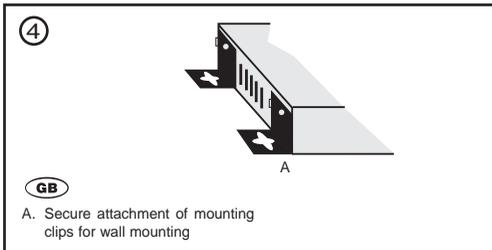
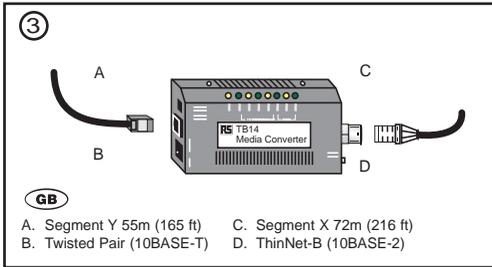
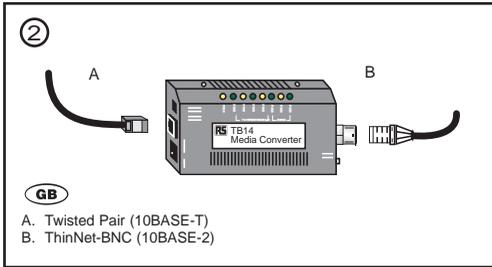
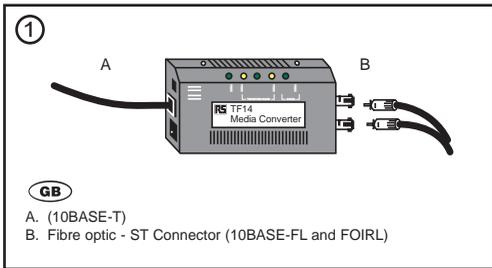




Instruction Leaflet

Media Converters **GB**

Figures



GB **RS Stock No.**

Model TB-14 331-6780
Model TF-14 331-6774

Table of contents

1.0 Introduction	1
1.1 Inspecting the Packaging and the Product	1
1.2 Product Description	2
1.3 Features and Benefits	2
1.4 Applications for TF14 (fibre) and TB14 (BNC)	2
1.5 Full-duplex twisted-pair to fibre applications	2
2.0 Installation	2
2.1 Locating the Media Converter Unit	2
2.2 Calculating Overall Segment Distances	2
2.3 Connecting Ethernet Media	3
2.3.1 Connecting Twisted Pair (RJ-45)	3
2.3.2 Connecting Fibre (ST)	3
2.3.3 Connecting ThinNet 10BASE2 (BNC)	3
3.0 Operation	3
3.1 Power Requirements, Power Supply Types	3
3.2 Front Panel LEDs	3
3.2.1 TF14	3
3.2.2 TB14	3
3.3 BNC port, Internal Termination Switch	3
3.4 Up-Link (Cross-over) Switch on RJ-45 port	4
3.5 Full and half-duplex transparent mode for TF14	4
4.0 Troubleshooting	4
5.0 Technical Specification	4

1.0 Introduction

This section describes the RS TF14, and RS TB14 Media Converters, including features and typical applications.

1.1 Inspecting the Package and the Product

Inspect the contents of the package for any signs of damage and ensure that the items listed below are included.

This package should contain:

- 1 RS Media Converter Unit
- 1 External Power Supply, 230 Vac 50Hz
- 1 set Metal mounting clips and screws, 2 each
- 1 Velcro® Tape section, approximately 3 inches in length
- 1 User Guide

1.2 Product Description

RS Media Converters offer a compact, cost-effective way to adapt to non-RJ-45 Ethernet cabling as network requirements change. They offer a graceful way to convert and transmit data among twisted pair, fibre and thin coaxial network cabling environments.

RS Media Converters cost significantly less than full repeaters and can be used whenever media distance limitations will not be exceeded in the segment. All units are compatible with Ethernet V 1.0/2.0 specifications and comply with IEEE802.3 standards

Magnum TF14 and TB14 10Mb Media Converters are designed for quick and easy installation even in very tight spaces. Media cables are easily attached to the corresponding Media Converter. Because of their compact size, the units can be Velcro®-mounted on an office wall or the side of a desk or cabinet.

The external power supply plugs into a nearby AC wall socket or power strip. Each converter features a full set of LEDs that convey essential diagnostic and status information. See Section 3.2, for LED function specific information.

RS Media Converters are designed to provide low-temperature operation over an extended period to make them some of the most reliable in the industry. Their high-strength fabricated steel packaging shields against Radio Frequency Interference (RFI) and Electromagnetic Interference (EMI).

RS Media Converters are specifically designed to convert data signalling to allow transmission between two different Ethernet cabling types, allowing migration to a new media type while preserving segments of the existing wiring structure.

These Media Converters comply with the IEEE 802.3 10BASE-T specification for 10Mb/sec traffic via shielded (STP) or unshielded pair (UTP) segments. They feature an up-link or cross-over switch to eliminate the need for a special cross-over cable when connecting to a hub or concentrator.

Note: experience shows that the maximum number of 10Mb Media Converters that can be used in series is three. The cumulative signal noise from more units together in series may cause packet alignment errors.

Fibre model

The TF14 is equipped with one fibre-ST and one RJ-45 connector for use in IEEE FOIRL or 10BASE-FL compliant networks. (see fig.1)

BNC model:

The TB14 is equipped with one BNC and one RJ-45 port. The BNC port has an internal termination switch, allowing BNC attachment without a "T" connector. The BNC connector complies with IEEE 802.3 10BASE2 specifications. (see fig.2)

1.3 Features and Benefits

Reduces Network Costs

RS Media Converters offer the ideal solution to quickly and inexpensively connect Twisted Pair with Fibre or ThinNet media within an expanding Ethernet network where full repeaters are not required.

No added Repeater Hop Count

Media Converters do not add signal timing delays associated with full repeaters, and can be installed without increasing the repeater hop count of an existing network.

Small, Compact, Rugged Design

Featuring a compact steel case with an external power supply, the units can be conveniently installed in minimal space on table-tops or wall-mounted.

Full Complement of LEDs.

Each model is equipped with a full complement of LEDs to provide network traffic status and basic diagnostic information without additional network diagnostic equipment.

Highly Reliable and Dependable

RS Media Converters are based on a robust design and are packaged in a metal enclosure to ensure high reliability and durability.

1.4 Applications

The primary function of a 10Mb Ethernet Media Converter is to permit different 10Mb media types to coexist inexpensively within the same network by allowing data to be transmitted and received between different media types.

Media Converters are typically used where new 10BASE-T networking equipment is being installed and connection to existing BNC or fibre Ethernet cabling is required. Alternatively a twisted-pair-to-fibre model (TF14) is convenient for inserting a fibre segment into a twisted pair environment in order to connect to a remote workstation, hub or switch via fibre cabling, without increasing the repeater hop count.

RS Media Converters have an external power supply, enabling them to be used to convert signals among media that does not have a power source as part of the cabling system, such as twisted pair, BNC and Fibre.

1.5 Full / half-duplex applications.

Of the various 10Mb media types, only the twisted-pair to fibre combination is capable of full-duplex (i.e. simultaneously transmitting and receiving on the same cable segment) operation. Full-duplex is rarely required at 10Mb, but might occasionally be desired to connect a 10Mb RJ-45 Switching Hub port over a fibre link to a full-duplex RJ-45 NIC in a remote server, or to connect one port of a full-duplex Switching Hub via fibre to another full-duplex 10Mb RJ-45 Switching Hub port.

The TF14 operates in transparent half and full-duplex mode. For half-duplex traffic, the TF14 works correctly but does not detect or indicate collisions.

2.0 Installation

This section describes the installation of the Media Converters, including location, segment distance calculation and media connection.

2.1 Locating the Media Converter Unit

The compact and lightweight design of the Media Converter allows it to be easily installed in almost any location. A Velcro strip is included for mounting the unit on a vertical surface such as a wall or cabinet, or for securing the unit on a table-top or shelf.

Alternatively, metal mounting clips and screws are included for a rugged and secure mounting in any orientation. (see fig.4)

Installation location is dependent upon physical layout of the Ethernet network. Make sure the unit is installed in a location that will be easily accessible to an AC power outlet and where convection cooling is not inhibited.

2.2 Calculating Overall Segment Distance

Important Note: Special consideration must be given to maximum segment lengths on each side of the Media Converter. It is recommended that IEEE 802.3 specifications for overall maximum segment distances be adhered to in order to maintain optimum network performance.

When installing the Media Converter, it is important to consider the combined overall segment length of both of the attached media types. The overall segment length is calculated by adding together the segment lengths on both sides of the Media Converters. Cable segment length on each side of the Media Converter is measured as a percentage of the maximum allowable standard media distance for the given media type. The percentages, when added together must not exceed 100%.

Media Distance Formula for Media Converters

(see fig.3)

$$X\% + Y\% \leq 100\%$$

Where **X** = The segment distance on one side of the Media Converter divided by the Standard Maximum Media Distance for that media type, x 100%.

Where **Y** = The segment length on the other side of the Media Converter divided by the Standard Maximum Media Distance for that media cabling type, x 100%.

In figure 3, the length of segment X is 72m (216ft). This is 39% of the maximum allowable distance for 10BASE-2 media (185m) [72/185 x 100% = 39%].

The length of segment Y is 55m (165ft). This is 55% of the maximum allowable distance for UTP 10BASE-T media (100m) [55/100 x 100% = 55%]. The total of the two percentages (39% + 55%) is 94%, which is allowable.

Note 1: Where more than one Media Converter is used in one segment run, the percentages for all of the cabling lengths in the run must be added together and must not exceed 100%.

Note 2: If the total segment distance calculation result is greater than 100%, consider using a Repeater so that each cable type can be 100% of its maximum allowed length.

2.3 Connecting Ethernet Media

Connecting Ethernet media to the Media Converter is very simple and straightforward. Using a properly terminated media segment, simply attach the cable end to the appropriate connector.

2.3.1 Connecting Twisted Pair (RJ-45 ports)

The following procedure describes how to connect a 10BASE-T twisted pair segment to the RJ-45 port on the Media Converters. The procedure is the same for both unshielded and shielded twisted pair segments.

- Using standard 10BASE-T media, insert either end of the cable with an RJ-45 plug into the RJ-45 connector of the Media Converter.
- Connect the other end of the cable to the corresponding device.
- Use the LINK LED to ensure proper connectivity by noting that the LED will be illuminated when the unit is powered and proper connections established. If the LINK LED is not illuminated, change the setting of the up-link switch (See Section 3.4 for up-link switch information.) If this does not help, ensure that the cable is connected properly at both ends and is not defective.

2.3.2 Connecting Fibre Optic multi-mode

The following procedure applies to 10BASE-FL multi-mode applications using the TF14 Media Converter with ST-type fibre connectors. The TF14 is used for a multi-mode fibre segment length of up to 2Km. The following table is provided for general information:

Fibre Cable Type	cable diameter *	Max. length	Wavelength
Multi-mode fibre	50/125, 62.5/125. **	2Km	850 nm

* xx/yy are the diameters of the core and the core plus cladding respectively

** The values shown are typical values

Procedure for connecting fibre cables:

- Before connecting the fibre cable, remove the protective dust caps from the tips of the connectors on the Media Converter. Save these dust caps for future use.
- Wipe clean the ends of the dual connectors with a soft cloth or lint-free lens tissue dampened in alcohol. Make certain the connectors are clean before connecting.

Note: One strand of the duplex fibre optic cable is coded using colour bands at regular intervals; you must use the colour coded strand on the associated ports at each end of the fibre optic segment.

- Connect the Transmit (TX) port (light coloured post) on the Media Converter to the Receive (RX) port of the remote device. Begin with the colour coded strand of this first TX-to-RX connection.
- Connect the Receive (RX) port (dark-coloured post) on the product to the Transmit (TX) port of the remote device. Use the non-colour coded fibre strand for this.
- The LINK LED corresponding to the fibre port on the front of the product will illuminate when a proper connection has been established at both ends (and when power is ON in the units at each end). If LINK is not lit after cable connection, the normal cause is improper cable polarity. Swap the fibre cables to remedy this situation.

2.3.3 Connecting ThinNet 10BASE-2

Connect the ThinNet coax cable to the BNC connector on the TB14 Media Converter in the same manner as is done for any standard BNC connection. Be sure that the BNC segment is properly terminated using a standard "T" connector and terminator.

3.0 Operation

This section describes the operation of the Media Converters, including power supply requirements, up-link switch functionality, and a description of all LEDs

3.1 Power Requirements

TF14 Media Converters are very power-efficient. They only require about 2 watts of power and are designed to be used with a tiny external 9volt power supply.

TB14 Media Converters require 12v internal for the BNC port. They typically use about 5 watts of power and are designed to be used with an external 12-volt power supply.

3.2 Front Panel LEDs

3.2.1 TF14 LED Description

- PWR** Illuminates GREEN to indicate the unit is receiving DC power.
- LINK** (per port) Illuminates to indicate proper connectivity on each cable segment. LINK will turn off in the event connectivity is lost between the ends of each cable segment or a loss of power occurs in the unit or in the attached device.
- RX** (per port) Illuminates GREEN to indicate data is being received.

3.2.2 TB14

LED Description

- PWR** Illuminates GREEN to indicate the unit is receiving DC power.
- LINK** (TP) Illuminates GREEN, to indicate proper connectivity on the 10BASE-T network segment. LINK will turn off in the event connectivity is lost between the ends of the twisted pair segment or a loss of power occurs in the unit or remote device.
- RX** (per port) Illuminates GREEN to indicate data is being received
- POL** (TP) Illuminates AMBER to indicate inverse polarity detected
- JAB** Illuminates AMBER to indicate jabber (illegal packet length).
- COL** (per port) Illuminates AMBER to indicate a collision on the segment.

3.3 TB14, BNC Internal Termination Switch

An internal termination switch is provided on the TB14. The BNC port is specially equipped with an internal termination switch that eliminates the need to use a "tee" connector when the BNC cable is ending at the TB14. When the switch is in the "INT" position, connection is internally terminated. When switched to the "EXT" position, external termination (using a "tee" connector, not supplied) is required. Some applications require a "tee" connector, used as a tap, to allow the 10BASE2 coax segment to continue on past the TB14 port connection.

3.4 Up-Link (Cross-over) Switch

RS Media Converters are equipped with an up-link switch to accommodate repeater-to-converter connections without a special cross-over cable.

When set to the UP position (⇌), the Media Converter is wired for normal twisted-pair connection to a user device. When set to the DOWN position (X), the Media Converter is wired with cross-over functionality for direct up-link to a network hub or concentrator. Switch ports may be of either polarity, and this feature is most convenient with switches.

3.5 Full and half-duplex transparent operation for TF14

The TF14 operates in transparent half and full-duplex mode. For half-duplex traffic, the TF14 works correctly but doesn't detect or indicate collisions.

4.0 Troubleshooting

Important: RS Media Converters contain no user serviceable parts. Attempted service by unauthorised personnel shall render all warranties null and void.

Should problems develop during installation or operation, this section should help to locate, identify and correct such problems. Please follow the suggestions listed below prior to contacting your supplier. However, if you are unsure of any procedure described in this section, or if the Media Converter is not operating as expected, do not attempt to repair or alter the unit. Contact RS Technical Helpline for assistance.

Before calling for assistance, observe the following steps:

1. If difficulty is encountered when installing or operating the Media Converter, refer back to Section 2.0, Installation and Section 3.0, Operation. Check to make sure that the various other components of the network are operable.
2. Check the cables and connectors to ensure that they have been properly connected, and the cables/wires have not been crimped or in some way impaired during installation. (About 90% of network downtime can be attributed to wiring and connector problems.)
3. Make sure that the external DC power supply is properly attached to the unit, and that it is plugged into a functioning electrical outlet. Use the PWR LEDs to verify the unit is receiving proper power.
4. If the problem is isolated to a network device other than the Media Converter, it is recommended that the problem device be replaced with a known good device. Verify whether or not the problem is corrected. If not, go to step 5 below. If the problem is corrected, the Media Converter and its associated cables are functioning properly.
5. If the problem continues after completing Step 4 above, contact the RS Technical Helpline on:
TEL: 01536-402888
FAX: 01536-401588

5.0 Specifications

Performance:

Data rate: 10 Mbps (IEEE 802.3)

Network standards:

Ethernet V1.0/2.0 IEEE 802.3: 10BASE-2 10BASE-T, 10BASE-FL (RS Media Converters are physical layer standard Ethernet and operate independently of all software.)

Maximum Standard Ethernet Segment Lengths:

10BASE-T (twisted pair): _____ 100m (328 ft)
10BASE-2 ThinNet (BNC): _____ 185m (607 ft)
FOIRL Fibre optic: _____ 1.0 km (3,281 ft)
10BASE-FL Fibre optic: _____ 2.0 km (6,562 ft)

Note: RS Media Converters DO NOT support full length Ethernet segments. See Section 2.2 of this manual for media lengths and distance calculations.

Operating Environment:

Ambient Temperature: _____ 32°F to 104°F (0°C to 40°C)
Storage Temperature: _____ -20°C to 60°C
Ambient Relative Humidity: _____ 10% to 95% (non-condensing)

Power Supply (External):

Power Input: _____ 200-250vac at 50 Hz
Power Consumption: _____
2 watts typical and 3 watts max. for TF14 (fibre) Media Converter
4 watts typical and 6 watts max. for the TB14 (BNC) Media Converter

Connectors:

RJ-45 Port: _____ Modular 8-pin female, with "cross-over" up-link switch
Fibre Port: _____ Fibre optic (standard ST type)
BNC Port: _____ Standard BNC connector,
RG-58 ThinNet with internal termination switch.

Fibre, Full and half-duplex:

TF14 Fibre model operates in the full or half-duplex transparent mode. They do not detect and do not indicate collisions, even when the traffic is half-duplex.

Packaging:

Enclosure: High strength sheet metal

Dimensions, Media Converters

TF14: _____ 53mm x 76mm x 20mm
TB14: _____ 53mm x 76mm x 20mm

Dimensions, Power Supply units:

TF14: _____ 43mm x 55mm x 38mm
TB14: _____ 51mm x 51mm x 38mm

Weight:

TF14: _____ 131g; power supply 164g
TB14: _____ 131g; power supply 285g

Media Converter LED Indicators:

LED	TF14	TB14	Description
PWR	unit	unit	Indicates unit is receiving DC power
Link	TP, Fibre	TP	Steady ON when proper link is established at both ends of the segment
RX	TP, Fibre	TP, BNC	Indicates port is receiving packets.
POL	n.a.	TP	Indicates the unit has detected a TP receive wire-pair signal inversion (polarity)
COL	n.a.	TP, BNC	Indicates unit is simultaneously transmitting and receiving data from the cables.
JAB	n.a.	unit	Indicates jabber (illegal packet length fault) condition. Segment is partitioned when lit.

NOTE: COL and JAB LEDs, only on TB14 units, are indicators applicable to standard collision domains with only half-duplex operation.

Approvals:

230v 50 Hz Power Supply is UL Listed (UL 1950 and cUL)
Emissions: Meets FCC Part 15 Class A, CE

Federal Communications Commission Radio Frequency Interference Statements

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

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