FIMO-2100

Installation Guide

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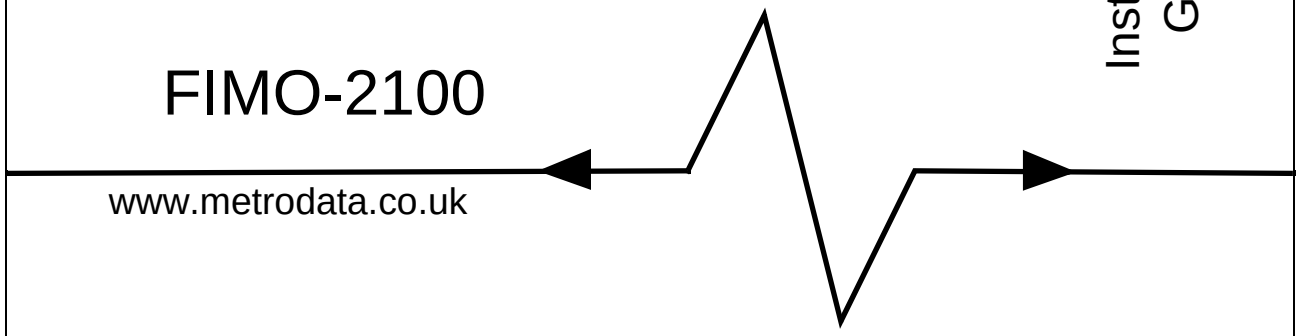

Metrodata FIMO-2100 Installation Guide

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Preface

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1 INTRODUCTION

1.1 About the FIMO-2100

The Metrodata FIMO-2100 is a fibre modem supporting the transport of serial signals over an optical fibre. The FIMO-2100 has dual SFP ports, providing resilient connection to the unit should one fibre fail.

The FIMO-2100 supports RS-232, EIA-530 interfaces, and by the use of adaptor cables, V.36, X.21 and V.35 serial interface specifications (See note 1 below). It also supports the FM0 mode. The FIMO-2100 supports synchronous and asynchronous data. The fibre data traffic is encoded using a proprietary transport protocol, and therefore FIMO-2100 units must be used in pairs.

Figure 1.1 Rear view of FIMO-2100 with SFP connectors

The FIMO-2100 supports asynchronous RS232 data rates up to 256Kbaud, and synchronous data rates up to a maximum of 8.192Mbps.

The FIMO-2100 offers both DTE and DCE interfaces and automatically adjusts the internal signal mapping to support a variety of connection options:

DTE Port to DTE Port
DCE Port to DCE Port
DTE Port to DCE Port

To simplify fault diagnosis the FIMO-2100 has a number of LEDs onr the rear panel to show the status of the unit.

Notes:

1) V.36, X.21 and V.35 interfaces are supported by the use of adapter cables to convert the 25-way D-type presentation to the normal connection for the standard to be implemented. The adaptor cables are described in the Appendix at the rear of this manual.

2) This manual describes the technical features of the FIMO-2100 product in the usual style of Metrodata manuals. In addition the User planning an installation may find Section 5 helpful since it gives example configurations to meet the needs of a variety of applications.

2 STATUTORY INFORMATION

2.1 Safety

The following ports are designated SELV (Safety Extra Low Voltage) within the scope of EN41003:

Serial DCE Port
Serial DTE Port
Alarm extension port

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

2.2 Electromagnetic Compatibility

In order to ensure EMC compliance all signal 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 must not be connected to any pins of the connector. Failure to use the correct connector may compromise EMC compliance.

2.3 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.

2.4 EN55022 Declaration

The FIMO-2100 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.

2.5 RoHS Compliance

The FIMO-2100 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.

The FIMO-2100 product is manufactured using a lead-free soldering process and as such is RoHS 6/6 compliant.

2.6 WEEE Directive

The FIMO-2100 unit is covered by Directive 2002/96/EC (OJ:L37/24/2003) on waste electrical and electronic equipment (The WEEE Directive). FIMO-2100 units must therefore not be disposed of in a standard landfill.

2.7 Power Supply

The FIMO-2100 is powered by an internal mains power supply with an input voltage range 100-250 VAC / 50-60 Hz. The maximum operating input current is 50mA rms at 100VAC.

An alternative -48 VDC power supply is available with an input voltage range of minus 36VDC to minus 72 VDC, 200-100mA.

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. The FIMO-2100 must be connected to safety earth for correct operation.

3 INTRODUCING THE FIMO-2100

3.1 Rear Panel

The layout of the FIMO-2100 is shown below.

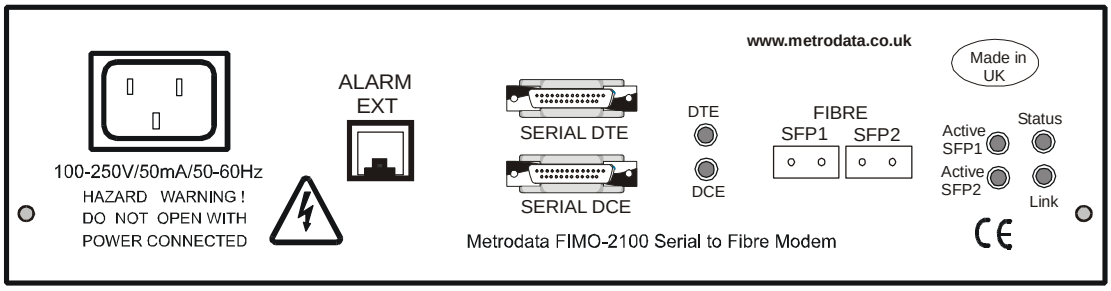


Figure 3.1 FIMO-2100 rear panel

3.2 Power

The FIMO-2100 is powered by a mains supply with an input voltage of 100-250VAC 50-60Hz and with a maximum input current of 50mA at 100VAC. Mains power is connected via the IEC inlet on the rear of the unit. The FIMO-2100 consumes approximately 5 Watts.

An alternative -48VDC powered unit is available. The input voltage and current ranges are minus 36 to minus 72 VDC, 200 - 100mA. A Buccaneer type socket is fitted to the rear panel, and a plug is provided with the unit for the users own wiring. The connections are labelled on the rear panel of the FIMO-2100.

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

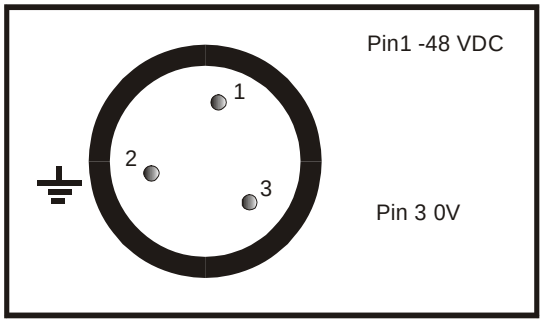


Figure 3.2 -48VDC connections

Note: The FIMO-2100 must be connected to safety earth for correct operation. This is provided in the IEC connector for AC mains powered units. DC units have an additional Ground stud located on the rear panel to permit a separate Ground connection to be made, as shown in the figure above.

3.3 SFP interfaces

Dual SFP 155 Mbps interfaces are fitted on the rear panel to enable two fibre connections to be made to the FIMO-2100, thus providing a resilient connection should one fibre fail.

If FIMO-2100 units are connected with two diversely routed fibre connections, then if a fault is detected on the active fibre, the FIMO-2100 will automatically switch over and use the back-up fibre connection, thus keeping the circuit operational.

The FIMO-2100 transmits the same data stream on both fibres and monitors them for receive data. By default SFP1 is the primary connection and is used following power-up. If a fault is detected on the active fibre, then the FIMO-2100 switches to receive data from the back-up fibre connection. To prevent link flapping (switching back and forth rapidly) a time-out is applied such that around 10 seconds are allowed for the FIMO-2100 to synchronise after switching before a switch back can be made.

The fibre detection circuit monitors the signal and will initiate a switch over on loss of synchronisation as well as a simple loss of signal, so that systems with active line drivers in the fibre circuit are accommodated.

Link activity is indicated by the Status and Link LEDs described below.

3.4 Serial Interfaces

The FIMO-2100 presents a DCE interface on the lower (female) connector, and a DTE interface on the upper (male) connector. Each FIMO-2100 serial interface is presented on a dual 25-way D-type connector.

The interface type is selected using the bit-switches on the underside of the unit. Optionally RS-232, EIA-530, V.35, X.21 or FM0 may be selected.

3.5 LED Indicators

The FIMO-2100 provides essential information through a number of LEDs on the rear panel. These are described below.

3.5.1 SFP LEDs

There are two LEDs on the rear panel labelled SFP1 and SFP2. They indicate the status of the two SFP ports.

SFP1, SFP2 LEDs	
Off	No signal being received (LOS).
Green Flashing	SFPx is active
Green Steady	Signal present on SFPx which is in Standby mode

Figure 3.3 Rear panel SFP LEDs

3.5.2 Port Select LED (DTE/DCE)

The FIMO-2100 has two green LEDs next to the dual-stacked D-Type connector. These LEDs illuminate to indicate which port is active.

The upper LED, labelled DTE, will be illuminated when the upper (male connector) DTE port is selected. The lower LED, labelled DCE, is illuminated when the lower (female connector) DCE port is selected.

Port selection is accomplished with the bit-switches mounted on the underside of the unit.

3.5.3 Status & Link LEDs

The status LED is a red/green indicator, whilst the Link LED is green.

Status LED	
Off	Power is not being received by the FIMO-2100
Green	Status is OK
Green Flashing	Remote Alarm Indication (RAI)
Red	Fibre Alarm
Red Flashing	Not receiving FM0 on Serial port
Red/Green Flashing	Not receiving FM0 data on Fibre port
Link LED	
Off	No signal being received
Green Flashing	A signal is present but the FIMO-2100 cannot synchronise
Green	The Fibre Link is synchronised

Figure 3.4 Rear panel status & link LEDs

3.5.4 RS-232 Interface (Mode=110)

Pin	Signal	Symbol	Direction	Standard
1	Shield			
2	Transmit Data	TxD	To DCE	V.28
3	Receive Data	RxD	To DTE	V.28
4	Request to Send	RTS	To DCE	V.28
5	Clear to Send	CTS	To DTE	V.28
6	Data Set Ready	DSR	To DTE	V.28
7	Signal Ground			
8	Data Carrier Detect	DCD	To DTE	V.28
9				
10				
11				
12				
13				
14				
15	DCE Transmit Timing	TxC	To DTE	V.28
16				
17	Receive Timing	RxC	To DTE	V.28
18	Local Loop	LL	To DCE	V.28
19				
20	Data Terminal Ready	DTR	To DCE	V.28
21	Remote Loop	RL	To DCE	V.28
22	Ring Indicator	RI	To DTE	V.28
23				
24	DTE Transmit Timing	ETxC	To DCE	V.28
25	Test Indicator	TI	To DTE	V.28

Figure 3.5 FIMO-2100 RS-232 Interface

3.5.5 EIA-530 Interface (Mode =000)

Pin	Signal	Symbol	Direction	Standard
1	Shield			
2	Transmit Data (A)	TxD(A)	To DCE	V.11
3	Receive Data (A)	RxD(A)	To DTE	V.11
4	Request to Send (A)	RTS(A)	To DCE	V.11
5	Clear to Send (A)	CTS(A)	To DTE	V.11
6	Data Set Ready (A)	DSR(A)	To DTE	V.11
7	Signal Ground			
8	Received Line Signal Detect (A)	RLSD(A)	To DTE	V.11
9	Receive Timing (B)	RxC(B)	To DTE	V.11
10	Received Line Signal Detect (B)	RLSD(B)	To DTE	V.11
11	DTE Transmit Timing (B)	ETxC(B)	To DCE	V.11
12	DCE Transmit Timing (B)	TxC (B)	To DTE	V.11
13	Clear to Send (B)	CTS(B)	To DTE	V.11
14	Transmit Data (B)	TxD(B)	To DCE	V.11
15	DCE Transmit Timing (A)	TxC(A)	To DTE	V.11
16	Receive Data (B)	RxD(B)	To DTE	V.11
17	Receive Timing (A)	RxC(A)	To DTE	V.11
18	Local Loop	LL	To DCE	V.10
19	Request to Send (B)	RTS(B)	To DCE	V.11
20	DTE Ready (A)	DTR(A)	To DCE	V.11
21	Remote Loop	RL	To DCE	V.10
22	DCE Ready (B)	DSR(B)	To DTE	V.11
23	DTE Ready (B)	DTR(B)	To DCE	V.11
24	DTE Transmit Timing (A)	ETxC(A)	To DCE	V.11
25	Test Mode	TM	To DTE	V.10

Figure 3.6 FIMO-2100 EIA-530 Interface

For V.36 operation an adaptor cable is required to convert the EIA-530 standard 25-way D-type presentation to the V.36 standard 37-way D-type presentation. The cable specification is given in Appendix A at the rear of this manual.

3.5.6 V.35 Interface (Mode=100)

Pin	Signal	Symbol	Direction	Standard
1	Shield			
2	Transmit Data (A)	TxD(A)	To DCE	V.35
3	Receive Data (A)	RxD(A)	To DTE	V.35
4	Request to Send	RTS	To DCE	V.28
5	Clear to Send	CTS	To DTE	V.28
6	Data Set Ready	DSR	To DTE	V.28
7	Signal Ground			
8	Received Line Signal Detect	RLSD	To DTE	V.28
9	Receive Clock (B)	RT(B)	To DTE	V.35
10				
11	Terminal Timing (B)	TT(B)	To DCE	V.35
12	Transmit Timing (B)	TxC (B)	To DTE	V.35
13				
14	Transmit Data (B)	TxD(B)	To DCE	V.35
15	Transmit Timing (A)	TxC(A)	To DTE	V.35
16	Receive Data (B)	RxD(B)	To DTE	V.35
17	Receive Timing (A)	RxC(A)	To DTE	V.35
18	Local Loop	LL	To DCE	V.28
19				
20	Data Terminal Ready	DTR	To DCE	V.28
21	Remote Loop	RL	To DCE	V.28
22				
23				
24	Terminal Timing (A)	TT(A)	To DCE	V.35
25	Test Mode	TM	To DTE	V.28

Figure 3.7 FIMO-2100 V.35 Interface

An adaptor cable is required to convert the EIA-530 standard 25-way D-type presentation of the FIMO-2100 to the V.35 standard Winchester MRAC connector presentation. The cable specification is given in Appendix A at the rear of this manual.

3.5.7 X.21 Interface (Mode=011)

25 way D-type Pin	Signal	Symbol	Direction	Standard
1				
2	Transmit(A)	T(A)	To DCE	V.11
3	Receive(A)	R(A)	To DTE	V.11
4				
5				
6				
7	Signal Ground			
8	Indicate(A)	I(A)	To DTE	V.11
9	Signal Element Timing(B)	S(B)	To DTE	V.11
10	Indicate(B)	I(B)	To DTE	V.11
11				
12				
13				
14	Transmit(B)	T(B)	To DCE	V.11
15	Signal Element Timing(A)	S(A)	To DTE	V.11
16	Receive(B)	R(B)	To DTE	V.11
17				
18				
19				
20	Control(A)	C(A)	To DCE	V.11
21				
22				
23	Control(B)	C(B)	To DCE	V.11
24				
25				

Figure 3.8 FIMO-2100 X.21 interface

An adapter cable is needed to convert the 25-way D-type presentation of the FIMO-2100 to the X.21 standard 15-way connector. The adapter cable specification is shown in Appendix A.

3.5.8 FM0 Interface (Mode 010)

This interface is available only on the FIMO-2100 product.

25 way D-type Pin	Signal	Symbol	Direction	Standard
1				
2	Transmit(A)	T(A)	To DCE	V.11
3	Receive(A)	R(A)	To DTE	V.11
4				
5				
6				
7	Signal ground			
8				
9				
10				
11				
12				
13				
14	Transmit(B)	T(B)	To DCE	V.11
15				
16	Receive(B)	R(B)	To DTE	V.11
17				
18				
19				
20				
21				
22				
23				
24				
25				

Figure 3.9 FIMO-2100 FM0 interface

3.6 Alarm extension relay

The FIMO-2100 offers dual Alarm relays to provide an external warning of problems which may arise. The interface is presented on an RJ45 connector, and offers both normally open and normally closed contacts. Maximum contact rating is 1.5 Amp at 125 VDC.

The normal state is the powered up, non-alarmed state such that a unit will report an alarm when it is subject to power failure.

3.6.1 FIMO-2100 Alarm extension relay

The FIMO-2100 has dual alarm relays.

Pin	Contact	Type
1	Normally closed	Major
2	Normally open	Major
3	Common	Major
4	Not connected	
5	Not connected	
6	Normally open	Minor
7	Normally closed	Minor
8	Common	Minor

Figure 3.10 FIMO-2100 Alarm extension RJ45 connector

Alarm states are defined in the table below as

Major alarms	Minor alarms
Power supply failure	Single fibre failure
Both fibres failed	
Serial port failure	

Figure 3.11 FIMO-2100 Alarm states

4 FIMO-2100 CONFIGURATION & OPERATION

4.1 FIMO-2100 Bit-switch settings

The bit-switches on the base of the unit must be configured before making any connections to the unit. There is a label on the base that defines the bit-switch options.

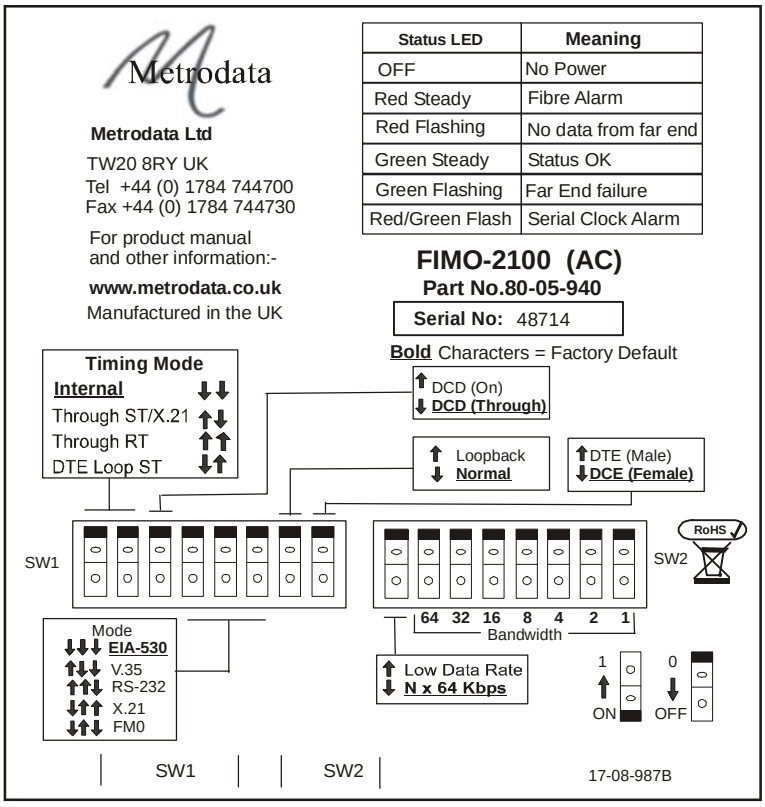


Figure 4.1 FIMO-2100 base panel label

4.1.1 Port select (SW1)

The port select bit-switch selects which of the serial ports are active:

ON Select DTE port (Upper 25-way D-type Male connector)
OFF Select DCE port (Lower 25-way D-type Female connector)

The rear panel of the FIMO-2100 includes a pair of green LEDs to indicate which of the ports is currently selected.

4.1.2 Loopback select (SW1)

For diagnostic testing a loopback may be applied to the FIMO-2100 as below:

ON Normal operation

OFF Loopback applied

The loopback is bidirectional with the signals looped.

4.1.3 Serial interface mode select (SW1)

The serial interface supports multiple serial interface standards and is controlled using the SW1 bit-switch array on the underside of the module. The bit-switches select the mode as shown below:

Interface mode	Mode switch no: 2 1 0
EIA-530	**0 0 0**
V.35	**1 0 0**
RS-232	**1 1 0**
X.21	**0 1 1**
FM0	**0 1 0**

Figure 4.2 Serial Interface mode select

Note: For V.36 operation, select EIA-530 mode and use an adapter cable as specified in Appendix A at the rear of this manual.

4.1.4 DCD control (SW1)

The FIMO-2100 allows the user to control the operation of the DCD or RLSD control signal.

When the FIMO-2100 is used in a DTE to DCE configuration, DCD should be configured for THROUGH mode such that the state of the signal is transported end to end.

When the FIMO-2100 is used in a DTE/DTE mode, or if it is not driven in a DTE/DCE application, the user may set the control to be permanently ON.

The FIMO-2100 will automatically negate the DCD/RLSD control signal when the fibre link has lost synchronisation.

4.1.5 Timing mode (SW1)

The FIMO-2100 can be used in a variety of applications and the 2 timing mode bit-switches control the selection of source for the DCE Transmit Timing signal.

Bit-switch setting	Timing
0 0	Internal Timing sourced from local oscillator
1 0	Through Timing sourced from recovered Transmit Timing data packets (X.21 mode).
1 1	Through Timing sourced from recovered Receive Data packets
0 1	DTE Loop ST Timing: loops ST back to the DCE as TT

Figure 4.3 Timing mode bit-switch settings

Note: X indicates that the switch is ignored and may be set in either the 0 or the 1 state.

4.1.6 Data rate select (SW2)

The data rate select SW2 bit-switch controls the operating mode of the FIMO-2100. When the switch is in the ON position, the FIMO-2100 operates in Nx64k mode and supports data rates between 64Kbps and 8.192Mbps. When the switch is in the OFF position the FIMO2100 operates in low data rate mode and supports synchronous or asynchronous data at up to 256Kbps when in THROUGH timing mode, and 38400 bps when in INTERNAL timing mode. The set-up of the bit-switches in Nx64K mode is described in detail in section 4.3 below.

4.2 Status LED Indicators

There is a status LED mounted on the rear panel of the FIMO2100. This LED responds to problems detected in the operation of the unit in different ways, depending on the set-up of the unit as defined by the bit-switch settings. The LED response definitions are tabulated below. The operating and timing modes are described in the subsection following this one.

All low data rate settings	Meaning
Green ON	Unit OK
Green Flashing	Remote Fault Remote Fibre LOS on fitted SFP. Remote Unit not receiving packets
Red ON	Fibre fault Link LED OFF: Fibre LOS Link LED Flashing: Fibre sync error Check for transparent connection to remote FIMO

Figure 4.4 LED status for all low data rate settings

FM0 setting (any speed)	Meaning
Green ON	Unit OK
Green Flashing	Remote Fault Remote Fibre LOS on fitted SFP. Remote Unit not receiving packets
Red ON	Fibre fault Link LED OFF: Fibre LOS Link LED Flashing: Fibre sync error Check for transparent connection to remote FIMO. Check remote unit serial cable connection as this shows no data being received
Red Flashing	Not receiving data from Far End. Data Packet Timeout - check remote unit serial cable
Red/Green Flashing	Not receiving data from serial port. No data activity on the local serial port - check the cable

Figure 4.5 LED status for all FM0 settings

N x 64K DTE any timing mode	Meaning
Green ON	OK
Green Flashing	Remote Fault Remote Fibre LOS on fitted SFP. Remote Unit not receiving packets
Red ON	Fibre fault Link LED OFF: Fibre LOS Link LED Flashing: Fibre sync error Check for transparent connection to remote FIMO
Red Flashing	Not receiving data from Far End. Data Packet Timeout - check remote unit serial cable
Red/Green Flashing	Not receivinga clock on serial interface. No data activity on the local serial port - check the cable

Figure 4.6 LED status for Nx64K DTE, any timing mode

N x 64K DTE, DCE Internal timing	Meaning
Green ON	OK
Green Flashing	Remote Fault Remote Fibre LOS on fitted SFP
Red ON	Fibre fault Link LED OFF: Fibre LOS Link LED Flashing: Fibre sync error Check for transparent connection to remote FIMO. Check remote unit serial cable connection as this shows no data being received
Red Flashing	Does not occur
Red/Green Flashing	Not receivinga clock on serial interface (Not X.21 mode) No data activity on the local serial port - check the cable

Figure 4.7 LED status for Nx64K DCE, Internal timing mode

N x 64K DTE,Through ST/RT timing	Meaning
Green ON	OK
Green Flashing	Remote Fault Remote Fibre LOS on fitted SFP
Red ON	Fibre fault Link LED OFF: Fibre LOS Link LED Flashing: Fibre sync error Check for transparent connection to remote FIMO. Check remote unit serial cable connection as this shows no data being received
Red Flashing	Does not occur
Red/Green Flashing	Not receivinga clock on serial interface (Not X.21 mode) No data activity on the local serial port - check the cable

Figure 4.8 LED status for Nx64K DCE, Through ST/RT timing

4.3 Bandwidth selection

The FIMO-2100 supports three Timing mode configurations that are explained below.

4.3.1 DCE Mode

In DCE mode the FIMO-2100 generates two clock signals: TRANSMIT CLOCK which is used by the DTE as a clock reference, and RECEIVE CLOCK which is synchronous to the receive data.

The FIMO DCE clock architecture is shown in the figure below:

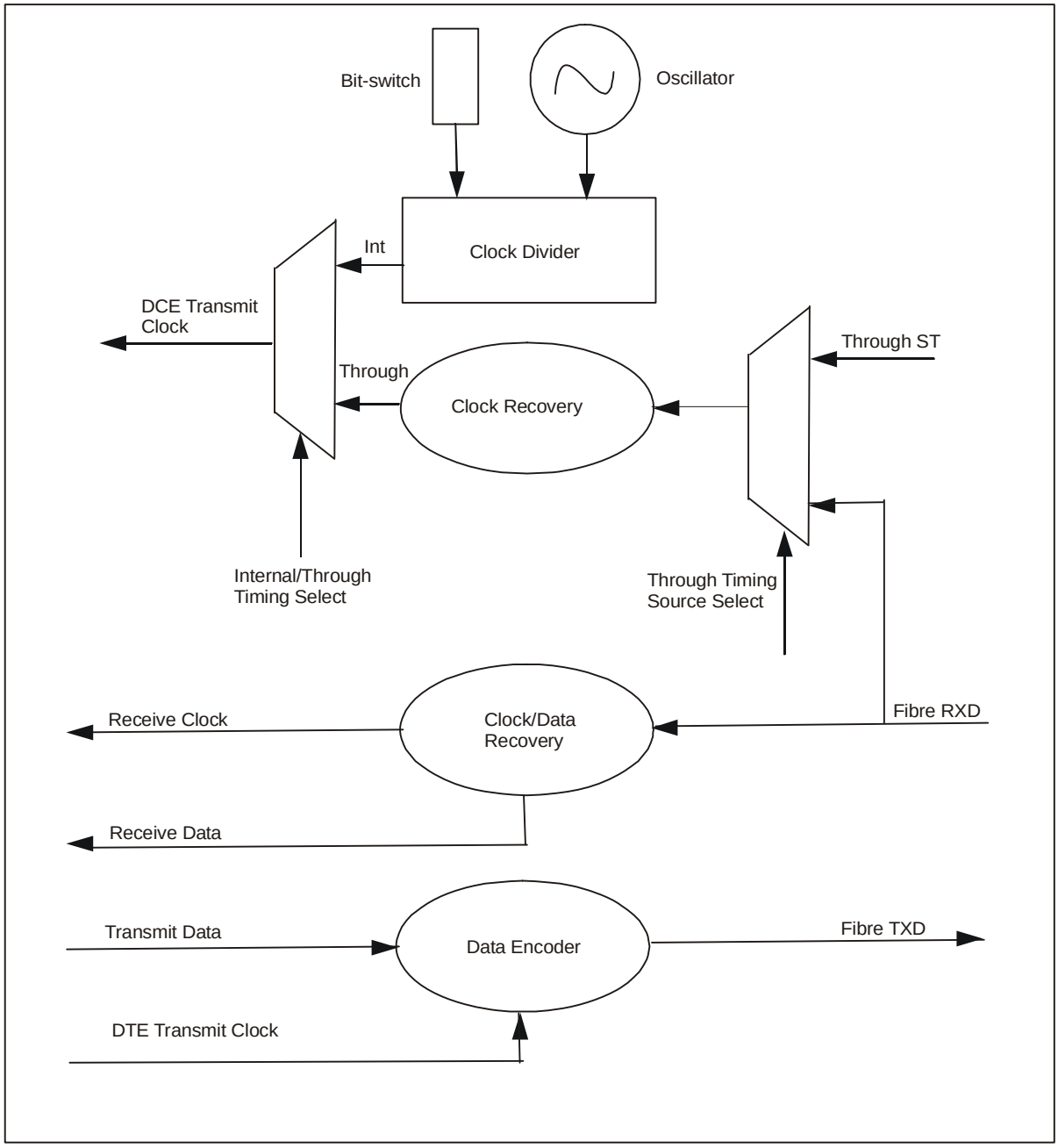


Figure 4.9 DCE clock architecture

4.3.2 DCE Mode - Internal Timing

When the FIMO-2100 is configured for DCE mode, and the timing mode is set to INTERNAL, the FIMO-2100 generates a clock referenced to its local oscillator with the clock rate configured using the SW2 Bandwidth bit-switches.

This clock is output as DCE TRANSMIT TIMING on pins 15/12 of the DCE interface. For X.21 mode, this clock is also output as DCE RECEIVE TIMING on pins 17/9 of the DCE interface.

The FIMO-2100 has two modes of operation:

Nx64K mode that will generate clocks between 64Kbps and 8.192Mbps

Low speed mode that generates clocks between 300 and 38400bps

The SW2 bandwidth bit-switches on the base panel are set as in the table below to generate the required clock frequency.

High/Low Speed	Binary SW2	N	Data rate
1(Low speed)	0000000		300 bps
1(Low speed)	0000001		600 bps
1(Low speed)	000001x		1200 bps
1(Low speed)	00001xx		2400 bps
1(Low speed)	0001xxx		4800bps
1(Low speed)	001xxxx		9600bps
1(Low speed)	01xxxxx		19200bps
1(Low speed)	1xxxxxx		38400bps
0(Nx64K)	0000001	1	64Kbps
0(Nx64K)	0000010	2	128Kbps
0(Nx64K)	0000011	3	192Kbps
0(Nx64K)	0000100	4	256Kbps
	and on to.....		
0(Nx64K)	1111101	125	8000Kbps
0(Nx64K)	1111110	126	8064Kbps
0(Nx64K)	1111111	127	8128Kbps
0(Nx64K)	0000000	128	8192Kbps

Figure 4.10 SW2 bit-switch settings

Note: X indicates that the switch position is ignored and may be in the 0 or the 1 position.

4.3.3 DCE Mode - Through Timing

When the FIMO-2100 is configured for THROUGH Mode timing, the clocks are recovered from the fibre signals. In THROUGH Mode, the FIMO-2100 becomes “data agile” in that the clock recovery can track the fibre signals and automatically adapt to changes in data rate.

In Nx64 Through Mode, the bandwidth bit-switches should be set to select the highest expected data rate.

In low-speed Through Mode, the bandwidth bit-switches are ignored and the interface is fully transparent, passing clocks and data.

4.3.4 DTE Mode

In DTE Mode, the clock recovery circuits are configured as shown in the figure below:

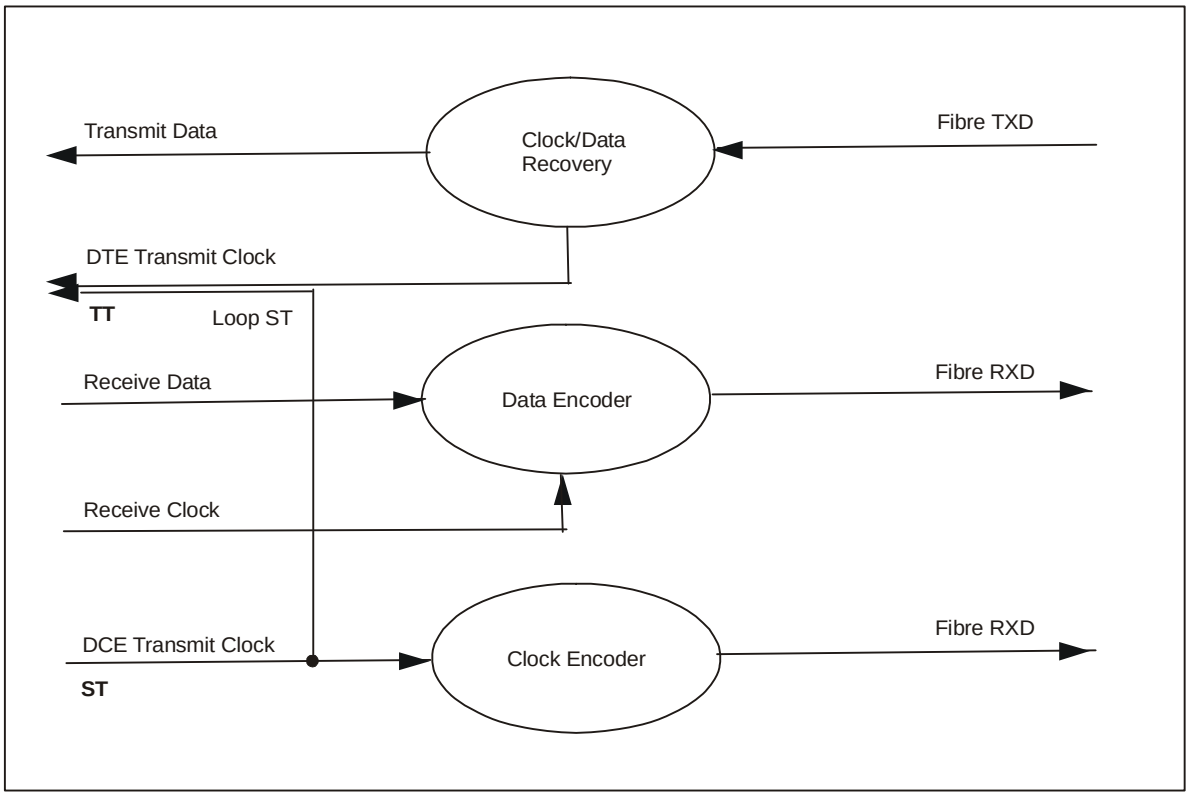


Figure 4.11 DTE Mode clocks

Both TRANSMIT and RECEIVE data are encoded/decoded for transparent transmission over the fibre. Additionally the DCE TRANSMIT CLOCK input is encoded for use by the remote DCE unit in THROUGH TIMING mode.

4.3.5 Operating mode FM0

FM0 mode is a method by which an incoming signal is recovered by sampling it at high speed and then recreating the signal profile for onward transmission without the need for clocking. In FM0 coding, a transition occurs at the boundary of every bit-cell. If the bit is zero, there is an additional transition in the middle of the cell. These transitions provide enough information for the clock to be recovered at the receiving device.

.

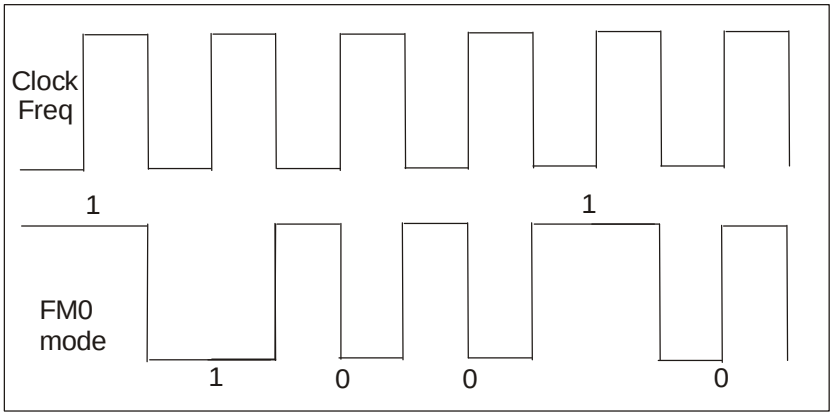


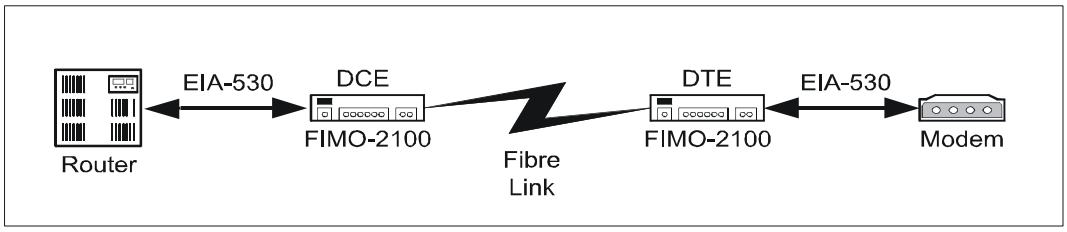
Figure 4.12 FM0 mode

4.4 FIMO-2100 operation

The FIMO-2100 operates as a fibre modem transporting serial data traffic over an optical fibre. The FIMO-2100 uses a proprietary encoding scheme that transports clock, data and control information between units. The FIMO-2100 offers a selectable DTE or DCE port and automatically supports any combination of interface connections as shown below.

4.4.1 DTE to DCE

In the normal operating configuration, one FIMO-2100 is configured as DTE for connection to a DCE device such as a modem, whilst the other is configured as DCE for connection to a DTE device such as a Router as shown:



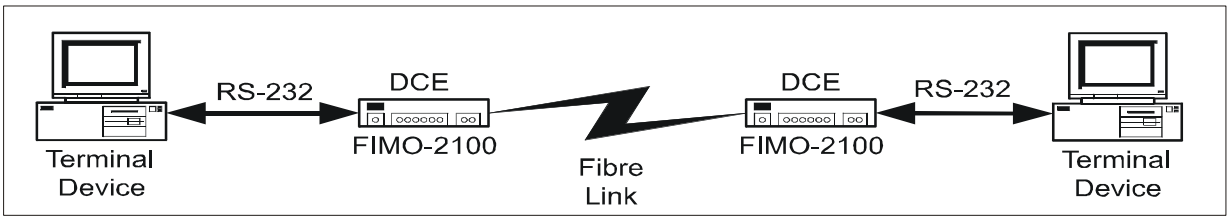
TXC	**<-**	TXC
TT	**->**	TT
TXD	**->**	TXD
RXC	**<-**	RXC
RXD	**<-**	RXD
DCD	**<-**	DCD
RTS	**->**	RTS
CTS	**<-**	CTS
DTR	**->**	DTR
DSR	**<-**	DSR
LL	**->**	LL
RL	**->**	RL
TM	**<-**	TM

Figure 4.13 DTE to DCE Operation

In this configuration all signals are transported end-to-end transparently. To ensure that the modem is the clock master, and that TXC is passed end-to-end, the DCE must be configured for DTE Loop ST timing. In this mode the FIMO-2100 is data agile between 64Kbps and 8.192Mbps.

4.4.2 DTE to DTE

Both FIMO-2100 units are connected to DTE devices such as a terminal as shown. Therefore in this configuration both FIMO-2100 units are configured for DCE mode.



TXC	**<- ->**	TXC
TT	**->**	RXC
TXD	**->**	RXD
RXC	**<-**	TT
DCD	**<- ->**	DCD
RTS	**->**	CTS
CTS	**<-**	RTS
DTR	**->**	DSR
DSR	**<-**	DTR

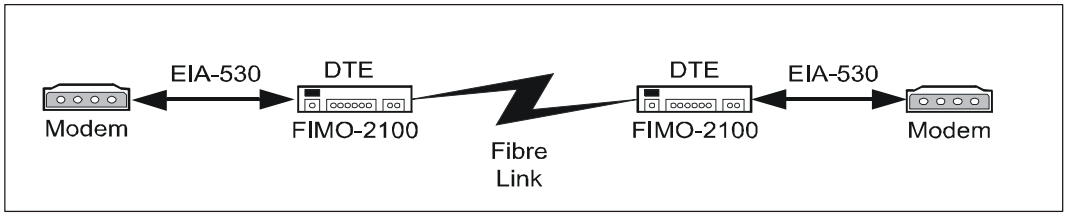
Figure 4.14 DCE to DCE Operation

The signals are automatically crossed over as shown. Both FIMO-2100s will generate the TXC timing sourced from the local oscillator.

The FIMO-2100 will force DCD into the ON State when a valid fibre connection is detected.

4.4.3 DCE to DCE

In this configuration both FIMO-2100 units are configured for DTE mode and are used to extend a connection between a pair of DCE devices such as modems.



RXC	->	TT
RXD	->	TXD
TT	<-	RXC
TXD	<-	RXD
RTS	->	CTS
CTS	<-	RTS
DTR	->	DSR
DSR	<-	DTR

Figure 4.15 DTE to DTE Operation

The signals are automatically crossed over as shown, and the incoming DCD and TXC signals are ignored by the FIMO-2100.

5 FIMO-2100 QUICKSTART EXAMPLE CONFIGURATIONS

This section provides example configurations to assist the user in applying the FIMO-2100 to real life situations. The terms DTE and DCE will be used to describe two different types of equipment and interface.

5.1 Scope of example configurations

DTE (Data Terminating Equipment) is a term used to describe equipment that displays user information. Examples of DTE Equipment are Terminals and Routers. Typically a DTE device will have a male connector and will be connected to a DCE device. A DTE device will take its timing from the DCE attached to it.

DCE (Data Circuit Terminating Equipment) is a term used to describe equipment that connects to a transmission network. Examples of DCE devices include Modems, CSU/DSU, NTU, Multiplexers, Switches etc. Typically a DCE device will have a female connector and will be connected between the DTE and the transmission network.

The applications in the table below, together with their sub-section number, are described in this Quickstart guide.

DCE to DTE	Section	DTE to DTE	Section
EIA-530 Router to Modem	5.2	EIA-530 Router to Router	5.6
V.35 Router to DSU	5.3	RS-232 Terminal to Terminal	5.7
X.21 Router to NTU	5.4		
RS-232 Terminal to Modem	5.5		

Figure 5.1 Quickstart example applications

5.1.1 DCE to DTE Connection

The normal mode of operation is for a DTE device to be connected to a DCE device. Normally this uses a straight through cable for short distances, but for longer cable runs the FIMO-2100 provides a simple method of extending the connection up to 40 kms using fibre. Some example applications are described in the following subsection.

5.1.2 DTE to DTE

In DTE to DTE applications such as terminal to terminal, the FIMO-2100 effectively provides a null modem crossover function.

5.2 EIA-530 Modem to EIA-530 Router at 2.048 Mbps (DCE to DTE)

The FIMO-2100 is used to extend the connection between the modem (DCE) and a router (DTE). The diagram and signal connection table below describe the application:

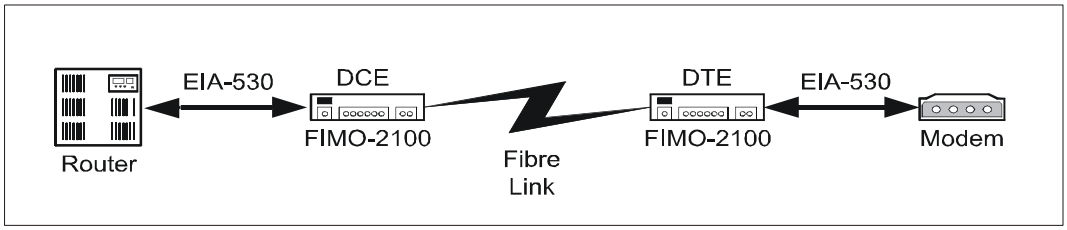


Figure 5.2 DCE to DTE operation

TXC	**<-**	TXC
TT	**->**	TT
TXD	**->**	TXD
RXC	**<-**	RXC
RXD	**<-**	RXD
DCD	**<-**	DCD
RTS	**->**	RTS
CTS	**<-**	CTS
DTR	**->**	DTR
DSR	**<-**	DSR
LL	**->**	LL
RL	**->**	RL
TM	**<-**	TM

Figure 5.3 DCE to DTE connections

5.2.1 DTE FIMO-2100 connection

The FIMO-2100 connected to the Modem (DCE) should be configured for DTE operation as shown on the FIMO-2100 base label below:

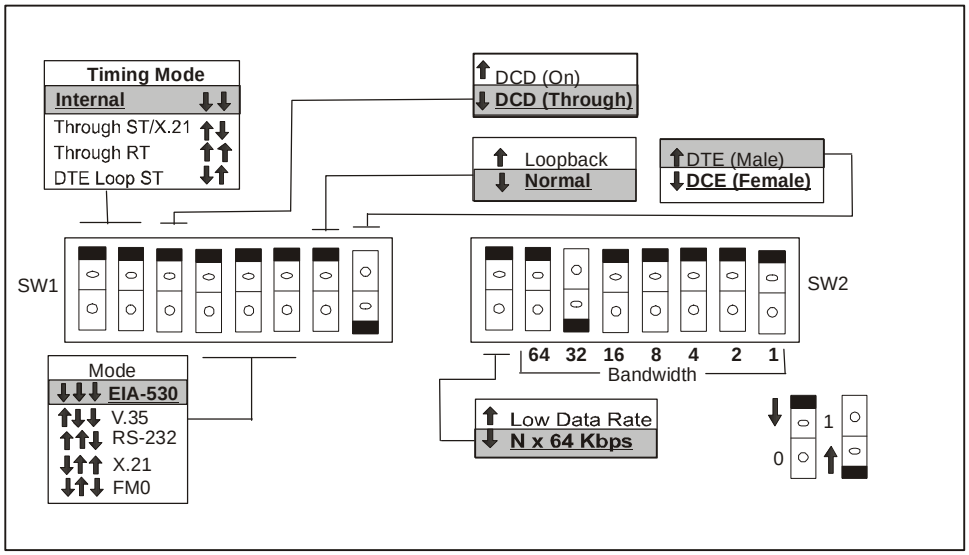


Figure 5.4 DTE configuration

The following settings in the figure are fixed whenever a FIMO-2100 DTE port is connected to a DCE device such as a modem:

Mode: DTE
DCD: Through
Test: Normal

Other switch settings depend upon the actual requirements:

Interface Mode: EIA-530 - Select the required interface for your application e.g. EIA-530

Data Rate: Nx64 Kbps - In this example the data rate is 2.048Mbps. This is an Nx64 standard rate and thus the switch is set to the Nx64 position.

Bandwidth: 2048k, N=32, so set (0100000) - The bandwidth required in this example is 2.048Mbps, or 2048Kbps. This is an Nx64 rate where N=32. The SW2 bit-switches must therefore be set to binary 32, which is 0100000.

5.2.2 DCE FIMO-2100 connection

The FIMO-2100 connected to the Router (DTE) should be configured for DCE operation as shown on the FIMO-2100 base label below:

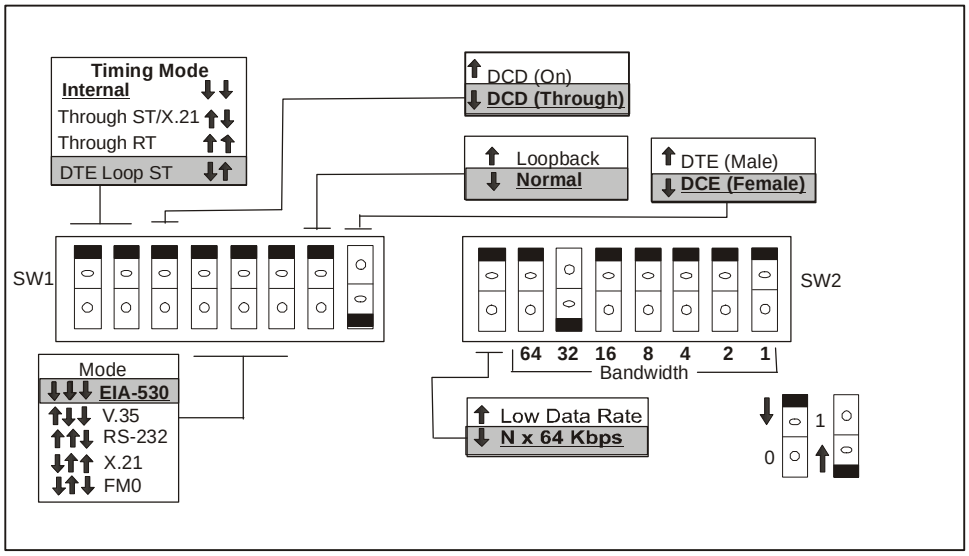


Figure 5.5 DCE configuration

The following settings in the figure are fixed whenever a FIMO-2100 DCE port is connected to a DTE device such as a Router:

Interface: DCE
DCD: Through
Test: Normal

Other switch settings depend upon the actual requirements:

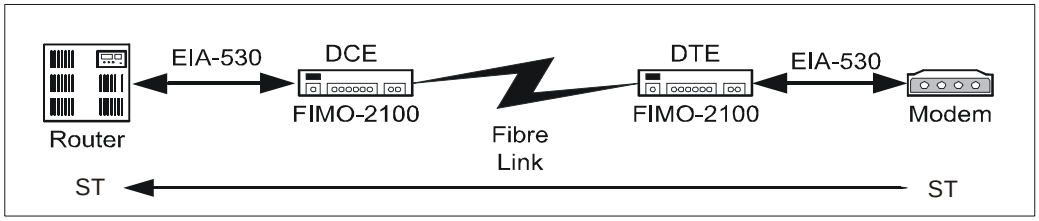
Interface Mode: EIA-530 - Select the required interface for your application e.g. EIA-530

Data Rate: Nx64 Kbps - In this example the data rate is 2.048Mbps. This is an Nx64 standard rate and thus the bit-switch is set to the Nx64 position.

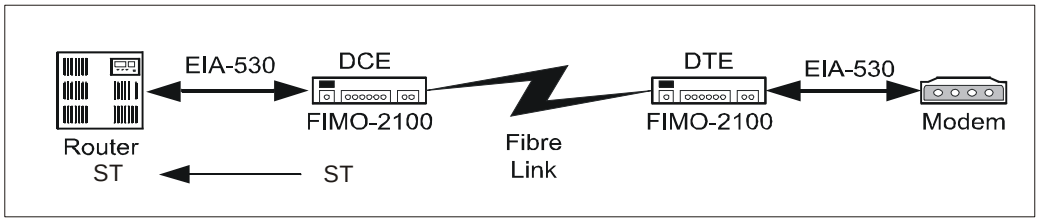
Bandwidth: 2048k, N=32, so set (0100000) - The bandwidth required in this example is 2.048Mbps, or 2048Kbps. This is an Nx64 rate where N=32. The SW2 bit-switches must therefore be set to binary 32, which is 0100000.

Timing Mode: DTE Loop ST

In order to pass the Modem generated Send/Transmit Timing (ST) to the router, the DCE FIMO-2100 is set for THROUGH timing sourced from the ST information on the fibre. The diagram below shows the through timing mode with the ST clock signal generated by the Modem being recovered by the DCE FIMO-2100 and used to clock the Router. The Router will normally use ST as the source for Terminal timing and Send/Transmit Data.



Alternatively if the modem does not generate ST, the DCE FIMO-2100 may be set to INTERNAL timing, and it will generate a clock based on the local oscillator as shown in the figure below:



5.3 V.35 to V.35 Router at 1.984Mbps (DCE to DTE)

in this application the FIMO-2100 is used to extend the connection between a DSU (DCE) and a router (DTE). The application is shown in the diagram below, together with a signal connection table for V.35 to V.35 operation.

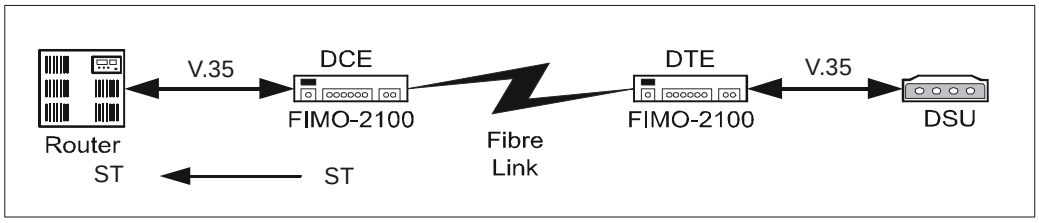


Figure 5.6 V.35 to V.35 connection

ST	**<-**	ST
TT	**->**	TT
TXD	**->**	TXD
RT	**<-**	RT
RXD	**<-**	RXD
DCD	**<-**	DCD
RTS	**->**	RTS
CTS	**<-**	CTS
DTR	**->**	DTR
DSR	**<-**	DSR
LL	**->**	LL
RL	**->**	RL
TM	**<-**	TM

Figure 5.7 DCE to DTE connection

5.3.1 DTE FIMO-2100 Configuration

The FIMO-2100 connected to the DSU (DCE) should be configured for DTE operation as shown below

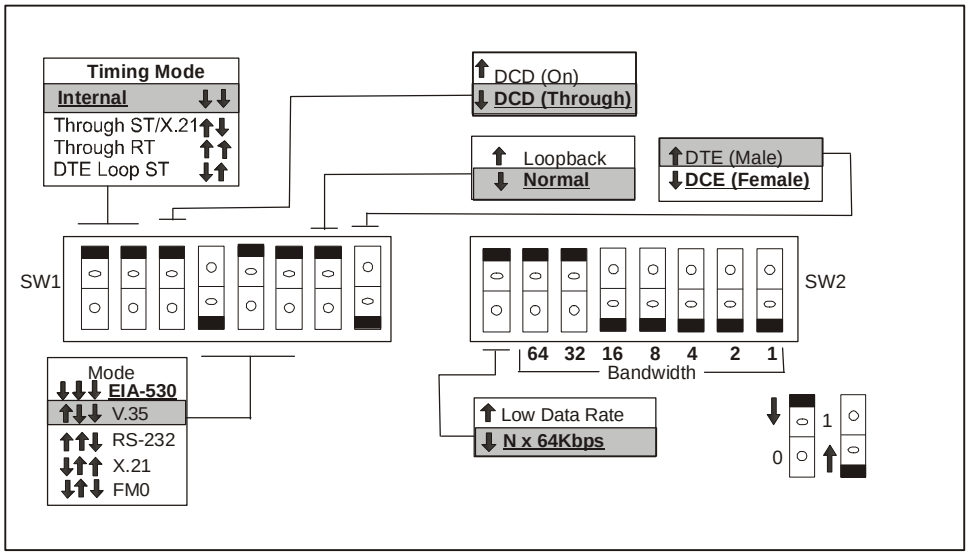


Figure 5.8: V.35 DTE configuration

The following bit-switch settings in the figure are fixed whenever a FIMO-2100 DTE port is connected to a DCE device such as a modem:

Interface: DTE
DCD: Through
Test: Normal

The following switch settings depend upon the actual requirements:

Interface Mode: V.35 - Select the required interface for your application. Here, it is V.35

Data Rate: Nx64 Kbps - In this example the data rate is 1.984Mbps. This is an Nx64 standard rate and thus the switch is set to the Nx64 position.

Bandwidth: 1984k, N=31, so set (0011111) - The bandwidth required in this example is 1.984Mbps, or 1984Kbps. This is an Nx64 rate where N=31. The SW2 bit-switches must therefore be set to binary 31, which is 0011111.

Timing:

5.3.2 V.35 DCE FIMO-2100 configuration

The FIMO-2100 connected to the Router (DTE) should be configured as shown below:

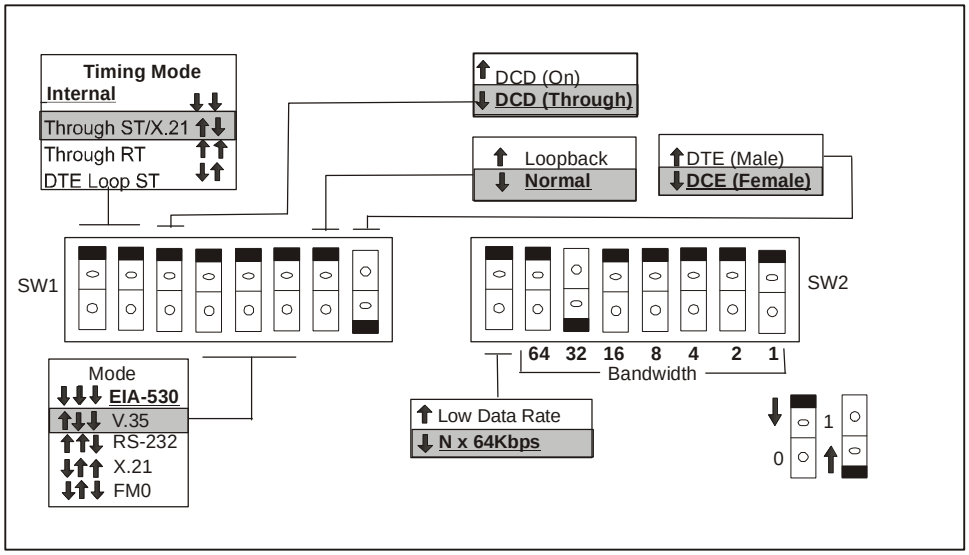


Figure 5.9 V.35 DCE configuration

The following settings in the figure are fixed whenever a FIMO-2100 DCE port is connected to a DTE device such as a router:

Interface: DCE
DCD: Through
Test: Normal

The following switch settings depend upon the actual requirements:

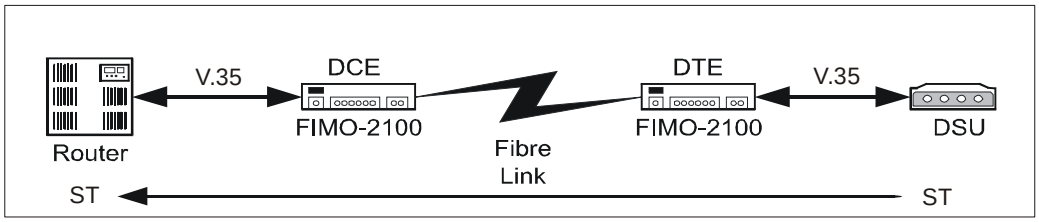
Interface Mode: V.35 - Select the required interface for your application.Here, it is V.35

Data Rate: Nx64 Kbps - In this example the data rate is 1.984Mbps. This is an Nx64 standard rate and thus the switch is set to the Nx64 position.

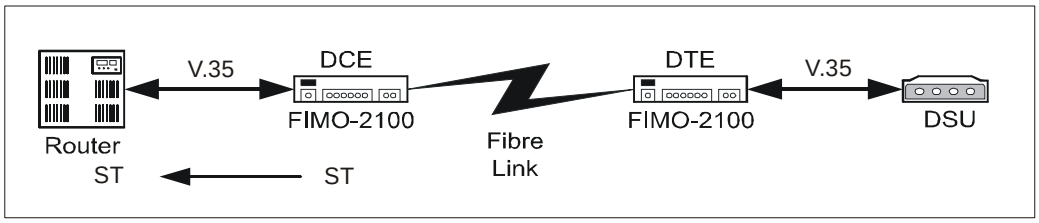
Bandwidth: 1984k, N=31, so set (0011111) - The bandwidth required in this example is 1.984Mbps, or 1984Kbps. This is an Nx64 rate where N=31. The SW2 bit-switches must therefore be set to binary 31, which is 0011111.

Timing mode: Through/ST

In order to pass the DSU generated Send/Transmit Timing (ST) to the Router, the DCE FIMO-2100 is set for THROUGH timing sourced from the ST information on the fibre. The diagram below shows the THROUGH timing mode with the ST clock signal generated by the DSU being recovered by the DCE FIMO-2100 and used to clock the Router, which will normally use ST as the source for Terminal Timing and Send/Transmit data.



Alternatively if the DSU does not generate ST the DCE FIMO-2100 may be set to INTERNAL timing and it will generate a clock based on the local oscillator as shown in the diagram below:



5.4 X.21 NTU to X.21 Router at 128Kbps (DCE to DTE)

In this application the FIMO-2100 is used to extend the connection between an X.21 NTU (DCE) and a router (DCE) as shown in the diagrams below:

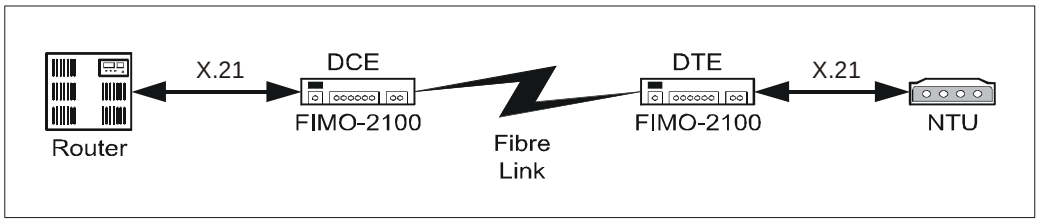


Figure 5.10 X.21 Router to NTU

T	->	T
S	<-	S
R	<-	R
I	<-	I
C	->	C

Figure 5.11 X.21 Connections

5.4.1 X.21 DTE FIMO-2100 configuration

The FIMO-2100 connected to the NTU (DCE) should be configured for DTE operation as shown below:

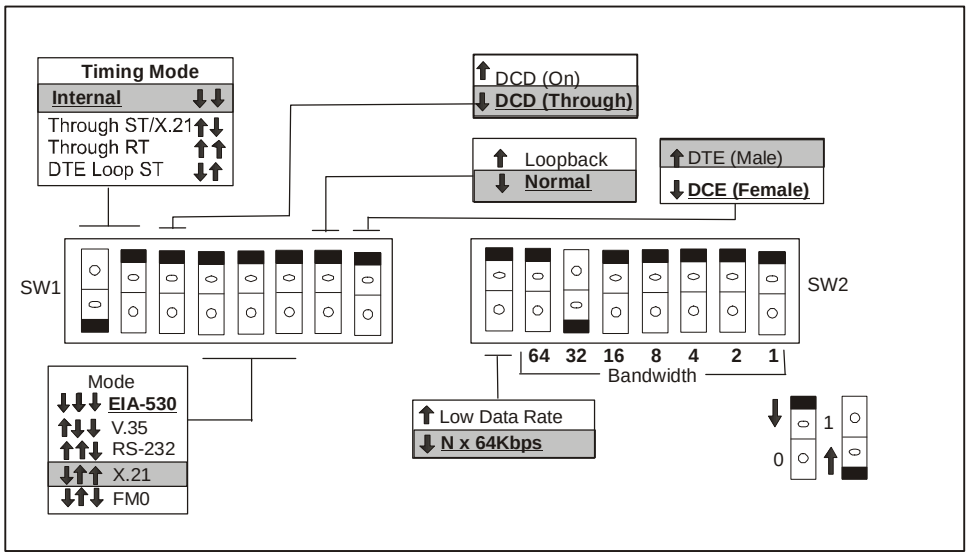


Figure 5.12 X.21 DTE Configuration

The following settings in the figure are fixed whenever a FIMO-2100 DTE port is connected to a DCE device such as a modem:

Interface: DTE
Timing mode: Internal
DCD: Through
Test: Normal

The following switch settings depend upon the actual requirements:

Interface Mode: X.21- Select the required interface for your application. In this case, X.21

Data Rate: Nx64 Kbps - In this example the data rate is 128 Kbps. This is an Nx64 standard rate and thus the switch is set to the Nx64 position.

Bandwidth: 128k, N=2, so set (0000010) - The bandwidth required in this example is 128Kbps. This is an Nx64 rate where N=2. The SW2 bit-switches must therefore be set to binary 2, which is 0000010.

5.4.2 X.21 DCE FIMO-2100 configuration

The FIMO-2100 connected to the router (DTE) should be configured for DCE operation as shown below

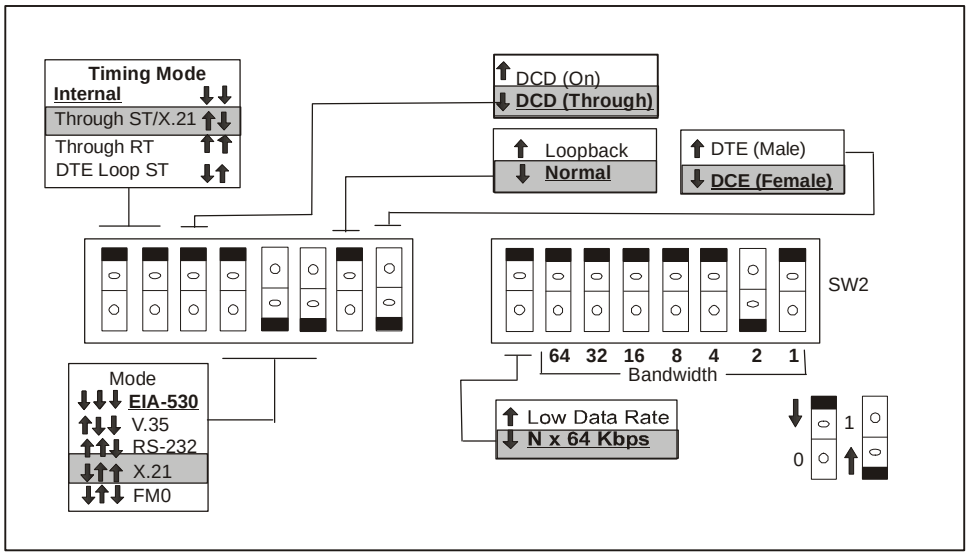


Figure 5.13 X.21 DCE configuration

The following switch settings are fixed whenever a FIMO-2100 is connected to a DTE device such as a router:

Interface: DCE
DCD: Through
Test: Normal

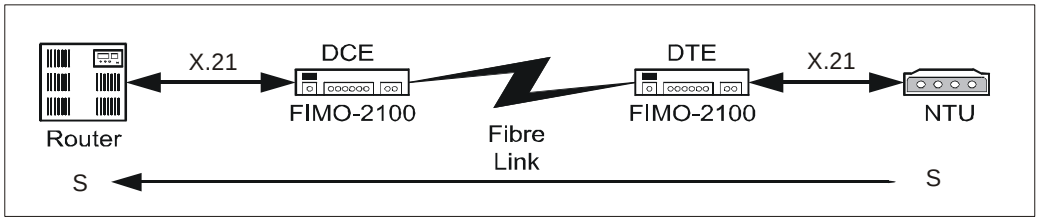
The following switch settings depend upon the actual requirements:

Interface Mode: X.21- Select the required interface for your application. Here, it is X.21

Data Rate: Nx64 Kbps - In this example the data rate is 128 Kbps. This is an Nx64 standard rate and thus the switch is set to the Nx64 position.

Bandwidth: 128k, N=2, so set (0000010) - The bandwidth required in this example is 128Kbps. This is an Nx64 rate where N=2. The SW2 bit-switches must therefore be set to binary 2, which is 0000010.

Timing mode: Through/X.21 In order to pass the NTU generated Timing S to the router, the DCE FIMO-2100 is set for THROUGH/X.21 timing sourced from the S information on the fibre. The diagram below shows the THROUGH timing mode with the S clock signal generated by the NTU being recovered by the DCE FIMO-2100 and used to clock the router.



5.5 RS-232 modem to RS-232 terminal at 38400bps (DCE to DTE)

In this application the FIMO-2100 is used to extend the connection between a Modem (DCE) and a Terminal (DTE) as shown in the diagrams below:

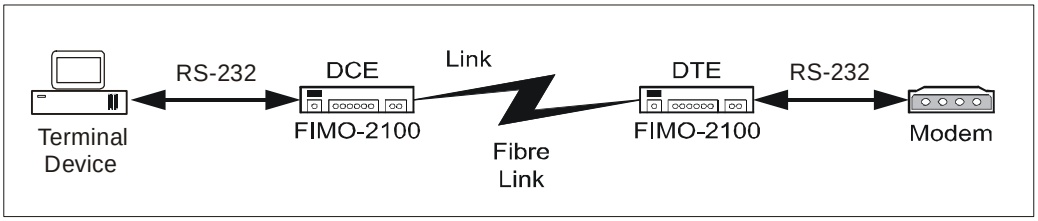


Figure 5.14 RS232 modem to RS-232 terminal

TXC	**<-**	TXC
TT	**->**	TT
TXD	**->**	TXD
RXC	**<-**	RXC
RXD	**<-**	RXD
DCD	**<-**	DCD
RTS	**->**	RTS
CTS	**<-**	CTS
DTR	**->**	DTR
DSR	**<-**	DSR
LL	**->**	LL
RL	**->**	RL
TM	**<-**	TM

Figure 5.15 RS-232 connections

5.5.1 RS-232 DTE FIMO-2100 configuration

The FIMO-2100 connected to the Modem (DCE) should be configured for DTE operation as shown below:

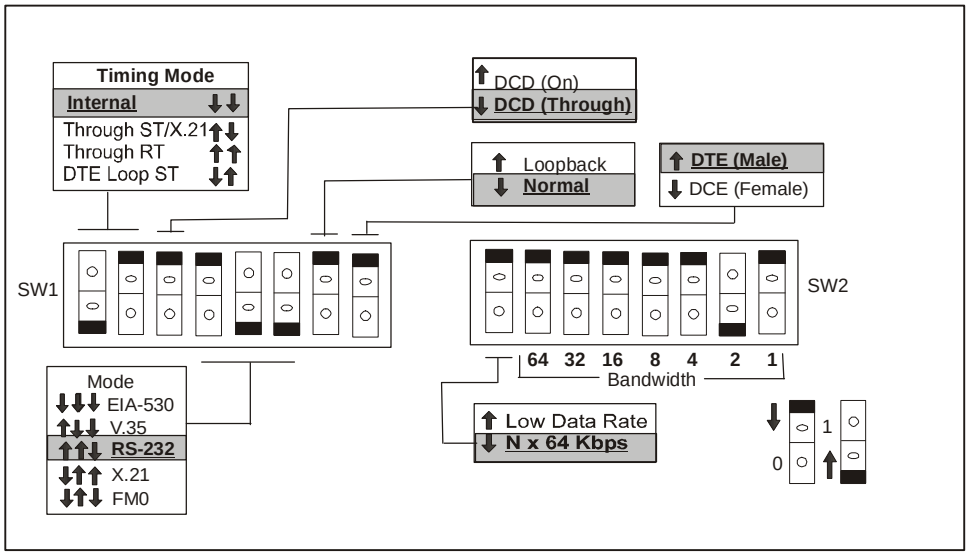


Figure 5.16 RS-232 DTE configuration

The following switch settings are fixed whenever a FIMO-2100 DTE port is connected to a DCE such as a modem:

Interface: DTE
Timing mode: Internal
DCD: Through
Test: Normal

The following switch settings depend upon the actual requirements:

Interface Mode: RS-232 - Select the required interface for your application. e.g. RS-232

Data Rate: Low Data Rate - In this example the data rate is 38400bps. This is a low data rate and thus the switch is set to the Low Data Rate position.

Bandwidth: 38400bps, so set (0000000) - The bandwidth required in this example is 38400bps. This is a low data rate. In DTE mode, the bandwidth SW2 bit-switches are not used, and may be left in factory default position of 0000000.

5.5.2 RS-232 DCE FIMO-2100 configuration

The FIMO-2100 connected to the Modem (DCE) should be configured for DTE operation as shown below:

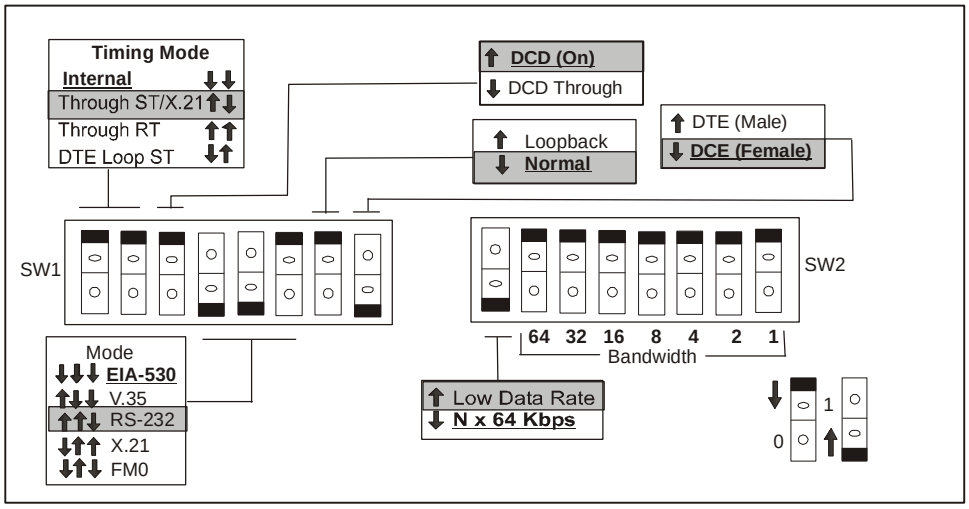


Figure 5.17 RS-232 DCE configuration

The following switch settings are fixed whenever a FIMO-2100 is connected to a DTE device such as a Terminal:

Interface: DCE
DCD: Through
Test: Normal

The following switch settings depend upon the actual requirements:

Interface Mode: RS-232 - Select the required interface for your application. e.g. RS-232

Data Rate: Low Data Rate - In this example the data rate is 38400bps. This is a low data rate and thus the bit-switch is set to the Low Data Rate position.

Bandwidth: 38400bps, so set (0000000) - The bandwidth required in this example is 38400bps. This is a low data rate, so the FIMO-2100 operates in over-sampling mode.

If the modem (DCE) generates a Transmit Clock and the FIMO-2100 is operated in THROUGH timing mode, the SW2 bit-switches are not used, and the FIMO-2100 will support operation at up to 256Kbps.

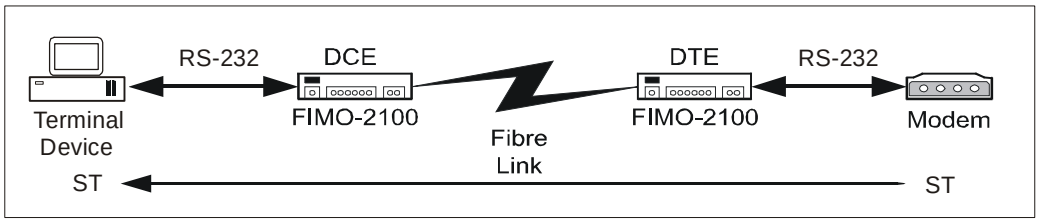
However, if there is a requirement for the FIMO-2100 to source the Transmit Timing, then the bit-switches should be set to select the desired rate as shown in the table below:

Bit-switch 2 settings	Data Rate
0000000	300
0000001	600
0000010	1200
0000100	2400
0001000	4800
0010000	9600
0100000	19200
1000000	38400

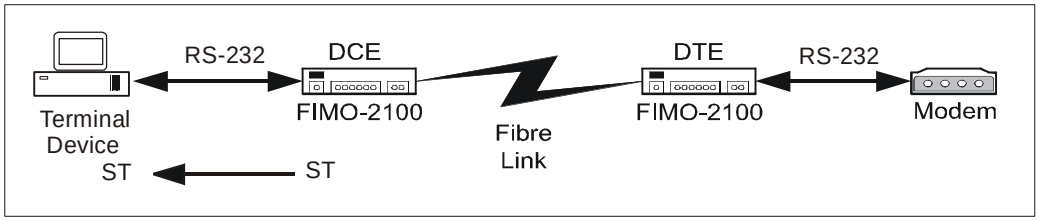
Figure 5.18 Bit-switch 2 bandwidth settings

Timing Mode: Through/ST

In order to pass the modem generated Send/Transmit Timing (ST) to the Terminal, the DCE FIMO-2100 is set for THROUGH timing sourced from the ST information on the fibre. The diagram below shows the THROUGH timing mode with the ST clock signal generated by the Modem being recovered by the DCE FIMO-2100 and used to clock the Terminal, which will normally use ST as the source for Terminal Timing and Send/Transmit Data.



Alternatively if the modem does not generate ST, the DCE FIMO-2100 may be set to INTERNAL timing and it will generate a clock based on the local oscillator as shown in the diagram below:



5.6 EIA-530 router to EIA-530 router at 8.192Mbps (DTE to DTE)

In this application two routers (DTE) are connected using a pair of FIMO-2100s configured as for DCE operation, as shown below:

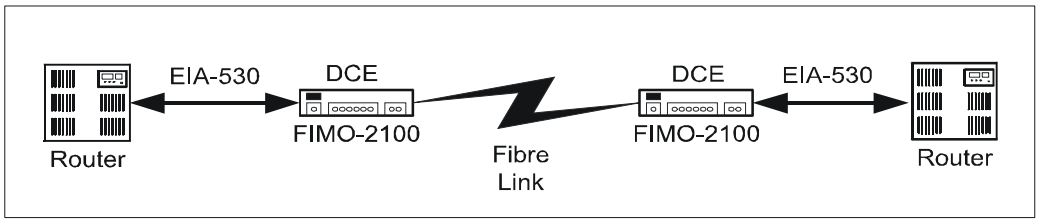


Figure 5.19 EIA-530 to EIA-530

TXC	**<- ->**	TXC
TT	**->**	TT
TXD	**->**	TXD
RXC	**<-**	RXC
RXD	**<-**	RXD
DCD	**<- ->**	DCD
RTS	**->**	RTS
CTS	**<-**	CTS
DTR	**->**	DTR
DSR	**<-**	DSR

Figure 5.20 DTE to DTE connections

The FIMO-2100 performs a “null modem” or crossover function, automatically connecting the Transmit Data (TXD) output from one Router to the Receive Data (RXD) input of the other Router. For most applications of this type both FIMO-2100 units may be configured using the same switch settings as shown below:

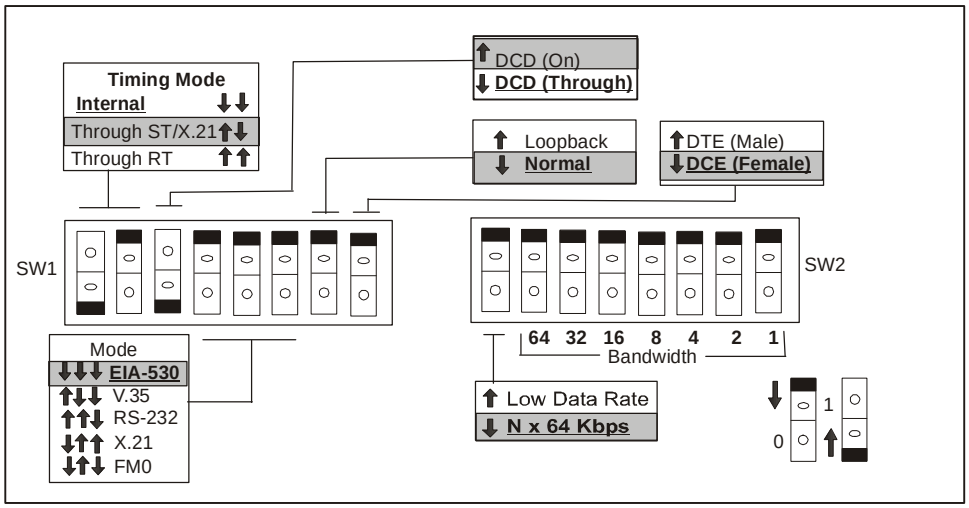


Figure 5.21 DTE to DTE configuration

The following switch settings are fixed whenever a FIMO-2100 DTE/DTE connection is required: Interface: DCE
DCD: ON
Test: Normal
The following switch settings depend upon the actual requirements:

Interface Mode: EIA-530 - Select the required interface for your application. e.g. EIA-530

Data Rate: Nx64kbps - In this example the data rate is 8.1192Mbps. This is an Nx64kbps rate, and the bit-switch is in the Nx64Kbps position.

Bandwidth: 8.192Mbps, **(Bandwidth = 0000000)** - The bandwidth required in this example is 8.192Mbps. This is an Nx64kbps data rate where SW2 bit-switches should be set to binary 0000000 so as to select N=128 as explained below.

In Nx64k mode, the bit-switches are used to select the data rate for clock recovery modules. The bit-switches are used to configure the N multiplier for the Nx64 using binary notation as shown below:

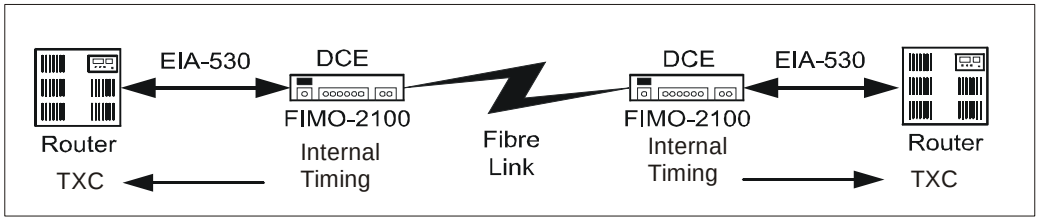
Binary Switch Setting	N=	Data rate
0000001	1	Nx64=64k
0000010	2	Nx64=128k
0000011	3	Nx64=192k
and so on...		
1111110	126	Nx64=8064k
1111111	127	Nx64=8128k
0000000	128	Nx64=8192k

Figure 5.22 Bandwidth select bit-switches

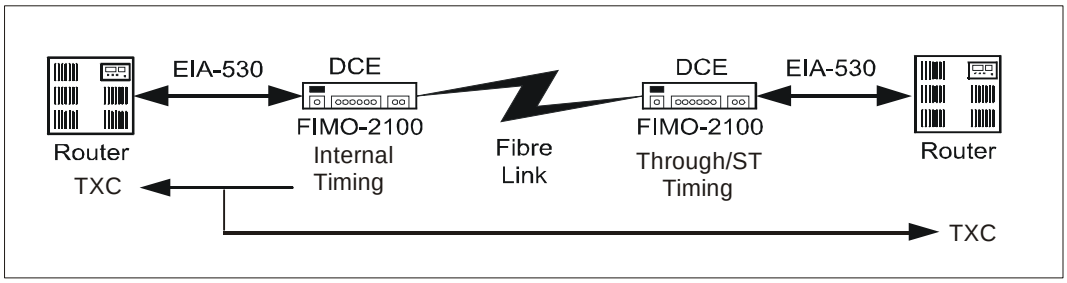
Note that N=128 is selected using all switches on SW2 set to 0 since only 7 switches are used for selection, and N=0 is not valid.

Timing mode: Internal

The FIMO-2100 at each end should be set to INTERNAL timing to generate a clock sourced from the local oscillators as shown below:



However, this configuration will operate with slightly different clocks in each direction since the internal oscillators in the two FIMO-2100 devices will differ by a few ppm. If a fully synchronous network is required as shown, then one FIMO-2100 should be configured as with THROUGH timing as shown in figure 5.21 , with the other set for INTERNAL timing ST mode as shown in Figure 5.23 below:



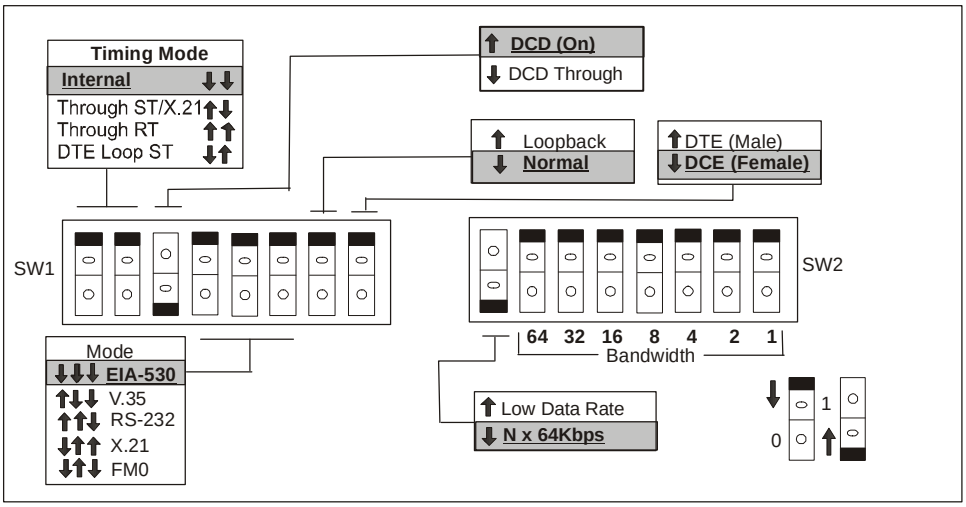


Figure 5.23 DTE to DTE mode with Through timing on one FIMO-2100

5.7 RS-232 terminal to RS-232 terminal at 38400bps (DTE to DTE)

In this application the FIMO-2100 is used to extend the connection between a pair of synchronous RS-232 terminals (DTE) and operates at 38400bps. The application is shown in the diagrams below, along with crossed over signal connections.

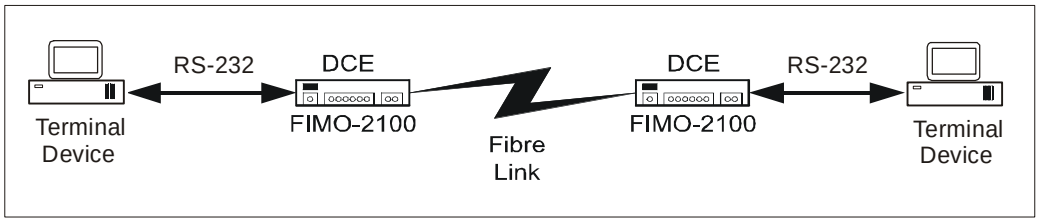


Figure 5.24 RS-232 to RS-232

TXC	**<- ->**	TXC
TT	**->**	RXC
TXD	**->**	RXD
RXC	**<-**	TT
RXD	**<-**	TXD
DCD	**<- ->**	DCD
RTS	**->**	CTS
CTS	**<-**	RTS
DTR	**->**	DSR
DSR	**<-**	DTR

Figure 5.25 RS-232 to RS-232 connection

Each FIMO-2100 should be configured with the same bit-switch settings as shown below:

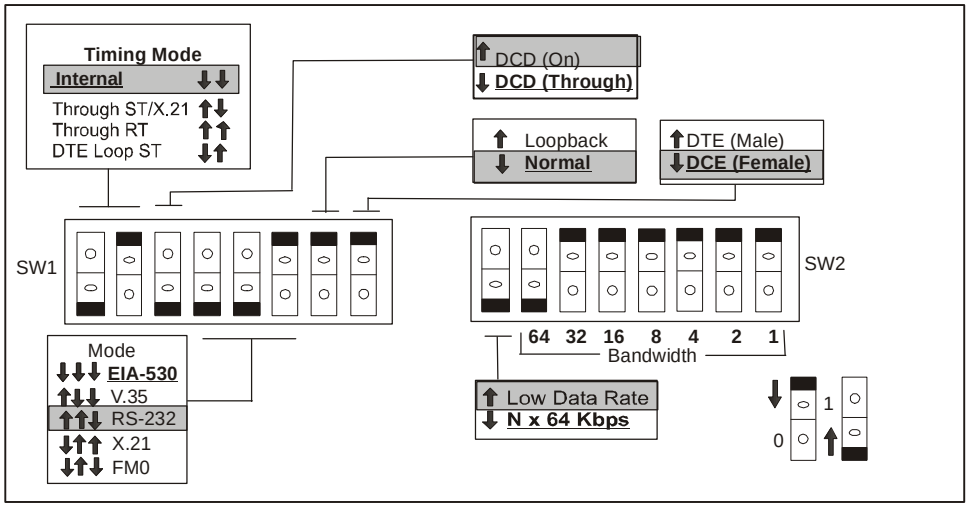


Figure 5.26 RS-232 DTE to DTE configuration

The following bit-switch settings are fixed whenever a FIMO-2100 DTE/DTE connection is required:

Interface: DCE
DCD: ON
Test: Normal

The following bit-switch settings depend upon the actual requirements:

Interface Mode: RS-232 - Select the required interface for your application. e.g. RS-232

Data Rate: Low Data Rate - In this example the data rate is 38400bps. This is a low data rate and thus the switch is set to the Low Data Rate position.

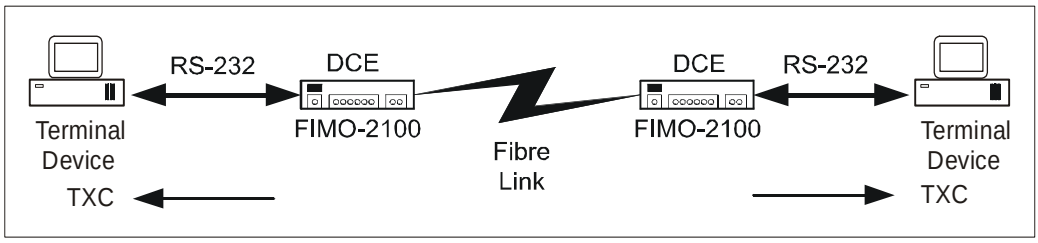
Bandwidth: 38400bps, so set (1000000) - The bandwidth required in this example is 38400bps. This is a low data rate, and the SW2 bit-switches should be set to binary 1000000 as shown in the table below:

Bit-switch 2 settings	Data Rate
0000000	300
0000001	600
0000010	1200
0000100	2400
0001000	4800
0010000	9600
0100000	19200
1000000	38400

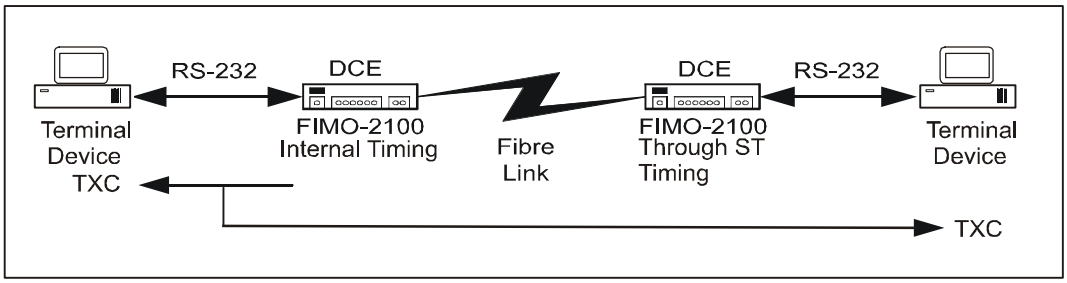
Figure 5.27 Bit-switch SW2 low data rate settings

Timing Mode: Internal

The FIMO-2100 at each end should be set to INTERNAL timing to generate a clock sourced from the local oscillators as shown below



However, this configuration will operate with slightly different clocks in each direction since the internal oscillators in the two FIMO-2100 devices will differ by a few ppm. If a fully synchronous network is required as shown, then one FIMO-2100 should be configured as in Figure 5.26 above with the other set for THROUGH ST timing mode as shown in Figure 5.28 below:



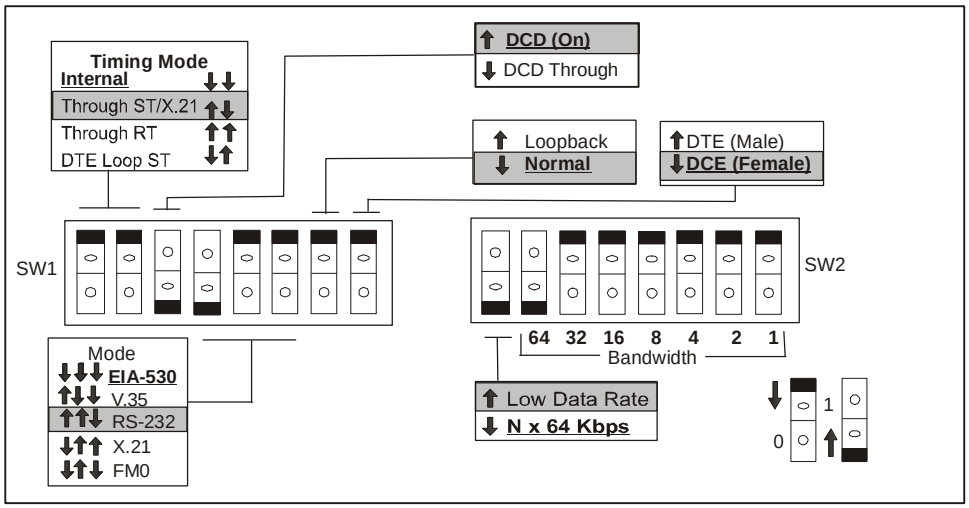


Figure 5.28 RS-232 to RS-232 Synchronous Through timing configuration

6 INSTALLING & SETTING-UP

This section describes how to set up the FIMO-2100 ready for use. It covers the initial connections, powering on the unit, and how to access the software that controls the operating parameters.

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.

6.1 Connecting up

Step 1: Mounting

The FIMO-2100 is housed in a convenient 1U high (202mm wide) table top enclosure. 19 inch rack-mounting options are available as are rack nests for 2 to 18 units.

Step 2: Configuration

The bit-switches on the underside of the FIMO-2100 unit must be configured for the desired operation. See Section 4 for set-up details.

Step 3: Power Supply

Connect the mains power lead (or DC supply cable) and re-check all connections for security. When power has been switched on, the Status LED should be ON or Flashing to indicate that the FIMO-2100 is operational.

Step 4: Fibre Ports FM2100

Connect each Fibre Optic to the FIMO-2100. Ensure that the correct fibre type is used to match the transceivers fitted to the FIMO-2100.

When both ends of the Fibre Link are connected, the LINK LEDs SFP1 and SFP2 will each be ON with a GREEN colour to indicate that the incoming fibre link is operationa.l

If a LINK LED is **not Green** this indicates that either the remote FIMO-2100 is not connected or powered up. Alternatively **Flashing Green** may indicate that the remote unit is not a FIMO-2100, or there is a high bit error rate on the fibre.

Step 5: Serial Port

The bit-switches should have been set to select the correct interface type and mode, the DCD mode, timing mode and bandwidth.Connect the serial data cable to the selected port on the rear panel of the unit. See Section 4 for details of setting up bit-switches.

When the cable is connected, the Status LED should be steady GREEN, indicating that the unit is operating normally.

6.2 Rack mounting

Rack-mounting kits may be used to mount two FIMO-2100 units side by side in a 19 inch rack. The kit, part number 80-05-256, has a recessed plate to permit cable or fibre bends to be made within the envelope of the 19 inch cabinet or rack. It has a cut-out to provide access to all the connectors on the rear panel of the FIMO-2100.

To install the FIMO-2100, first remove the two rear panel screws securing the lid as arrowed below. Fasten the FIMO-2100 into the rack-mounting adaptor plate using the screws just removed. Then secure the rack-mounting plate complete with one or two FIMO-2100 units into the 19 inch rack using the locator holes at the ends of the adaptor plate.
Ensure that the bit-switches are correctly set before installing the rack-mount option.

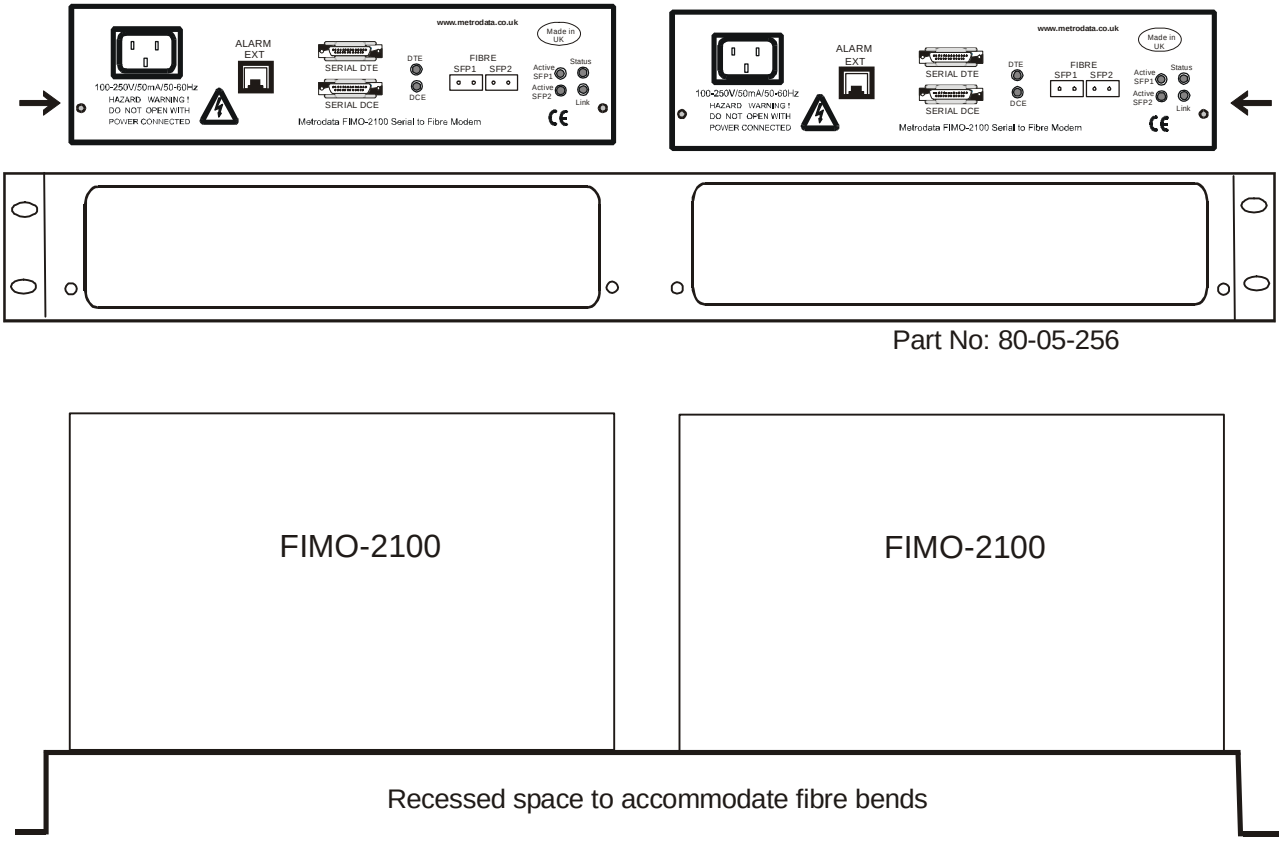


Figure 6.1 2-unit FIMO-2100 rackmount option

An alternative unit can house up to 18 FIMO-2100 units in a single 19 inch rack. Contact Metrodata technical support for further information on this product.

7 TROUBLESHOOTING

If the link is not functioning correctly, the following troubleshooting hints may be helpful.

Status LED	
Off	Power is not being received by the FIMO-2100
Green	Status is OK
Green Flashing	Remote Alarm Indication (RAI)
Red	Fibre Alarm
Red Flashing	Not receiving FM0 on Serial port
Red/Green Flashing	Not receiving FM0 data on Fibre port
Link LED	
Off	No signal being received
Green Flashing	A signal is present but the FIMO-2100 cannot synchronise
Green	The Fibre Link is synchronised

Figure 7.1 Rear panel status & link LEDs

7.1 Status LED Off

If the Status LED is unlit, the unit has no power. Check the power connection to the unit. If you are certain that the power connection is good, it is likely that the FIMO-2100 has developed a fault causing the internal fuse to fail. This is not a field replaceable item, and the unit should be returned to Metrodata for repair.

7.2 Link LED Off

If the Fibre LINK LED is OFF, this indicates that the fibre receiver cannot detect a signal. Check that the fibre is connected correctly and is of the correct type (e.g. Multi-mode, Single-mode). If the local fibre is correctly connected, it is likely that the remote end is powered down or not connected.

7.3 Link LED Flashing Green

If the Fibre LINK LED is Flashing GREEN, this indicates that a signal can be detected but the FIMO-2100 cannot synchronise to the signal. This may be for two reasons.

Firstly, if the Fibre link is faulty and has a very high error rate. This may be caused by having installed the wrong type of fibre e.g. Multi-mode instead of Single-mode; or that the loss budget has been exceeded owing to distance or couplings.

Secondly, perhaps the Fibre link is not a transparent connection to the remote FIMO-2100 unit.

7.4 Status LED

7.4.1 Status LED Flashing Green

With the FIBRE LINK LED in the GREEN ON state, a Flashing GREEN Status LED indicates that the remote FIMO-2100 unit has a fibre fault, either LOS (Loss of Signal) or Loss of Synch. Check that the local fibre transmitter is correctly connected. Otherwise, the fault exists at the remote unit. It may be that the remote equipment is not connected or is powered down.

7.4.2 Status LED Steady Red

A Fibre alarm is present.

7.4.3 Status LED Flashing Red

FM0 is not being received on serial port.

7.4.4 Status LED Flashing Red/Green

FM0 is not being received on a fibre port.

7.4.5 Status OK, but no traffic passing

Check that the correct connector has been selected i.e. DTE or DCE.
Check that the correct interface type has been selected.
Check that the Bandwidth selected is correct.

8 FIMO-2100 SPECIFICATIONS

Serial Interface	Definition
DCE Mode	25-way D-type Female connector on rear panel
DTE Mode	25-way D-type Male connector on rear panel
Standards	EIA-530, V.35, RS-232, X.21, FM0
Data Rates	Nx64k, maximum 8.192Mbps
Signals	TxD, RxD, TxC, RxC, ETxC, RTS, CTS, DSR, DTR, DCD, RL, LL, RI, TM
SFP Fibre Interfaces	**Typical options**
OC-3 MM 1310 SR-1	1310 nm, Multi-mode, short range (2km)
Output optical power	Min: -15dBm Max: -8dBm
Receiver sensitivity	-28dBm
OC-3 SM 1310 IR-1	1310 nm, single-mode, intermediate range (15KM)
Output optical power	Min: -15dBm Max: -8dBm
Receiver sensitivity	-28dBm
OC-3 SM 1310 LR-1	1310 nm, single-mode, long range (40km)
Output optical power	Min: -5dBm Max: 0dBm
Receiver sensitivity	-34dBm
OC-3 SM 1550 LR-2	15560 nm, single-mode, long range (80km)
Output optical power	Min: -5dBm Max: 0dBm
Receiver sensitivity	-34dBm
General	**Definition**
Power supply	100-250 VAC, 50-60 Hz, 60-24 mA or
Dimensions	202 x 132 x 44 mm (w x d x h) Enclosure only
Environmental	**Range**
Ambient Temperature	0degC to +50degC
Storage Temperature	-20degC to +70degC
Relative Humidity	0% - 95% non condensing
Barometric Pressure	86 KPa - 106 KPa

9 APPENDIX A

9.1 V.35 DCE Adaptor cable specification

FIMO-2100 DCE Serial I/F 25-way D Male Pin No	Pair	Signal name	V.35 DCE MRAC Female Pin No
1	Screen	Shield	A
2	A	TxD(A)	P
3	B	RxD(A)	R
4	C	RTS(A)	C
5	D	CTS(A)	D
6	E	DSR(A)	E
7	K	Signal Ground	B
8	F	DCD(A)	F
9	G	RxC(B)	X
10	F	DCD(B)	No Connect
11	H	ETxC(B)	W
12	I	TxC (B)	AA
13	D	CTS(B)	No Connect
14	A	TxD(B)	S
15	I	TxC(A)	Y
16	B	RxD(B)	T
17	G	RxC(A)	V
18	L	LL	J
19	C	RTS(B)	No Connect
20	J	DTR(A)	H
21	L	RL	BB
22	E	DSR(B)	No Connect
23	J	DTR(B)	No Connect
24	H	ETxC(A)	U
25	K	TM	K
Connect all pins			Unlisted Pins unconnected

Figure 9.1 FIMO-2100 V.35 DCE adaptor cable

Note: 12 pair screened cable is required

9.2 V.36 DCE Adaptor cable specification

FIMO-2100 DCE Serial I/F 25-way D Male Pin No	Pair	Signal name	V.36 DCE 37-Way D Female Pin No
1	Screen	Shield	1
2	A	TxD(A)	4
3	B	RxD(A)	6
4	C	RTS(A)	7
5	D	CTS(A)	9
6	E	DSR(A)	11
7	K	Signal Ground	19, 20, 37
8	F	DCD(A)	13
9	G	RxC(B)	26
10	F	DCD(B)	31
11	H	ETxC(B)	35
12	I	TxC (B)	23
13	D	CTS(B)	27
14	A	TxD(B)	22
15	I	TxC(A)	5
16	B	RxD(B)	24
17	G	RxC(A)	8
18	L	LL	10
19	C	RTS(B)	25
20	J	DTR(A)	12
21	L	RL	14
22	E	DSR(B)	29
23	J	DTR(B)	30
24	H	ETxC(A)	17
25	K	TM	18
Connect all pins			Unlisted Pins unconnected

Figure 9.2 FIMO-2100 V.36 DCE adaptor cable

Note: 12 pair screened cable is required

9.3 X.21 DCE Adaptor cable specification

FIMO-2100 DCE Serial I/F 25 way D Male Pin No	Signal	Direction	X.21 DCE 15-way D Female Signal	Pin	Pair
1	Shield		Shield	1	
2	TxD(A)	<--	T(A)	2	1
3	RxD(A)	-->	R(A)	4	2
4	RTS(A)				
5	CTS(A)				
6	DSR(A)				
7	Signal Ground		Signal Ground	8	
8	DCD(A)	-->	I(A)	5	4
9	RxC(B)	-->	S(B)	13	5
10	DCD(B)	-->	I(B)	12	4
11	ETxC(B)				
12	TxC (B)				
13	CTS(B)				
14	TxD(B)	<--	T(B)	9	1
15	TxC(A)				
16	RxD(B)	-->	R(B)	11	2
17	RxC(A)	-->	S(A)	6	5
18	LL				
19	RTS(B)				
20	DTR(A)	<--	C(A)	3	3
21	RL				
22	DSR(B)				
23	DTR(B)	<--	C(B)	10	3
24	ETxC(A)				
25	TM				
			Unused	7, 14, 15	

Figure 9.3 FIMO-2100 X.21 DCE adaptor cable

9.4 V.35 DTE Adaptor cable specification

FIMO-2100 DTESerial I/F 25-way D Female Pin No	Pair	Signal name	V.35 DTE MRAC Male Pin No
1	Screen	Shield	A
2	A	TxD(A)	P
3	B	RxD(A)	R
4	C	RTS(A)	C
5	D	CTS(A)	D
6	E	DSR(A)	E
7	K	Signal Ground	B
8	F	DCD(A)	F
9	G	RxC(B)	X
10	F	DCD(B)	No Connect
11	H	ETxC(B)	W
12	I	TxC (B)	AA
13	D	CTS(B)	No Connect
14	A	TxD(B)	S
15	I	TxC(A)	Y
16	B	RxD(B)	T
17	G	RxC(A)	V
18	L	LL	J
19	C	RTS(B)	No Connect
20	J	DTR(A)	H
21	L	RL	BB
22	E	DSR(B)	No Connect
23	J	DTR(B)	No Connect
24	H	ETxC(A)	U
25	K	TM	K
Connect all pins			Unlisted Pins unconnected

Figure 9.4 FIMO-2100 V.35 DTE adaptor cable

Note: 12 pair screened cable is required

9.5 V.36 DTE Adaptor cable specification

FIMO-2100 DTE Serial I/F 25-way D Female Pin No	Pair	Signal name	V.36 DTE 37-Way D Male Pin No
1	Screen	Shield	1
2	A	TxD(A)	4
3	B	RxD(A)	6
4	C	RTS(A)	7
5	D	CTS(A)	9
6	E	DSR(A)	11
7	K	Signal Ground	19, 20, 37
8	F	DCD(A)	13
9	G	RxC(B)	26
10	F	DCD(B)	31
11	H	ETxC(B)	35
12	I	TxC (B)	23
13	D	CTS(B)	27
14	A	TxD(B)	22
15	I	TxC(A)	5
16	B	RxD(B)	24
17	G	RxC(A)	8
18	L	LL	10
19	C	RTS(B)	25
20	J	DTR(A)	12
21	L	RL	14
22	E	DSR(B)	29
23	J	DTR(B)	30
24	H	ETxC(A)	17
25	K	TM	18
Connect all pins			Unlisted Pins unconnected

Figure 9.5 FIMO-2100 V.36 DTE adaptor cable

Note: 12 pair screened cable is required

9.6 X.21 DTE Adaptor cable specification

FIMO-2100 DTE Serial I/F 25-way D Female Pin No	Signal	Direction	X.21 DTE 15-way D Male Signal	Pin	Pair
1	Shield		Shield	1	
2	TxD(A)	-->	T(A)	2	1
3	RxD(A)	<--	R(A)	4	2
4	RTS(A)				
5	CTS(A)				
6	DSR(A)				
7	Signal Ground		Signal Ground	8	
8	DCD(A)	<--	I(A)	5	4
9	RxC(B)	<--	S(B)	13	5
10	DCD(B)	<--	I(B)	12	4
11	ETxC(B)				
12	TxC (B)				
13	CTS(B)				
14	TxD(B)	-->	T(B)	9	1
15	TxC(A)				
16	RxD(B)	<--	R(B)	11	2
17	RxC(A)	<--	S(A)	6	5
18	LL				
19	RTS(B)				
20	DTR(A)	-->	C(A)	3	3
21	RL				
22	DSR(B)				
23	DTR(B)	-->	C(B)	10	3
24	ETxC(A)				
25	TM				
			Unused	7, 14, 15	

Figure 9.6 FIMO-2100 X.21 DTE adaptor cable