

LV 2000



www.metrodata.co.uk

**Metrodata LV2000
Ethernet LAN to EIA-644 LVDS
Converter Installation Guide**

Metrodata Ltd
Fortune House
Crabtree Office Village
Eversley Way
Egham
Surrey TW20 8RY
United Kingdom

tel: +44 (0) 1784 744700
fax: +44 (0) 1784 744730
email: sales@metrodata.co.uk
website: www.metrodata.co.uk

Part No: 76-02-063B

1 INTRODUCTION

1. 1 About the LV2000

The Metrodata LV2000 is used to extend a LAN segment over an LVDS network connection, such as a satellite modem across a satellite link to a remote site. LAN data is adapted to a synchronous format using HDLC as a transport mechanism. Frame integrity is ensured by appending a 16 bit FCS to the LAN packet before transmission. At the far end, incoming packet integrity is checked using the 16 bit FCS, which is stripped for good packets before forwarding to the LAN port. If the FCS is incorrect, the packet is discarded.

The LV2000 has an auto-negotiating 10/100BaseT Ethernet port and an EIA-644 LVDS DTE port for LVDS connection mounted on the rear panel of the unit. The maximum speed of the LVDS DTE port is 52 Mbps.

LV2000 units are used in pairs or in conjunction with other Metrodata Extension products, such as the WAN-in-a CAN (WC1000) or the LH1000.

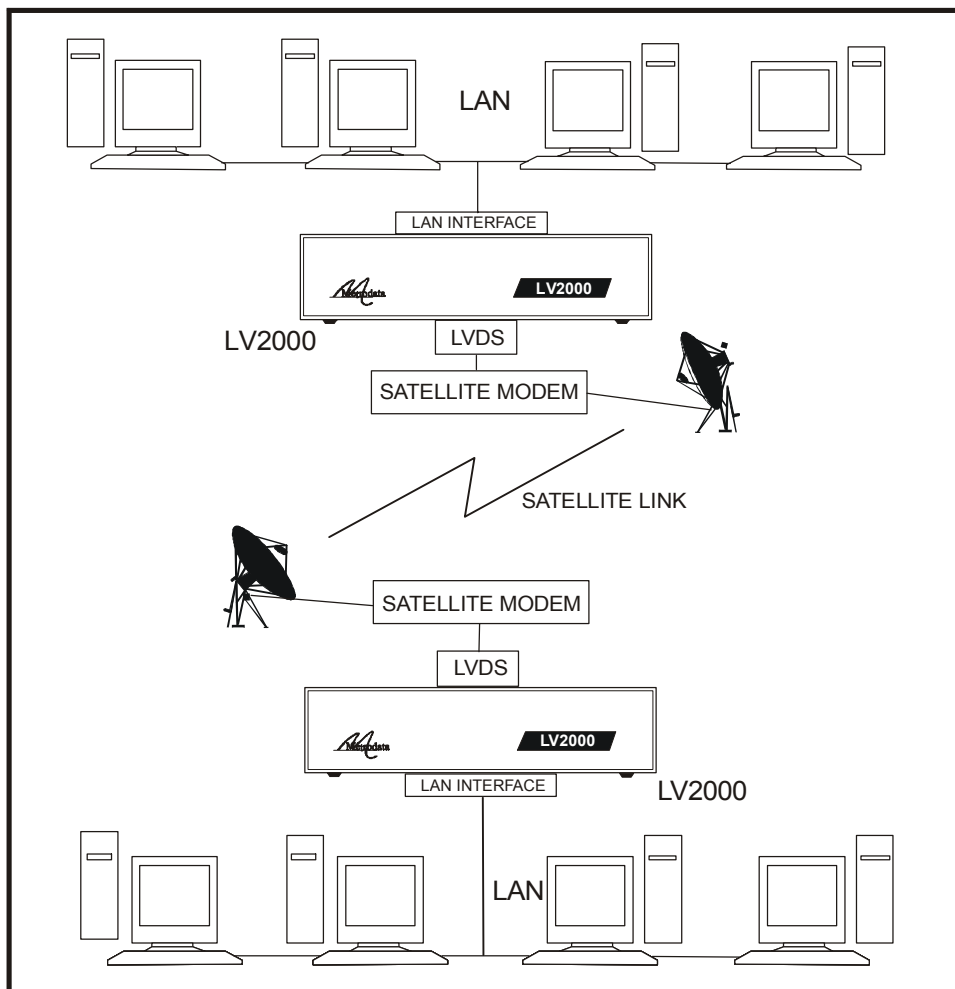


Figure 1. 1 LV2000 installation

The LAN interface performs address learning and filtering and will discard all errored packets, including short (runt) packets and FCS errored packets.

The LAN interface supports VLAN tagged frames and will forward frames sized up to 1536 bytes. Frames longer than this are discarded.

There is usually an LV2000 at each end of the link, and maximum efficiency is achieved by not transmitting the 4 byte FCS field of the MAC frame end to end, but recalculating it before transmission at the far end.

The theoretical maximum performance of the LV2000 at standard network speeds is given below. Note that a variable number of flags are set between frames, depending on the line speed.

Data rate Mbps	Flags between frames	Performance without FCS in pkts/sec
51.840	7	93913

Figure 1. 2 Performance of LV2000

1. 2 Safety

The LV2000 should not be connected to cabling which would be required by BS6701 to be equipped with over-voltage protection. The following ports are designated SELV (Safety Extra Low Voltage) within the scope of EN41003:

10/100 BaseT Ethernet port
EIA-644 LVDS DTE port (maximum speed 52 Mbps)

These ports should only be connected to SELV ports on other equipment in accordance with EN60950 clause 2.3.

1. 3 Electromagnetic Compatibility

In order to ensure EMC compliance all signal and data cables and connectors must use a screened connector shell with a screened cable. The cable screen must be terminated to the screened connector shell and not connected to any pins of the connector. Failure to use the correct connector may compromise EMC compliance.

1. 4 EN55022 Declaration

The LV2000 is a Class A product. In a domestic environment it may cause radio interference in which case the user may be required to take adequate measures.

1. 5 FCC Declaration

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at its own expense.

1. 6 RoHS Compliance

The LV2000 is compliant with the EU RoHS directive 2002/95/EC. The RoHS directive bans the use of six hazardous materials in products placed on the market after July 1st 2006. The six banned materials are Lead, Mercury, Hexavalent Chromium, Polybrominated Biphenyls, Polybrominated Diphenyl Ethers and Cadmium.

To ensure product reliability, the RoHS directive exempts Network Infrastructure Equipment including the LVXX00 product range, allowing the use of standard leaded solder; as such the LVXX00 range is manufactured using leaded solder.

1. 7 Power Supply

The LV2000 is powered by an internal mains-fed power supply. The input voltage is 100-250VAC, 50/60Hz with an input current of 50 mA. An alternative unit fitted with a nominal -48VDC power supply is available, the supply definition being minus 36 to minus 72VDC, 200-100mA.

The LV2000 must be connected to safety earth for correct operation. The LV2000 power supply should be connected to a supply socket that is physically located close to the LV2000 and is easily accessible.

Safety Notes: Excessive voltages are present inside the unit. There are no user serviceable parts inside the unit, and the cover should not be removed by unqualified personnel. The unit must not be exposed to damp or condensing conditions.

2 LV2000 DESCRIPTION OF PARTS

2.1 Rear panel

All connections into and out of the LV2000 are made through the rear panel which is shown in schematic form for both AC and DC models below.

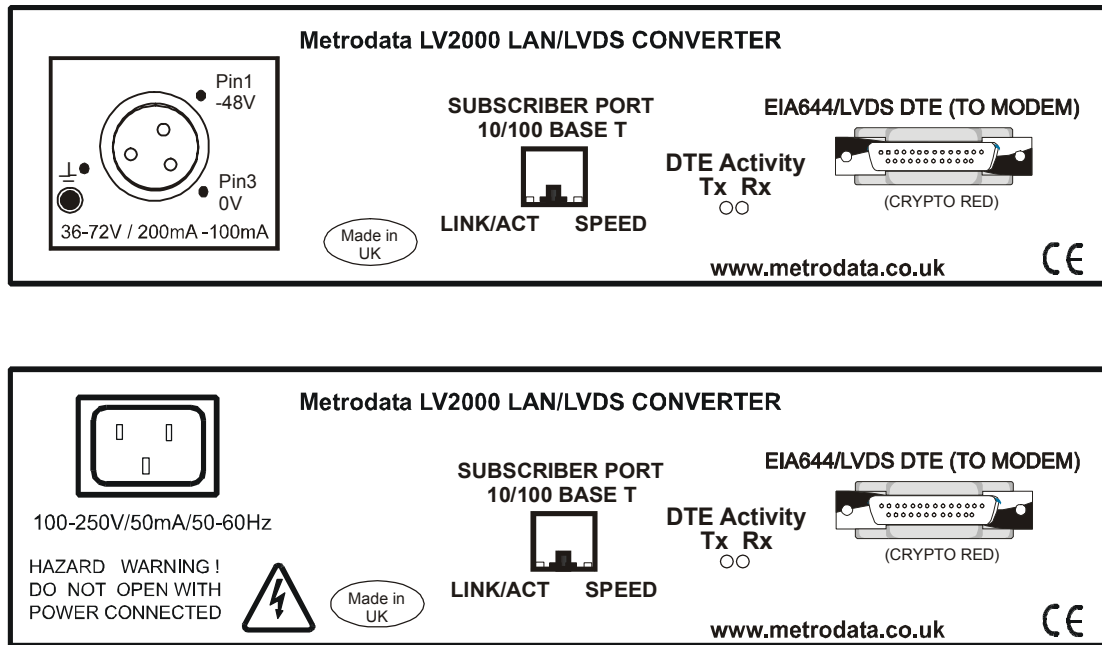


Figure 2. 1 LV2000 AC and DC rear panels

2.2 Power Supply

The LV2000 is powered by a mains supply with an input voltage of 100-250VAC 50-60Hz and with an input current of 50 mA. The LV2000 is provided ex-factory with a 1A internal fuse. Mains power is connected via the IEC socket on the rear of the unit.

An alternative -48VDC powered unit is available. The input voltage and current ranges are - minus 36 to minus 72 volts DC, 200 - 100mA. A Buccaneer type socket is fitted to the rear panel, and a plug is provided with the unit for the customer's own wiring. The connections are labelled on the rear panel of the LV2000.

On some units, an additional Ground stud may be located on the rear panel to permit a separate Ground connection to be made.

Pin no	Connection
1	-48VDC
2	Ground
3	0VDC

Figure 2. 2 -48VDC connections

Note: The LV2000 must be connected to safety earth for correct operation.

2.3 LVDS EIA-644 DTE Port

The LVDS interface is presented on a 25-way male D-type connector. The rear panel connector layout is shown below:

Pin	Direction	Signal name
1		
2	SD(A)	Send Data(A)
3	RD(A)	Receive Data(A)
4	RS(A)*	Request to Send (A)
5		
6		
7	Ground	Signal Ground
8	RR(A)	Receiver Ready(A)
9	RT(B)	Receive Timing(B)
10	RR(B)	Receiver Ready(B)
11	TT(B)	Terminal Timing(B)
12	ST(B)	Send Timing(B)
13		
14	SD(B)	Send Data(B)
15	ST(A)	Send Timing(A)
16	RD(B)	Receive Data(B)
17	RT(A)	Receive Timing(A)
18		
19	RS(B)*	Request to Send (B)
20		
21		
22		
23		
24	TT(A)	Terminal Timing(A)
25		

Figure 2.3 LV2000 DTE port D-type connector layout

* optionally driven LVDS or LVTTTL outputs

2.4 LAN port

The LAN port is presented on an RJ45 female connector mounted on the rear panel of the LV2000. The port automatically senses the LAN interface and switches between MDI and MDI-X configurations. This removes the potential requirement for Crossover cables when connecting LANs to the LV2000 whatever LAN equipment is being used. The port also automatically negotiates the LAN speed and operates at either 10 Mbps or 100 Mbps, and negotiates whether operation should be in full or half duplex mode, providing that it is negotiating with another auto-negotiating port. If it negotiates with a fixed port, it can identify the speed, but it cannot distinguish the full/half duplex mode status, and consequently selects half duplex operation. Such operation is prone to errors and should be avoided by setting AUTONEGOTIATION to DISABLED and manually selecting the correct SPEED and DUPLEX mode of operation using bit-switches 6, 7 and 8. See section 3 of this guide.

There is a miniature LED on the lower right corner of each RJ45 socket on the rear panel which is illuminated yellow when operation is at 100 Mbps. The miniature LED on the lower left corner of each RJ45 socket is illuminated green when the link is up, and flashes when there is activity on the link. The RJ45 connector layout for an auto-sensing MDI/MDI-X port is shown below:

:

Pin No	MDI Signal	MDI-X Signal
1	Tx Data +ve	Rx Data +ve
2	Tx Data -ve	Rx Data -ve
3	Rx Data +ve	Tx Data +ve
4	Not used	Not used
5	Not used	Not used
6	Rx Data -ve	Tx Data -ve
7	Not used	Not used
8	Not used	Not used

Figure 2.4 LAN port connector layout

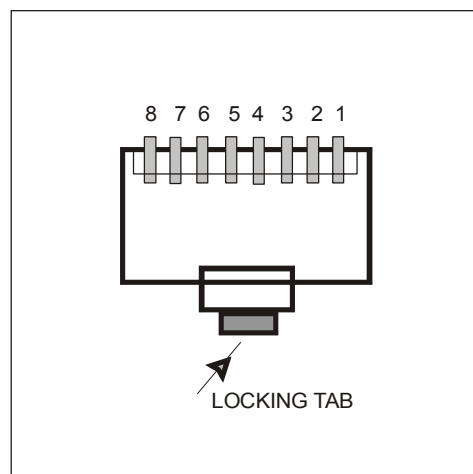


Figure 2.5 RJ45 connector layout

3 INSTALLATION & SET-UP

3.1 Setting-up the Bit-switches

The Bit-switches on the base of the unit must be set-up before making any connections to the unit. There is an explanatory label on the unit's base which defines the bit-switch set-up options.

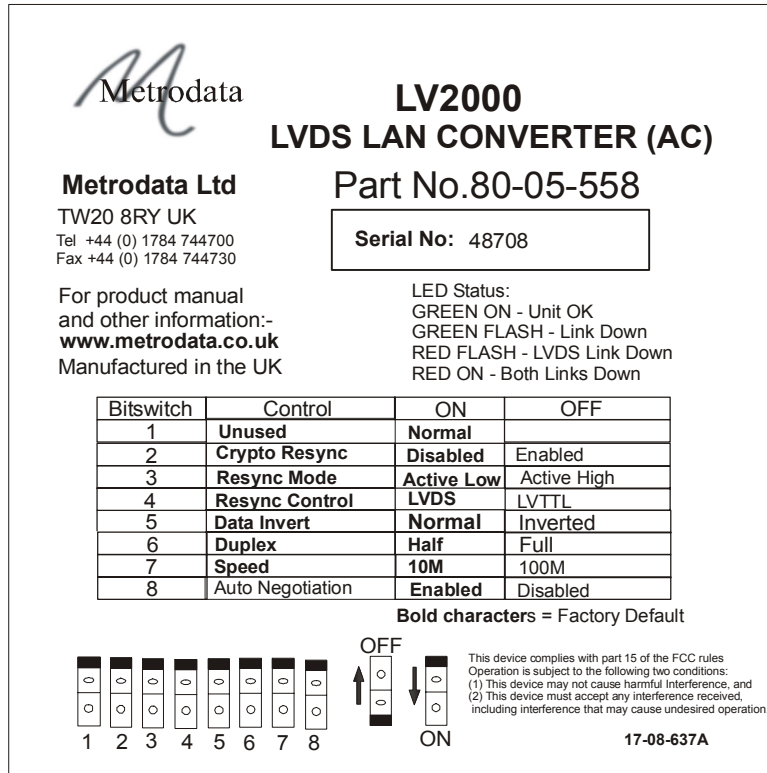


Figure 3. 1 LV2000 Base Panel label

3.1.1 Bit-switch definitions

The default settings of the bit-switch are shown in bold:

Bit-switch	Control	On	Off
1	Unused	Normal	
2	Crypto Resynch	Disabled	Enabled
3	Resynch Mode	Active Low	Active High
4	Resynch Control	LVDS	LVTTL
5	Data Invert	Normal	Inverted
6	Duplex	Half	Full
7	Speed	10M	100M
8	Auto Negotiation	Enabled	Disabled

Figure 3. 2 Bit-switch definitions

3 . 1. 2 Crypto Resynch

Bit-switch ON: The Crypto Resynch function is DISABLED

Bit-switch OFF: The Crypto Resynch function is ENABLED. when the LV2000 detects a loss of synch on the receive data, it will pulse the RS control signal for half a second and then wait for 5 seconds before checking for synchronisation again.

3 . 1. 3 Resynch Mode

Bit-switch ON: Normal State of Resynch control is High (Bit-switch in ON position). Resynch pulse will be Low (OFF) when ENABLED.

Bit-switch OFF: Normal State of Resynch control is Low (Bit-switch in OFF position). Resynch pulse will be High (ON) when ENABLED.

Note: The above High/Low states refer to the A signal of a differential pair.

3 . 1. 4 Resynch Control

Bit-switch ON: The Resynch control will be differential LVDS.

Bit-switch OFF: The Resynch control will be single ended LVTTTL

3 . 1. 5 Data Invert

Bit-switch ON: Normal operation.

Bit-switch OFF: The data is inverted.

3 . 1. 6 Duplex

Bit-switch ON: LAN port operates Half Duplex in manual mode, ignored in Auto-Negotiate mode.

Bit-switch OFF: LAN port operates Full Duplex in manual mode, ignored in Auto-Negotiate mode.

3 . 1. 7 Speed

Bit-switch ON: LAN port operates at 10Mbps in manual mode, ignored in Auto-Negotiate mode.

Bit-switch OFF: LAN port operates 100Mbps in manual mode, ignored in Auto-Negotiate mode.

3 . 1. 8 Auto Negotiation

Bit-switch ON: LAN port Auto Negotiates for Speed and Duplex.

Bit-switch OFF: LAN port uses manual settings for Speed and Duplex.

Note: The IEEE802.3 Auto-Negotiation standard allows for operation with ports that support either Auto-Negotiation or a fixed configuration. Note that when operating with a fixed configuration port, the Auto negotiation function can ONLY detect the speed of the link. The fixed link will always be assumed to be half duplex.

3. 2 LV2000 Crypto Resynch Operation

When operating with a serial encryption unit, it is possible that the decryption function will lose synchronisation, with the result that the data being received by the LV2000 unit is invalid. When synchronisation is lost, it is useful for the LV2000 to be able to detect this and automatically take action to resynchronise and restore the data link.

The LV2000 uses HDLC encapsulation for the serial data link and uses this protocol to detect synchronisation loss. HDLC uses a checksum to validate all frames and the LV2000 will declare loss of synch if 10 consecutive frames are received containing errors.

Providing that Crypto resynch function is ENABLED, when the LV2000 finds that it has lost synch it will pulse the RS output signal for half a second before then restoring it to its normal state. It will then wait for 5 seconds to allow the crypto to perform its initialisation and synchronisation functions before checking for synch again. If the link is still out of synch, the process will repeat with another RS pulse.

To ensure maximum flexibility, the state of the RS pulse can be set to either High or Low to initiate Resynch action. When Crypto resynch is DIASABLED, the RS output will assume the normal High (ON) state.

In addition, in order to support the widest range of Crypto equipment, the RS signal may be set to be driven as either Differential LVDS, or as a single ended LVTTTL signal.

3. 3 Connecting up

Safety Notice: Ports that are identified as SELV in this manual should only be connected to SELV ports on other equipment in accordance with EN 60950 clause 2.3.

Step 1: Mounting.

The LV2000 is housed in a convenient 1U table top enclosure. 19 inch rack nests for two or 18 units are available as options.

Step 2: Set up Bit-switches

These switches are located on the base of the unit and are used to configure the unit.

Step 3: Power Supply

Finally, connect the main power lead and re-check all connections for security. Then turn on the power supply.

Warning: Do not connect the LV2000 to excessive voltage. Read the safety information before continuing.

Step 4: LAN ports

Connect the LV2000 to the RJ45 LAN port on the rear panel. The indicator lights on the lower corners of the RJ45 socket indicate the LAN speed and activity status.

Step 5: LVDS port

Connect the satellite modem to the EIA-644 LVDS port using an appropriate cable type for the satellite modem interface. The DTE activity LED on the rear panel will indicate the link status.

3. 4 Optional rackmounting

Rackmounting kits may be used to mount two LV2000 units side by side in a 19" rack. The kit, Part no 80-05-256, has a recessed plate to permit cable or fibre bends to be made within the envelope of a 19" rack. It also has a single cut-out for all connections to the rear of the LV2000. The installation method is the same in all cases.

First remove the two rear panel screws securing each unit's lid. Fasten the two LV2000 units to the rackmount adaptor plate using the screws that you have removed, as shown in the illustrations below.

Then secure the rack mounting plate complete with the two LV2000 units to the 19" rack using the locating holes at the ends of the adaptor plate. If you have set the bit-switches on the base plate of the units before fixing them to the adaptor plate, check that the settings are still correct.

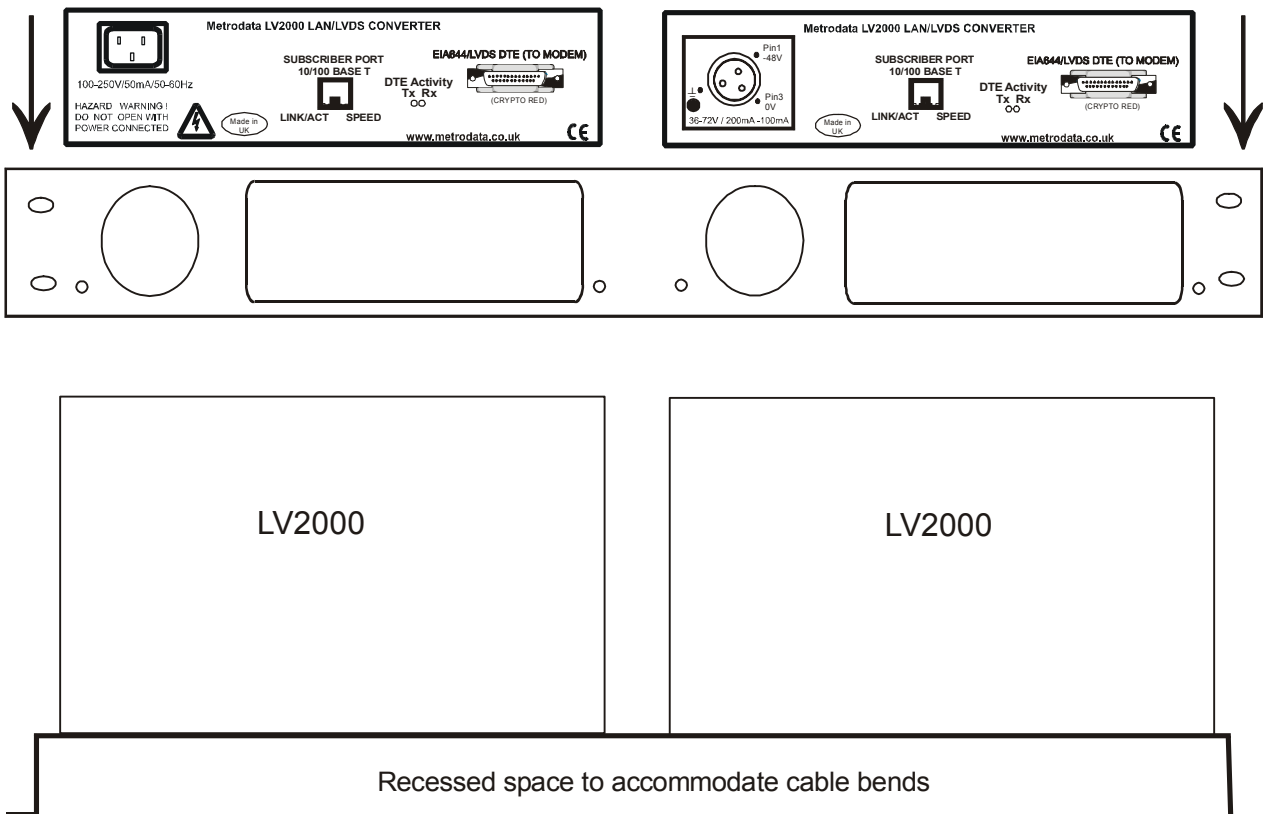


Figure 3. 3 2-unit recessed rackmounting plan & elevation

4 LV2000 TROUBLESHOOTING & TESTING

4. 1 Establish and verify the LAN link

Connect the LAN cable to the LAN port. If the LED on the bottom left hand corner of the RJ45 socket goes green, or flashes green, then there is a LAN connection. If the LED remains unlit, there is no LAN connection, and investigatory action should be taken on the LAN and/or its cables.

Note that for 100M Full Duplex operation between the LV2000 and a fixed (i.e. non-negotiating) LAN port, bit-switch 6 must be set to **FULL** (OFF state) and Bit-switch 7 must be set to **100M** (OFF state). Bit-switch 8 must also be set to **DISABLED** (OFF state) in order to prevent Auto-negotiation.

5 LV2000 SPECIFICATIONS

DTE Interfaces	Definition
DTE Interfaces	EIA-644 LVDS port
Framing	Unframed
Encapsulation	HDLC
Clocking options	LVDS port: DCE supplied clock
Line Rate	LVDS: 52Mbps
Max packet rate	93913 64 byte packets per second, full duplex at 52 Mbps
LED Indicators	DTE Tx and Rx Activity, LAN Speed & Activity
Alarms & Loopbacks	None
LAN Port	Definition
LAN Interface	RJ45, Auto switched MDI or MDI-X, or fixed MDI selected by bit-switch
Operating mode	Auto negotiated 10/100 Mbps Full / Half Duplex, or Manually selected by bit-switches.
Port filtering rate	148810 packets per second, 64 byte packets
MAC address table	4096 entries
Min/Max Packet size	64 bytes / 1536 bytes (larger packets are discarded)
General	Definition
Power supply	100-250 VAC, 50-60 Hz, 25 mA or -36 to -72 VDC, 100-200mA
Dimensions	202 x 132 x 44 mm (w x d x h) Enclosure only 202 x 132 x 47 mm (w x d x h) Overall including feet
Environmental	Range
Ambient Temperature	0 degC to +50 degC
Storage Temperature	-20 degC to +70 degC
Relative Humidity	0% - 95% non condensing
Barometric Pressure	86 KPa - 106 KPa

Disclaimer

Metrodata Ltd makes no representations or warranties with respect to the contents hereof and specifically disclaims any implied warranties or merchantability or fitness for any particular purpose. Further, Metrodata Ltd reserves the right to revise this publication and to make changes from time to time in the content hereof without obligation of Metrodata Ltd to notify any person of such revision or changes.

Trademarks

The Trademarks of other Corporations which may be used in this manual are hereby acknowledged.

Copyright © 2007 by Metrodata Ltd

All Rights Reserved