

E3/DS3 Fibre Extender



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1 INTRODUCTION

1.1 About the products

The Black Box range of Fibre Converters tabulated below provide a simple economic way of converting from one type of transmission medium to another. Examples include:

Electrical signals on copper to optical signals on fibre, and vice-versa.
Single-mode optical fibre to multimode and vice-versa.

Model	Customer Interface	Line Interface
MTU9230	E3/DS-3 G.703 via BNC 75 ohm	Dual SC Multi-mode fibre
MTU9240	E3/DS-3 G.703 via BNC 75 ohm	Dual SC Single-mode short haul fibre

The MTU9230/MTU9240 have been designed to be plug and go, conforming to appropriate standards, physically very compact, and rack mountable in sets of 2 using a dual face plate, or 18 units in a rack mount kit for large installations. FC units often enable substantial savings to be made in cable costs by utilising the cheapest effective cable type without incurring the costs of additional router or switch interfaces.

We are continually developing new models, so if the interface combination required is not listed in this guide, please contact us.

1.2 Safety

Where electrical signal cabling is connected to the units, do not connect to cabling which would be required by BS6701 to be equipped with over-voltage protection. Electrical signal 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 electrical 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

FC units are 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 WEEE Directive

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

1.7 Power Supply

Both units are powered by an internal mains-fed power supply. The mains input voltage is 100-250VAC, 50/400Hz. An alternative -48VDC power supply is available on all units as a custom order item. The power consumption of each model in the range is shown below, together with the current consumption over the operating voltage ranges.

An alternative -48VDC or -24 VDC power supply is available on most units as a custom order item.

The supply definition of the -48VDC supply is minus 36 to minus 72 VDC, 200-100 mA. DC power is supplied via a 3 pin Buccaneer socket fitted to the rear panel.

The supply definition of the -24VDC supply is minus 12 to minus 36 VDC, 700-125 mA. DC power is supplied via a 2 pin Buccaneer socket fitted to the rear panel. The surrounding label is cloured blue for the -12V/-24 option.

A Buccaneer plug is supplied with the unit for customer's own wiring. The connections are labelled on the rear panel of the unit as shown in the schematics below.

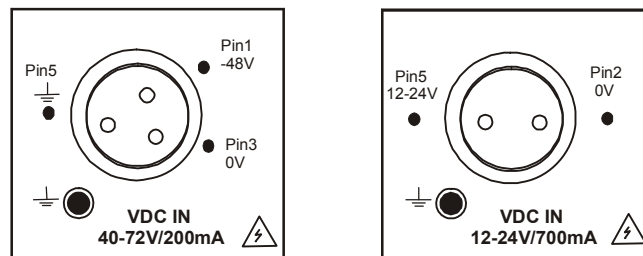


Figure 1. 3 Buccaneer DC sockets

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

The power consumption of the units is shown below, together with the current consumption over the operating voltage ranges.

Product	Watts Power Consumption	100-250 VAC Current Range mA	-36 to -72 VDC Current Range mA	-12 to -36 VDC Current range mA
MTU9230 & MTU9240	6.0	60 - 25	200 - 100	600-200

power consumption

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 UNPACKING & INSTALLATION PROCEDURE

2.1 Unpack and inspect the equipment.

The carton should contain a single unit and for UK models, a power cable.

If there is any visible damage, do not attempt to connect the device. Contact your Supplier or Black Box Technical support for advice and assistance.

2.2 Optional rackmounting procedure

Rackmounting kit Part No MTU9000M-RACK may be used to mount two FC units side by side in a 19" rack. First remove the two rear panel screws securing each unit's lid. Fasten the 2 units to the rack mount adaptor plate using the screws that you have removed, as shown in the illustrations below.

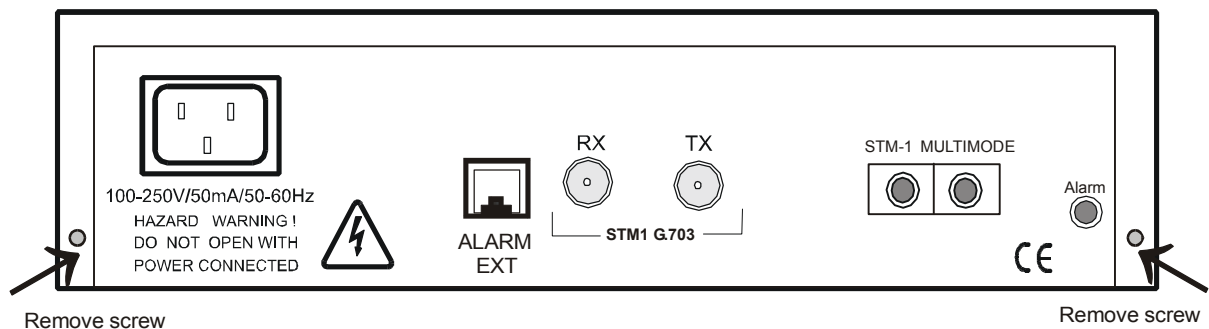


Figure 2.1 Unit rear panel

Then secure the rack mounting plate complete with the two units to the 19" rack using the locating holes at the ends of the adaptor plate. The recessed twin unit rack will accept either AC or DC FC models.

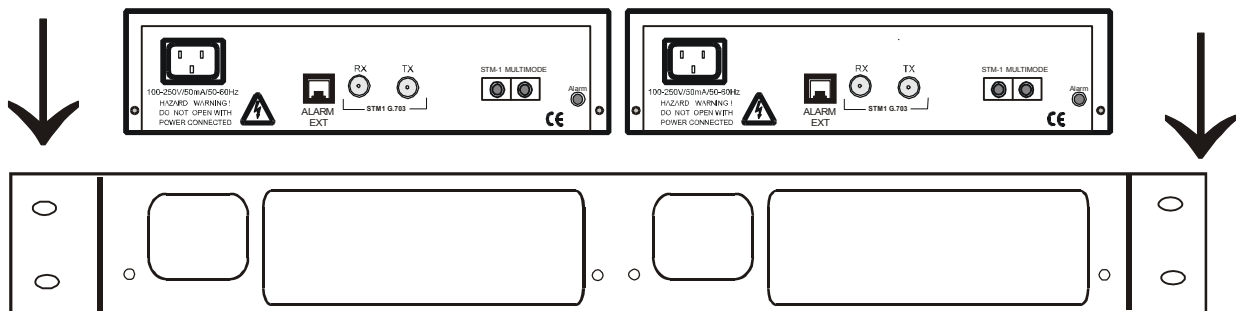


Figure 2.2 Twin unit rack mounting

If you wish to use the optional 18 unit mounting rack, instructions are provided with the rack, part number MTU9000M-18RACK-AC (AC Mains) or MTU9000M-18RACK-DC (DC Supply).

2. 3 Power up the units

The unit requires 100-250 VAC, 50-60 Hz AC supply, drawing less than 50mA when operating.

Alternatively, a -48VDC power supply is available as another option for all models. The DC power options are -36 to -72 VDC (-48VDC), or -12 to -36 VDC (-24VDC), using a Buccaneer type connector. See Section1 for further details on power consumption.

Plug a power cable into the back of the unit and switch on. Check that the Alarm LED on the rear panel is illuminated red or green, flashing or steady. If the LED is off, power is not being supplied to the unit.

2. 4 Connect the Customer and Network ports.

When all the ports are connected, the Alarm LED should give a steady Green display. Set-up information for both models is contained in each section of this manual.

2. 5 Optionally connect the alarm relay

Many units offer an Alarm relay 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. Normal is the powered up, non-alarmed state. The connections are shown in the table below:

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

Figure 2.3 Alarm relay pinout

5 E3/DS3 TO FIBRE CONVERTER

5.1 Rear panel

The E3/DS-3 line is connected via a pair of BNC connectors on the rear panel. The fibre connection is via a Dual SC connector on the rear panel.

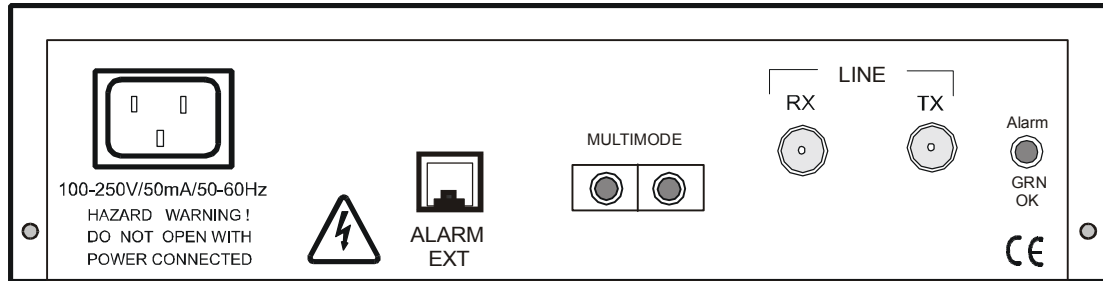


Figure 5.1 MTU9230 rear panel

5.1.1 Power connector

AC mains power is supplied via an IEC connector. The units have an integral power supply operating over the range 100-250 VAC. It draws less than 50mA of current when operating.

Alternative -48 VDC and -24VDC power supplies are available. See Section 1 of this manual for further details of this option and consumption data.

The units must be connected to safety earth for correct operation. The MTU9230 power supply should be connected to a supply socket that is physically located close to the unit and is easily accessible.

5.1.2 External alarm relay

Both models offer an Alarm relay 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. Normal is the powered up, non-alarmed state. The connections are shown in the table below:

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

Figure 5.2 Alarm relay pinout

5.1.3 LED Alarms

There is a single multi-state alarm LED mounted on the rear panel. Its status options are shown below:

LED Status	Indication
Off	No mains power present
Red steady	E3/DS-3 Alarm
Red/Off flashing	E3/DS-3 and Fibre Alarm
Green/Off flashing	Fibre Alarm
Green steady	Status OK

Figure 5.3 LED status

5.1.4 Unbalanced BNC E3/DS-3 G.703 Customer port

The customer equipment is connected to the BNC connectors at the rear of the unit:

Pin	Function
Tip	Signal
Ring	Shield

Figure 5.4 BNC connection

Cable lengths should be restricted to those defined below:

Cable	E3 Max Length (metres)	DS-3 Max Length (metres)
UR202	180	155
RG59U	150	130
BT2002	160	140
BT2003	165	140

Figure 5.5 Cable lengths

Note: The total maximum attenuation of each of the cables attached to the BNC (network) port must not exceed 6dB when measured at 1024 MHz. The frequency/attenuation characteristic of the cables attached to this port shall follow a root frequency law.

5.2 Base panel & bit-switches

The base label and bit-switch set-up shown in Figure 5.6 below is the current version applicable to units with serial number 60128 and upwards.

The earlier version shown in Figure 5.7 below applies to serial numbers 60127 and below.

The key difference between the two versions is in the scrambler facility. This is explained below.

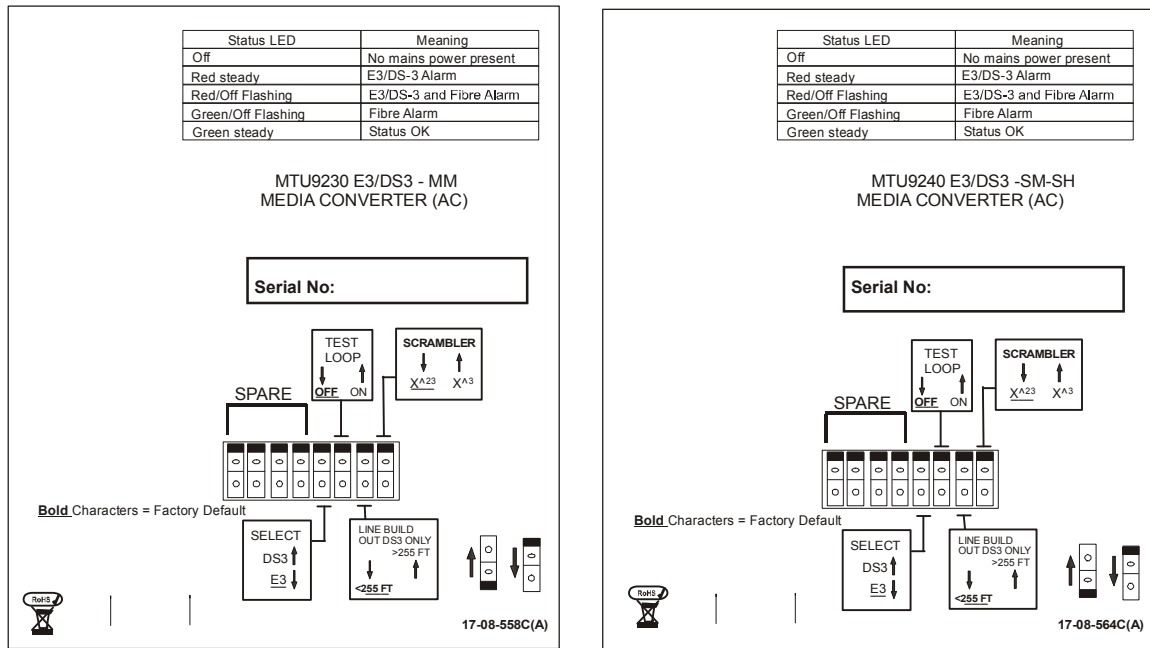


Figure 5.6 base label current examples

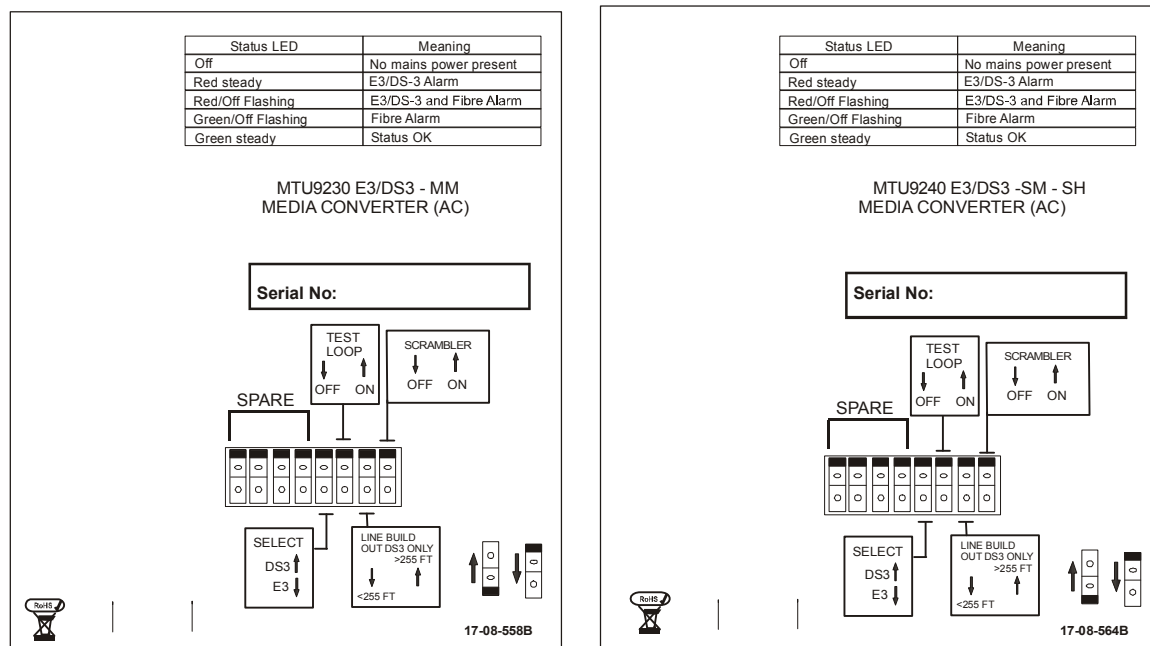


Figure 5.7 base label early examples

The base panel bit-switches must be set for correct operation as below:

5.2.1 E3/DS-3

This switch is set to specify the Customer side line type. The default setting is E3.

5.2.2 Test Loop

This switch initiates an outside test loop on both ports

5.2.3 Line Build out

This switch boosts the DS-3 signal strength for long lines of over 255ft. The default setting is <255 feet.

5.2.4 Scrambler - current version serial no 60128 and above

The scrambler function modifies the E3/DS-3 line traffic with an algorithm designed to break up long strings of 1's or 0's so that clock synchronisation is not lost or degraded by the long strings. The traffic is unscrambled on arrival at the far end.

Two scrambler algorithms are offered by setting the scrambler bit-switch, with the default option being X^{23} and the alternative being X^3 . Note that X^{23} is the more powerful scrambler and should be used whenever possible, whilst X^3 is available for use for legacy reasons.

5.2.5 Scrambler - old version serial no 60127 and below

The scrambler function modifies the E3/DS-3 line traffic with an algorithm designed to break up long strings of 1's or 0's so that clock synchronisation is not lost or degraded by the long strings. The traffic is unscrambled on arrival at the far end.

The scrambler bit-switch offers either scrambler OFF or X^3 scrambling. It is recommended that where available, payload scrambling should also be enabled on the attached equipment, especially where framed or channelised data is used.

5.3 Specifications

Units	Specification
E3/DS-3 Interface	Port: G.703 compliant, Sensitivity -10dB. Interface type: BNC 75 Ohm unbalanced coax Line coding: E3: HDB3 DS-3: B3ZS E3 Bit rate: 34.368 Mbps +/- 20ppm DS-3 Bit rate: 44.736 Mbps +/- 20ppm
Jitter Tolerance	Per G.823.
Barrier	EN 41003 compliant barrier provided on the E1 interface.
Diagnostics	Loop Test initiated by Bit-switch
MTU9230 Fibre interface	G.957, Dual SC Multi-mode 62.5/125 um Bit rate: up to 155.52Mbps Transmit power: -14 to -19 dBm Max Rx input power: -14 dBm Receive sensitivity: -14 to -30 dBm Optical loss budget: = -19-(-30) = 11dB
MTU9240 Fibre interface	G.957, Dual SC SH Single-mode 8/125 um (Short haul) Bit rate: up to 155.52Mbps Transmit power: -8 to -15 dBm Max Rx input power: -8 dBm Receive sensitivity: -8 to -31 dBm Optical loss budget: = -15-(-31) = 16dB
Safety	EN41003, EN50082
EMC	EN55022, EN50082
Power supplies	100-250 VAC, 50-60Hz, 35 mA to 15mA or -40 to -72 VDC, 100 to 50mA -12 to -36VDC, 700 to 200mA See Section1 for power consumption detailed data
Dimensions	202 x 132 x 44 mm (w x d x h) Enclosure only (1U) 202 x 132 x 48 mm (w x d x h) Overall including feet
Ambient Temperature	0degC to +50degC
Storage Temperature	-20degC to +70degC
Relative Humidity	0% - 95% non condensing

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