ViaLite
10/100/1000Mb/s Ethernet Optical Transceiver

User Manual

LSX-Ex-HB-3

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Pulse Power & Measurement Ltd, 65 Shrivenham Hundred Business Park, Watchfield, Swindon, Wiltshire SN68TY, UK
Tel +44 (0)1793 784389 Fax +44 (0)1793 784391 Email sales@ppm.co.uk www.vialite.co.uk

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 servicable 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*** Ethernet Optical Transceiver modules contain laser diode sources operating from 1270nm to 1610nm. 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*** 100Mb/s Ethernet Optical Transceiver and 10/100/1000Mb/s Ethernet Optical Transceiver are optically coupled link systems that offers a way to incorporate fibre into a Ethernet network, allowing implementation of a transparent Ethernet segment over long distances and in electrically noisy or secure environments.

This handbook covers the following ***ViaLite*** 100Mb/s Ethernet Optical Transceiver and 10/100/1000Mb/s Ethernet Optical Transceiver part numbers:

- Transceiver units with part numbers starting LSX-E2 (100Mb/s only) and LSX-E4 (10/100/1000Mb/s auto negotiating)
- Optical fibre interconnects with part numbers starting F6 or F7
- The D-Type-to-RJ45 converter cable, 73636

The Ethernet optical links comprise two Transceivers linked by two Fibre Optic Cables.

The Fibre Optic Cable is single mode fibre type depending on span length, and uses FC/APC type or E2000/APC 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 & Understanding the Transceiver

This section describes the connections between your Ethernet Optical Transceiver Modules, and the operation of both units in a system.

Please read fully, the document Lxx-HB for information on installing your ***ViaLite*** equipment before commissioning your Ethernet optical link system.

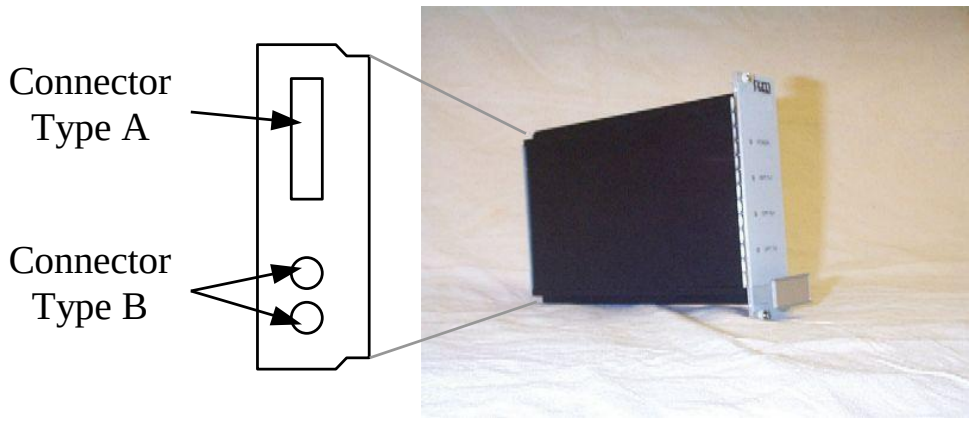
Please note that Ethernet Optical Transceiver Modules with part numbers beginning LSX-E2 and LSX-E4 are not compatible and cannot be used for form a working fibre optic link.

2.1 Physical Layout of the Transceiver

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 of the Transceiver (see below).

Connector A is a DIN 41612 backplane connector providing power and Ethernet connectivity to the module.

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

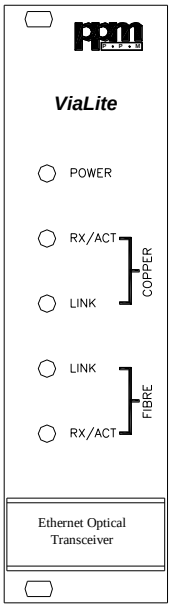


Connections on the rear of the Transceiver.

A short RJ45 to D-connector adapter cable (73636) is supplied with the Transceiver module. This is used to connect a standard Ethernet cable to the module via the respective D-connector situated on the rear of the ***ViaLite*** 19" rack chassis.

The adapter cable is terminated with a male RJ45 connector. An in-line RJ45 coupler may be used to connect this cable to a standard male RJ45-terminated Ethernet cable.

The Transceiver module features a set of LEDs, located on the front panel, that convey essential status information.



2.2 Fibre Optic Cable & Connectors

2.2.1 Connector and Cable Types

All ***ViaLite*** Ethernet Transceiver modules use singlemode (9µm/125µm) cable terminated with either FC/APC or E2000/APC optical connectors. Cross-site fibre optic cables are available from PPM as either standard patch leads or heavy-duty multicore cables.

Warning!
FC/APC and E2000APC are standards for angle-polished connectors and must not be confused with standard FC/PC and E2000 connectors respectively. The two connector-types are not interchangeable and mating one with the other will damage both the cable and the module connectors.

The specification of the FC/APC and E2000APC optical connector is critical to the performance of the complete fibre optic link. System performance can only be guaranteed with fibre optic cables and connectors supplied by PPM. FC/APC connectors must be "narrow key width" (see technical specification).

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).

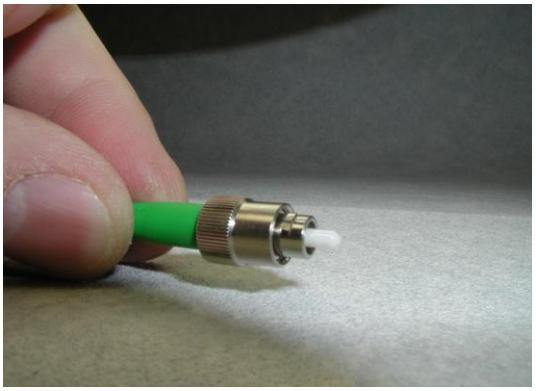
2.2.2.1 FC/APC

To connect FC/APC optical connectors, remove the dustcaps and align the white ceramic 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 aligned, gently push the plug home and finger tighten the knurled collet nut onto the threaded receptacle. See Figure 1 below.

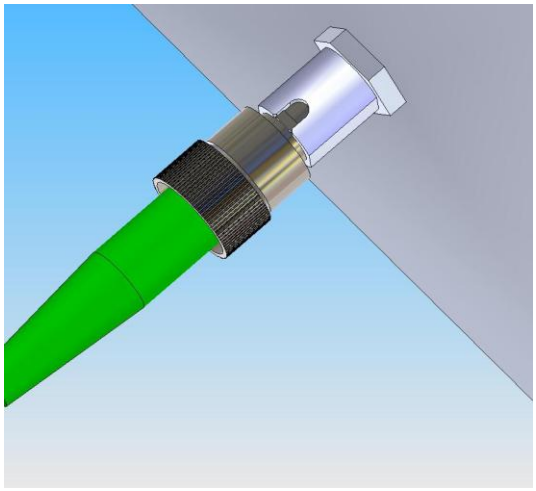
To disconnect FC/APC connectors, unscrew the knurled collet on the plug and gently withdraw the plug. Replace the dustcaps on both the receptacle and the cable plug.

Warning!
It is possible to tighten the knurled collet without aligning the lug and gap. This will result in poor light transmission. Check that the lug and gap are aligned before tightening the knurled collet.

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 tighten the knurled collet nut onto the threaded receptacle.



(a)



(b)

2.2.2.2 E2000/APC

To connect E2000/APC optical connectors, simply push the connector positively into the receptacle until a click is heard. The protective shutter will automatically lift as the connector is mating.

To disconnect E2000/APC connectors, depress the lever on the connector to disengage, then withdraw the connector from the receptacle. The shutter is spring-loaded and should spring back to protect the ferrule.

Care and Cleaning
The optical connectors should be cleaned **before each and every use**, even where they have been protected with dust caps.

Cleaning items required
- Lint free fibre cleaning tissues and/or cleaning sticks(normal cosmetic tissues produce dust and are not acceptable);
- Reagent grade Iso Propyl Alcohol;
- Air duster or FILTERED compressed air line.

Cable Connector Cleaning
- Dampen a patch of cleaning tissue with IPA and clean all surfaces of the plug ferrule.
- Using a dry cleaning tissue, dry the ferrule and polish the end face.
- Using the air duster, blow away any residue from the end of the connector.

Module Female Receptacle Cleaning (only recommended if problems are being experienced)
- Either use a cleaning stick or twist a cleaning tissue to form a stiff probe, and moisten with IPA. Gently push the probe into the receptacle and twist around several times to dislodge any dirt.
- Repeat the above process with a dry tissue.
- Using the air duster, blow away any residue from the receptacle.

Important Notes

- IPA is flammable. Follow appropriate precautions / local guidelines when handling and storing.
- IPA can be harmful if spilt on skin. Use appropriate protection when handling.
- It should only be necessary to clean the female receptacles on the modules if problems are being experienced.

Never inspect an optical fibre or connector with the naked eye or an instrument unless you are convinced that there is no optical radiation being emitted by the fibre. Remove all power sources to all modules, and completely disconnect the optical fibres.

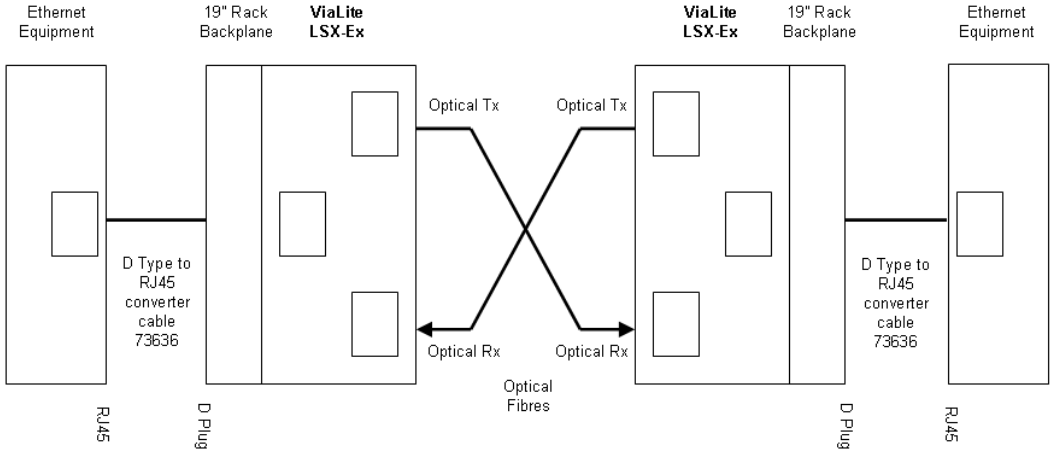
2.2.3 Minimum Bend Radius

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

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

2.3 Using the Ethernet Optical Transceiver

An Ethernet connection is made to each Transceiver at the respective D-connector on the rear of the ***ViaLite*** 19" rack chassis, via the RJ45 to D-connector adapter cable together with the RJ45 coupler.



Two fibre optic cables are necessary for the operation of the Ethernet Optical Link. Connect the optical fibre connector marked *T* on one module to *R* on the other module, and vice-versa.

Note: It is not possible to establish a link by connecting a 100Mb/s Ethernet Optical Transceiver to a 10/100/1000Mb/s auto switching Ethernet Optical Transceiver as the fibre interfaces are incompatible. To establish a successful working link, two modules with the same speed specifications must be used.

2.3.1 Front Panel Indicators

The Transceiver has a number of front panel LEDs for indication of essential status information of the module. The following table shows the operation of the front panel LEDs :

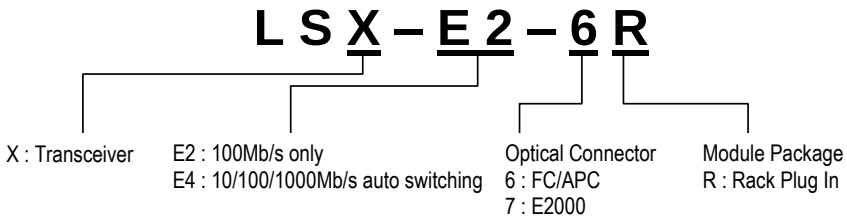
100Mb/s Ethernet Optical Transceiver

	LED	Function
	Pwr	Illuminates to indicate power supply to the Transceiver.
Fibre Port	**LINK**	Steady ON when both of the attached fibres are operational at opposite ends, and blinking when receiving a remote fault signal from the other end.
	RX/ACT	Blinking indicates receiving packets.
Copper Port	**LINK**	Steady ON when the attached Ethernet cables are operational at their respective other ends.
	RX/ACT	Blinking indicates receiving packets.

10/100/1000Mb/s Auto Switching Ethernet Optical Transceiver

	LED	Function
	Pwr	Illuminates to indicate power supply to the Transceiver.
Fibre Port	**LINK**	Steady ON when port is running at 1000Mb/s (default). OFF when port is running at 10/100Mb/s.
	RX/ACT	Steady ON for LINK (LK) with no traffic. Blinking for activity.
Copper Port	**LINK**	Steady ON when port is running at 1000Mb/s (default). OFF when port is running at 10/100Mb/s.
	RX/ACT	Steady ON for LINK (LK) with no traffic. Blinking for activity.

3 Part Numbering



Note – the standard module has 1310nm laser, but 1550nm and CWDM lasers are also available for long haul applications, please contact PPM for part numbers.

Important Note - Ethernet Optical Transceiver Modules with part numbers beginning LSX-E2 and LSX-E4 are not compatible and cannot be used for form a working fibre optic link.

4 Transceiver Specifications

	Ethernet E4 Rack Module	Ethernet E2 Rack Module
Data Format		
Data Rate	10/100/1000 Mb/s (auto negotiating)	100 Mb/s (fixed)
Network Standards	Fast Ethernet IEEE 802.3u (10/100/1000BASE-TX, 1000BASE-FX) Full duplex, two fibres	Fast Ethernet IEEE 802.3u (100BASE-TX, 100BASE-FX) Full duplex, two fibres
Module Format		
Module Function	10/100/1000Mb/s Optical Ethernet Transceiver	100Mb/s Optical Ethernet Transceiver
Indicators	Front Panel LED “Power” Front Panel LED “Copper RX/ACT ” Front Panel LED “Copper LINK ” Front Panel LED “Fibre RX/ACT ” Front Panel LED “Fibre LINK ”	Front Panel LED “Power” Front Panel LED “Copper RX/ACT ” Front Panel LED “Copper LINK ” Front Panel LED “Fibre RX/ACT ” Front Panel LED “Fibre LINK ”
Plug-in Module Electrical Signal/Power Connector	User accessible 15-way D-type Female via 19” Rack Shelf backplane	User accessible 15-way D-type Female via 19” Rack Shelf backplane
Module Operating Voltage and Power	4W at +12V ± 0.5V Typical	4W at +12V ± 0.5V Typical
Operating Conditions		
Operating Temperature	0°C to +50°C	0°C to +50°C
Storage Temperature	-40°C to +80°C	-40°C to +80°C
Ambient Relative Humidity	10% to 95% (Non Condensing)	10% to 95% (Non Condensing)
Optical Characteristics		
Output Power	Class 1	Class 1
Wavelength	1310+/-20nm (1550nm and CWDM wavelength options)	1310+/-20nm (1550nm and CWDM wavelength options)
Fibre	Singlemode 9/125, Corning SMF28 or equivalent	Singlemode 9/125, Corning SMF28 or equivalent
Optical Connector	FC/APC	FC/APC
Optical Path Length	0m to 20km for 1310nm, with single-mode fibre	0m to 20km for 1310nm, with single-mode fibre
Optical Power Budget	10dB (Typical fibre losses: Fibre: 0.4dB/km; Connectors: 0.5dB max.)	10dB (Typical fibre losses: Fibre: 0.4dB/km; Connectors: 0.5dB max.)

5 Maintenance and Fault-Finding Guide

5.1.1 Troubleshooting Chart

Fault	Possible Causes	Solution
"+12V" LED is not illuminated on the Rack Mount PSU.	• Power is not attached to the PSU. • Fuse has blown in PSU.	• Connect mains power to the PSU. • Replace fuse.
"Power" LED is not illuminated on the Ethernet Transceiver.	• Module is not receiving power from the Rack Mount PSU.	• Check operation of the PSU.
Link LED is steady off	• Port is not receiving link signal from device at remote end of cable.	• Confirm that remote unit is switched on and connected with working cable.

Most network problems are attributable to wiring and connector problems. Check all cables and connectors to ensure that they have been properly connected, and that they have not been damaged during installation.

6 Product Warranty

PPM 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.

PPM or its agents and distributors will maintain its products in full working order and make all necessary adjustments and parts replacements during normal working hours provided that the Customer will pay at the rates currently charged by PPM 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).

Appendix I: D-Connector Pin Assignments

Module Pin Connections

Connector Type: 15-pin D-Sub Socket

Connections are shown below:

D-type pin No.	Description
1	Orange/white wire from RJ45 connector
2	Green/white wire from RJ45 connector
3	Blue/white wire from RJ45 connector
4	Brown/white wire from RJ45 connector
5	
6	
7	
8	
9	Orange wire from RJ45 connector
10	Green wire from RJ45 connector
11	Blue wire from RJ45 connector
12	Brown wire from RJ45 connector
13	
14	
15	

PPM LTD., 65 SHRIVENHAM HUNDRED BUSINESS PARK, SWINDON, SN6 8TY, UK.
TEL: +44 1793 784389 FAX: +44 1793 784391
EMAIL : INFO@PPM.CO.UK WEBSITE : WWW.PPM.CO.UK