

# ViaLite Serial Digital Fibre Optic Modem

User Manual

LSx-x2-HB-5

CR2874

14/04/11





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## Instrument Care and Safety Information

*Please read the whole of this section before using your **ViaLite** product. It contains important safety information and will enable you to get the most out of your link.*

### Electrical Safety



The **ViaLite** Power Supply Units are Safety Class 1 products (having a metal case that is directly connected to earth via the power supply cable).

When operating the equipment note the following:

- Hazardous voltages exist within the equipment. There are no user serviceable parts inside, and the covers should only be removed by suitably qualified personnel.
- The equipment does not have an isolating switch on the mains inlets. Equipment must be installed within easy reach of a clearly labelled dual pole mains isolation switch.
- Make sure that only fuses of the required rated current, and of the specified type (anti-surge, quick blow, etc.) are used for replacement.

### Optical Safety



The **ViaLite** Serial Digital Fibre Optic Modems contain laser diode sources operating at 1310nm. These devices are rated at under IEC825-1 “Safety Of Laser Products”, Part 1, First Edition, 1993 as CLASS 1 radiation emitting devices.

When operating the equipment note the following:

- Never look into the end of an optical fibre directly or by reflection either with the naked eye or through an optical instrument.
- Never leave equipment with radiating bare fibres accessible – always cap the connectors.
- Do not remove equipment covers when operating.
- Details of optical connections to the units, compatible fibre types and care instructions can be found in the **ViaLite** system handbook. Please read this section before using the link.

**Adjustment, maintenance and repair of the equipment should only be carried out by suitably qualified personnel.**

**For more information on the **ViaLite** range of products, please refer to the generic **ViaLite** system handbook Lxx-HB.**

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# 1 Introduction

The **ViaLite** Serial Digital Fibre Optic Modem is a family of fibre optically coupled link systems designed for the Full Duplex transmission of DC Coupled RS422/485/232 and TTL signals over long distances in electrically noisy environments.

This handbook covers the following **ViaLite** Serial Digital Fibre Optic Modem part numbers:

- Modem units with part numbers starting LSX-K2
- Modem units with part numbers starting LSX-L2
- Modem units with part numbers starting LSX-M2

The LSX series links comprise two Modems linked by two fibre optic cables.

The fibre optical cable is single mode fibre type depending on span length, and uses FC/APC or E2000/APC (OEM module only) type connectors.

## Care of Fibre Optic Connectors

NB: When the fibre optic cables are not connected, it is essential that the cable and equipment connectors are protected by the dust caps provided with the system. Failure to do so may result in damage to the fibre ends, which are critical to the system performance.

# 2 Setting up and Understanding the Modem

This section describes the connections between your Serial Digital Fibre Optic Modems, and the operation in a system.

Please read fully document Lxx-HB for information on installing your **ViaLite** equipment before commissioning your system.

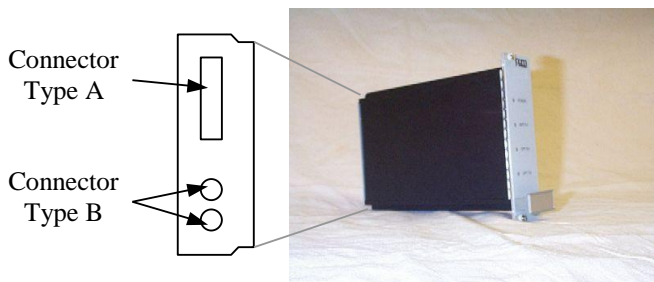
## 2.1 Module Formats

### 2.1.1 Plug-In Modules

The plug-in modules are designed for use in PPM's **ViaLite** 19" rack chassis. The module is powered from the rack chassis backplane and all connections are on the rear panel (see below).

Connector A is a DIN 41612 backplane connector providing power, data access and connectivity to the module alarm outputs.

Connectors B are FC/APC receptacles. These are the optical connections for linking the Modems together.



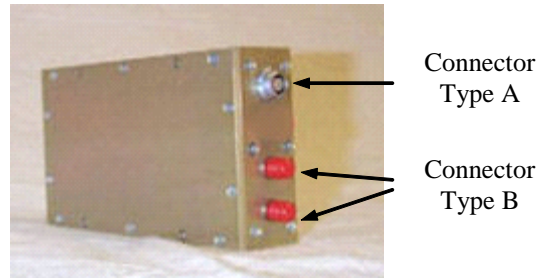
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## 2.1.2 Shielded Remote Modules

The shielded remote modules are designed for use in electrically harsh environments and can withstand high electromagnetic fields. There are two types of connector on the front panel of the unit (see below).

Connector A is a Lemo multi-contact connector. This connector provides power and data to the unit.

Connectors B are FC/APC receptacles. These are the optical connections for linking the Transceivers together.

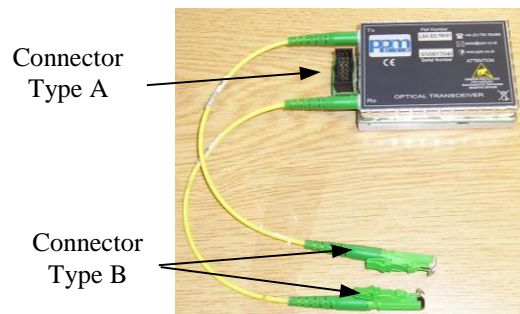


## 2.1.3 OEM Modules

Compact OEM modules are designed for integration into the host systems.

Connector A is 14 pin IDC connector providing power, data access and connectivity to the module alarm outputs.

Connectors B are E2000/APC or FC/APC types. These are the optical connections for linking the Modems together.



## 2.2 Fibre Optic Cable & Connectors

### 2.2.1 Connector and Cable Types

All **ViaLite** Serial Digital Fibre Optic Modems use singlemode (8µm/125µm) fibre cables terminated with either FC/APC or E2000/APC optical connectors. Cross-site cables are available in light (3mm O/D) and heavy-duty (8mm O/D) variants.

**FC/APC is a standard for angle-polished connectors and must not be confused with standard FC/PC connectors. The two connector-types are not interchangeable and mating one with the other will damage both the cable and the module connectors.**

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## 2.2.2 Connecting and Disconnecting

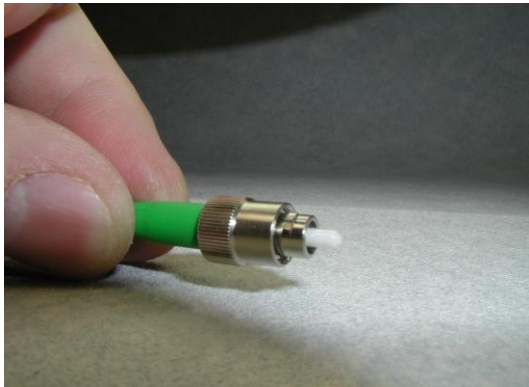
Before connecting optical fibres to the module or to each other, ensure that the mating connectors are clean (see below).

To connect FC/APC optical connectors, remove the dust caps and align the centre ferrule on the cable connector with the receptacle. There is a lug on the side of the ferrule, which must match the gap in the receptacle shroud. When they are in alignment, push the plug gently home and finger tighten the knurled collet onto the threaded receptacle. See Figure 1 below.

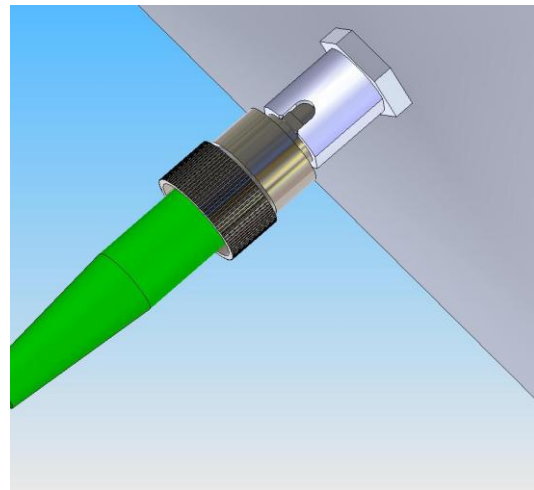
To disconnect FC/APC connectors, unscrew the knurled collet on the plug and gently withdraw the plug. Replace the dust caps on both the receptacle and the cable plug.

Figure 1

(a) showing FC/APC connector with dust cap removed, (b) showing alignment of the lug on the side of the ferrule, which must match the gap in the receptacle shroud before gently pushing the plug home and finger tightening the knurled collet nut onto the threaded receptacle.



(a)



(b)

### 2.2.3 Care and Cleaning

See **ViaLite** System Handbook Lxx-HB. A fibre cleaning kit is available from PPM for use with these modules.

### 2.2.4 Minimum Bend Radius

Because the optical fibre is made of glass, it is important not to subject it to too much bending. For this reason, each kind of fibre has a minimum bend radius (MBR) specification, beyond which the cable cannot be bent without damage occurring.

MBR specifications for PPM fibre are given in the **ViaLite** System Handbook Lxx-HB.

## 2.3 Using the Modem Module

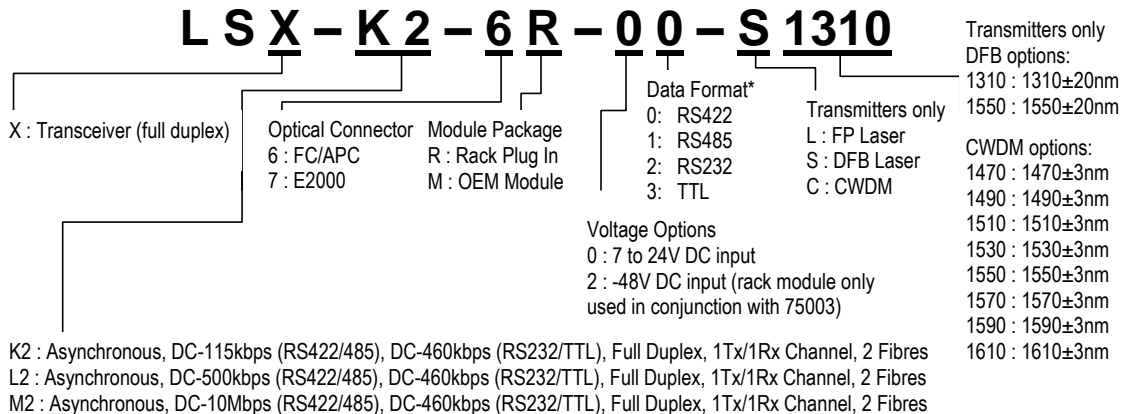
### 2.3.1 Data/Signal Connection

The user's signal is applied to the PWR/Data Connector on the Modem Module. Maximum ratings for this input are given in the technical specifications in section 0.

The Modem units are set up at the factory to present a load impedance of 120Ω across the RS422/485 IN+/- terminals. If your application requires an open circuit termination, refer to Appendix I for details

Digital data is available on the multi way connector on the front panel of shielded, the D15 connector of rack plug-in converter sleeve and IDC 14pin connector on the OEM modules.

The figure below summaries various types and options of the Modem family.



\*Please note that data format must be selected when ordering this module.

Depending on which types of the module you have, the following pin-out tables can be selected and used for connections into your system.

<b>Plug-in Module D15</b>	
<b>Pin</b>	<b>Function</b>
1	RS422/485 OUT+
2	RS422/485 OUT-
3	RS232/TTL OUT
4	Rx Optical Detect
5	Backplane Alarm
6	Power Supply
7	NC
8	Ground
9	RS422/485 IN+
10	RS422/485 IN-
11	RS232/TTL IN
12	Tx Optical Detect
13	Backplane Alarm
14	NC
15	Ground

<b>Shielded Module Lemo1B</b>	
<b>Pin</b>	<b>Function</b>
1	Backplane Alarm
2	RS422/485 OUT+ or RS232/TTL OUT
3	RS422/485 OUT-
4	Ground
5	Power Supply
6	RS422/485 IN+ or RS232/TTL IN
7	RS422/485 IN-
8	RTS RS485

<b>OEM Module IDC14</b>	
<b>Pin</b>	<b>Function</b>
1	RS422/485 IN+
2	RS422/485 OUT+
3	RS422/485 IN-
4	RS422/485 OUT-
5	Alarm
6	RTS RS485
7	Power Supply
8	Ground
9	RS232/TTL OUT
10	RS232/TTL IN
11	Ground
12	Tx Optical Detect
13	NC
14	Rx Optical Detect

### 2.3.2 Front Panel Indicators

For rack plug-in and shielded modules, the modem module has a number of front panel LEDs for indication of the state of the module. The following table shows the operation of the front panel LEDs :

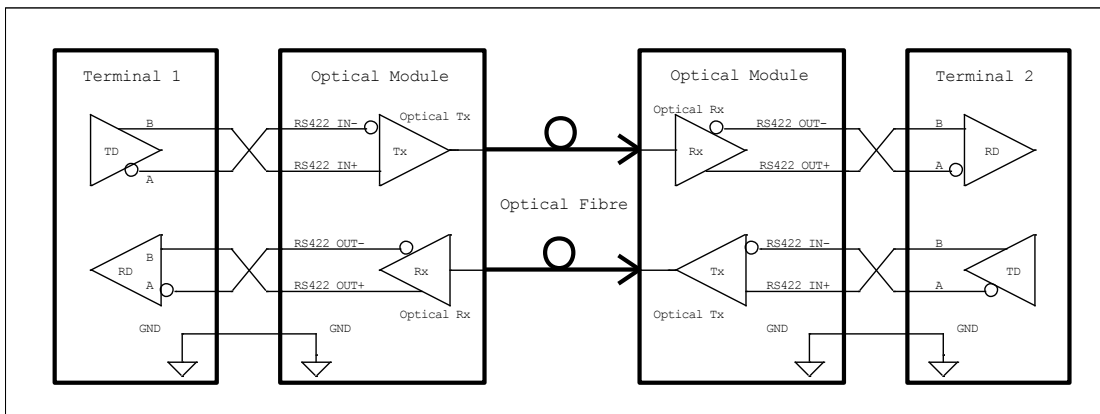
	<b>Power LED</b>	<b>Status LEDs</b>
<b>OFF</b>	Unit Off	Idle
<b>GREEN</b>	Unit OK	
<b>GREEN (flashing)</b>		Traffic Present

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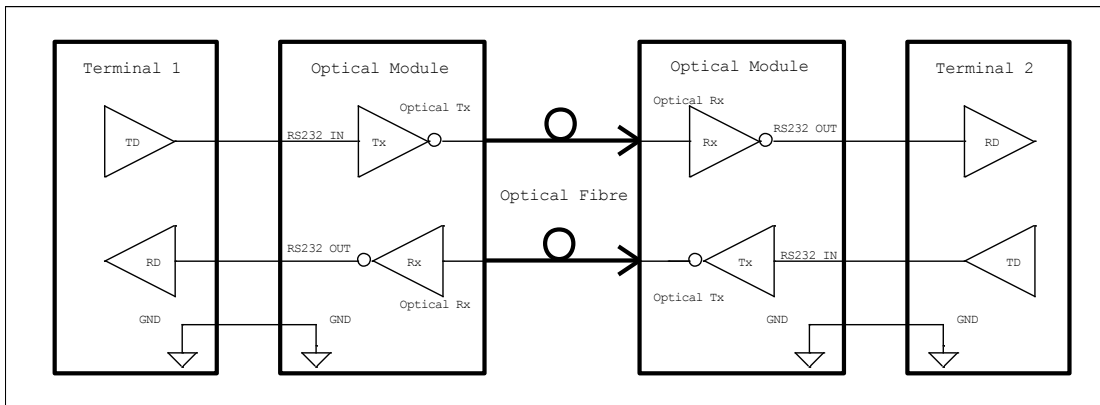
## 2.4 Recommended System Connections

The following connections are recommended by PPM for best performance from the optical modules and apply to all types of module packages listed in this document. Since the optical path is shared between RS422 and RS232 interfaces, only one signal can be transmitted through the optical link at one time.

### 2.4.1 RS422



### 2.4.2 RS232



Note that there must be a signal ground connection between the optical module and the terminal for correct signalling.

## 2.5 Specifications

Parameter	Shielded	Rack Plug-in	OEM Module
Module operating voltage and power	<0.5W at 12VDC $\pm$ 0.5VDC	<0.5W at 12VDC $\pm$ 0.5VDC	<0.5W at 7VDC to 24VDC (wide range input voltage allowed)
Electrical Signal/Power Connector	Lemo 8 pin 1B Socket on SSM Front Panel.	User accessible 15-way D-Type Female via 19" Rack Shelf backplane	14 Pin IDC Connector
Optical Connections	FC/APC Singlemode	FC/APC Singlemode	FC/APC or E2000/APC
Indicators	Front Panel LED "Power" Front Panel LED "Opt Tx 1" Front Panel LED "Opt Rx 1" etc.	=	No
Alarms	Power supply	=	=
Data Channels	DC to 10Mbps NRZ, asynchronous RS422/485, or DC to 460kbps NRZ asynchronous RS232/TTL	=	=
Data Format	RS422/485/232 and TTL	=	=
Data Input Impedance	Default 120 $\Omega$ for RS422/485, $\geq$ 3k $\Omega$ for RS232/TTL	=	=
Absolute Maximum Input/Output Signal Lines Surge Protection	Driver Output Voltage $\pm$ 13V Receiver Input Voltage $\pm$ 25V	=	=
Maximum Consecutive Same Symbol (NRZ)	$\infty$	=	=
Duty Cycle Distortion	<5% @115kbps	=	=
Bit Error Rate	<1 in 10 <sup>8</sup>	=	=
Delay	<5 $\mu$ s with 1m fibre Add 5ns/m of fibre optic cable	=	=
Optical Path Length	1m to 250m MM 1m to 20km SM	=	=
Optical Power Budget	10dB Typical fibre losses: Fibre: 0.4dB/km Connectors: 0.5dB max. Fusion Splices: 0.1dB max.	=	=
Jitter	<10mUI(RMS), 100mUI(p-p)	=	=
Output Rise/Fall Time	<25ns@10Mbps	=	=

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### **3 Maintenance and Fault-Finding Guide**

Refer to the following table that gives a list of commonly encountered problems and suggested solutions.

Fault	Possible Causes	Solution
“+12V” LED is not illuminated on the Rack Mount PSU.	Power is not attached to the PSU.	Connect mains power to the PSU.
	Fuse has blown in PSU.	Replace fuse.
Power LED does not light on Shielded Satellite Module.	Power source not connected.	Connect power source.
Channel LED is flashing GREEN, but link not passing data.	Connector wiring is not correct.	Check wiring interface to user equipment.

In the event of any problems or queries about the equipment, contact PPM or your local agent.

### **4 Product Warranty**

The Company guarantees its products, and will maintain them for a period of three years from the date of shipment and at no cost to the customer. Extended warranty options are available at the time of purchase.

Please note that the customer is responsible for shipping costs to return the unit to PPM.

The Company or its agents will maintain its products in full working order and make all necessary adjustments and parts replacements during the Company’s normal working hours provided that the Customer will pay at the rates currently charged by the Company for any replacements made necessary by accident, misuse, neglect, wilful act or default or any cause other than normal use.

Claims must be made promptly, and during the guarantee period.

**IMPORTANT: -**

**Please contact both your selling agent and PPM prior to returning any goods for Warranty or Non-Warranty repairs. Goods will not be accepted without a valid Goods Return Number (GRN).**

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## 5 Appendix I: RS422 Input Termination

The RS422/485 modems are set to present a 120Ω input across the RS422/465 IN+ and RS422/485 IN- terminals. In certain applications, it may be desirable to have an open circuit load across these two terminals.

If you wish to change the input impedance, follow the instructions below.

CAUTION: The **ViaLite** Serial Digital Modems contain components that are sensitive to Electrostatic Discharge (ESD). Follow ESD precautions throughout this procedure.

CAUTION: The **ViaLite** Serial Digital Modems contain fragile optical fibres. Take care not to damage these fibres during this procedure.

### **Remove the Lid/Cover**

#### **Rack Mount Module**

- Switch the Rack On/Standby switch to Standby.
- Remove the module from the rack by removing the top and bottom front panel screws.
- Remove the two cross-head fixings from the rear panel of the Rack Mount Module.
- The rear panel and PCB assembly may now be carefully removed from the cover.

#### **Shielded Module**

- Remove power connections from the shielded module.
- Remove all 10 lid fixing screws – do not remove the front panel fixing screws – and carefully remove the lid.

#### **OEM Module**

- Remove power connections from the OEM module.
- Remove the lid and be careful about fibre coils.

### **Set the Modem**

R49 of 0805 size determines the input impedance of the receiver. Leave it in place for 120Ω termination and remove it by de-soldering for high impedance.

### **Replace the Lid/Cover**

The lid or cover is replaced by reversing the above procedure.

**Take extreme care not to damage the fragile optical fibres during this process.**

## 6 Appendix II: Wiring Options

For details of the Rear Bulkhead and other Rack accessories, consult your System Handbook (Lxx-HB) or consult PPM or your local representative.

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