

eLYTE 2 Wire POTS

Product Information*

Background

eLYTE POTS system provides fundamental isolation protection within hazardous areas, such as power generators, substations, heavy power users, lightning prone areas or where soil conditions provide unsuitable earthing conditions leading to Earth Potential Rise (EPR).

This condition is known to lead to damage not only to customer equipment connected to the incoming copper pair, but also to the Telco providers' exchange equipment. Possible damage to the copper in the ground and other circuits within the cable bundle is also prone to damage in extreme situations.

Any of the above situations can lead to expensive repairs, and time consuming downtime for all involved.

Protection Methods

Suppression

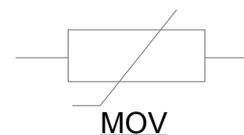
The clamping of the voltages presented to equipment.

This method is used where short high energy impulses are presented to the circuit, Lightning strikes in the region of the circuit contribute to this type of surge.

Protection devices such as MOVs, (Metal Oxide Varistors), GDTs (Gas Discharge Tubes) and Sidactors are proven voltage clamp devices that hold the voltage across them below a set voltage by way of drawing excess current through the copper line. These devices are capable of absorbing large amounts of energy.

Limitations are speed of action, sidactors are the current best option as they are capable of operating very quickly.

Due to action of drawing current through them the copper line can experience very high currents, potentially melting the conductor at a weak point within the circuit, and possibly damaging other circuits in the process.



Restriction

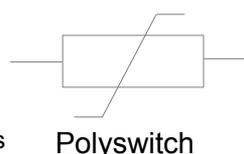
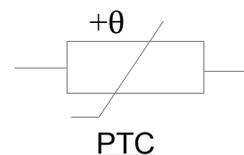
The limiting of the circulating current.

This method is used where high currents are drawn through the circuit usually by mains contact or EPR.

Devices such as PTC (Positive Temperature Coefficient) devices. More recently this device has evolved into what's referred to as a Polyswitch or resettable fuse.

These devices provide a low resistance, typically 10R. When current is passed through the device the temperature increases, this increase in temperature makes the resistance increase to the point the current is reduced.

The Polyswitch device is a refined PTC which has a more defined point of firing and can operate in a much quicker time-frame and provide a greater resistance to protect the circuit.



Both Suppression and Restriction methods are used together to provide protection, but there are limits to its effectiveness in extreme conditions.

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Isolation

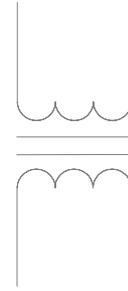
The isolation of the incoming line from the customer equipment.

This method provides a physical barrier between the customer equipment and the incoming line. It negates the need to suppress or restrict voltages or current between the incoming line and the customer equipment.

Utilizes high voltage transformers, (15-25kV) to couple audio signals and the use of opto-isolators for switching and line conditions such as ringing are employed.

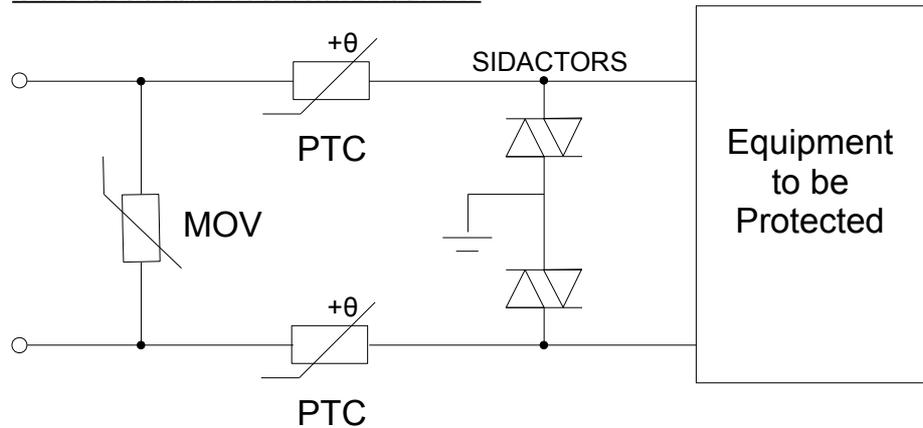
Limitations - Transformers and optocouplers are used to provide a limited level of isolation.

These systems work reliably below 25kV conditions. But can experience failures in isolation barrier leaving the site potentially unprotected. These faults are difficult to identify until it's too late and damage to equipment has occurred.



Transformer

Conventional Protection Network



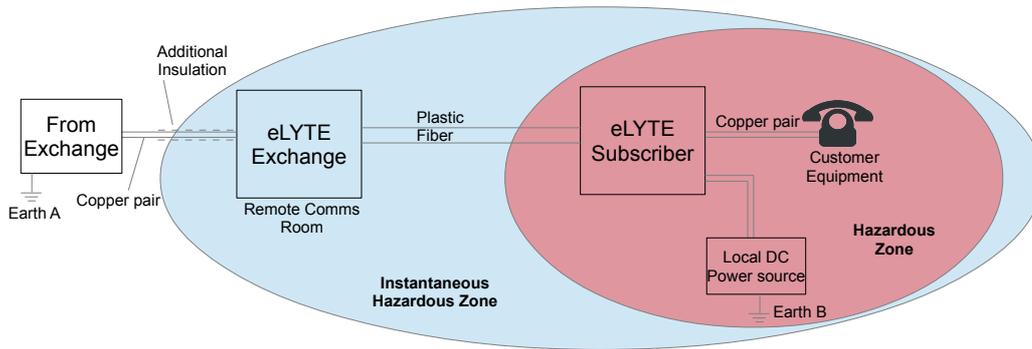
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Optical Isolation

The eLYTE solution.

This is the conversion of copper based signaling and audio signals to fiber based communications which is passed down an optical fiber pair over a distance that provides suitable protection by way of physically separating the incoming copper from the local hazardous voltage, in the order of 100kV per meter.

The fiber based communications are received by a customer card that provides the original copper based circuit to the existing customer equipment.



Typical eLYTE optical isolation installation

Instantaneous conditions such as a substation fault or lightning strikes can increase the hazardous zone to encompass the entire site, including the remote communications room.

Under such situations the incoming copper pair from the Telco requires additional insulation prior to entering the Remote Comms room. The additional insulation can come from the use of a large PVC or acrylic pipe acting as a conduit for the incoming copper pair/bundle into the Remote Comms Room. The Exchange enclosure contains the Isolation Switch unit. When the Isolation Switch Blade which part of the cover is ejected the exchange cards are isolated. The eLYTE enclosure range has been designed to conform to AS/NZS3835 Installation Guidelines.

Limitations

- The customer side equipment requires a local power source to provide POTS functions, preferably a battery backup system would be required to provide reliable service during power failure.
- Exchange fiber range is limited by available power at the exchange card. Total loop resistance is a factor with the amount of power available for fiber transmission.

Plastic fiber solution can operate up to 20meters of plastic fiber.

Multi mode fiber has an effective range of up to 400m – 1500m depending on aperture size of the fiber being used.

Single mode 1310nm fiber model has an effective range of 1.6km

Due to the limitation of eLYTE Exchange power, specific devices are required for the single mode solution.

Note- All solutions still **must** employ suppression and restriction methods of protection as a requirement for safety reasons as defined in specification EN60950.

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The Solution

eLYTE POTS designers at DAVAS Ltd have addressed the limitation of single mode performance and cost by providing an intermediate converter to allow the plastic fiber model to be used with a range of installed fiber materials, including multi mode step or graded indexes at any available wavelength or single mode glass fiber from a few meters to a few hundred kilometers if needed. Any type of installed interface can be provided for - ST,SC,FC,LC,SMA for example. Depending on customer requirements.

Installation sites

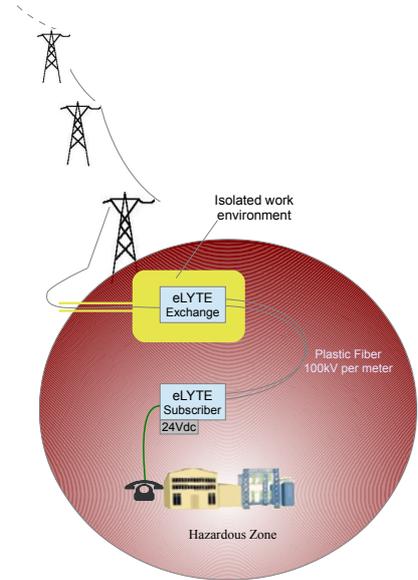
Terminating within the Hazardous Zone

DAVAS have noted an expected change in how hazardous zones are managed and a move to longer distances between the hazardous boundary and the communication demarcation point where the isolation equipment is to be placed to isolate the incoming line from personnel and equipment.

Isolation equipment would be installed in specific enclosures and demarcation areas defined as NO-GO areas, or Isolated Work Environment.

This situation suits plastic fiber, as the distance required to provide suitable isolation may only need to be 0.2m, but could require 1 meter or more. The Isolation Switch unit inside the Exchange enclosure would be required for this type of installation.

These sites are common due to unknown range on influence due to EPR, cost of site installation or size of site available.



Typical Isolation installation employing an Isolated Work Environment

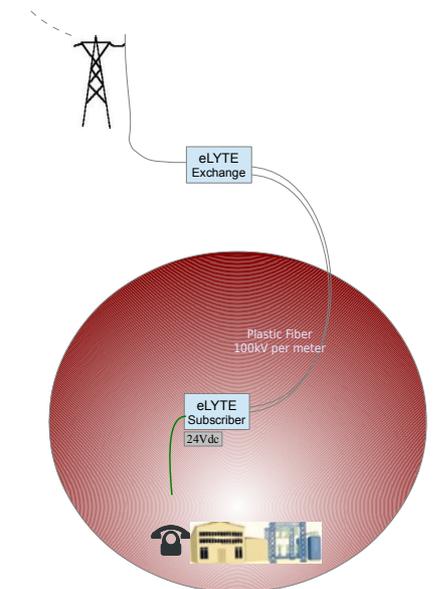
Terminating Outside the Hazardous Zone

Newer sites where the hazardous zone is identified due to geographical analysis and core sampling have allowed for the communications termination room to be located outside the hazardous site and pass glass fiber communication into the hazardous zone. This allows for the communications room to be a safe environment without the need for special equipment or methods to install equipment. It also allows for a more cost effective and more manageable communications installation.

This type of installation usually requires single mode communications devices and equipment to be installed. There should be no need for the Isolation Switch Unit inside the the Exchange enclosure unless required by site practices.

Depending on size of site to be protected and the size of the hazardous zone the length of single mode fiber could be from 10m to several kilometers.

Due to economic realities the cost of single mode fiber has generally become more cost effective to install than the simpler multi mode cable varieties. This allows for future upgrades of equipment to utilize the bandwidth available from single mode fiber.



Typical Isolation installation employing a Remote Comms Room

Given this change in methodology for providing communications to hazardous sites the need for single mode equipment has become more apparent.

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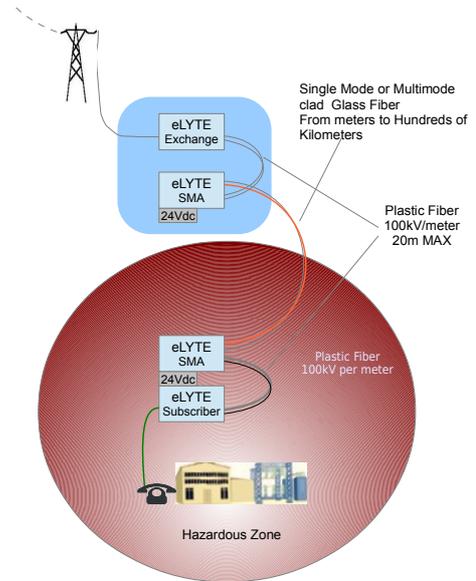
The eLYTE SMA

DAVAS has developed the eLYTE SMA (Single Mode Adapter) to provide for these installations and offers a simple upgrade of installations with the current eLYTE POTS isolation equipment.

The eLYTE SMA utilizes the current plastic fiber low power isolation that is provided by the eLYTE Exchange card and forwards the signal via Single mode glass fiber to a receiving eLYTE SMA adapter that converts the signal back into the Plastic fiber signal for normal operation of the POTS line.

The system calls for two SMA units to be installed, one at each end of the Single mode span and provided with local power at each site.

This allows for the Exchange card to still provide local isolation from incoming POTS line that will provide additional protection from the remote communications site.



eLYTE Isolation installation employing a Remote Communications room and the eLYTE SMA

Varieties of SMA Currently available

		Single Mode Glass Fiber interface option		
		ST	SC	FC
Supply Voltage Option	24V	D905-24ST	D905-24SC	D905-24FC
	48V	D905-48ST	D905-48SC	D905-48FC

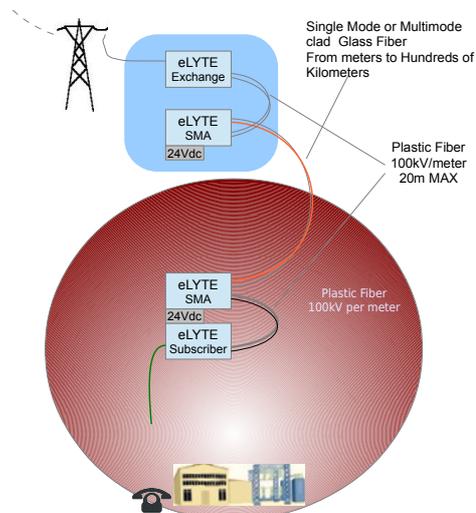
Specifications

Power	D905-24XX - 24Vdc typical 9-36Vdc 180-360mA D905-48XX - 48Vdc typical 36-72Vdc 140-290mA
Plastic Fiber	Utilizing 2mm Plastic fiber connected via Versatile Link.
Glass Fiber	As per customer requirements Single Mode 9/125µm glass fiber terminated to choice of interface types. Multi mode solution available for both Step or Graded fibers, 50/125 µm or 62.5/125µm.
Environmental	Designed for indoor use Operating Temperature range 0°C to 70°C Designed to EN60950 specification Surge and safety (yet to be confirmed by accredited approval body). Designed to EN55022 specification EMC (yet to be confirmed by accredited approval body).
Audio parameters	Not applicable for this product. The eLYTE SMA series does not degrade or interfere with the performance of audio or signaling provided by the eLYTE isolation equipment.

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Installation

Location	The eLYTE POTS card D901/2 can be installed at their respective locations, The Subscriber card (D901) requires local power and can connect to the customer phone, PBX or modem as a normal POTS line.
Single mode fiber	<p>The eLYTE SMA requires two units separated by the installed single mode glass fiber between the communications room outside the Hazardous zone and the second unit installed within the hazardous zone.</p> <p>Each unit requires their own respective power supply.</p> <p>Care to be taken to connect Tx on eLYTE SMA 1 to Rx on eLYTE SMA 2 Rx on eLYTE SMA 1 to Tx on eLYTE SMA 2</p>
Plastic Fiber 1	<p>Plastic fiber is used to connect the eLYTE POTS Subscriber card (D901) to the eLYTE SMA (D905).</p> <p>Care to be taken to connect Tx on eLYTE Subscriber to Rx on eLYTE SMA. Rx on eLYTE Subscriber to Tx on eLYTE SMA.</p>
Exchange pair	<p>The incoming Exchange pair should be treated as hazardous voltage source and due care should be taken against electric shock or energy discharge due to the proximity to the hazardous area.</p> <p>The incoming exchange line is terminated to the eLYTE POTS Exchange card (D902).</p> <p>The eLYTE POTS Exchange card must not have any other conductors connected to it. It must be installed in an physically isolated fashion from surrounding equipment, cabinets or building structures made of any type of metal or earthed structure.</p> <p>Failure to do so may cause serious damage to installed equipment and/or personnel.</p>
Plastic Fiber 2	<p>Plastic fiber is used to connect the eLYTE POTS Exchange card (D902) to the eLYTE SMA (D905).</p> <p>Care to be taken to connect Tx on eLYTE Exchange to Rx on eLYTE SMA. Rx on eLYTE Exchange to Tx on eLYTE SMA. Note Exchange (D902) Rx line requires specialised Rx plastic fiber.</p>



eLYTE Isolation installation employing a Remote Communications room and the eLYTE SMA

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