative solution.

Applicable Standards:

- IEC 61000-4-2 (ESD)
- IEC 61000-4-4 (EFT)
- IEC 61000-4-5 (Lightning)
- ITU K.20 Internal Ports & YD/T 950-1998
- ITU K.21 Internal Ports & YD/T 950-1998
- GR 1089 Intra-Building (Type 2)
- UL 60950-1/IEC60950-1, EN60950-1

Outdoor and harsh environments – RS-485



	Technology	Series
I	Resettable PPTC	TRF250/600 , TS250 , TSV250
II	GDT	GTCxx
III	SIDACtor	Pxxx0s

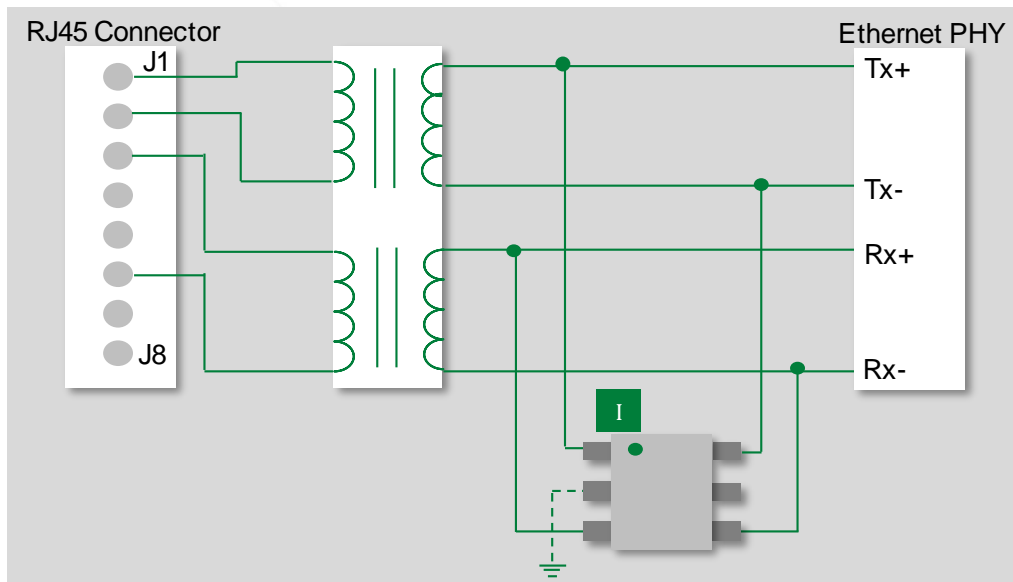
Applicable Standards:

- IEC 61000-4-2 (ESD)
- IEC 61000-4-4 (EFT)
- IEC 61000-4-5 (Surge)
- ITU K.20 Internal Ports & YD/T 950-1998
- ITU K.21 Internal Ports & YD/T 950-1998
- GR 1089 Intra-Building (Type 2)
- UL 60950-1/IEC60950-1, EN60950-1

I Resettable PPTC can increase up-time by helping to protect equipment from short circuit and power cross events.

II Lightning protection is provided using a Gas Discharge Tube (GDT) with SIDACtor. When lightning occurs, SIDACtor will react first, causing the voltage to increase across PPTC until GDT fires. THE PPTC resistance must be selected carefully for proper coordination.

Intra-building protection for ethernet



Note: 1Gbps or greater will require an additional two twisted pair and the diode array solution should be replicated.

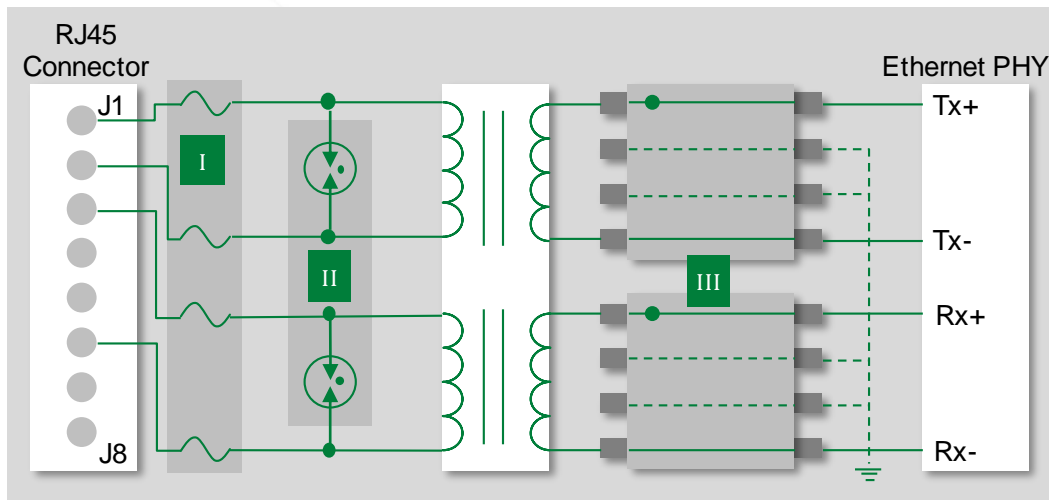
	Technology	Series
I	Diode Array	SRV05xx

Applicable Standards:

- IEC 61000-4-2 (ESD)
- IEC 61000-4-4 (EFT)
- ITU (ESD Section)
- GR 1089 (ESD & EFT Sections)
- YD/T 950 & 1082
- UL 60950-1/IEC60950-1, EN60950-1

I Port protected from ESD and EFT. Lightning is not a concern in this application. A low capacitance diode array is needed for high data transmission speeds.

Outdoor and harsh environments – ethernet



	Technology	Series
I	Fuse	0461xxx
II	GDT	SG , CG6 , & CG5
III	Diode Array	LC03xx or SP40xx

Note:

* PPTC Devise such as T-Line (TelecomLine PPTC)

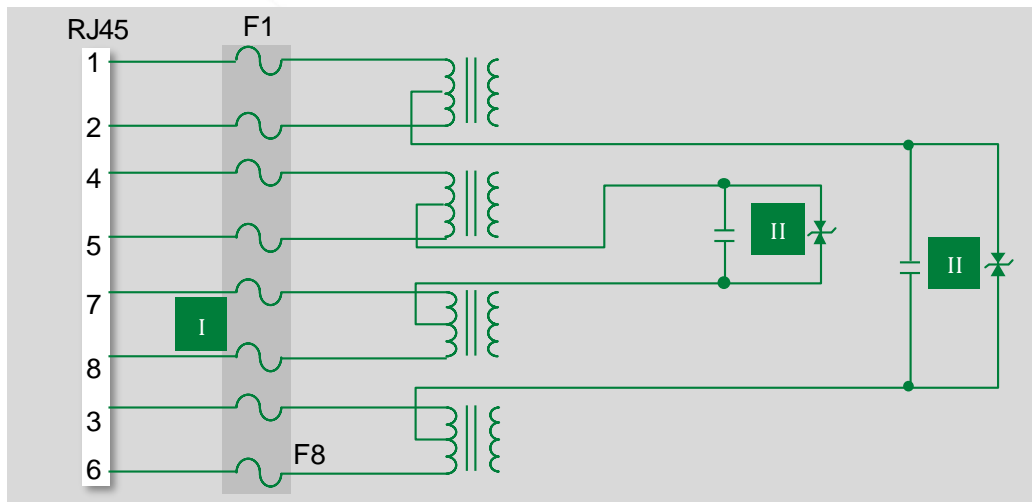
Applicable Standards:

- IEC 61000-4-2
- IEC 61000-4-4
- IEC 61000-4-5
- ITU K.20, K.21
- GR 1089
- UL 60950-1/IEC60950-1, EN60950-1

I Telelink fuses can help protect against power fault overcurrent. These fuses are designed specifically for high-speed telecom applications. A single fuse per wire pair is sufficient.

II Lightning protection uses GDT with a diode array to meet standard requirements. The class rating and external wiring configuration will determine the specific protection needed, but an example would be as follows: 4kV/2kA, 1.2/50µs-8/20µs.

Lightning, ESD, and power fault protection – PoE



	Technology	Series
I*	Fuse	0461xxx
II	TVS Diode	SMCJxxCA

Note:

* PPTC Device such as T-Line (TelecomLine PPTC)

Applicable Standards:

- IEC 61000-4-2 (ESD)
- IEC 61000-4-4 (EFT)
- IEC 61000-4-5 (Class 0-4)
- ITU K.20 Internal Ports & YD/T 950-1998
- ITU K.21 Internal Ports & YD/T 950-1998
- GR 1089 Intra-Building (Type 2)
- UL 60950-1/IEC60950-1, EN60950-1

I Telelink fuses can help protect against power fault overcurrent. These fuses are designed specifically for high-speed telecom applications.

II There is a single TVS diode (bi-directional) across the center tap signal pair and a second TVS diode across the center tap spare pair. The TVS diode can be chosen based on surge requirements for 400 W, 600 W, 1500 W, or 3000 W.