GarrettCom®

A BELDEN BRAND

Magnum 10KT

Managed Switch with Timing

Hardware

Installation and User Guide

Magnum™ 10KT
Managed Switch

Hardware
Installation and User Guide

Part #: 84-00188Z (Rev. D)

Important: The Magnum 10KT Managed Switch contains no user-serviceable parts. Attempted service by unauthorized personnel may render all warranties null and void. If problems are experienced with Magnum 10KT Switch products, consult Section 6, Troubleshooting.

Contacting GarrettCom, Inc

Please use the mailing address, phone and fax numbers and email address listed below:

GarrettCom, Inc.
47823 Westinghouse Dr.
Fremont, CA 94539-7437
Phone (510) 438-9071
Fax (510) 438-9072
Website: http://www.GarrettCom.com
Email: support@garrettcom.com

Federal Communications Commission
Radio Frequency Interference Statement

This equipment generates uses and can radiate frequency energy and if not installed and used properly 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 their own expense, will be required to take whatever measures may be required to correct the interference.

Canadian Emissions Statement

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil respecte toutes les exigences du Réglement sur le matériel du Canada. Cet appareil est Classe A.

Electrical Safety requirements:

1. This product is to be installed Only in Restricted Access Areas (Dedicated Equipment Rooms, Electrical Closets, or the like).
2. All products shall be installed with a readily accessible disconnect device in the building installation supply circuit to the product.
3. This product shall be provided with a maximum 10A DC Listed fuse or circuit breaker in the supply circuit when connected to a 48V centralized source.
4. The external power supply for DC units shall be Listed, Direct Plug In power unit, marked Class 2, or listed ITE Power Supply, marked LPS, which has suitably rated output voltage (i.e. 24VDC or 48VDC) and suitable rated output current.
5. Product does not contain user replaceable fuses. Any internal fuses can ONLY be replaced by GarrettCom personnel through the RMA process.
6. The chassis main earthing screw shall be connected to the supply protective earthing conductor.

This equipment has the ordering option of being supplied to the purchaser without a Fiber Optic Class 1 Laser transceiver included. In this case, it is the responsibility of the purchasing party to apply the proper labeling required to the product, in accordance with US 21CFR Subchapter J Part 1040, if a transceiver is installed by the purchaser. (See label example below)

Complies with FDA radiation performance standards, 21CFR Subchapter J.

Table of Contents **Page**

Revisions:

Rev. A 05/11: Initial Release
Rev. B 11/11: Updated model numbers
Rev. C 03/12: Added PoE support
Updated Agency Approvals and Standards Compliance, pg.7
Rev. D 06/12: Added Dual Fixed PSU

1.0 SPECIFICATIONS

1.1 Technical Specifications

Performance

Filtering / Forwarding Rate:
- Ethernet (10Mb): 14,880 pps
- Fast Ethernet (100Mb): 148,800 pps
- Gigabit Ethernet (1000Mb): 1,488,000 pps

Switching Processing Type: Store and Forward with IEEE 802.3x full-duplex flow control, non-blocking
- Data Rate: 10Mbps, 100Mbps and 1000Mbps

Address Table Capacity: 8K node, self-learning with address aging
- Packet buffer size: 512KB for 10/100Mb, 128KB for Gb

Latency: 6µs + packet time max. (TX-TX, TX-FX, FX-FX, TX-G, G-G)
System aggregate forward and filter rate: 11.9 Mpps

Network Standards and Compliance, hardware

Ethernet V1.0/V2.0 IEEE 802.3: 10BASE-T,
IEEE 802.3u: 100Base-TX, 100BASE-FX
IEEE 802.3z: 1000BASE-X Ethernet (Auto-negotiation)
IEEE 802.3ab: 1000BASE-X Ethernet
IEEE 802.1p: Priority protocol
IEEE 802.1d: Spanning Tree protocol
IEEE 802.1w: Rapid Spanning Tree protocol
IEEE 802.1q: VLAN Tagging
IEEE 802.3x: Flow Control
IEEE 802.3ad: Link Aggregation (Trunking)
IEEE 802.1x: Port-based network access control
IEEE 802.3af: Power over Ethernet (PoE)
IEEE 802.3at: Power over Ethernet (PoE+)
IEEE 1588v2 Timing compliance
IPv6 Compliance

Maximum 10 Mbps Ethernet Segment Lengths

Unshielded twisted pair	- 100 m (328 ft)
Shielded twisted pair	- 150 m (492 ft)
10BASE-FL multimode fiber optic	- 2 km (6562 ft)

Maximum Standard Fast Ethernet Segment Lengths:

10BASE-T (CAT 3, 4, 5 UTP)	- 100 m (328 ft)
100BASE-TX (CAT 5 UTP)	- 100 m (328 ft)
Shielded twisted pair	- 150 m (492 ft)
100BASE-FX, half-duplex, multimode	- 412 m (1350 ft)
100BASE-FX, full-duplex, multimode	- 2.0 km (6562 ft)
100BASE-FX, half-duplex, singlemode	- 412 m (1350 ft)
100BASE-FX, full-duplex, singlemode	- 20.0 km (66K ft)
100BASE-FX, full-duplex, Long Reach	- 40.0 km (122K ft)

Maximum Standard Gigabit Ethernet Segment Lengths:

1000BASE-T (CAT5e or higher is recommended) - 100m (328 ft)
1000BASE-SX, full-duplex, multimode (62.5µm cable) - 220m (722 ft)
1000BASE-SX, full-duplex, multimode (50µm cable) - 550m (1804 ft)

1000BASE-LX, full-duplex, multimode (50, 62.5µm cable) - 550m (1804 ft)
1000BASE-LX, full-duplex, singlemode (9µm cable) - 5km (16.4K ft)
1000BASE-ZX, full duplex, singlemode (9µm cable) - >70km (229.6K ft)

Fiber Multimode connector types supported:

Fiber Port, LC-type (plug-in): SFF fiber multimode 100BASE-FX
Fiber Port, MTRJ-type (plug-in): SFF fiber multimode 100BASE-FX
Fiber Port, SC-type (plug-in), multimode 100BASE-FX
Fiber Port, ST-type (twist-lock), multimode 100BASE-FX
Fiber Port, 1000BASE-SX, SFP modules

Fiber Singlemode connector types:

Fiber Port, LC-type, Fiber SFF singlemode, 100BASE-FX
Fiber Port, SC-type, singlemode, 100BASE-FX
Fiber Port, 1000BASE-LX, SFP modules

LEDs: Per Port

(see section 5.1.1 for detailed LED configurations)

Operating Environment

Ambient Temperature:
-40° to 140° F (-40° to 60°C) for UL 60950 and Component Parts rating
-40° to 195° F (-40° to 85°C) for IEC 60068 Type Test short term rating
Storage Temperature: -40° to 185°F (-40°to 85°C)
Ambient Relative Humidity: 5% to 95% (non-condensing)
Altitude: -200 to 13,000 ft. (-60 to 4000m)
Conformal Coating (humidity protection) optional: Request quote

Alarm Relay Contacts

Form C, One NC hardware controllable, One NC software controllable

10KTP (PoE chassis): One Form C, NC/NO software controllable

Mechanical (Thermal fin version)

Enclosure: High strength steel, 1.5U rack-mounting or stand-alone
Dimensions: 2.63 in H x 17.5 in W x 12.0 in D
(6.7 cm H x 44.5 cm W x 30.5 cm D)
Cooling method: Convection, special (patent pending) thermal techniques or Fan cooling
Weight: 14.2 lbs. (6.5 kg)

Mechanical (non-Thermal fin version)

Enclosure: High strength steel, 1U rack-mounting or stand-alone
Dimensions: 1.74 in H x 17.5 in W x 12.0 in D
(4.4 cm H x 44.5 cm W x 30.5 cm D)
Cooling method: Convection, special (patent pending) thermal techniques or Fan cooling
Weight: 9.7 lbs. (4.4 kg)

DC Power Supply (Internal, floating ground)

DC Power Connector: Terminal block
(L) 24/48VDC Power Input (range 22 to 60VDC)
(H) AC/DC Power Input (range 90-250V AC or DC)
Standard 3-screw Terminal block: " -, +, GND "

for PoE applications:

PoE 802.3af: (L) 48VDC Power Input (range 45 to 57VDC)
PoE+ 802.3at: (L) 48VDC Power Input (range 52 to 56VDC)
Standard 2-screw Terminal block: "+, -"

Power Consumption:

55 watts Max. (for a fully-loaded model with 4Gb ports, 16 100Mb fiber ports and 16 RJ-45 10/100Mb ports)

AC Power Supply (Internal)

AC Power Connector: IEC-320/C14 type, male recessed
100-240VAC Power Input, 47 to 63 Hz (auto-ranging)

Power Consumption:

30 watts typical with 32 fully-loaded copper ports
60 watts typical with 32 fully-loaded fiber ports

Management Console Connector

RJ45, see details at Section 3.6

10KT Mounting:
Rack-mounting, standard method.

Unit supplied with rack-mounting brackets for mounting in a 19" rack.

Agency Approvals and Standards Compliance:

ANSI/UL 60950-1, Issued: 2007/03/27 Ed:2 UL Standard for Safety for Information Technology Equipment Safety Part 1: General Requirements'
CSA C22.2 No. 60950-1, Issued: 2007/03/01 Ed:2 Standard for Safety for Information Technology Equipment Safety Part 1: General Requirements'
Emissions meet FCC Part 15 Class A
IEEE 1613 Class 2 Environmental Standard for Electric Power Substations
See also **Note for Power Substations** in Section 3.2.1 and 5.1.2
IEC 61850-3 EMC and Operating Conditions Class C for Power Substations
NEMA TS-2 for Traffic Control

Warranty: Three years, per UL 60950 temperature rating Made in USA

Email **info@GarrettCom.com** for additional information.

1.2 Ordering Information

Hot-Swap Power supply models, w/Thermal Fins

MODEL **DESCRIPTION**

10KT-HSPHH-TF: Magnum 10KT Managed Switch, front-mount, with two PS slots for two H Hot-Swap Power Supplies. May be factory-configured with a variety of fiber and copper port modules selected designed specifically for the 10KT-series. Configure up to 36 ports in a mix of Gb and 100Mb. Heavy-duty case with thermal fins for maximum convection cooling efficiency in a rack-mount setting.

10KTR-HSPHH-TF: Same as Model 10KT-HSPHH-TF except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

10KT-HSPHL-TF: Magnum 10KT Managed Switch, front-mount, with two PS slots for one H and one L Hot-Swap Power Supply. May be factory-configured with a variety of fiber and copper port modules selected designed specifically for the 10KT-series. Configure up to 36 ports in a mix of Gb and 100Mb. Heavy-duty case with thermal fins for maximum convection cooling efficiency in a rack-mount setting.

10KTR-HSPHL-TF: Same as Model 10KT-HSPHL-TF except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

10KT-HSPLL-TF: Magnum 10KT Managed Switch, front-mount, with two PS slots for two L Hot-Swap Power Supplies. May be factory-configured with a variety of fiber and copper port modules selected designed specifically for the 10KT-series. Configure up to 36 ports in a mix of Gb and 100Mb. Heavy-duty case with thermal fins for maximum convection cooling efficiency in a rack-mount setting.

10KTR-HSPLL-TF: Same as Model 10KT-HSPLL-TF except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

10KTP-HSPLL-TF: Magnum 10KT Managed Switch, front-mount, with two PS slots for two L Hot-Swap Power Supplies. Supports PoE – choose PoE module(s) separately. May be factory-configured with a variety of fiber and copper port modules selected designed specifically for the 10KT-series. Configure up to 36 ports in a mix of Gb and 100Mb. Heavy-duty case with thermal fins for maximum convection cooling efficiency in a rack-mount setting.

10KTPR-HSPLL-TF: Same as Model 10KTP-HSPLL-TF except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

Fixed Power supply models w/Thermal Fins

MODEL **DESCRIPTION**

10KT-H-TF: Magnum 10KT Managed Switch, front-mount, with integral 90-250V AC/DC Power Supply. May be factory-configured with a variety of fiber and copper port modules selected designed specifically for the 10KT-series. Configure up to 36 ports in a mix of Gb and 100Mb. Heavy-duty case with thermal fins for maximum convection cooling efficiency in a rack-mount setting.

10KTR-H-TF: Same as Model 10KT-H-TF except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

10KT-HH-TF: Magnum 10KT Managed Switch, front-mount, with two integral 90-250V AC/DC Power Supply. May be factory-configured with a variety of fiber and copper port modules selected designed specifically for the 10KT-series. Configure up to 36 ports in a mix of Gb and 100Mb. Heavy-duty case with thermal fins for maximum convection cooling efficiency in a rack-mount setting.

10KTR-HH-TF:Same as Model 10KT-HH-TF except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

10KT-L-TF: Same as Model 10KT-H-TF except the integral power supply is L 24/48VDC.

10KTR-L-TF: Same as Model 10KT-L-TF except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

10KT-LL-TF: Same as Model 10KT-HH-TF except the integral power supplies are L 24/48VDC.

10KTR-LL-TF: Same as Model 10KT-LL-TF except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

10KT-HL-TF: Same as Model 10KT-HH-TF except the integral power supplies are one H 90-250V AC/DC and one L 24/48VDC.

10KTR-HL-TF: Same as Model 10KT-HL-TF except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

10KTP-L-TF: Magnum 10KT Managed Switch, front-mount, with integral 24/48VDC Power Supply. Supports PoE – choose PoE module(s) separately. May be factory-configured with a variety of fiber and copper port modules selected designed specifically for the 10KT-series. Configure up to 36 ports in a mix of Gb and 100Mb. Heavy-duty case with thermal fins for maximum convection cooling efficiency in a rack-mount setting.

10KTPR-L-TF: Same as Model 10KTP-L-TF except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

10KT-AC-TF: Same as Model 10KT-H-TF except the power supply is an auto-sensing worldwide AC power type (100-240V AC) using a UL-registered recessed-male IEC 320 plug.

10KTR-AC-TF: Same as Model 10KT-AC-TF except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

Please use this URL: for the complete Configuration Guide for the Magnum 10KT.
http://www.garrettcom.com/techsupport/insertion_guides/10ktcg.pdf

Hot-Swap Power supply models, wo/Thermal Fins

MODEL **DESCRIPTION**

10KT-HSPHH: Magnum 10KT Managed Switch, front-mount, with two PS slots for two H Hot-Swap Power Supplies. May be factory-configured with a variety of fiber and copper port modules selected designed specifically for the 10KT-series. Configure up to 36 ports in a mix of Gb and 100Mb.

10KTR-HSPHH: Same as Model 10KT-HSPHH except chassis is a Reverse Mount unit. (All signal and power cables are in the rear).

10KT-HSPHL: Magnum 10KT Managed Switch, front-mount, with two PS slots for one H and one L Hot-Swap Power Supply. May be factory-configured with a variety of fiber and copper port modules selected designed specifically for the 10KT-series. Configure up to 36 ports in a mix of Gb and 100Mb.

10KTR-HSPHL: Same as Model 10KT-HSPHL except chassis is a Reverse Mount unit. (All signal and power cables are in the rear).

10KT-HSPLL: Magnum 10KT Managed Switch, front-mount, with two PS slots for two L Hot-Swap Power Supplies. May be factory-configured with a variety of fiber and copper port modules selected designed specifically for the 10KT-series. Configure up to 36 ports in a mix of Gb and 100Mb.

10KTR-HSPLL: Same as Model 10KT-HSPLL except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

10KTP-HSPLL: Magnum 10KT Managed Switch, front-mount, with two PS slots for two L Hot-Swap Power Supplies. Supports PoE – choose PoE module(s) separately. May be factory-configured with a variety of fiber and copper port modules selected designed specifically for the 10KT-series. Configure up to 36 ports in a mix of Gb and 100Mb.

10KTPR-HSPLL: Same as Model 10KTP-HSPLL except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

Fixed Power supply models, wo/Thermal Fins

MODEL **DESCRIPTION**

10KT-H: Magnum 10KT Managed Switch, front-mount, with integral 90-250V AC/DC Power Supply. May be factory-configured with a variety of fiber and copper port modules selected designed specifically for the 10KT-series. Configure up to 36 ports in a mix of Gb and 100Mb.

10KTR-H: Same as Model 10KT-H except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

10KT-HH: Magnum 10KT Managed Switch, front-mount, with two integral 90-250V AC/DC Power Supply. May be factory-configured with a variety of fiber and copper port modules selected designed specifically for the 10KT-series. Configure up to 36 ports in a mix of Gb and 100Mb.

10KTR-HH: Same as Model 10KT-HH except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

10KT-L: Same as Model 10KT-H except the integral power supply is L 24/48VDC.

10KTR-L: Same as Model 10KT-L except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

10KT-LL: Same as Model 10KT-HH except the integral power supplies are L 24/48VDC.

10KTR-LL: Same as Model 10KT-LL except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

10KT-HL: Same as Model 10KT-HH except the integral power supplies are one H 90-250V AC/DC and one L 24/48VDC.

10KTR-HL: Same as Model 10KT-HL except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

10KTP-L: Magnum 10KT Managed Switch, front-mount, with integral 24/48VDC Power Supply. Supports PoE – choose PoE module(s) separately. May be factory-configured with a variety of fiber and copper port modules selected designed specifically for the 10KT-series. Configure up to 36 ports in a mix of Gb and 100Mb.

10KTPR-L: Same as Model 10KTP-L except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

10KT-AC: Same as Model 10KT-H except the power supply is an auto-sensing worldwide AC power type (100-240V AC) using a UL-registered recessed-male IEC 320 plug.

10KTR-AC: Same as Model 10KT-AC except chassis is a Reverse Mount unit. (All signal and power cables are in the rear)

Please use this URL: for the complete Configuration Guide for the Magnum 10KT.
http://www.garrettcom.com/techsupport/insertion_guides/10ktcgnf.pdf

"HSP" Hot-Swap power supply options:

(If "HSP" base unit is selected, choose up to two power supply modules. For "-HF" or "-LF" models below, Also choose the KT-RFAN option in the Options & Extras below)

HSPM-H:	AC or DC power (90-250V)
HSPM-L:	24/48V DC power (22-60V)
HSPM-HF:	AC or DC power (90-250V) w/Internal cooling fan
HSPM-LF:	24/48V DC power (22-60V) w/Internal cooling fan
10K-PSBLNK:	Blank cover for one hot-swap power supply slot

Following 2-port Gb modules can be configured in Slots A and/or B only

Magnum 10KT (Slots A, B) Port Modules:

10K2T-2GCU	Module with two Gigabit RJ-45 ports, 1588 timing
10K2T-2GSFP	Module with two Gigabit SFP slots, 1588 timing
10K2-2GCU	Module with two Gigabit RJ-45 ports
10K2-2GSFP	Module with two Gigabit SFP slots

Gigabit SFP transceiver options for Slots A & B:

SFP-GTP	Gb SFP transceiver, Copper 1000Base-T, 100m
SFP-SX	Gb SFP transceiver, 1000Mb-SX, 850nm wavelength, 550m
SFP-ESX	Gb SFP transceiver, 1000Mb, 1310nm wavelength, 2km
SFP-LX10	Gb SFP transceiver, 1000Mb-LX, 1310nm wavelength, 10km
SFP-LX25	Gb SFP transceiver, 1000Mb-LX, 1310nm wavelength, 25km
SFP-ZX40	Gb SFP transceiver, 1000Mb-ZX, 1550nm wavelength, 40km
SFP-ZX70	Gb SFP transceiver, 1000Mb-ZX, 1550nm wavelength, 70km

Following modules can be configured in Slots C thru J only

Magnum 10KT (Slots C thru J) Port Modules:

10K4-RJ45	Module w/four 10/100 RJ-45 ports
10K4T-RJ45	Module w/four 10/100 RJ-45 ports with 1588 timing
10K4P-RJ45	Module w/four 10/100 RJ-45 PoE (802.3af) ports (PoE chassis and L power supply is required)
10K4PX-RJ45	Module w/four 10/100 RJ-45 PoE PLUS (802.3at) ports Supports PoE (802.3af) or PoE Plus (802.3at) (PoE chassis and L power supply is required) (Only a maximum of four 10K4PX-RJ45 modules is supported)
10K4-MLC	Module w/four 100Mb multimode fiber LC ports
10K4T-MLC	Module w/four 100Mb multimode fiber LC ports with 1588 timing
10K4-SLC	Module w/four 100Mb singlemode fiber LC ports (20km)
10K4T-SLC	Module w/four 100Mb singlemode fiber LC ports (20km) with 1588 timing

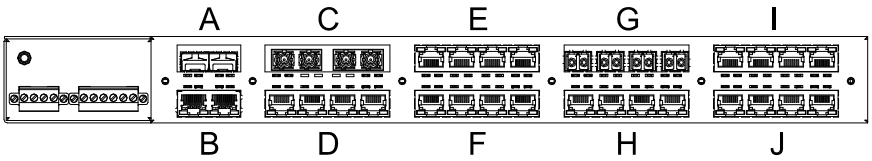
10K4-SLCL	Module w/four 100Mb “long-haul” singlemode fiber LC ports (40km)
10K4T-SLCL	Module w/four 100Mb “long haul” singlemode fiber LC ports (40km) with 1588 timing
10K4-MTRJ	Module w/four 100Mb multimode fiber MTRJ ports
10K4T-MTRJ	Module w/four 100Mb multimode fiber MTRJ ports with 1588 timing
10K2-MST	Module w/two multimode ST fiber ports
10K2T-MST	Module w/two multimode ST fiber ports with 1588 timing
10K2T-SST	Module w/two singlemode ST fiber ports with 1588 timing
10K2-F10ST	Module w/two multimode 10Mb ST fiber ports
10K2-MSC	Module w/two multimode SC fiber ports
10K2T-MSC	Module w/two multimode SC fiber ports with 1588 timing
10K2-SSC	Module w/two singlemode SC fiber ports
10K2T-SSC	Module w/two singlemode SC fiber ports with 1588 timing
10K2-SSCL	Module w/two “long-haul” singlemode SC fiber ports
10K4-FXSFP	Module w/four open 100Mb SFP ports

100Mb SFP transceiver options for module 10K4-FXSFP:

SFP100P-FXMM2	100FX fiber SFP transceiver, multimode, 2km
SFP100P-FXSM20	100FX fiber SFP transceiver, singlemode, 20km
SFP100P-FXSM40	100FX fiber SFP transceiver, singlemode, 40km
SFP100P-RJ45	10/100Mb, RJ45 SFP transceiver

NOTE: 1588 timing modules must be configured in vertical slot pairs only.
(For example, if slot A, on the top, has a timing module, then slot B, below it, must also have a timing module or be unpopulated.)

10KT Slot locations:



Options & Extras:

KT-RFAN: Removable Fan for extra fiber ports and cooling;
Optional for up to 16 fiber ports. Required for 18 to 36 fiber ports.

10KT-BLNK: Blank cover for 1 unused 10KT port module slot.

CONSOLE-CBLQD: Console attachment cable. Serial null modem (aka X-modem) cable with RJ45 connector for the 10KT on one end and a DB-9 connector on other end.

CONSOLE-CBLQU: Same as above, but with USB connector

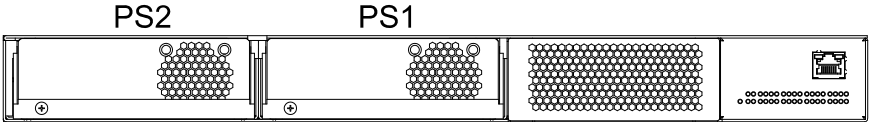
MNS-6K-SECURE: Optional, licensed software per switch for extra security

S-RING-Key: S-Ring Redundancy Manager licensed software for redundant ring management. One S-Ring key is for licensed use one 10KT-managed self healing ring.

CONFORM05-RMOD: Conformal coating, heavy duty silicone at 5 mil thickness, for interior PCBs, PS and modules (for moisture protection)

CONFORM08-RMOD: Conformal coating, heavy duty silicone at 8 mil thickness, for interior PCBs, PS and modules (for corrosion in paper, mining, and oil & gas industries)

Hot-Swap power supply locations:



2.0 INTRODUCTION

2.1 Inspecting the Package and Product

Examine the shipping container for obvious damage prior to installing this product; notify the carrier of any damage that 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 10KT Managed Switch, base unit
(configured with user-selected port module options installed, and factory-loaded MNS-6K or MNS-6K-SECURE software installed)

1 Set of two metal 19" rack-mounting brackets, with screws to mount to 10KT case

Remove the items from the shipping container. Be sure to keep the shipping container should you need to re-ship the unit at a later date.

In the event there are items missing or damaged, contact the party from whom you purchased the product. If the unit needs to be returned, please use the original shipping container if possible. Refer to Section 6, Troubleshooting, for specific return procedures.

2.2 Product Description - Magnum 10KT Managed Switch

The Magnum 10KT Switch provides rack-mount space efficiency and advanced port configurability for heavy duty industrial applications where maximum fiber port count and diversity are required. New advanced thermal design techniques (patent pending) enable the 10KT to deliver high reliability and configurability even at extended operating temperatures. Special rack-mount cooling features include Thermal Fins for extra heat dissipation and internal heat transfer techniques that use the case as a heat sink. Cooler operation of internal electronic components leads to longer life-time and increased reliability.

10KTR (Reverse model shown)

Next-Generation industrial switch features, especially for power utility facilities in the Smart Grid, importantly include high precision IEEE 1588v2 timing synchronization with precision as low as single-digit nanoseconds. The Magnum 10KT provides an advanced level of 1588v2 timing features and accuracy, using integrated hardware and software. Advanced timing is supported on 100Mb and Gb ports, and is configurable on both fiber and copper port types.

The Magnum 10KT also offers configurable Dual Hot-Swappable power supplies for redundancy and increased reliability. Both high voltage AC/DC and low voltage DC hot-swappable power supplies are configurable in the Magnum 10KT. Matching power supply types are normally selected for each of the two hot-swappable slots. Software monitors each power supply, and can signal when a power supply module replacement is needed. The swap-out can readily be done while the 10KT Switch continues in operation.

The ten module slots in the Magnum 10KT provide the configuration flexibility for network designers to choose up to four fiber or copper Gb ports, and up to thirty-two 100 Mb fiber or copper ports. Modules may be configured for regular port types, IEEE 1588v2 Timing, or combinations. See the 10KT Configuration Guide for configuration details.

Magnum 10KT Managed Switches come with field-proven MNS-6K and MNS-6K-SECURE Management Software. MNS-6K features include LAN software support including SNMP management, IPv6, Secure Web Management, IGMP, graphical user interface (GUI), redundant LANs support, and many network management security and ease-of-use features.

Magnum 10KT Managed Switches have rugged metal cases for regular or "Reverse" rack-mounting, and auto-ranging power supplies for operation with standard AC power worldwide, or DC power input choices. Moisture and corrosion-protecting Conformal Coating is optional. The Magnum 10KTs and all other Magnum products are designed and manufactured in the USA and have a three year warranty.

2.2.1 Packet Prioritization, 802.1p QOS

Quality of Service (QOS) means providing consistent predictable data delivery to users from datagram paths that go all across a network. As a LAN device, the Magnum 10KT can do its part to prevent any QOS degradation while it is handling Ethernet traffic through its ports and internal switch buffers.

The Magnum 10KT switching hardware supports the IEEE 802.1p standard, and fulfills its role in support of QOS, giving packet processing priority to priority-tagged packets according to the 802.1p standard. In addition to hardware support for QOS, the MNS software supports four priority queues that can be shared across the eight levels of defined packet priorities for application-specific priority control by the user through software configuration settings.

2.2.2 Frame Buffering and Flow Control

Magnum 10KT's are store-and-forward switches. Each frame (or packet) is loaded into the Switch's memory and inspected before forwarding can occur. This technique ensures that all forwarded frames are of a valid length and have the correct CRC, i.e., are good packets. This eliminates the propagation of bad packets, enabling all of the available bandwidth to be used for valid information.

While other switching technologies (such as "cut-through" or "express") impose minimal frame latency, they will also permit bad frames to propagate out to the Ethernet segments connected. The "cut-through" technique permits collision fragment frames (which are a result of late collisions) to be forwarded which add to the network traffic. Since there is no way to filter frames with a bad CRC (the entire frame must be present in order for CRC to be calculated), the result of indiscriminate cut-through forwarding is greater traffic congestion, especially at peak activity. Since collisions and bad packets are more likely when traffic is heavy, the result of store-and-forward operation is that more bandwidth is available for good packets when the traffic load is greatest.

When the Magnum 10KT Switch detects that its free buffer queue space is low, the Switch sends industry standard (full-duplex only) PAUSE packets out to the devices sending it packets to cause "flow control". This tells the sending devices to temporarily stop sending traffic, which allows the traffic to catch-up without dropping packets. Then, normal packet buffering and processing resumes. This flow-control sequence occurs in a small fraction of a second and is transparent to an observer.

Another feature implemented in the Magnum 10KT Switches is a collision-based flow-control mechanism (when operating at half-duplex only). When the Switch detects that its free buffer queue space is low, the Switch prevents more frames from entering by forcing a collision signal on all receiving half-duplex ports in order to stop incoming traffic.

2.3 Managed Network Software for Magnum 10KT

Magnum 10KT comes with licensed MNS-6K software or MNS-6K-SECURE, which allow the user to configure the Magnum 10KT as a Managed Switch and implements security features and other software-enabled features.

(NOTE: Magnum 10KT managed switch will work with MNS-6K Rel v4.2.0 firmware or higher version only, or MNS-6K-SECURE v14.2.0 firmware or higher version only. Using any earlier MNS-6K Rev-level versions will not provide support for the Magnum 10KT switch)

(NOTE: For units that support PoE, Magnum 10KT managed switch will work with MNS-6K Rel v4.3.2 firmware or higher version only, or MNS-6K-SECURE v14.3.2 firmware or higher version only. Using any earlier MNS-6K Rev-level versions will not provide support for the Magnum 10KT switch)

For additional information about MNS-6K, see the Magnum MNS-6K **Software User guide** in pdf format, a separate document normally accessible via your web-browser, at ftp://ftp.garrettcom.com/

or FTP client program at ftp.GarrettCom.com using

user : m6kuser

password : m6kuser

All MNS-6K software information, and the documentation related to MNS-6K and MNS-6K-SECURE software, can be accessed at GarrettCom's FTP site.

Alternatively, for the latest documentation and information, or needed GarrettCom's MIBs for SNMP, visit **www.GarrettCom.com/techsupport/index.htm#software** and look for the Magnum MNS-6K info.

For interactive training software which shows basic and advanced info about the Magnum MNS-6K management software and for a useful tool for first time users, visit **Magnum MNS-6K Operator Training**.

You may also email: info@GarrettCom.com for further information.

2.4 Features and Benefits

- **Dual Hot-swappable power supplies**
  The Magnum 10KT offers configurable Dual Hot-Swappable power supplies for redundancy and increased reliability. Available for "H" AC/DC and "L" 48/24VDC.
- **IEEE 1588 Precision Timing Synchronization**
  The Magnum 10KT offers high precision IEEE 1588v2 timing Synchronization, with precision as low as single-digit nanoseconds.
- **PoE support**
  10KTP base units support up to 32 ports of 802.3af PoE or up to 16 ports of 802.3at PoE+ ports.
- **Managed switching for high performance Ethernet LANs**
  Magnum 10KT Switches provide non-blocking (all ports can run at full speed at once) performance with standard Managed Network Software.
- **Switching services includes 802.1p QoS packet prioritization**
  The Magnum 10KT switching hardware supports QoS, giving packet processing priority to priority tagged packets according to the IEEE 802.1p 4-level standard. For port- and application-specific priorities of data, including VLANs, the QoS software may be configured by the user.
- **Fiber Port configurability**
  Magnum 10KT Managed Switches are designed to naturally include fiber ports, and support mixes of multimode, singlemode, 10Mb and 100Mb and 1000Mb speed; full- and half-duplex; classic FX Small Form Factor (SFF) and Small Form Pluggable (SFP) connectors for fiber cable.
- **Relay Contacts for monitoring internal power and user-defined software events**
  Two Alarm Relay contacts monitor basic operations. One is for hardware, and will signal loss of power internally. The other is software controlled and will signal user-defined software events such as a security violation or a redundancy fault condition.
- **19" Rack-mounting**
  The standard rack mounting provides Ethernet ports and status LEDs in front, service connections (Power input / Alarm connections) in the rear. "Reverse" rack mounting provides status LEDs in front and all cabling connections in the rear. For best reliability and cooling, 1U vertical space above and below is recommended.
- **Heavy-duty design for Industrial Ethernet and extended temperature operation**
  Fiber ports take more power than copper ports, but the Magnum 10KT design with Thermal Fins provides for this with heavy-duty components. The ambient temperature dual-rating is 60`C per UL methods, and 85°C per IEC type test methods.
- **MNS-6K licensed Management Software**
  Managed Networks Software (MNS) basic version, combined with a Magnum 10KT Switch, provides power and efficiency in a managed Ethernet platform. A full range of industry-standard software functions in the MNS-6K software product enables the versatile Magnum 10KT Switches to perform efficiently in a wide range of managed LAN applications, including redundant topologies.

- **MNS-6K-SECURE (optional, for extra security)**
  Magnum MNS-6K-SECURE software is designed for those customers demanding extra security in their networks. MNS-6K-SECURE is an optional item--licensed per switch. All of the features in regular MNS-6K are included, plus extra security.
- **RSTP-2004 for rings and meshes, fastest fault recovery, interoperability**
  RSTP-2004 provides reliable fast recovery from a fault in a redundant LAN, which may include Magnum switches and routers as well as other vendors industry-standard-RSTP products. Redundant topologies may include rings, dual-rings, and complex meshes.
- **S-Ring and Link Loss Learn for economical high availability using ring topology**
  S-Ring, combined with the Link-Loss-Learn feature, provides reliable fast recovery of a fault in an economical ring topology, combining unmanaged and managed switches.

2.5 Applications

Magnum 10KT Switches offer high performance, modularity and availability. They provide the flexibility of 100Mbps fiber and copper ports as well as Gigabit (1000Mb) ports, with industry-standard LAN management software. Magnum 10KT Switches are easily used in a variety of applications including client/server computing, secure VLAN- performance upgrades to industrial networks, and streaming traffic for VOIP and audio/video applications. They can also be used in a diversified combination of mixed media in substation automation and transportation systems applications. The performance characteristics of the 10KT Switches enable them to inter-connect a series of subnets (one subnet per 10KT Switch port) in a LAN traffic center. The subnet connections may be via fiber or twisted pair cabling, Gb or 100Mbps or 10 Mbps speed, and full-or half-duplex.

The mixed-media modular capability is ideal for industrial applications where existing Ethernet network cabling must be accommodated. The fiber-built-in media capability is ideal for integrating future-proof fiber cabling into an industrial network structure.

For a library of actual Application Notes for a variety of Magnum products and industries, see the GarrettCom website at http://www.garrettcom.com/app_notes.htm

Example 1: Magnum 10KT-Series Switch for VLAN applications

Equipped with lots of advanced management features, the Magnum 10KT Series Managed switch is able to handle a VLAN application and provide security and performance in an industrial network center. A secure VLAN-enabled network is simply an administratively-configured broadcast domain. The network administrator determines which ports and nodes are in which broadcast domains by setting membership profiles for each of them. The Magnum 10KT VLAN capability can be configured for use in standard Tag-based VLANs networks.

The modularity of the 10KT-Series Managed Switch makes it an attractive choice for use in applications with LAN connections to a large organization's multiple site industrial facilities. The different facilities can be easily connected together with the fiber ports supported by the switch.

Future-proof fiber media can easily connect long distance subnets and provide a stable secure network to all applications using VLANs. The SNMP management capability of the Magnum 10KT-Series Switch helps create a database of all the network subnets to easily manage the network. Secure web-based management is also included, with SSL authentication and encryption to keep out even determined trouble-makers.

For a library of actual Application Notes for a variety of Magnum products and industries, see the GarrettCom website at http://www.garrettcom.com/app_notes.htm

Example 2: Magnum 10KT Switch for an Industrial Application

Equipped with lots of heavy duty features including hardened enclosures, a variety of DC power supply options, and extended temperature ratings qualifies the Magnum 10KT Managed switch for any industrial power utility, surveillance and physical security, traffic control, transportation system, mining, or COTS military application. The MNS-6K software features qualifies this managed switch to operate and perform securely and reliably in mission critical applications. The industry-standard RSTP-2004 software features allow this managed switch to provide a highly available redundant network capability in any ring or mesh topology network.

The option of setting the ports at 10, 100 or 1000Mb on copper and 100 or 1000Mb on fiber media provide widespread options to the users to mix and match their legacy and advanced network needs.. Different industrial locations can be easily connected together with the fiber ports supported by the Magnum 10KT Switch. A main data center in a secure area protected from earthquake or fire hazards can be connected to the Gigabit Copper or Fiber ports.

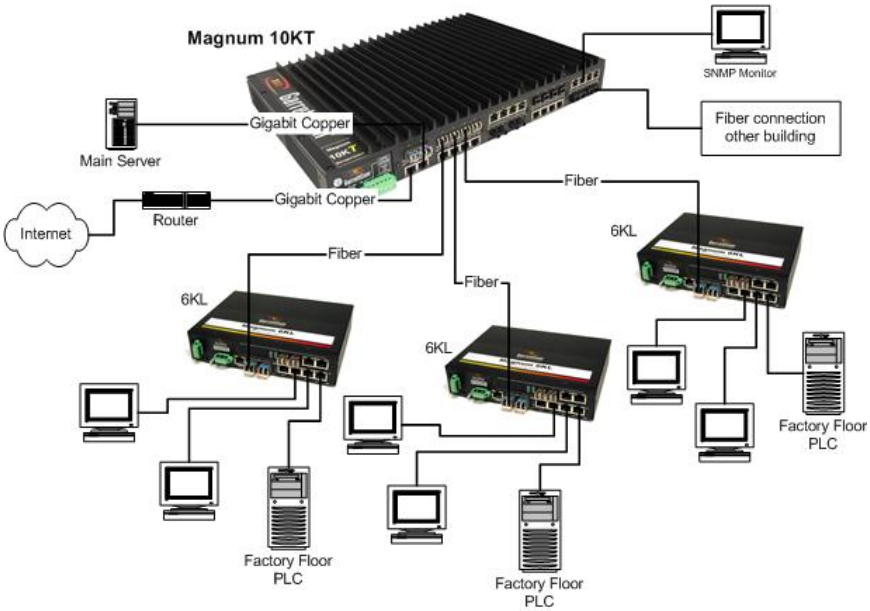


Fig 2.5a A industrial network application with Magnum 10KT

Extended temperature ratings and a variety of choices for AC/DC power supplies qualify this managed 10KT switch for use in non-temperature-controlled networks and many other temperature sensitive critical industrial applications where above normal temperatures occur while the network is in operation. The SNMP management capability of the Magnum 10KT Switch helps create a database of all the network subnets to easily manage the network.

Example 3: A managed network is needed to provide a redundant ring topology for maximum reliability. In a network where any faulty cable, cable disconnection or power failure could bring the whole thing down, a ring topology can be configured to provide for continued network operation and recovery from a fault condition.. The ring topology of the network may consist of high speed LAN segments supported by 100Mbps fiber media to provide a secure long distance LAN connection. The entire redundant network may utilize higher bandwidth Gigabit up-links to a central operations center for the vital database located in a separate secured building. The network will be manageable to provide easy, detectable, uninterrupted support through a viewable SNMP monitor.

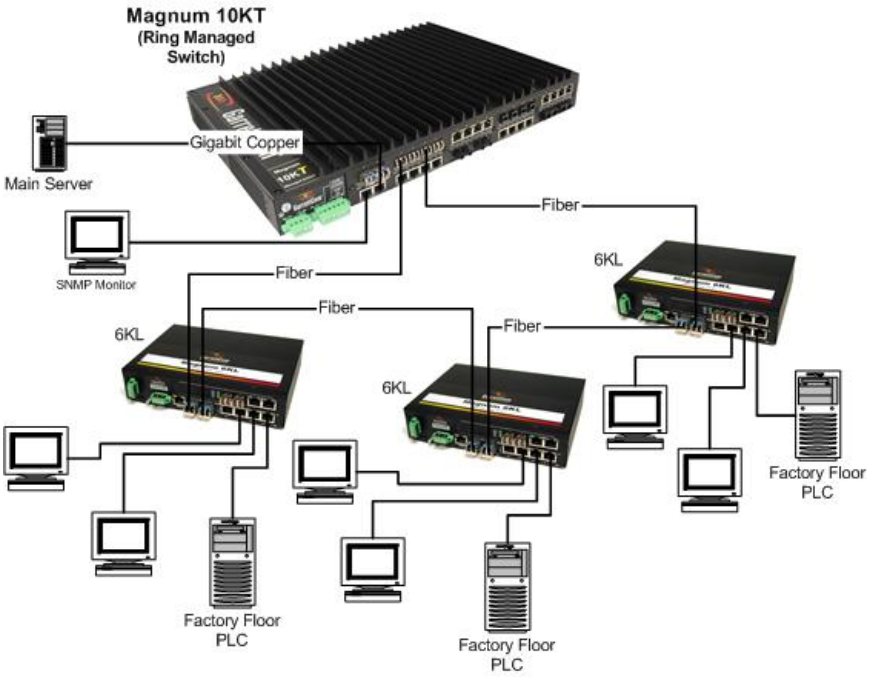


Fig 2.5b Magnum 10KT equipped with RSTP-2004 in a redundant ring solution

The 10KT Managed Switch with RSTP-2004 fault recovery fulfills the redundancy requirements for reliable industrial networks with fast reconfiguration time (typically 20 to 40 milliseconds) for cable breaks or similar network faults when set up in a ring topology. The Gigabit ports option boosts the bandwidth for high speed to support high traffic loads and minimize congestion.

For a library of actual Application Notes for a variety of Magnum products and industries, see the GarrettCom website at http://www.garrettcom.com/app_notes.htm

3.0 INSTALLATION

Before installing the equipment, it is necessary to take the following precautions:

1.) If the equipment is mounted in an enclosed or multiple rack assembly, the steady-state long-term environmental temperature around the equipment must be less than or equal to 60^{0}C.

2.) If the equipment is mounted in an enclosed or multiple rack assembly, adequate airflow must be maintained for proper and safe operation.

3.) If the equipment is mounted in an enclosed or multiple rack system, placement of the equipment must not overload or load unevenly the rack system.

4.) If the equipment is mounted in an enclosed or multiple rack assembly, verify the equipment's power requirements to prevent overloading of the building/s electrical circuits.

5.) If the equipment is mounted in an enclosed or multiple rack assembly, verify that the equipment has a reliable and uncompromised earthing path.

This section describes installation of the Magnum 10KT Switches, as well as connection of the various Ethernet media types.

3.1 Locating Magnum 10KT Switches

For Rack-mounting, see Section 3.3

For DC power input data, see Appendix B.

The rugged metal case of the Magnum 10KT will normally protect it from accidental damage in an industrial lab or workplace setting. Maintain an open view of the front to visually monitor the status LEDs. Keep an open area around the unit so that cooling can occur from convection while the unit is in operation. The standard 10KT has no fans (fans are optional, see KT-RFAN), so it is silent when in operation. Internal electronics use the case as a heat sink, so the unit may normally be quite warm to the touch.

When connecting the Ethernet cabling, there is no need to power down the unit. Individual cable segments can be connected or disconnected without concern for power-related problems or damage to the unit.

3.2 Connecting Ethernet Media

The Magnum 10KT Switches are specifically designed to support standard Ethernet media types within a single switch unit. This is accomplished by supporting all popular fiber and copper port connectors which can be individually selected and configured. (See Section 5.1 for a description of the Port Modules choices, Request a quote if you do not see the ones you want.)

The various media types supported along with the corresponding IEEE 802.3, 802.3D, 802.3u, 802.3AB and 802.3z standards and connector types are as follows:

Media	IEEE Standard	Connector
Twisted Pair (CAT 3 or 5)	10BASE-T	RJ-45
Twisted Pair (CAT 5)	100BASE-TX	RJ-45
Twisted pair (CAT5E or CAT6)	1000BASE-T	RJ-45 and SFP
Fiber (Multimode)	10BASE-FL	ST
Fiber (Multimode)	100BASE-FX	LC, SC, ST, MTRJ
Fiber (Singlemode)	100BASE-FX	LC, SC
Fiber (Multimode)	1000BASE-SX	LC (SFP)
Fiber (Multimode, Singlemode)	1000BASE-LX	LC (SFP)
Fiber (Singlemode)	1000BASE-ZX	LC (SFP)

See http://www.garrettcom.com/techsupport/power_budget.pdf for Power budget calculations, to find fiber cable distance information.

3.2.1 Connecting Twisted Pair (CAT3, CAT5, UTP or STP)

The RJ-45 ports of the Magnum 10KT can be connected to the following two media types: 100BASE-TX and 10BASE-T. CAT 5 cables should be used when making 100BASE-TX connections. When the ports are used as 10BASE-T ports, CAT 3 may be used. In either case, the maximum distance for unshielded twisted pair cabling is 100 meters (328 ft).

NOTE : *It is recommended that high quality CAT. 5 cable be used whenever possible in order to provide flexibility in a mixed-speed network, since 10/100 copper switched ports are auto-sensing for either 10 and 100Mb/s.*

The following procedure describes how to connect a 10BASE-T or 100BASE-TX twisted pair segment to the RJ-45 port. The procedure is the same for both unshielded and shielded twisted pair cables.

1. Using standard twisted pair media, insert either end of the cable with an RJ-45 plug into the RJ-45 connector of the port. Note that, even though the connector is shielded, either unshielded or shielded cables and wiring may be used.
2. Connect the other end of the cable to the corresponding device
3. Use the LINK LED to ensure proper connectivity by noting that the LED will be illuminated when the unit is powered and proper connection is established.

NOTE: for Power Substations: In support of the IEEE 1613 Class 2 standard, GCI advises that, for substation applications, the RJ-45 ports are intended for connectivity to other communication equipment such as routers or telecommunication multiplexers installed in close proximity (i.e., less than 2 meters or 6.5ft) to the 10KT. It is not recommended to use these ports in substation applications to interface to field devices across distances which could produce high (greater than 2500V) levels of ground potential rise (GPR) during line-to-ground fault conditions. The 10KT passes the 1613 specifications for zero packet loss with fiber ports & with RJ-45 ports used as indicated here.

3.2.2 Connecting Twisted Pair (CAT5e or better, UTP or STP)

The RJ-45 Gigabit ports (Slots A & B) of the Magnum 10KT can be connected to the media types, 1000BASE-T or CAT 5E or better 100-ohm UTP or shielded twisted pair (STP) balanced cable. The CAT 5E or better 100-ohm UTP or shielded twisted pair (STP) balanced cable is recommended to use when making 1000BASE-TX connections. In either case, the max distance for unshielded twisted pair cabling is 100 meters (328 ft).

The following procedure describes how to connect a 1000BASE-T twisted pair segment to the RJ-45 port. The procedure is the same for both unshielded and shielded twisted pair cables.

1. 1000BASE-T connections require that all four pairs or wires be connected. Insert either end of the cable with an RJ-45 plug into the RJ-45 connector of the port. Note that, even though the connector is shielded, either unshielded or shielded cables and wiring may be used.
2. Connect the other end of the cable to the corresponding device
3. Use the LINK LED to ensure proper connectivity by noting that the LED will be illuminated when the unit is powered and proper connection is established

LASER WARNING: DO NOT LOOK INTO A FIBER OPTIC CABLE OR PORT! These can produce invisible light that may do serious eye damage. Always assume that fiber optic cables or ports are actively radiating light energy.

3.2.3 Connecting Singlemode Fiber Optic

When using singlemode fiber cable, be sure to use singlemode fiber port connectors. Singlemode fiber cable has a smaller diameter than multimode fiber cable (9/125 microns for singlemode, 50/125 or 62.5/125 microns for multimode where xx/xx are the diameters of the core and the core plus the cladding respectively). Singlemode fiber allows full bandwidth at longer distances, about 70km with the singlemode LC.

3.2.4 SFP (Small Form-factor Pluggable) Transceivers

The small form-factor pluggable (SFP) is a compact optical transceiver used in optical communications for both telecommunication and data communications applications. Due to its compact, hot pluggable characteristics, SFPs are becoming a very popular choice for various applications. The Magnum 10KT is designed for industry-standard SFPs for user selection of the SFP media type as desired.

All SFPs used in the Magnum 10KT are compliant with the industry standard Multi-Source Agreement (MSA) ensuring compatibility with a wide range of networking kit.

(see Section 1.2 for the SFP's available for the 10KT)

Note: It is highly recommended to remove the fiber cable first before removing the SFP transceiver for any reason. Not removing the fiber cable first can damage the fiber cable, cable connector or optical interfaces. It is advised not to remove and insert a SFP transceiver frequently as this may shorten its useful life.

Note: Always use an ESD wrist strap while handling the SFP transceivers since the SFP modules are static sensitive devices.

Note: The copper 1000BASE-T SFP transceiver port supports 1000Mb only. It is recommended to use a straight-through RJ-45(4-twisted pair) connection while connecting to any Server/workstation. While connecting with any Switch/repeater or other device, it is recommended to use Crossover RJ-45 (4-twisted pair) category 5 or higher cabling. The maximum length supported on copper 1000BASE-T is 100m (328 ft.).

3.2.5 Connecting Fiber Optic Cable to SFP Transceivers

1. Before connecting the fiber optic cable, remove the protective dust caps from the module connectors. 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. Find the Transmit (TX) and Receive (RX) markings on the SFP transceiver to verify the top side of it. Some of the transceivers show a arrow mark for up.

4. Position the SFP transceiver correctly before insertion, and then insert the SFP transceiver carefully, until the transceiver connector snap into the place in the socket connector.

5. Connect the Transmit (TX) port on the Magnum module to the Receive (RX) port of the remote device. Connect the Receive (RX) port on the module to the Transmit (TX) port of the remote device.

The LINK LED on the front of the module will illuminate and turn Green, when a proper connection has been established at both ends (and when power is ON in the unit). If LINK is not lit or OFF after cable connection, the normal cause is improper cable polarity. Swap the fiber cables at the module connector and also check the connectivity on the target device to remedy this situation.

Reconfigure or reboot both of the devices if required.

If connected properly, you can check via (MNS-6K) software for verifying the validity of SFP ports.

3.3 Table-Top or Shelf Mounting

The Magnum 10KT Series Managed Switches can be easily mounted on a table-top or any suitable horizontal surface. They have four rubber feet to provide stability without scratching finished surfaces.

3.3.1 Rack-mounting options

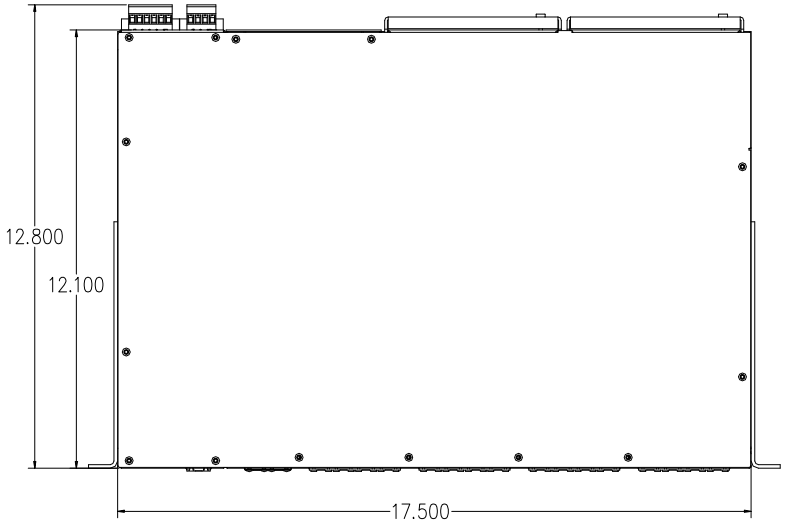
Installation of the Magnum 10KT Switch in a 19" rack is a simple procedure. The units are 1.5U (2.63") high for Thermal fin version and 1U (1.74") high for non-Thermal fin version. When properly installed, the front-mounted LED status indicators should be in plain view and easy to read.

Rack-mount installation requires special 19" front mount rack brackets and screws (included with each Magnum 10KT unit). These brackets attach to the each side of the Switch (specifically designed left and right side brackets), which is then typically fastened into a standard 19" RETMA rack.

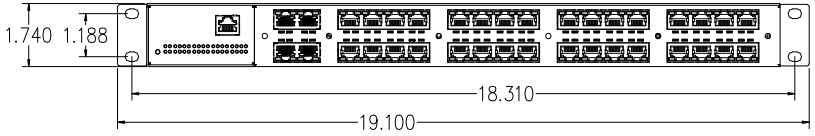
Optional Rear mount rack brackets are available for added security and/or vibration protection. Available for Thermal finned and non-Thermal finned chassis. Inquire with your Sales representative for additional information.

3.3.2 Rack-mounting, Reverse mount option

The optional Reverse Magnum 10KTR Model has all of the cabling (Ethernet cabling, power cabling) connectors in the rear, and the status LEDs and Console port in the front. The status LEDs that are co-incident with the ports are still present and a second or dual set of LEDs are used for status visibility in the front of the unit, showing the same data.



model without Thermal Fin cover



model with Thermal Fin cover

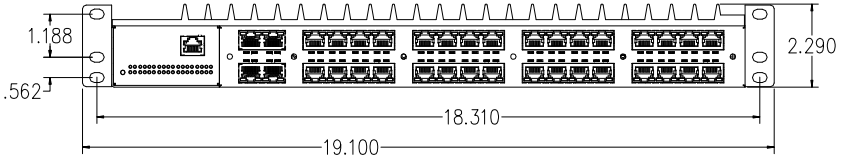
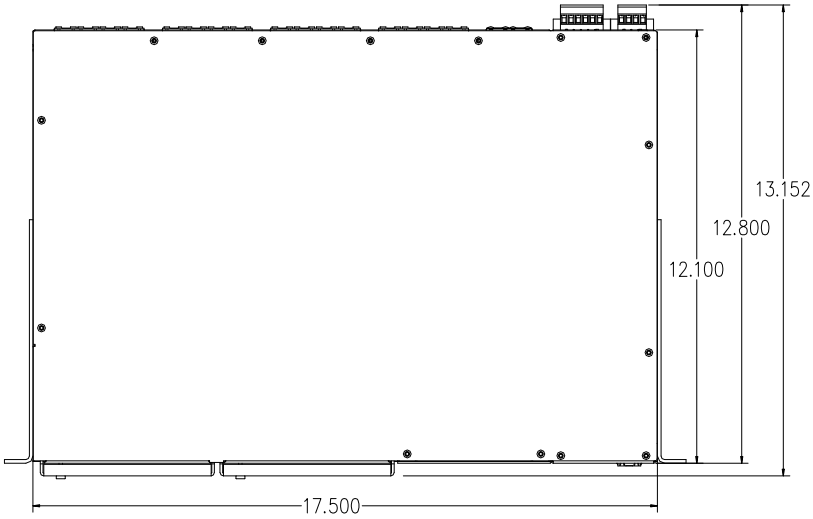
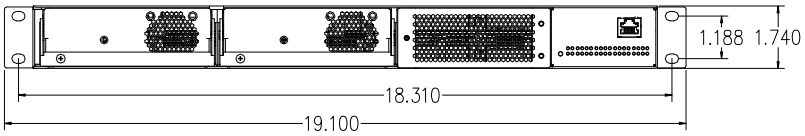


Fig 3.3a 10KT Front mount dimensions



model without Thermal Fin cover



model with Thermal Fin cover

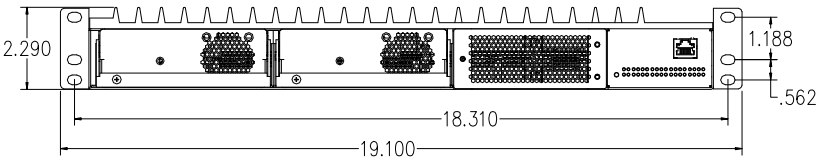


Fig 3.3b 10KT Reverse mount dimensions

3.4 Powering the Magnum 10KT Managed Switch

The Magnum 10KT Switch is available with the choice of Dual Hot-Swappable power supplies, single fixed (non Hot-Swappable) and Dual Fixed internal power supplies.

The Hot-Swappable power supplies are available with 90-250V AC/DC and 24/48V DC power inputs. They are normally used as matching pairs.

The fixed internal power supply supports installation environments where the voltage is from 22 to 250VDC and universal AC depending on the model select.

The power consumption for DC models is 55 watts with the unit loaded with 4 Gb ports, 16 100Mb fiber ports and 16 10/100Mb copper ports. The AC model consumes 30 watts typical with 32 fully loaded copper ports, and 60 watts typical with 32 fully loaded fiber ports. The fan-cooling option is required with fully-loaded fiber ports.

When connecting the Ethernet cabling, there is no need to power down the unit. Individual cable segments can be connected or disconnected without concern for power-related problems or damage to the unit.
(see Section 1.2, for Ordering Information)

3.4.1 Power Input connection

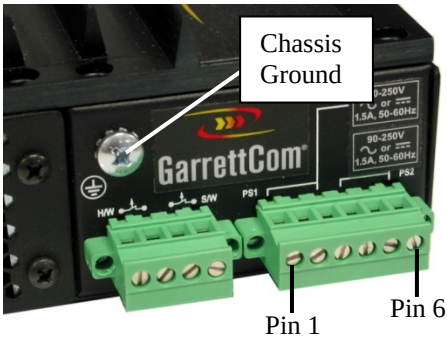


Fig 3.4.1a AC/DC power input

PS1 (Power Supply 1)
- Pin 1: - (Negative)/N
- Pin 2: + (Positive)/L
- Pin 3: Ground

PS2 (Power Supply 2)
- Pin 4: Ground
- Pin 5: - (Negative)/N
- Pin 6: + (Positive)/L

Fig 3.4.1b AC power input
Connection made via IEC 320/C14 3-prong male connector

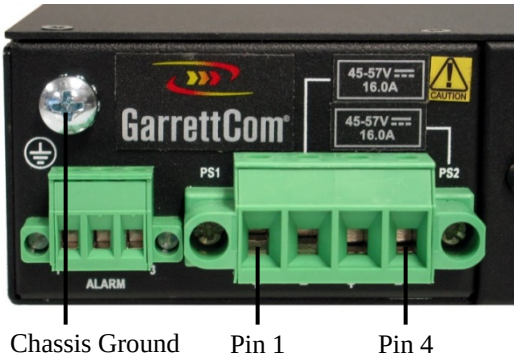


Fig 3.4.1c PoE power input

PS1 (Power Supply 1)
Pin 1: + (Positive)/L
Pin 2: - (Negative)/N
Chassis Ground
PS2 (Power Supply 2)
Pin 3: + (Positive)/L
Pin 4: - (Negative)/N
Chassis Ground

3.5 Alarm Contacts for monitoring internal power and Software Traps

The Alarm Contacts feature, standard on the Magnum 10KT, provides two Form C Normally Closed (NC) contacts to which the user can attach two sets of status monitoring wires at the Alarms terminal block, see Fig 3.5a below.

The first NC Alarm Contact is a "Software Alarm" (labeled S/W), operated by user settings in the MNS-6K software. The user can disable the Software Alarm feature with a software configuration command if desired. When the Software Alarm is enabled, the Form C Normally Closed (NC) contact is held close during normal software operation. A user-defined software malfunction, such as an SNMP Trap or a Software Security violation or an RSTP Fault, causes the contact to open and thus triggers an alarm in the user's monitoring system.

The second NC Alarm Contact is held closed when there is power on the main board inside of the Switch. This provides a "Hardware Alarm" (labeled H/W) because the NC contacts will open when internal power is lost, either from an external power down condition or (if not a Hot-Swappable Power Supplies switch unit) by the failure of the power supply inside of the Magnum Switch.

Useful information about the Alarm contacts:

1. There are four terminal contacts (1,2,3,4) provided next to the power input.
2. The left two pins (1,2) are hardware controlled.
3. The right two pins (3,4) are software controlled.
4. These are both NC (normally closed) relays.
5. The switch's software operation needs to be enabled and set to get the Alarm traps. For detailed information about the Software Alarm and software control of SNMP alarm traps, please reference the Magnum MNS-6K Software User Manual.

The Alarm Contacts are located to the left of the power input connection of the Magnum 10KT unit and are green in color as shown in the picture.

Alarm contact ratings (resistive): 220 VDC / 0.27A - 60W
250VAC / 0.25A - 62.5VA
30VDC / 2A - 60W

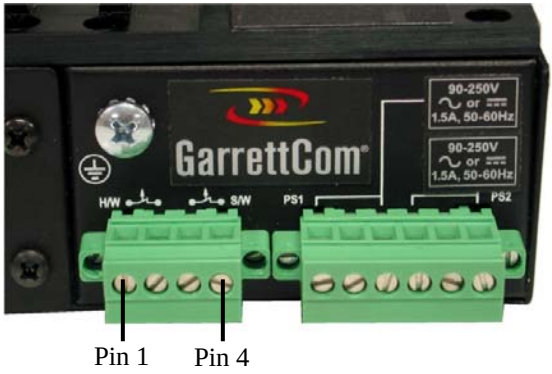


Fig 3.5a Alarm Contacts:
(1,2) hardware controlled
(3,4) software controlled

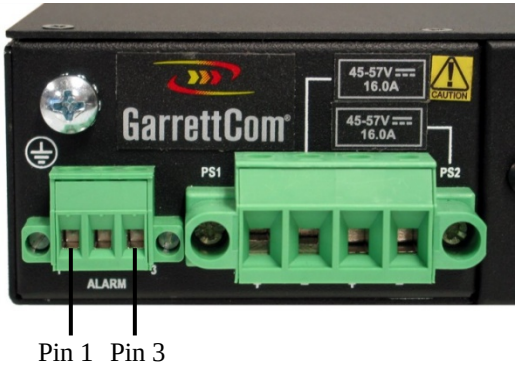


Fig 3.5b PoE Alarm Contacts: (software controlled)
(1) NO (normally open)
(2) Common
(3) NC (normally closed)

3.6 Connecting the Console Terminal to Magnum 10KT

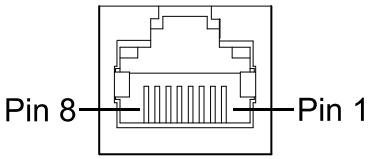
Use a (RJ45) "null modem" cable to connect the Magnum 10KT Console Port (the RJ45 Console port on the 10KT Switch) to your PC, so that your PC becomes the 10KT Console Terminal.

Note: The RJ45 null modem cable is not included with the 10KT package, but two models are available for purchase. Model CONSOLE-CBLQD has a DB-9 on the PC end, while Model CONSOLE-USB has a USB connector on the computer end.

Note: For a detailed description of Managed Network Software (MNS-6K) and Magnum 10KT Switch software configuration for Network Management, please refer to Magnum 6K Software Manual available on GarrettCom's FTP site.

Also available on GarrettCom's website at:
http://www.garrettcom.com/techsupport/sw_downloads.htm

3.6.1 RJ45 Console port (Serial port) pin assignments



RJ45 (10KT Console port connector)

Pin	Signal	Description
1	RTS	Request to Send
2	open	not used
3	TXD	Transmit Data (output)
4	GND	Ground
5	open	not used
6	RXD	Receive Data (input)
7	open	not used
8	CTS	Clear to Send

The above provided information enables a managed station (a PC or a Console terminal) to connect directly to the switch.

Note: To use the Console port to configure the managed switch, a serial (Null-modem)

male to male cable is required to communicate properly. The Null-Modem (RJ45) cable is optional and can be ordered from the factory, along with the unit as-
CONSOLE-CBLQD for serial port
CONSOLE-CBLQU for USB port

NOTE for Power Substations: *In support of the IEEE 1613 Class 2 standard, GCI advises that, for substation applications, the serial (RJ45) console ports are intended for temporary connectivity to other equipment such as PCs. Since the console port connection is temporary, it is excluded from IEEE 1613 packet-loss testing per the 1613 standard-defined test procedure.*

4.0 OPERATION

This chapter describes the functions and operation of the Magnum 10KT Switch.

4.1 Switching Functionality

A Magnum 10KT provides switched connectivity at Ethernet wire-speed among all of its ports. The Magnum 10KT supports10/100/1000Mbs for copper media and 100/1000Mbs separate traffic domains for fiber ports to maximize bandwidth utilization and network performance. All ports can communicate to all other ports in a Magnum 10KT, but local traffic on a port will not consume any of the bandwidth on any other port.

The Magnum 10KT units are plug-and-play devices. There is no software configuring necessary to be done for basic operation at installation or for maintenance. There is an optional Half / Full duplex mode and 10Mbps or 100Mbps selection for the switched ports which must be configured through MNS-6K management software per unit as per the requirement. The internal functions of both are described below.

Filtering and Forwarding

Each time a packet arrives on one of the switched ports, the decision is taken to either filter or to forward the packet. Packets whose source and destination addresses are on the same port segment will be filtered, constraining them to that one port and relieving the rest of the network from having to process them. A packet whose destination address is on another port segment will be forwarded to the appropriate port, and will not be sent to the other ports where it is not needed. Traffic needed for maintaining the un-interrupted operation of the network (such as occasional multi-cast packets) is forwarded to all ports.

The Magnum 10KT Switch operates in the store-and-forward switching mode, which eliminates bad packets and enables peak performance to be achieved when there is heavy traffic on the network.

Address Learning

All Magnum 10KT units have address table capacities of 8K node addresses suitable for use in larger networks. They are self-learning, so as nodes are added, removed or moved from one segment to another, the 10KT Switch automatically keeps up with node locations.

An address-aging algorithm causes least-used addresses to fall out in favor for frequently-used addresses. To reset the address buffer, cycle power down-and-up.

4.2 Auto-Cross (MDIX) and Auto-negotiation, for RJ-45 ports

The RJ-45 ports independently support auto-cross (MDI or MDIX) in auto-negotiation mode and will work properly with all the other connected devices with RJ-45 ports whether they support Auto-negotiation (e.g 10Mb Hub, media converter) or fixed mode at 10Mb or 100Mb Half/Full Duplex(managed switch) or not. No cross-over cable is required while using the 10KT's copper port to other devices. Operation is according to the IEEE 802.3u standard.

The Managed 10KT's Fast Ethernet copper ports can be set for either fixed 100Mb speed or for 10/100 F/H N-way auto-negotiation per the IEEE802.3u standard. The selection is made via MNS software. The factory default setting is for auto-negotiation. At 10Mb or 100Mb-fixed speed, the user may select half- or full-duplex mode by MNS Software for each RJ-45 port separately. For detail information **See Section 2.3 of this manual for information to access the "6K-MNS Software user guide"**

One frequently-used application for the Managed Magnum 10KT Switch copper ports is to connect one of them using a fiber media converter to another Switch in the network backbone, or to some other remote 100Mb device. In this case, it is desirable to operate the fiber link at 100Mb speed, and at either half- or full duplex mode depending on the capabilities of the remote device. Standard commercially available Fast Ethernet media converters mostly do not support auto-negotiation properly, and require that the switched port to which they are connected be at the 100Mb fixed speed. Attachments to a 10/100 auto-negotiation port typically will not work properly. The 10KT Switch's RJ-45 ports handle this situation by configuring the ports as per desired through MNS software port settings and can check the port status of each port after the change.

When Magnum 10KT RJ-45 copper ports are set for auto-negotiation and are connected to another auto-negotiating device, there are 4 different speed and F/H modes possible depending on what the other device supports. These are: (1) 100Mb full-duplex, (2) 100Mb half-duplex, (3) 10 Mb full-duplex and (4) 10 Mb half-duplex. The auto-negotiation logic will attempt to operate in descending order and will normally arrive at the highest order mode that both devices can support at that time. (Since auto-negotiation is potentially an externally controlled process, the original "highest order mode" result can change at any time depending on network changes that may occur). If the device at the other end is not an auto-negotiating device, the 10KT's RJ-45 ports will try to detect its idle signal to determine 10 or 100 speed, and will default to half-duplex at that speed per the IEEE standard.

General information -

Auto-negotiation per-port for 802.3u-compliant switches occurs when:

-- the devices at both ends of the cable are capable of operation at either 10Mb or 100Mb speed and/or in full- or half-duplex mode, and can send/receive auto-negotiation pulses, and . . .

-- the second of the two connected devices is powered up*, i.e., when LINK is established for a port, or

-- the LINK is re-established on a port after being lost temporarily.

- **NOTE** – ***Some NIC cards only auto-negotiate when the computer system that they are part of is powered up. These are exceptions to the "negotiate at LINK – enabled" rule above, but may be occasionally encountered.***

When operating in 100Mb half-duplex mode, cable distances and hop-counts may be limited within that collision domain. The Path Delay Value (PDV) bit-times must account for all devices and cable lengths within that domain. For Magnum 10KT Fast Ethernet switched ports operating at 100Mb half-duplex, the bit time delay is 50BT.

4.3 Flow-control, IEEE 802.3x standard

Magnum 10KT Switches incorporate a flow-control mechanism for Full-Duplex mode. The purpose of flow-control is to reduce the risk of data loss if a long burst of activity causes the switch to save frames until its buffer memory is full. This is most likely to occur when data is moving from a 100Mb port to a 10 Mb port and the 10Mb port is unable to keep up. It can also occur when multiple 100Mb ports are attempting to transmit to one 100Mb port, and in other protracted heavy traffic situations.

Magnum 10KT Switches implement the 802.3x flow control (non-blocking) on Full-Duplex ports, which provides for a "PAUSE" packet to be transmitted to the sender when the packet buffer is nearly filled and there is danger of lost packets. The transmitting device is commanded to stop transmitting into the 10KT Switch port for sufficient time to let the Switch reduce the buffer space used. When the available free-buffer queue increases, the Switch will send a "RESUME" packet to tell the transmitter to start sending the packets. Of course, the transmitting device must also support the 802.3x flow control standard in order to communicate properly during normal operation.

Note: When in Half-Duplex mode, the 10KT Switch implements a back-pressure algorithm on 10/100 Mb ports for flow control. That is, the switch prevents frames from entering the device by forcing a collision indication on the half-duplex ports that are receiving. This temporary "collision" delay allows the available buffer space to improve as the switch catches up with the traffic flow.

4.4 Power Budget Calculations for 10KT Modules with Fiber Media

Receiver Sensitivity and Transmitter Power are the parameters necessary to compute the power budget. To calculate the power budget of different fiber media installations using Magnum products, 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 (Multimode) is 3.3 dB/km,
and the "Cable Loss" for 9/125 (Singlemode) is 0.5 dB/km
and the "Cable Loss" for 9/125 (Singlemode) is 0.4 dB/km (LX25)
and the "Cable Loss" for 9/125 (Singlemode) is 0.25 dB/km (ZX40)
and the "Cable Loss" for 9/125 (Singlemode) is 0.2 dB/km (ZX70)

See http://www.garrettcom.com/techsupport/power_budget.pdf for more information on Power budget calculations

5.0 MAGNUM 10KT MANAGED SWITCH PORT MODULES

This chapter describes each Port Module, including appearance, functionality, and status displays.

5.1 10KT Modules

An important feature of the Magnum 10KT is the use of Port Modules for flexible mixed-media connectivity to RJ-45 copper and various fiber media. The first two slots (A & B) of the Magnum 10KT Switch are fixed RJ-45 auto-negotiating copper ports or SFP (Small Form Pluggable) fiber ports with 1000Mbps capability. Additionally, the switch can accept up to eight additional Port Modules in slots C-J to provide the user with up to 32 additional ports providing a wide selection of Ethernet copper and fiber media connections with 10 and 100Mbps capability.

Note: The 10KT Port Modules are not identical to the port modules used in other GarrettCom 6K switch products. For information about other GarrettCom products, please see the applicable product manual. For a list of 10KT Port Modules, refer to Section 1.2

Each 10KT Port Module is individually described in the following section.

5.1.1 10KT Module LED designations

All ports have the following LED designations:

L/A = Link / Activity
Off (No Link established)
ON (Link established)
BLINKING (Link Activity)

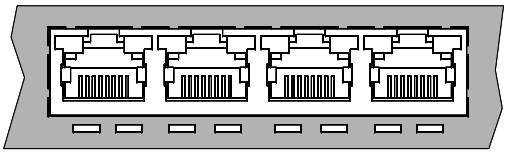
F/H = Full Duplex / Half Duplex (for Copper ports)
ON (Full Duplex)
OFF (Half Duplex) for Copper port

LED panel:

Link indicator
(Illuminated when Link is established to that port)

Power Indicator
(Illuminated when power is supplied to the internal switch)

5.1.2 10K4-RJ45, four 10/100Mb RJ45 ports (use in Slots C-J)



The 10K4-RJ45 four-port copper module provides four 10/100Mb switched RJ-45 ports. The 10/100Mb switched ports normally (as a default setting) are independently N-way auto-negotiating and auto-crossover (MDIX) for operation at 10 or 100Mb speed in full- or half-duplex mode. (i.e., each independently selects a mode and speed to match the device at the other end of the twisted pair cable).

(for auto-negotiation and MDIX details, see Section 4.2 in this User Guide)

There are two LEDs per RJ-45 port on the module; one for Link/Activity and one for F/H Duplex. For the 10K4-RJ45 LED designations, see Section 5.1.1.

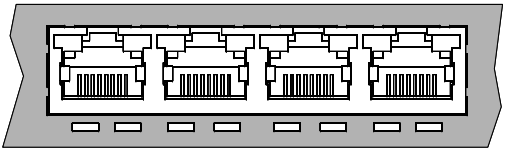
A twisted pair cable must be connected into an RJ-45 port and the Link (L/A) indicator for that port must be ON (indicating there is a powered-up device at the other end of the cable) in order for the L/A LED to provide valid indications of operating conditions on that port.

Using the 10KT management software (MNS-6K or MNS-6K-SECURE), the user may disable auto-negotiation and fix the desired operation of each RJ-45 port. The user may select 10Mb or 100Mb speed and full- or half-duplex mode per-port as required. (See the Magnum MNS-6K Software Manual for additional info)

A module similar to Model 10K4-RJ45 is also available with IEEE 1588v2 Timing Synchronization as Model # **10K4T-RJ45**.

NOTE: <u>for Power Substations</u>: *<u>In support of the IEEE 1613 Class 2 standard, GCI advises that, for substation applications, the RJ-45 ports are intended for connectivity to other communication equipment such as routers or telecommunication multiplexers installed in close proximity (i.e., less than 2 meters or 6.5ft) to the 10KT. It is not recommended to use these ports in substation applications to interface to field devices across distances which could produce high (greater than 2500V) levels of ground potential rise (GPR) during line-to-ground fault conditions. The 10KT passes the 1613 specifications for zero packet loss with fiber ports and with RJ-45 ports used as indicated here.</u>*

5.1.3 10K4P-RJ45, four 10/100Mb PoE RJ45 ports (use in Slots C-J)



The 10K4P-RJ45 four-port copper module provides four 10/100Mb switched RJ-45 ports with PoE 802.3af support. The 10/100Mb switched ports normally (as a default setting) are independently N-way auto-negotiating and auto-crossover (MDIX) for operation at 10 or 100Mb speed in full- or half-duplex mode. (i.e., each independently selects a mode and speed to match the device at the other end of the twisted pair cable).

(for auto-negotiation and MDIX details, see Section 4.2 in this User Guide)

The PoE 802.3af support on the four RJ45 ports provide 15.4 Watts per port output when used in conjunction with the 10KTP chassis.

There are two LEDs per RJ-45 port on the module; one for Link/Activity and one for F/H Duplex. For the 10K4-RJ45 LED designations, see Section 5.1.1.

A twisted pair cable must be connected into an RJ-45 port and the Link (L/A) indicator for that port must be ON (indicating there is a powered-up device at the other end of the cable) in order for the L/A LED to provide valid indications of operating conditions on that port.

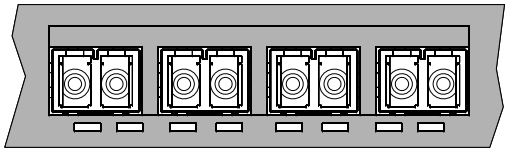
Using the 10KT management software (MNS-6K or MNS-6K-SECURE), the user may disable auto-negotiation and fix the desired operation of each RJ-45 port. The user may select 10Mb or 100Mb speed and full- or half-duplex mode per-port as required. (See the Magnum MNS-6K Software Manual for additional info)

5.1.4 10K4PX-RJ45, four 10/100Mb PoE+ RJ45 ports (use in Slots C-J)

A module similar to Model 10K4P-RJ45 is also available with PoE+ 802.3at support that provides 25 Watts per port output when used in conjunction with the 10KTP chassis.

NOTE: Only a maximum of 16 (4x 10K4PX-RJ45) PoE+ ports can be supported per 10KTP chassis.

5.1.5 10K4-MLC, four Multimode LC (use in Slots C-J)



The 10K4-MLC four-port fiber module provides four 100Mb Multimode LC Fiber ports.

The 10K4-MLC fiber ports are Small Form Factor (SFF) LC Multimode connectors used primarily in 100Mbps fiber-to-IED links in industrial applications. When installed in a Magnum 10KT Series Switch, it supports fiber optic cable distances up to the IEEE-standard 100Mbps distance limits, i.e., typically 2km at full-duplex and 412m at half-duplex.

The compact size of the LC Connector reduces the size of wiring panels in wiring closets while providing the advantage of "future-proof" fiber optic technology.

The cable end is a "plug-in" connector with both fiber strands terminated in one housing that cannot be improperly inserted. Each port has a Link/Activity (L/A) LED indicating proper connectivity (Link) with the remote device when lit and blinking (Activity), indicating packets being received.

A module similar to Model **10K4-MLC** is also available with IEEE 1588v2 Timing Synchronization as Model # **10K4T-MLC**.

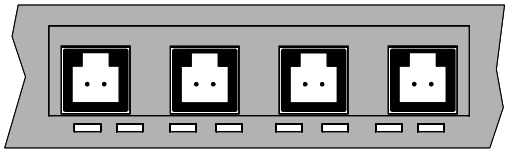
5.1.6 10K4-SLC, 10K4-SLCL, four Singlemode LC (use in Slots C-J)

The 10K4-SLC 4-port Fiber module provides four 100Mb Singlemode LC Fiber ports, supporting distances up to 20km. This module provides the same functions as the Multimode version (see Section 5.1.3 for more details).

The 10K4-SLCL 4-port Fiber module provides four 100Mb Singlemode LC (Long Reach) Fiber ports, supporting distances up to 40km. This module provides the same functions as the Multimode version (see Section 5.1.3 for more details).

Modules similar to Models **10K4-SLC and 10K4-SLCL** are also available with IEEE 1588v2 Timing Synchronization as Model #'s **10K4T-SLC and 10K4T-SLCL.**

5.1.7 10K4-MTRJ, four Multimode MTRJ (use in Slots C-J)



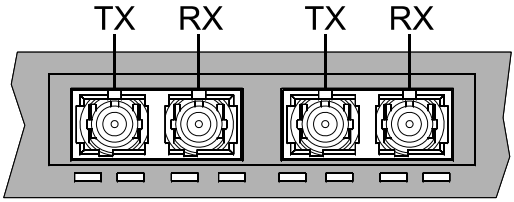
The 10K4-MTRJ four-port fiber module provides four 100Mb Multimode MTRJ Fiber ports.

The 10K4-MTRJ fiber port is a Small Form Factor (SFF) MTRJ Multimode connector. The MTRJ's small size and ease of connection make it a good choice for 100Mbps "fiber-to-the-desktop" Ethernet connectivity. When installed in a Magnum 10KT Series Switch, it supports fiber optic cable distances up to the IEEE-standard 100Mbps distance limits, i.e., typically 2km at full-duplex and 412m at half-duplex.

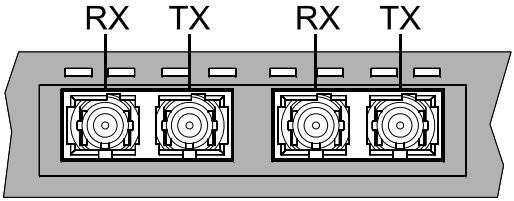
The cable end is a "plug-in" connector with both fiber strands terminated in one housing that cannot be improperly inserted. Each port has a Link/Activity (L/A) LED indicating proper connectivity (Link) with the remote device when lit and blinking (Activity), indicating packets being received.

A module similar to Model **10K4-MTRJ** is also available with IEEE 1588v2 Timing Synchronization as Model # **10K4T-MTRJ**.

5.1.8 10K2-MSC, 10K2-MST (use in Slots C-J)
Two SC Multimode or two ST Multimode



Upper Port module (Slots C, E, G, I)



Lower Port module (Slots D, F, H, J)

The 10K2-MSC (shown) two-port fiber module provides two 100Mb Multimode SC Fiber ports. This option utilizes a SC-type "push-pull" fiber optic connection.

The 10K2-MST two-port fiber module provides two 100Mb Multimode ST Fiber ports. This option utilizes a ST-type "twist-lock" fiber optic connection.

The 100Mb Multimode SC and ST ports typically support fiber optic cable distances up to the IEEE standard 100Mbps distance limits, typically 2km at full-duplex.

Each port has a Link/Activity (L/A) LED indicating proper connectivity (Link) with the remote device when lit and blinking (Activity), indicating packets being received.

A module similar to Model **10K2-MST** is also available with IEEE 1588v2 Timing Synchronization as Model # **10K2T-MST**.

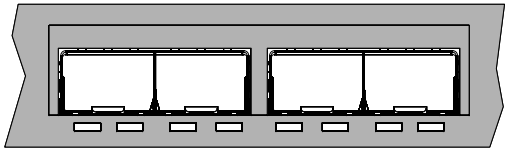
5.1.9 10K2-SSC, 10K2-SSCL (use in Slots C-J) Two SC Singlemode

The 10K2-SSC two-port fiber module provides two 100Mb Singlemode SC Fiber ports, supporting distances up to 20km. This module provides the same functions as the Multimode version (see Section 5.1.6 for more details).

The 10K2-SSCL two-port Fiber module provides two 100Mb Singlemode SC (Long Reach) Fiber ports, supporting distances up to 40km. This module provides the same functions as the Multimode version (see Section 5.1.6 for more details).

A module similar to Model **10K2-SSC** is also available with two SST (Singlemode ST) ports and IEEE 1588v2 Timing Synchronization as Model # **10K2T-SST**.

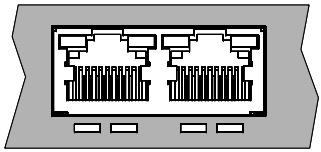
5.1.10 10K4-FXSFP, four open 100Mb SFP slots (use in Slots C-J)



The 10K4-FXSFP four port module provides four 100Mb open SFP ports, supporting distances up to 40km. This module provides the same functions as 10K4-MLC (see Section 5.1.3 for more details).

SFP Transceivers are available with multimode 850nm (550m), 1310nm (2km), singlemode 1310nm (10km and 25km) and singlemode 1550nm (40km and 70km) fiber options, as well as RJ45 copper. (see Sec. 1.2 of this manual for available part numbers)

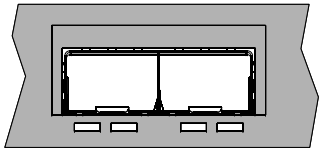
5.1.11 10K2-2GCU, two Gigabit RJ45 (use in Slots A and B only)



The 10K2-2GCU two-port Copper Gigabit Module provides two fixed 10/100/1000Mb RJ45 ports for configuration in slots A and/or B.

There are two LEDs provided for each Gigabit port. Each Copper Gigabit port has LEDs that indicate Link/Activity (L/A) and Full/Half Duplex (F/H).

5.1.12 10K2-2GSFP, two Gigabit SFPs (use in Slots A and B only)



The 10K2-2GSFP two-port Fiber Gigabit module provides two SFP open transceiver ports in slot A and/or B. SFP Transceivers are available with both multimode 850nm (550m), 1310nm (2km), singlemode 1310nm (10km and 25km) and singlemode 1550nm (40km and 70km) fiber options, as well as RJ45 copper. (see Sec. 1.2 of this manual for available part numbers)

The 1000Mb Gigabit SFP fiber-port modules on the Magnum 10KT are normally set (factory default) to operate at AUTO mode for best fiber distance and performance. Each port has a Link/Activity (L/A) LED indicating proper connectivity (Link) with the remote device when lit and blinking (Activity), indicating packets being received.

6.0 TROUBLESHOOTING

All Magnum products are designed to provide reliability and consistently high performance in all industrial network environments. The installation of a Magnum 10KT Switch is a straight forward procedure. The operation is also straightforward and is discussed in Section 4.0 of this User Guide.

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 10KT Switch is not performing as expected, do not attempt to repair the unit; instead contact your supplier for assistance or contact GarrettCom Customer Support.

6.1 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 power is properly attached to each Magnum 10KT Switch unit. 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 10KT Switch product, 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 Magnum 10KT Switch and its associated cables are functioning properly.
5. If the problem continues after completing Step 4 above, contact your supplier of the Magnum 10KT Switch unit or if unknown, contact GarrettCom, Inc. by fax, phone or email (*support@garrettcom.com*) for assistance.

6.2 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.

6.3 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.

6.4 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.

APPENDIX B: DC Power Input

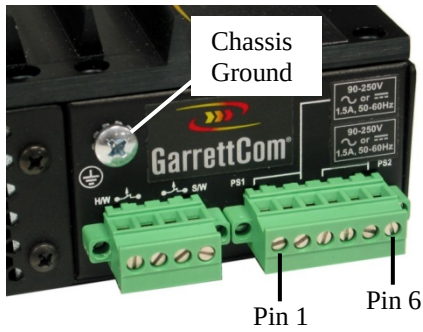
B1.0 Specifications for Magnum 10KT Switches, DC Power at 24/48VDC and 90-250 AC/DC Power input

Each Magnum Model 10KT Managed Switch requires DC power input, at 24/48VDC and 90-250 AC/DC nominal. The wide range of DC power input types qualifies this product for use in 24/48VDC and 90-250 AC/DC applications in different industries.

DC Power Terminals: "+", "**–**" are internally floating so that user may ground either

PS1 (Power Supply 1)
- Pin 1: - (Negative)/N
- Pin 2: + (Positive)/L
- Pin 3: Ground

PS2 (Power Supply 2)
- Pin 4: Ground
- Pin 5: - (Negative)/N
- Pin 6: + (Positive)/L



Chassis Ground: ground wire connection to the 10KT chassis (#10-32 thread)

Power Consumption:

55 watts typical
(fully loaded with 4 Gb ports, 16 100Mb fiber and 16 10/100 copper ports)

(L) 24/48VDC Power Input nominal (range 22 to 60VDC)
(H) AC/DC Power Input nominal (range 90 to 250V)

Standard 10KT DC Power Input Terminal Block : " -, +, GND "

See also Section 1.0, Technical Specifications, for the 10KT base unit.

Note: For PoE supported chassis Power input connections (see section 3.4.1, fig. 3.4.1c)
PoE 802.3af: 48VDC Power Input nominal (range 45 to 57VDC)
PoE+ 802.3at: 48VDC Power Input nominal (range 52 to 56VDC)

B2.0 Applications FOR DC POWERED Ethernet Switches

Magnum 10KT Switches are easily installed in a variety of applications where 24/48VDC and 90-250VDC power is used as the primary power source. The DC power configuration capability provides an Ethernet networking solution utilizing a special power supply in switches with a proven track record.

The 48VDC solution is particularly useful in the telecommunication industry, where it is common for facilities to operate on 48V DC power. Such companies include regular and wireless telephone service providers, Internet Service Providers (ISPs) and other communication companies. In addition, many high availability equipment services, such as broadcasters, publishers, newspaper operations, brokerage firms and other facilities often use a battery backup system to maintain operations in the event of a power failure. It is also frequently used for computer system backup, management and operations monitoring equipment.

The 24V and 90-250VDC options are particularly useful in the industrial environment, where it is common for facilities to operate on 24VDC or 125VDC power. (The 125VDC capability is achieved by purchasing a 10KT single-power-supply AC/DC model, and then using only 125VDC power input.) The 125VDC options are mainly used in power utilities, such as electrical substations, electrical generating plants, etc. The 24VDC applications are mainly in heavy duty industrial automation such as factory floor, mining, process control plants, HVAC, COTS military equipment, etc.

B3.0 10KT, 24/48VDC, 90-250VDC INSTALLATION

This section describes the proper connection of the 24/48VDC, leads to the DC power terminal block on the Magnum 10KT Switch. The DC terminal block on the Magnum 10KT Managed Switch is located on the right rear or left front (Reverse unit) of the unit and is equipped with four (6) screw-down lead posts. The power terminals are identified as positive (+/L) and negative (-/N), and they are electrically floating inside the unit so that either 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 Switch’s power terminals, positive (+/L) and negative (-/N) screws. The use of Ground (GND) connects to the Switch chassis screw provided under the DC terminal. Ensure that each lead is securely tightened.

Note: The GND should be hooked up first. The 10KT unit has a floating ground, so the user may elect to Ground either + or - terminal to suit the customer’s use. Before connecting live power lines to the terminal block, always use a digital voltmeter to measure the output voltage of the power supply and determine the lead which is more “+ve potential”. The more “+ve” voltage lead from a +ve or –ve power supply must be connected to the post labeled “+”.

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

Note: The 10KT unit has a floating ground, so the user may elect to Ground either + or - terminal to suit the customer’s use.

B3.1 UL Requirements for DC-powered units

CAUTION: 48VDC products shall be installed with a readily accessible disconnect device in the building installation supply circuit to the product.

Minimum 18AWG cable for connection to a Centralized DC power source.

1. *Minimum 14AWG cable for connection to an earth wiring.*
2. *Use only with Listed 10A circuit breaker provided in building installation.*
3. *"Complies with FDA radiation performance standards, 21 CFR subchapter J." or equivalent.*
4. *Fastening torque of the lugs on the terminal block: 9 inch-pound max.*
5. *To secure a centralized DC Power Source cable , use at least four cable ties to secure the cable to the rack at least 4 inches apart, with the first one located within 6 inches of the terminal block.*

B4.0 TROUBLESHOOTING

Please refer to Section 6.0 for troubleshooting.

APPENDIX C: Removal / Installation of the Hot-Swap power supply

Tools Required:

1 #1 Phillips head screwdriver

Step 1: Locate the Hot-Swap power supply locking screw. Loosen the locking screw until no longer engaged.

Step 2: Lift the Hot-Swap power supply handle (shown above) to disengage from the 10KT chassis.

Step 3: Slide out the power supply from the chassis. For installation, reverse the order.