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GarrettCom™
Ethernet at Its Best℠

MagnumFT14 and FT14H

10Mb/s Media Converters
Installation and User Guide

www . GarrettCom . com

Magnum™ FT14 and FT14H 10Mb/s Media Converters

Installation and User Guide

Part #: 84-00134 Rev. A (09/04)

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> **Important:** The Magnum FT14 and FT14H 10 Mb/s Media Converters contains no user serviceable parts. Attempted service by unauthorized personnel shall render all warranties null and void. If problems are experienced with Magnum FT14/FT14H 10 Mb/s Media Converters products, consult Section 5, Troubleshooting, of this User Guide.

Federal Communications Commission

Radio Frequency Interference Statement

This equipment generates, uses and can radiate frequency energy and if not installed and used properly, that is in strict accordance with the manufacturer's instructions, may cause interference to radio 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 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 required to correct the interference.

Contacting GarrettCom, Inc

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Revisions

Rev A 09/04: Minor updates on UL Requirements, power supplies
Rev A 06/04: Minor updates on Agency approvals and power supplies
Rev A 05/03: Initial release of this user manual for FT14 and FT14H

GarrettCom, Inc. reserves the right to change specifications, performance characteristics and/or model offerings without notice.

1.0 SPECIFICATIONS

1.1 Technical Specifications

Model FT14, FT14H multi-mode and single-mode

Performance:

Data Rate: 10 Mbps (IEEE 802.3), half duplex mode

Network Standards:

Ethernet: Ethernet V1.0/2.0 IEEE 802.3: 10BASE-T, 10BASE-FL IEEE 802.3,

(Magnum Media Converters are physical layer standard Ethernet products, and operate independently of all software.)

Number of Media Converters in series:

Experience shows that up to three units can be used in series between repeaters.

For 4 or more in series, noise build-up will typically preclude proper operation.

Maximum Standard Ethernet Segment Lengths:

10BASE-T (twisted pair):	100 m (328 ft)
10BASE-FL Fiber optic :	2.0 km (6,562 ft)
10BASE-FL Single-mode Fiber optic:	10.0 km (32,810ft)

Note for single-mode: HDX collision domain limits may restrict distances to about 5km.

Note: Magnum Media Converters DO NOT support full length Ethernet segments. See Section 3.2 of this manual for media lengths and segment distance calculations.

Operating Environment:

Ambient Temperature: (0°C to 50°C) FT14-Hd,-Hi, FT14S-Hd, Hi
(-40°C to 55°C) FT14H-Hd,-Hi, FT14SH-Hd,Hi
(-40°C to 75°C) FT14H-9VDC, FT14SH-9VDC,
FT14H-24VDC, FT14SH-24VDC
FT14H-48VDC, FT14SH-48VDC

Cold start down to -25°C

Storage Temperature: -40°C to 100°C (-40°F to 212°F)

Ambient Relative Humidity: 5% to 95% (non-condensing)

UL 2043 tested for above-the –ceiling (plenum) installation

Conformal coating (humidity protection) option, request quote.

Designed for NEBS compliance, including vibration, shock, and altitude

Power Supply

These products are intended to be supplied by a Listed, Direct Plug-In power unit, marked “Class 2”, or a Listed ITE Power Supply, marked “LPS”, which has suitably rated output voltage (i.e. 9vdc, 12vdc, 24vdc, 48vdc), and suitably rated output current (i.e. 100mA to 500mA).When connected to a 48 V centralized dc source these products shall be provided with a Listed 5 A DC fuse in the supply circuit.

UL listed Class II Power Supply (AC-DC Adapter):

100-240V AC at 50-60Hz, for **“-Hd”** high temp. with built-in IEC320 connector
Power input 9V DC jack is 2.5mm center +ve jack, with 6ft. cord
“Hd” North American models

100-240V AC at 50-60Hz, for high temp. with built-in IEC320 connector for **"-Hi" DC to unit**:
"Hi" international model
9V DC, 2.5mm jack, center +ve, 6ft. cord

Power Supply (DC Direct): built-in terminal block for +, -, ground. The 9V DC jack is also present.

9V DC internal (range of 7.5 to 15V DC)

24V DC internal (range of 18 to 36V DC)

-48V DC internal (range of 36 to 60V DC)

Power Consumption: 1.5 watts typical and 2 watts max. for all models

Connectors, for Media:

RJ-45 Port: Modular 8-Pin female, with "cross-over" up-link switch

Fiber Port: Fiber optic (standard ST type)

Packaging:

Enclosure: Rugged sheet metal (Steel).

Dimensions, Media Converter unit: Height x Width x Depth

FT14 and FT14H: 3.5 in H x 3.0 in W x 1.0 in D (8.9 cm x 7.6 cm x 2.5 cm)

Weight: all **FT14 and FT14H mm and sgl.mode models:** 4.6 oz. (130g);
power supply –Hd, and =Hi: 3 oz (85g)

Cooling Method: Convection, plus the case is used as a heat sink on "H" models

Media Converter LED Indicators:

LED	FT14	FT14S	Description
PWR	unit	unit	Steady ON when power applied.
Link(per port)	TP, Fiber	TP, Fiber *	Steady ON when both attached cable segments are operational at the other end
RX/Act	TP, Fiber	TP, Fiber	Indicates port is receiving packets.

Metal Mounting clips for panel mounting : included

DIN-Rail mounting option: Model # DIN-RAIL MC2 (see Section 3.4)

Rack-mount option: MC14-TRAY, see http://www.garrettcom.com/mc_tray.htm

Mean Tine Between Failure (MTBF) – 15+ years, Telcordia (Bellcore) Method

Agency Approvals and Standard Compliance:

UL LISTED (UL 60950), CUL, CE Emissions meet FCC Part 15, Class A
NEBS L3 and ETSI compliant
H Model: IEEE P1613 Env. Std for Electric Power Substations
H Model: NEMA TS-2 and TEES for traffic control equipment
H Model: designed for UL 2043 above-the-ceiling installation
IEC61850 EMC and Operating Conditions Class C for Power Substations

Warranty: Three years, return to factory Made in USA

1.2 Summary of models and descriptions:

FT14-Hd = TP to 10Mb mm Fiber ST, external 115 60Hz AC power supply, for 0 to 50`C
FT14-Hi = TP to 10Mb mm Fiber ST, external 230 50Hz AC power supply, for 0 to 50`C

FT14H-Hd = TP to 10Mb mm Fiber ST, external 115 60Hz AC power supply, for -40 to 55`C
FT14H-Hi = TP to 10Mb mm Fiber ST, external 230 50Hz AC power supply, for -40 to 55`C

FT14H-9V DC = TP to 10Mb mm Fiber ST, 12V DC Internal power supply, -40 to 75`C
FT14H-24V DC = TP to 10Mb mm Fiber ST, 24V DC Internal power supply, -40 to 75`C
FT14HR-24V DC = TP to mm Fiber, 24V DC Internal pwr supply, -40 to 75`C, includes DIN-Rail
FT14H-48V DC = TP to 10Mb mm Fiber ST, 24V DC Internal power supply, -40 to 75`C
For a Single-mode 10Mb Fiber ST model, insert "S" after the number "14" in each line above.

MC14-TRAY = 19" Rack-mount tray for 14-series Media Converters, up to 16 units

DIN-RAIL-MC2 Metal DIN-Rail mounting bracket for one FT14-Series Media Converter .

2.0 INTRODUCTION

This section describes the FT14 and FT14H models, including appearance, features and typical applications.

2.1 Inspecting the Package and the Product

Examine the shipping container for obvious damage prior to installing this product; notify the carrier immediately of any damage which you believe occurred during shipment or delivery. Inspect the contents of this package for any signs of damage and ensure that the items listed below are included.

This package should contain:

1	Magnum FT14 or FT14H mm or single-mode Media Converter Unit
1	External Power Supply, (except for internal DC power supply models)
1 set	Metal panel mounting clips and screws, 2 each
1	User Guide, i.e., this manual

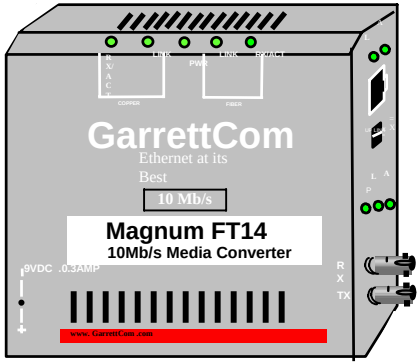
(continued next page)

Remove the Magnum Media Converter from the shipping container. Be sure to keep the shipping container should you need to ship the unit at a later date.
In the event there are items missing or damaged contact your supplier. If you need to return the unit use the original shipping container. Refer to Section 5 Troubleshooting, for specific return procedures.

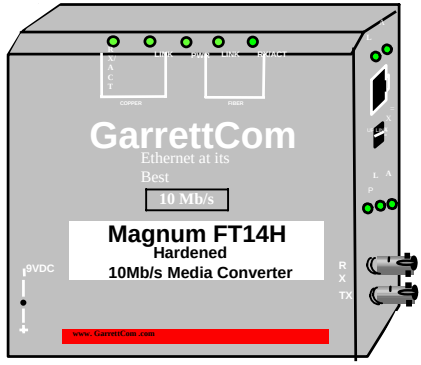
2.2 Product Description

Rugged packaging, a selection of extended temperature models, choice of AC and DC power types, ease-of-use features, and energy-efficiency are the primary characteristics of the Magnum 10Mb FT14 and FT14H Media Converters. All models offer a graceful way to convert and transmit data between twisted pair and Fiber network cables for media flexibility in new or expanded 10Mb Ethernet networks. The future proof fiber comes as ST connector with Multi or Single Mode options. They provide standard collision detection and indication, and comply with the Ethernet V1.0 / 2.0 specifications and the IEEE 802.3 standards. Power consumed in use is 1.5 to 2 watts.

The FT14 regular-package units are for office and wiring closet environments and use an external AC power supply. A metal case with convection cooling is featured.



Magnum FT14



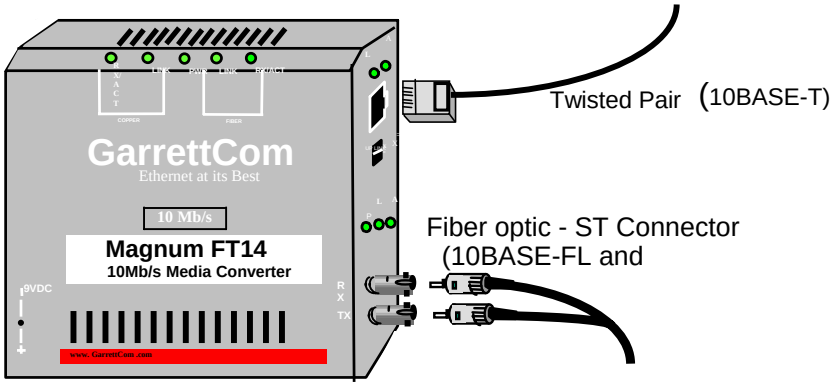
Magnum FT14H

Operation may be in 0° to 50°C ambient temperature. The units can be mounted securely on a closet wall or metal cabinet, or by using the metal panel mounting clips included.

The FT14H Hardened unit features a sealed metal case which is also used as a heat sink. No air inflow is required for cooling, so the FT14H resists dust, dirt, moisture, smoke and insects, and is plenum rated. Choices of models for external AC or internal DC power are available. Storage temperature rating is up to –40°C to +75°C depending on the power source used. The FT14H is suitable for temperature un-controlled outdoor applications. Mounting options include panel-mounting, DIN-rail, or rack-mount tray.

The FT14-series Media Converters offer a graceful way to convert and transmit data among twisted pair, and Fiber (Multi or Single Mode) network cabling environments. FT14 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 IEEE 802.3 standards.



The up-link (or crossover) switch on the RJ-45 port simplifies cable installation. All fiber models operate in transparent full- or half-duplex mode, supporting matched sets of either mode type, i.e., attached devices are either both full-duplex or both half-duplex.

Magnum FT14-series 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 or any other device. Using the Uplink Switch feature eliminate the use of cross-over cable, see sec 4.6 for details. Because of their compact size, Magnum Media Converters can be Velcro®-mounted on an office wall or the side of a desk or cabinet. Mounting options include panel-mounting, DIN-rail and rack-mount tray (MC14-TRAY) that neatly holds the units and associated power supplies.

The standard “1-per-unit” external power supply plugs into a nearby AC wall socket or power strip. The FT14H (Hardened) media converter is also available with

extended temperature power supply AC/DC (External/Internal) to qualify for un-controlled and Industrial application. Each converter features two full sets of LEDs that convey essential diagnostic and status information at any angle. See Section 4.1 and 4.4, for power supply and LED function specifications.

All of the Magnum FT14-series Media Converters comply with the IEEE 802.3 10BASE-T specification for 10 Mb/sec traffic via shielded (STP) or unshielded twisted pair (UTP) segments. The Link Pass-Through feature is especially desirable for use in managed networks, and is standard in all FT14 and FT14H models.

Note: experience shows that the maximum number of 10Mb Media Converters that can be used in series is three. The cumulative signal noise from 4 or more units together in series may cause packet alignment errors.

2.3 Features and Benefits

- **Reduces Network Costs**

  Magnum Media Converters offer the ideal solution to efficiently and inexpensively connect Twisted Pair with 10Mb Fiber 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.

- **Fiber / twisted-pair models for all fiber modes**

  A variety of twisted-pair-to-fiber models provide for multi-mode or single-mode fiber, transparent full- or half-duplex mode, ST connectors

- **Two sets of LEDs for viewing status from any angle.**
  Each FT14 Media Converter is equipped with a two sets (front and side) of LEDs to provide status information when viewed at any angle or mounting arrangement, rack-mount (MC14- Tray) or wall-mount**.**

- **Rugged metal case, Industrial grade**

  FT14 Media Converters have a robust design and are packaged in a rugged sheet metal enclosures to ensure high reliability and durability even when placed in extended temp; e.g industrial or outdoor applications.

- **AC and DC Power Supplies with extended temperature ratings**

  FT14 & FT14H Media Converters are designed for use in temperature **un**-controlled applications, and are available with variety of ratings, external AC and internal DC power supplies. See Section 1.1 for details.

- **Qualified to use for temperature un-controlled "outdoor" application**

  The Magnum FT14H Hardened version of media converter supports the ambient temperature rating up to –40C to +75C for DC options model, which qualified for un-controlled "outdoor" application.

- **Compact design, mount anywhere**

  Featuring a compact steel case with an external AC power supply, Magnum FT14 Media Converters can be installed in minimal space in rack mount cabinets like MC14-TRAY, on table-tops or wall-mounted.

- **Uplink Switch to eliminate cross-over cable while cascading**

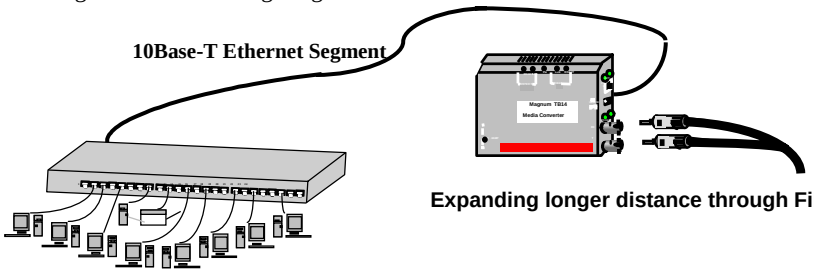
  All the Magnum FT14-series Media Converter featured with Uplink Switch, which easily allow the media converter to cascade with other Switch Hub or media converter, without using the cross-over cable.

2.4 Applications for FT14's and hardened FT14H's

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

Magnum FT14-series Media Converters are typically used where 10BASE-T networking equipment is being installed in un-controlled temp environment and require longer distance. Magnum FT14-series Media Converters have an external AC power supply and internal DC 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 and Fiber. Equipped with wide variety of options of AC and DC power supply and components for higher un-controlled temp qualify the FT14's for use in office locations as well as industrial and even outdoor applications.

In this application, in a Industrial environment where extended temp. supported units is a requirement, the existing Twisted pair network can be easily connected to longer distance through fiber media using Magnum FT14 or FT14H 10 Mb media converters.



Expanding longer distance through Fiber optic

2.5 Full / Half-duplex capability

For 10Mb FT14-series Media converters, the twisted-pair to fiber 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 fiber link to a full-duplex RJ-45 NIC in a remote server, or to connect one port of a full-duplex Switching Hub via fiber to another full-duplex 10Mb RJ-45 Switching Hub port.

All the FT14-series operate in transparent half-and full-duplex mode. For half-duplex traffic, the FT14-series work correctly but do not detect or indicate collisions.

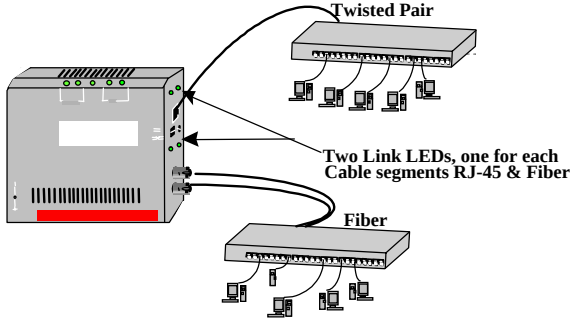
2.6 Link Pass-through, features and options.

The Magnum FT14 Media Converters, regular, non-hardened models, come without the Link Pass-through feature unless it is specially ordered with the "LP" model. In this regard, the FT14 models operate the same as the smaller companion product, the Magnum TF14.

By comparison, the FT14H hardened models come with Link-Pass-through as a standard feature in order to be used with switches in industrial networks. In managed

networks, the LINK signal on a managed switch (or hub) port is used as an indicator that the attached cable segment is installed and operable. The network manager, using the SNMP agent, can troubleshoot the cabling by examining the LINK status on each port. This works fine as long as all of the cabling is twisted pair.

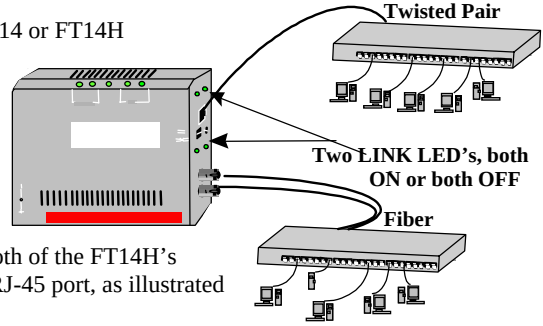
When a twisted-pair to fiber media converter is introduced, the FT14 regular models of these products (not the Magnum FT14H's) treat each attached cable segment as a separate entity. LEDs on the FT14 Media Converters separately indicate LINK on each port, enabling an installer to see the LINK (or no-LINK) status of each port and each piece of cable independently. This is nice for the network installer, but it introduces a discontinuity for the managed network software which wants to "see through" the media converter, treating it as part of



the cable attached to a managed switch port.

The Link-Pass-through in the FT14H models provides the LINK "see-through" feature desired for managed networks. On the FT14H models, either both LINK LEDs are lit or neither is lit. And, the FT14 and FT14H's both operate in transparent half- and full-duplex mode.

Note that a pair of FT14 or FT14H media converters in series can be used to go from an RJ-45 port, through a fiber segment, and into another RJ-45 port. Where both media converters are FT14H's with Link Pass-through, the LINK on each RJ-45 port can "see through" both of the FT14H's Media Converters to the other RJ-45 port, as illustrated in this diagram.



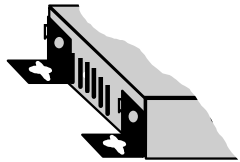
3.0 INSTALLATION

This section describes the installation of the Magnum FT14-series Media Converters, including location, segment distance calculation and media connection.

3.1 Locating the Media Converter Unit

All the FT14-series operate in transparent half- and full-duplex mode. For half-duplex traffic, the FT14-series work correctly but do not detect or indicate collisions.

The compact and lightweight design of the Magnum Media Converter allows it to be easily installed in almost any location. A



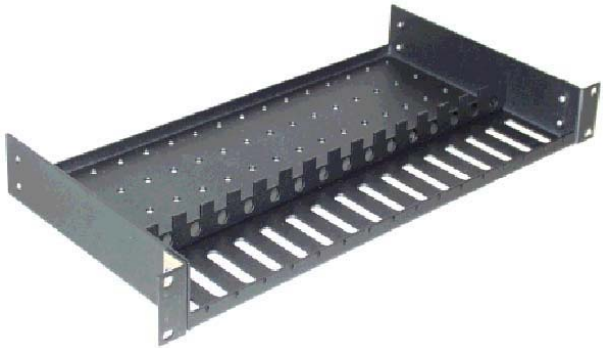
Secure attachment of mounting clips for wall mounting

Velcro strip may be used 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.

Installation of the Magnum FT14 and FT14H Media Converters is a simple procedure. The installation location is dependent upon the physical layout of the Ethernet network and associated cabling. Make sure the unit is installed in a location that is easily accessible to an AC power outlet or power strip, and where convection cooling is not inhibited. The green Power (PWR) Led must turn ON, when power is applied through the internal DC input 9V, 24V or –48V DC or external AC through 9V DC jack.

3.2 MC14-TRAY for Rack Mounting of FT14 and FT14H Media Converters

For 19" rack-mounting of Magnum FT14-series Media Converters, a rack-mount tray is available, MC14-TRAY. The Media Converter units are mounted with their RJ-45 port and DC power jack in the back, with either fiber or BNC cable in the front. Any mix of the FT14-type Media Converters may be placed on a tray, up to a maximum of 16 units. (The mounting spaces of the MC14-TRAY are



specific to the “14”-series, and do not permit other models).

A typical installation of the model MC14-TRAY, 19” rack-mount tray will hold a few (often three to eight) 14-series Media Converters, with their power supplies plugged into power strips (not included) in the rear area of the tray. Metal mounting screws in the bottom-front hold the Media Converters firmly in place. The beveled-top edge of the units permits the LEDs of each unit to be viewed for operational status, even when the units are very close together.

3.3 MC14-TR+PS9 & MC14-TR+PS9X2 for Rack Mounting Media Converters

The MC14-TR+ PS9 and MC14-TR+PS9X2 are another option available for Rack Mounting the mix-match of 10Mbps and 100Mbps Media Converters together in 19” rack-mount tray. These models comes with built-in common universal AC power supply rated at 55 watts at 50°C ambient, 9VDC output, and supporting up to 10 MC for

MC14-TR+PS9 and 16 units of Fiber media converters for MC14-TR+PS9X2. The MC14-TR+PS9X2 Model has two groups of eight units per power supply. These models are equipped with auto-ranging AC input to the power supplies for use worldwide.

(The MC mounting spaces of the MC14 -TR models are specific to the Magnum 10Mbps (FT14 and TB14) and 100Mb (14E) series, and do not permit other models to be put in the tray).

The side-view picture shown here (above) is an example of an installation of the model MC14-TR+PS9, 19" rack-mount tray, holding a few 10Mbps FT14's and 100Mb 14E Media Converters, each with their power input plugged into the built-in common AC power supply in the rear area of the tray. (PS units that come with the MC's are not used).

Metal mounting screws in the bottom-front hold each of the media converters secure in the tray, separately removable for service. The dual LEDs permit viewing operating status of the Media Converters from any angle.

3.4 DIN-Rail mounting option

The Magnum FT14 and FT14H Media Converters, designed for use in "Factory Floor" Industrial Ethernet environments, are also available for DIN-Rail mounting in an enclosure having DIN Rails.

The metal DIN-Rail mounting hardware is optional and needs to be ordered as a separate item, e.g. Model # DIN-RAIL-MC2. It comes with four screws to attach the bracket to the MC unit. The rail clip is spring-loaded with a pull-up latch at the top for easy "snap-on" attachment and removal.

The Magnum FT14 Models with "HR" have 24VDC power, and have the DIN-Rail-MC2 bracket included and assembled with the MC unit at the factory.

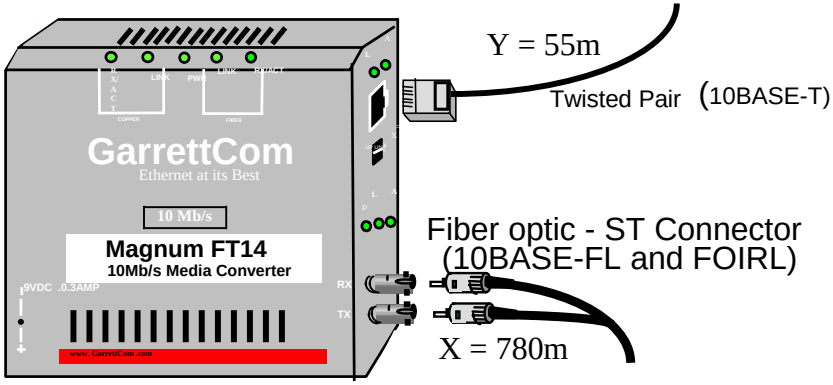
A Magnum FT14H is shown alongside the DIN-Rail-MC2 bracket

3.5 Calculating Overall Segment Distance

Important Note: Special consideration must be given to maximum cable segment lengths of a Magnum FT14 and FT14H 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. (See also Technical Specs, Maximum Standard Ethernet Segment Distances, Section 1.1 of this manual.)

When installing the Magnum FT14-series 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 Magnum 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%.



Connectivity between Fiber and TP Ethernet Media.

Media Distance Formula for Magnum Media Converters:

X% + Y% ≤ 100%

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

A Distance Calculation Example:

Connectivity between ThinNet and TP Ethernet Media.

In the figure shown above, the length of Segment X is 780m (2574 ft). This is 39% of the maximum allowable distance for 10BASE-FL media (2Km) [780/2000 x 100% = 39%]. The length of Segment Y is 55m (165 ft). This is 55% of the maximum

allowable distance for UTP 10BASE-T media (100 m) [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 Magnum Repeater so that each cable type can be 100% of its maximum allowed length.

Note 3: The maximum number of 10Mb Media Converters that can be used in series is three. The cumulative noise from four or more units together causes packet alignment errors.

3.6 Connecting Ethernet Media

Connecting Ethernet media to the Magnum FT14 Series Media Converter is very simple and straightforward. Using proper media segment, simply attach the cable end to the appropriate connector.

See Sections 4.4 for details of the LEDs on the media converter models.

3.6.1 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 Magnum Media Converters. The procedure is the same for both unshielded and shielded twisted pair segments.

1. Using standard 10BASE-T media, insert either end of the cable with an RJ-45 plug into the RJ-45 connector of the Magnum Media Converter.

2. 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 units are powered and proper connections established. If the LINK LED is not illuminated, change the setting of the up-link switch (See Section 4.6 for up-link switch information.) If this does not help, ensure that the cable is connected properly at both ends and is not defective.

3.6.2 Connecting Fiber Optic multi-mode, single mode (half- and full-duplex)

The following procedure applies to 10BASE-FL multi-mode and single mode applications using the FT14-series Media Converters. All have ST-type fiber connectors. The FT14S single-mode differs from the other fiber media converters in terms of the maximum distance allowed. The others are used for a multi-mode fiber segment lengths of up to 2km. The FT14S is used for single-mode fiber segments of up to 10km in length. The following table (continued next page) is provided for general information:

Fiber Cable Type	cable diameter *	Max. length	Wavelength
Multi-mode fiber	50/125, 62.5/125.	2km	850 nm
Fiber Cable Type	cable diameter *	Max. length	Wavelength
Single-mode fiber	2/15 - 8/60	10km	1300 nm

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

The values shown are typical values

Procedure for connecting multi-mode and single-mode fiber cables:

1. Before connecting the fiber cable, remove the protective dust caps from the tips of the connectors on the media converter. Save these dust caps for future use.
2. 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 fiber optic cable is coded using color bands at regular intervals; you must use the color-coded strand on the associated ports at each end of the fiber optic segment.
3. Connect the Transmit (TX) port (light colored post) on the Magnum Media Converter to the Receive (RX) port of the remote device. Begin with the color-coded strand of the cable for this first TX-to-RX connection.
4. Connect the Receive (RX) port (dark-colored post) on the product to the Transmit (TX) port of the remote device. Use the non-color coded fiber strand for this.

5. The LINK LED corresponding to the fiber port on the front of the product will illuminate (for standard non-Link-Pass-through models) 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 fiber cables on the product connector to remedy this situation.
6. For the Link Pass-through model, connection is the same except that the LINK indication will not be present unless LINK is made for the cables on both sides.

3.6.3 Power Budget Calculations for Fiber Media Magnum FT14-series

Receiver Sensitivity and Transmitter Power are the parameters necessary to compute the power budget. To calculate the power budget of different fiber media installations, the following equations should be used:

OPB (Optical Power Budget) = P_T(min) - P_R(min)

where P_T = Transmitter Output Power, and P_R = Receiver Sensitivity

Worst case OPB = OPB - 1dB(for LED aging) - 1dB(for insertion loss)

Worst case distance = {Worst case OPB, in dB} / [Cable Loss, in dB/Km]

where the "Cable Loss" for 62.5/125 and 50/125μm (M.m) is 2.8 dB/km,
and the "Cable Loss" for 100/140 (Multi-mode) is 3.3 dB/km,
and the "Cable Loss" for 9/125 (Single-mode) is 0.5 dB/km

The following data has been collected from component manufacturer's (HP's and Siemens') web sites and catalogs to provide guidance to network designers and installers.

Fiber Port Module	**Speed, Std.**	**Mode**	**Std. km fdx (hdx)**	**Wave - length nm**	**Cable Size µm**	**X'mitr Output P_T, dB**	**R'cvr Sens. P_R,dB**	**Worst OPB, dB**	**Worst* distance Km, fdx**	**typical OPB, dB**	**typical* distance Km, fdx**
FT14-series all multi-mode	**10 Mb FL**	Multi-mode	**2 (2)**	850	62.5/125 100/140 50/125	-15.0 -9.5 -19.5	-31 -31 -31	14 19.5 9.5	**5** **5.9** **3.4**	17 23.5 13.5	**6** **7** **4.8**
FT14S all single-mode	**10 Mb FL**	Single-mode	**10 (5)**	1300	9/125	-30	-39	7	**14**	13	**26**

Note: The worst-case OPB of the fiber link must be greater than the fiber cable's passive Attenuation.

(Attenuation = Cable loss + LED aging loss + Insertion loss + safety factor)

4.0 OPERATION

This section describes the operation of the Magnum FT14 and FT14H, 10Mb Media Converters, including power supply requirements, up-link switch functionality, and a description of all LEDs.

4.1 Power Requirements, Power Supply Types for FT14 and FT14H

Magnum FT14 Media Converters are power-efficient and can work with an external AC power supply. Magnum FT14 Media Converters require a nominal 9VDC input. version The extended temperature –Hd version is used for heavy duty and industrial applications.

The 9V DC power input has a plug of 2.5mm, center +ve , with 6 ft. cord. The Magnum FT14 and FT14H media converters are designed to be used with UL listed Class II power supplies. Detail info. is provided in Technical Specifications Section 1.1.

The FT14H Hardened media converters are designed to provide reliable operation, withstand higher temperature environments, and provide the direct DC power choices to the user to deploy in uncontrolled temperature environments.

9VDC **24VDC** **-48VDC**



The Internal 9V DC (8 – 15V DC) has a built-in terminal block for +, -, ground. The 9V DC jack is also present. Detail information about the 9 VDC, the 24V DC and the –48V DC is provided in the Technical Specifications Section 1.1. The various models of DC power type and extended ambient temperature power supplies are numerous and your choice needs to be called out on your order.

Note: When connected to a -48 V centralized dc source these products are to be installed only in Restricted Access Areas (dedicated equipment rooms, electrical closets or the like).

4.2 Powering the FT14H (DC Direct) with 12V, 24V or –48V DC power input

Each Magnum FT14H is equipped with a Direct DC power supply, and have built-in screw terminals for secure attachment of the power leads. Three models support a range of power input types. The three model choices are for use with 9VDC, 24VDC or -48VDC power. DC power input may be chosen for high-availability.

The extended temperature capability of the DC-powered FT14H's can go outdoors, rated at –40`C to +75`C. If indoors, the DC jack

is also present and optionally can be used with an external AC power supply.

DC Power Terminals: "+", "-", floating

GND: Terminal for "earth" or ground wire connection to the FT14H chassis

Input Voltage: 7.5 - 15V DC (9V DC)

18 – 26V DC (24V DC)

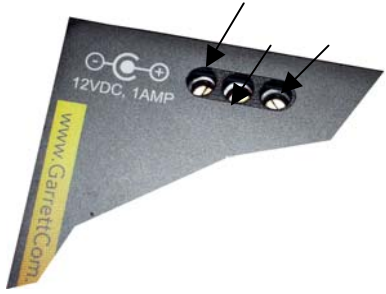
30 – 60V DC (-48V DC)

Input current: 0.8 amp max.(9V DC)

0.4 amp max.(24V DC)

0.2 amp max.(-48V DC)

Power Consumption: 1.5 watts typical, 2 watts maxm.



4.3 FT14H, DC-powered, -48VDC, 24VDC and 9VDC Installation

This section describes the proper connection of the -48VDC leads (or 24VDC, 9VDC leads) to the Direct DC power terminal block on the Magnum FT14H hardened media converter (as shown in Figure above)**.** The DC terminal block on the Magnum FT14H is located on the left side of the unit and is equipped with three (3) screw-down lead posts. The power

terminals are identified as positive (+) and negative (-), and they are floating inside the unit so that either of the terminal may be grounded by the user if desired. The chassis is "earth" or ground (GND).

The connection procedure is straightforward. Simply insert the DC leads to the FT14H's power terminals, positive (+) and negative (-) screws. The use of Ground (GND) is optional; it connects to the FT14H chassis. Ensure that each lead is securely tightened from the top, as shown here.

NOTE: Always use a voltmeter to measure the voltage of the incoming power supply and figure out the +ve potential lead or -ve potential lead. The more +ve potential lead will connect to the post labeled "+ve" and the rest to the "-ve".

The GND can be hooked up at the last.

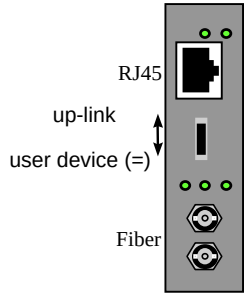
When power is applied, the green PWR LED will illuminate.

4.4 Dual LEDs, front-panel and side-panel (Magnum FT14 and FT14H)

LED	Description
PWR/P	Illuminates GREEN to indicate power applied.
LINK/L	(TP) Illuminates GREEN, Steady ON when both attached cable segments are operational at the other end. 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/ACT/A	Blinking GREEN indicates data is being received, receive activity. (Steady On or steady Off indicates no Receive Activity).

4.5 Up-Link (Cross-over) Switch

The FT14 and FT14H Media Converter is equipped with an Up-Link slide switch. When set to the UP position (X), the Media Converter is wired with cross-over functionality for direct up-link to a network hub, switch or concentrator. When set to the DOWN position (=), the Magnum Media Converter is wired for normal twisted-pair connection to a user node device. Some Ethernet Switch ports may be of either polarity, and this feature is most convenient with such switches.



End view, FT14, FT14H

5.0 TROUBLESHOOTING

All Magnum Ethernet products are designed to provide reliability and consistently high performance in all network environments. The installation of Magnum FT14-SERIESs 10 Mb/s Media Converters is a straightforward procedure (see INSTALLATION, Section 3.0); the operation is also straightforward and is discussed in Section 4.

Should problems develop during installation or operation, this section is intended to help locate, identify and correct these types of problems. Please follow the suggestions listed below prior to contacting your supplier. However, if you are unsure of the procedures described in this section or if the Magnum FT14 / FT14H 10 Mb/s Media Converter is not performing as expected, do not attempt to repair the unit; instead contact your supplier for assistance or contact GarrettCom Customer Support.

5.1 Before Calling for Assistance

1. If difficulty is encountered when installing or operating the unit, refer back to the Installation Section of the applicable chapter of this manual. Also check to make sure that the various components of the network are interoperable.

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 an AC power cord is properly attached to each Magnum FT14/FT14H 10 Mb/s Media Converters unit. Be certain that each AC power cord is plugged into a functioning electrical outlet. Use the PWR LEDs to verify each unit is receiving power.

4. If the problem is isolated to a network device other than the Magnum FT14/FT14H 10 Mb/s Media Converters product, it is recommended that the problem device is 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 Magnum FT14/FT14H 10 Mb/s Media Converters and its associated cables are functioning properly.

5. If the problem continues after completing Step 4 above, contact your supplier of the Magnum FT14/FT14H 10 Mb/s Media Converters unit or if unknown, contact GarrettCom, Inc by fax, phone or email (*support@garrettcom.com*) for assistance.

5.2 When Calling for Assistance

Please be prepared to provide the following information.

1. A complete description of the problem, including the following points:

   a. The nature and duration of the problem;

   b. Situations when the problem occurs;

   c. The components involved in the problem;

   d. Any particular application that, when used, appears to create the problem;

2. An accurate list of GarrettCom product model(s)involved, with serial number(s). Include the date(s) that you purchased the products from your supplier.

3. It is useful to include other network equipment models and related hardware, including personal computers, workstations, terminals and printers; plus, the various network media types being used.

4. A record of changes that have been made to your network configuration prior to the occurrence of the problem. Any changes to system administration procedures should all be noted in this record.

5.3 Return Material Authorization (RMA) Procedure

All returns for repair must be accompanied by a Return Material Authorization (RMA) number. To obtain an RMA number, please use this URL - **https://rma.garrettcom.com/rma/rma_request_noaccount.php** to fill out the form. Please have the following information readily available:

Name and phone number of your contact person.
Name of your company / institution
Your shipping address

Product name
Serial Number (or Invoice Number)
Packing List Number (or Sales Order Number)
Date of installation
Failure symptoms, including a full description of the problem.

GarrettCom will carefully test and evaluate all returned products, will repair products that are under warranty at no charge, and will return the warranty-repaired units to the sender with shipping charges prepaid (see Warranty Information, Appendix A, for complete details). However, if the problem or condition causing the return cannot be duplicated by GarrettCom, the unit will be returned as:

No Problem Found.

GarrettCom reserves the right to charge for the testing of non-defective units under warranty. Testing and repair of product that is not under warranty will result in a customer (user) charge.

5.4 Shipping and Packaging Information

Should you need to ship the unit back to GarrettCom, please follow these instructions:

1. Package the unit carefully. It is recommended that you use the original container if available. Units should be wrapped in a "bubble-wrap" plastic sheet or bag for shipping protection. (You may retain all connectors and this Installation Guide.)

CAUTION: Do not pack the unit in Styrofoam "popcorn" type packing material. This material may cause electro-static shock damage to the unit.

2. Clearly mark the Return Material Authorization (RMA) number on the outside of the shipping container.

3. GarrettCom is not responsible for your return shipping charges.

4. Ship the package to:

GarrettCom, Inc.

47823 Westinghouse Dr.

Fremont, CA 94539

Attn.: Customer Service

APPENDIX A: WARRANTY INFORMATION

GarrettCom, Inc. warrants its products to be free from defects in materials and workmanship for a period of three (3) years from the date of shipment by GarrettCom.

During this warranty period, GarrettCom will repair or, at its option, replace components in the products that prove to be defective at no charge other than shipping and handling, provided that the product is returned pre-paid to GarrettCom.

This warranty will not be effective if, in the opinion of GarrettCom, the product has been damaged by misuse, misapplication, or as a result of service or modification other than by GarrettCom.

GarrettCom reserves the right to make a charge for handling and inspecting any product returned for warranty repair which turns out not to be faulty.

Please complete the warranty card as this acts as a product registration, and mail it to GarrettCom within two weeks of your purchase.