

INFINIT^e

ELECTRONICS, INC.

Hazardous Location Surge Protection Solutions

$$\text{Width} = \frac{c}{2f_0 \sqrt{\frac{\epsilon_R + 1}{2}}}; \quad \epsilon_{eff} = \frac{\epsilon_R + 1}{2} + \frac{\epsilon_R - 1}{2} \left[\frac{1}{\sqrt{1 + 12 \left(\frac{h}{W}\right)}} \right]$$

$$\text{Length} = \frac{c}{2f_0 \sqrt{\epsilon_{eff}}} - 0.824h \left(\frac{(\epsilon_{eff} + 0.3) \left(\frac{W}{h} + 0.264\right)}{(\epsilon_{eff} - 0.258) \left(\frac{W}{h} + 0.8\right)} \right)$$

$$R_L = Z_0 \left[\frac{1}{10 \left(\frac{W}{h} - 1\right)} \right]$$



Agenda

- PolyPhaser | Transtector Market Leaders
- Hazardous Locations
- Class I Division 2 Qualifications and Definitions
- Impacts to Your Business
- Hazardous Applications
- Surge Protection Products and Solutions
- Professional Services



Surge Protection Experts

PolyPhaser and Transtector Systems are industry leaders in the development, design and manufacturing of power and signal integrity solutions for the oil and gas industry. Our sales and engineering teams are versed in the specific challenges, requirement and specifications for this market.



Coaxial RF Protection and Grounding

Innovator of patented DC block and DC pass technology.

Ultra low PIM design for next generation telecom applications.

www.PolyPhaser.com



AC | DC and Data Line Protection

Lead the industry with patented silicon diode (SASD) and metal oxide varistor (MOV) technology.

Dedication to safety through global standards – UL, FM, CE, RoHS, NEMA, IEC.

www.Transtector.com



Hazardous Locations

- A *hazardous location* is defined as a place where concentrations of flammable gases, vapors, or dusts occur. Electrical equipment that must be installed in such locations is especially designed and tested to ensure it does not initiate an explosion, due to arcing contacts or high surface temperature of equipment.



ANSI | NFPA Area Descriptions

Class | Div Locations Qualifications

- Class I, Div. 1 - Where ignitable concentrations of flammable gases, vapors or liquids are present continuously or frequently within the atmosphere under normal operation conditions.
- Class I, Div. 2 - Where ignitable concentrations of flammable gases, vapors, or liquids are present within the atmosphere under abnormal operating conditions.
- Class II, Div. 1 - Where ignitable concentrations of combustible dusts are present within the atmosphere under normal operation conditions.
- Class II, Div. 2 - Where ignitable concentrations of combustible dust are present within the atmosphere under abnormal operating conditions.
- Class III, Div. 1 - Where easily ignitable fibers or materials producing combustible flyings are present within the atmosphere under normal operation conditions.
- Class III, Div. 2 - Where easily ignitable fibers or materials producing combustible flyings are present within the atmosphere under abnormal operating conditions

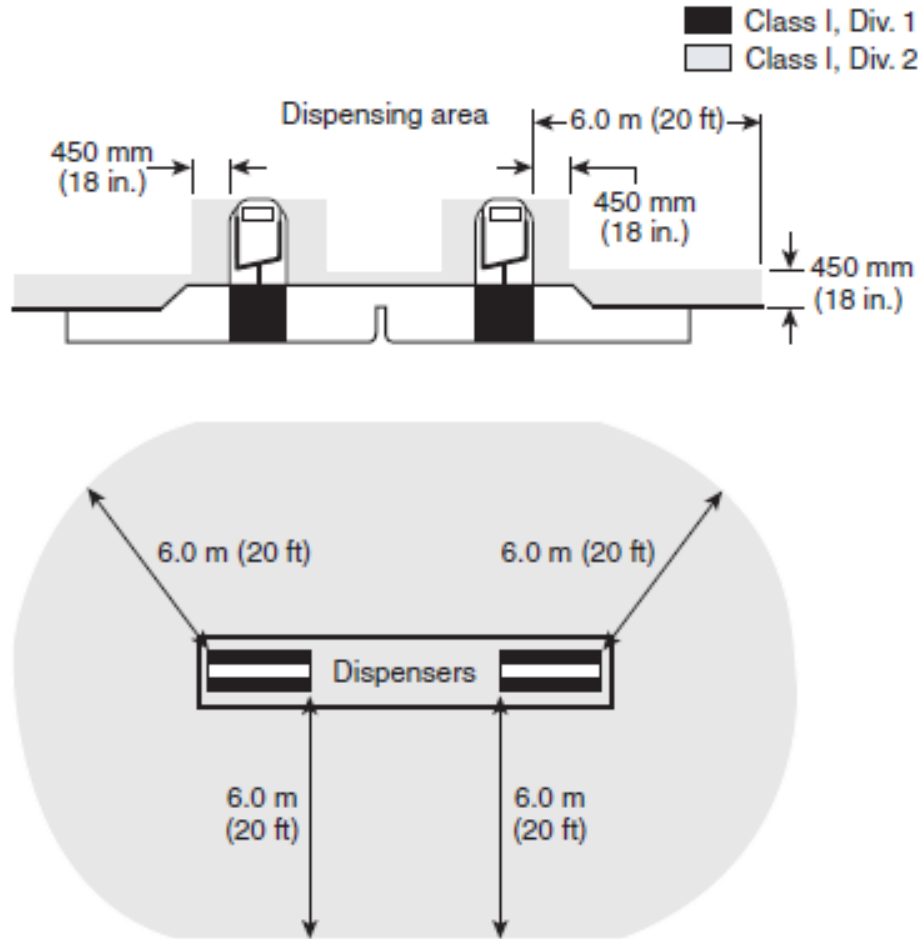


Equipment Protection Level

The Equipment Protection Level (EPL) is specified for several kinds of protection. The required protection level is linked to the intended use in the zones described below

Group	Ex risk	Zone	EPL	Minimum Type of Protection
I (mines)	energized		Ma	
I (mines)	de-energized in presence of Ex atmosphere		Mb	
II (gas)	explosive atmosphere > 1000 hrs/yr	0	Ga	ia, ma
II (gas)	explosive atmosphere between 10 and 1000 hrs/yr	1	Gb	ib, mb, px, py, e, o, q, s
II (gas)	explosive atmosphere between 1 and 10 hrs/yr	2	Gc	n, ic, pz
III (dust)	explosive surface > 1000 hrs/yr	20	Da	ia
III (dust)	explosive surface between 10 and 1000 hrs/yr	21	Db	ib
III (dust)	explosive surface between 1 and 10 hrs/yr	22	Dc	ic

Hazardous Locations—Gas Station



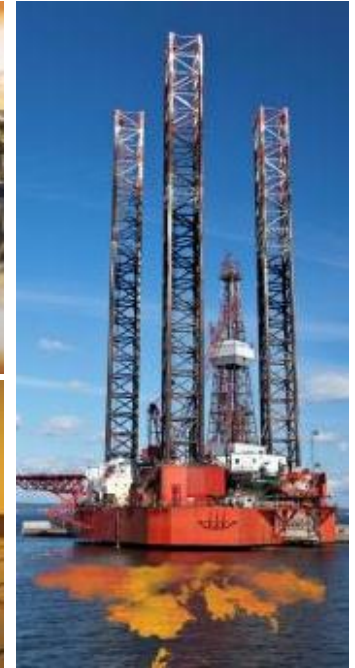
Lightning Impacts to Your Business

- Lightning accounts for 61% of the accidents initiated by natural events. In North America 16 out of 20 accidents involving petroleum products storage tanks were due to lightning strikes. (Journal of Hazardous Materials).
- Downstream costs due to lightning, fire and explosion --\$95,000,000 Texas Refinery | Louisiana Refinery \$104,000,000 | Rhineland-Palatinate Petroleum \$68,800,000 | Alberta Oil Sands \$1,070,000,000, Singapore Refinery \$153,000,000.
- Twelve miners killed by lightning-caused methane gas explosion (west Virginia 2005)
- Lightning strikes the earth 25 million times a year, with an estimated \$5 billion in annual loss.
- The National Lightning Safety Institute has reported that US lightning costs and losses may exceed **\$8-\$10 billion** per year. (Accurate information is elusive or in error: US Dept Commerce reports lightning property damage at \$48 million!).
- Global warming and climate change will increase lightning activity according to NASA.
- Indirect lightning strikes can induce voltages and currents into near by electrical lines.

Hazardous Applications

Surge protection devices are commonly deployed in numerous applications in the oil and gas sector, thus reducing economic risk due to downtime, lost revenue and equipment replacement.

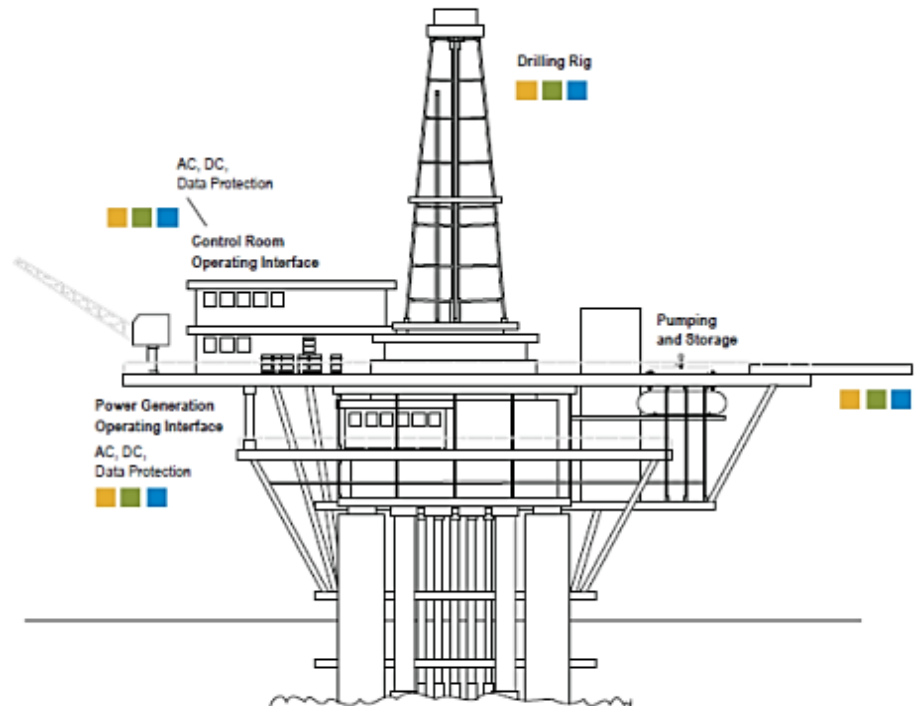
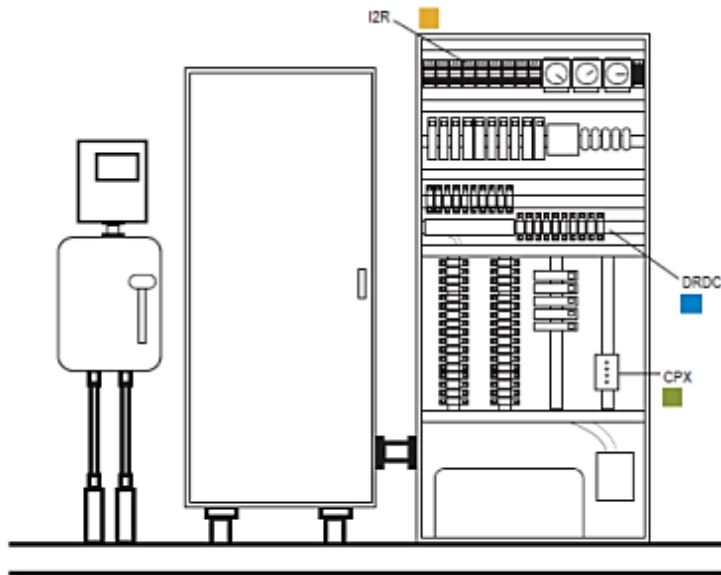
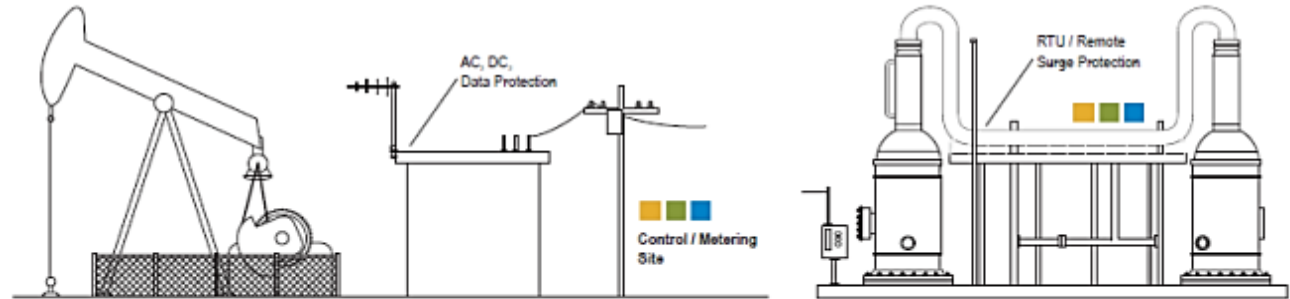
- SCADA
- Pump Jack
- Pipeline Compressor Stations
- Refining
- E&P (Exploration & Productions)
- Offshore Rigs
- Pipeline Metering Stations
- Motor Control Centers
- Fracturing
- Wellheads and Gathering Fields
- Pumping and Storage
- Transportation



Hazardous Product Solutions

Application	Network Component	Surge Protection Required
SCADA	Transmitters, Sensors, RTUs, PLCs, Telecom Backhaul	RF, AC, DC, Data
Exploration & Production	Drilling, Logging, Communications and Signaling Equipment	RF, AC, DC, Data
Offshore Drilling	Communications, signaling, satellite, drilling, and logging equipment	RF, AC, DC, Data
Wellheads and Gathering Fields	Communications and Signaling Equipment	RF, DC, Data
Compressor Stations	Power, Communication, Signaling, and Measurement Equipment	AC, DC, Data
Pipeline Metering Stations	Transmitters, Sensors, RTUs, PLCs, Communications	RF, AC, DC, Data
Storage	Transmitters, Sensors,	AC, DC, Data
Refining	Power, Communication, Signaling, and Measurement Equipment	RF, AD, DC, Data
Security	Access Control and Security Cameras	Data

Type	Series	Application
AC	I2R Series	PLC RTU
DC	DRDC Series	PLC RTU
DC	CPX Series	PLC RTU
DC	DC Defender	Communication Site
DC	DRI	Tank Measurement
Data Line	CPX Series	PLC RTU
Data Line	ALPU Series	Communication Site
Data Line	PDS Series	Field Instrumentation



Class I Div 2 Surge Protection

Product Type	Part Number	Name	Voltage	Mount Type
■ AC	1104-15-000	I2R IEP 120-10	120 Vac	DIN Rail
■ AC	1104-15-002	I2R SA 120-50M	120 Vac	DIN Rail
■ AC	1104-15-020	I2R IEP 240-10	240 Vac	DIN Rail
■ DC	1101-678	DRDC 7	7 Vdc	DIN Rail
■ DC	1101-679	DRDC 12	12 Vdc	DIN Rail
■ DC	1000-1464	CPX DC Defender 24	24 Vdc	Rack Mount
■ DC	1101-680	DRDC 24	24 Vdc	DIN Rail
■ DC	1101-869	DRI 24	24 Vdc	DIN Rail
■ DC	1101-1110	DC Defender 48-5	24, 48 Vdc	Surface Mount
■ DC	1000-1405	CPX DC Defender 48-5	48 Vdc	Rack Mount
■ DC	1101-681	DRDC 48	48 Vdc	DIN Rail
■ DC	1101-724	DRDC 70	70 Vdc	DIN Rail

[datasheet](#)

Class I Div 2 Surge Protection

Product Type	Part Number	Name	Voltage	Mount Type
Data Line	1101-935	ALPU 1000BT CS M	3.3 Vdc	Surface Mount
Data Line	1000-1268	CPX 10/100BT	5 Vdc	Rack Mount
Data Line	1000-1269	CPX T1/E1	5 Vdc	Rack Mount
Data Line	1000-1270	CPX GbE	3.3, 5 Vdc	Rack Mount
Data Line	1101-586	PDS 1	24 Vdc	1/2" pipe
Data Line	1101-587	PDS 2	24 Vdc	1/2" pipe
Data Line	1000-1402	CPX PoE	12, 24, 48 Vdc	Rack Mount
Data Line	1101-933	ALPU PoE 60 M	12, 24, 48 Vdc	Surface Mount
Data Line	1000-1117	CPX GbE PoE	12, 24, 48 Vdc	Rack Mount
Data Line	1101-959	ALPU PTP M	12, 24, 48 Vdc	Surface Mount

[datasheet](#)

Hazardous Product Solutions

<p> AC Protection</p>	 IEP Series	 I2R SA Series	 APEX IMAX	 MCP
<p> DC Protection</p>	 DRDC Series	 DRI Series	 DC Defender Series	
<p> Data Protection</p>	 ALPU Series	 PDS1	 CPX Series	 TSJ Series
<p> RF Protection Certs not required</p>	 TSX Series	 IS-B50LN-C2	 AL-LSXM_MA	

[Brochure](#)

Committed to Service

Meeting our customers' requirements is paramount to our effort in creating highly satisfied customers. We are the only surge protection supplier that offers a full line of personal services, including:

- **Consulting and Site Audits:** More than 30 years of expertise and professional experience in power and grounding consulting, site audits and educational courses for oil and gas customers worldwide.
- **Custom-Engineered Solutions:** Experts in transient technology and standards required for Class I Div 2, ATEX, CSAQ, UL and CE.
- **Tailored Product Expedite (TPE Program):** Designed to provide application-specific surge protection solutions, through modification or enhancement of a current product.
- **Technical Support:** Global engineering services teams available to answer application questions, troubleshoot, or assist in the design and development of a custom solution.
- **Customer Service:** Dedicated inside sales and customer service teams trained in the unique surge protection requirements for energy markets.



Summary

- Hazardous locations: definitions and classifications for each hazardous location.
- Impacts to your business: strain on network infrastructure—surge protection provides insurance to keep networks up and running as well as protects critical electronics.
- Class I Div 2 and hazardous product portfolio: AC, DC, Data Line and RF certified and specked in products to meet your project needs and applications.
- Our commitment to you: PolyPhaser | Transtector provide solutions that reach beyond surge protection to support your business needs and reduce costly downtime.



Our Mission

To provide power management and protection for mission critical systems.

Our Promise to You

Innovative Solutions | Reliable Products | Attentive Customer Service
We are here to assist you in finding the right solution for your needs.

Contact Information

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www.Transtector.com