TE100-H16R/H24R
16/24 Ports
Fast Ethernet
Stackable Hubs

User's Guide

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FCC Warning

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this user's guide, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE Mark Warning

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

TABLE OF CONTENTS

ABOUT THIS GUIDE

This guide discusses how to install and use the 16/24 port stackable Fast Ethernet Hubs

Conventions

References in this manual to the 16/24 port stackable Fast Ethernet Hubs are frequently written simply as "hub" or "hubs" where the text applies to all models. Model names are normally used only to differentiate between models where necessary.

Unless differentiated by model name, all information applies to all models.

Overview of the User's Guide

♦ Chapter 1, *Introduction.* Provides information on Fast Ethernet networks, and introduces the features of the 16/24 port stackable Fast Ethernet Hubs.

♦ Chapter 2, *Unpacking and Setup.* Helps you get started in setting up the hub.

♦ Chapter 3, *Understanding Indicators.* Describes all LED indicators on the hub's front panel. Understanding these indicators is essential to effectively using the hub.

♦ Chapter 4, *Making Connections.* Provides information on connecting to the hub's twisted-pair, stacking hubs, and linking with other 100BASE-TX hubs.

♦ Appendix A, *Cables and Connectors.* Provides specifications on the cables and connectors used with the hubs.

♦ Appendix B, *Specifications.* Lists the hub's specifications.

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INTRODUCTION

This chapter introduces the 16/24 port stackable Fast Ethernet Hubs, as well as giving some background information about the technology of the hubs use.

Product Description

Ideal for establishing or enlarging a Fast Ethernet LAN work-group, the Stackable Fast Ethernet Hub provides port density options from 16 to 190. The hub is IEEE 802.3u compliant and falls into the Class II Fast Ethernet hub type. The ports on the hub are standard RJ-45 connectors for use with Category 5 UTP or STP cabling.

The hubs in the series, available in 16-port and 24-port models, can be stacked with up to four hubs in a stack. A stack of four 24-port hubs gives a total of 96 Fast Ethernet ports. A 16/24 port stackable Fast Ethernet Hubs stack operates as a Class II Fast Ethernet repeater, allowing it to be linked to another Class II Fast Ethernet stack in the same collision domain.

Product Features

The list below highlights the features and specifications of hubs in the series.

♦ **Compatible with the 802.3u 100BASE-TX, 100BASE-FX Fast Ethernet Class II repeater standards for inter-operability with other Fast Ethernet network devices.**

♦ **Uses Category 5 UTP or STP cabling.**

♦ **Up to 100 Meters of cable length between any computer and the hub with a maximum of 205 meters of cable between any two network nodes.**

♦ **16 or 24 100Mbps Fast Ethernet ports.**

♦ **LED indicators for Power, FX Link/Rx, 100M Activity, 100M Collision and 100M Link/Rx.**

♦ **Scalable stack containing up to 4 units for a total 64 or 96 (depending on model) 100Mbps UTP/STP ports.**

♦ **Uplink port allows easy linking of two Fast Ethernet hub stacks to further expand your network.**

♦ **Standard-size (19", 1U height), rack mountable**

♦ **Optional slide-in module: 100BASE-FX (see Chapter 4 *: Making Connections).***

♦ **Automatic voltage selection (100V to 240V, 50~60Hz)**

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UNPACKING AND SETUP

This chapter provides information on the unpacking and initial installation of your hub stack.

Unpacking

Open the shipping cartons of your hub and carefully unpacks the contents. The carton should contain the following items:

♦ **One Fast Ethernet stackable hub**

♦ **One AC power cord, suitable for your area's electrical power connections**

♦ **One daisy-chain cable**

♦ **Four rubber feet to be used for shock cushioning**

♦ **Screws and two mounting brackets**

♦ **This User's Guide**

Inspect the hub and all accompanying items. If any item is damaged or missing, report the problem immediately to your dealer.

Identifying External Components

This section identifies all the major external components of the hub. Both the front and rear panels are shown, followed by a description of each panel feature. The indicator panel is described in detail in the next chapter.

Front Panel
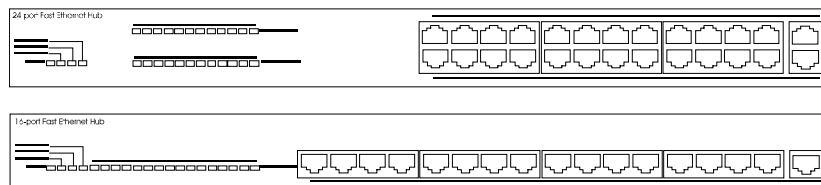
♦ **LED Indicator Panel**

Refer to the next chapter, *Understanding Indicators*, for detailed information about each of the hub's LED indicators.

♦ **Twisted-Pair Ports**

Use any of these ports to connect stations to the hub. The ports are MDI-X ports, which means you can use ordinary straight-through twisted-pair cable to connect the hub to PCs, workstations, or servers through these ports. If you need to connect to another device with MDI-X ports such as another hub or an Ethernet switch, you should use a crossover cable, or connect using the Uplink port (described below). For more information about crossover connection, see the *Crossover Cables* section.

♦ **Uplink Ports**

The Uplink port is an MDI port, which means you can connect the hub (or hub stack) to another device with MDI-X ports us-

ing an ordinary straight-through cable, making a crossover cable unnecessary.

In 24-port model, port 12 and the Uplink-1 port, port 24 and the Uplink-2 is really the same port, except that their pinouts are different. **Do not use both Port 12 and the Uplink-1 port, Port 24 and the Uplink-2 port at the same time.**

In 16-port model, port 16 and the Uplink port, is really the same port, except that their pinouts are different. **Do not use both Port 16 and the Uplink port at the same time.**

Rear Panel
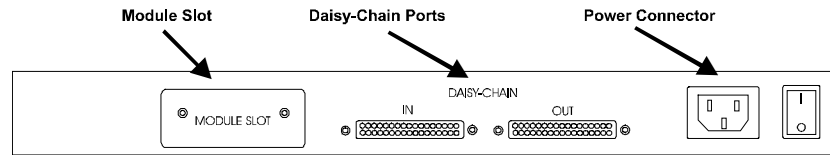
♦ **Module Slots**

Used to install module options for 100BASE-FX connection.

♦ **Daisy-Chain IN Port**

When cascading a set of stackable Fast Ethernet hubs, this port should be connected to the Daisy-Chain OUT port of the previous hub in the stack (usually placed immediately above it). A cascade of four hubs can be created in this way. The first and last hubs in the stack use only one of the daisy-chain ports, while the others use both.

♦ **Daisy-Chain OUT Port**

Works in conjunction with the Daisy-Chain IN Port (see above). Connect this port to the Daisy-Chain IN Port of the next hub in the stack (usually placed immediately below it), using the enclosed daisy-chain cable.

♦ **AC Power Connector**

For the power cord.

Installing the Hub

Installation

The site where you install the hub stack may greatly affect its performance. When installing, consider the following pointers:

♦ **Install the hub stack in a fairly cool and dry place. See Appendix B, *Specifications*, for the acceptable temperature and humidity operating ranges.**

♦ **Install the hub stack in a site free from strong electromagnetic field generators (such as motors), vibration, dust, and direct exposure to sunlight.**

♦ **Leave at least 10cm of space at the front and rear of the hub for ventilation.**

♦ **Install the hub on a sturdy, level surface that can support its weight, or in an EIA standard-size equipment rack. For information on rack installation, see the next section, *Rack Mounting*.**

When installing the hub stack on a level surface, attach the rubber feet to the bottom of each device. The rubber feet cushion the hub and protect the hub case from scratching.

Rack Mounting

The hub can be mounted in an EIA standard-size, 19-inch rack, which can be placed in a wiring closet with other equipment. Attach the mounting brackets at the hub's front panel (one on each side), and secure them with the provided screws.
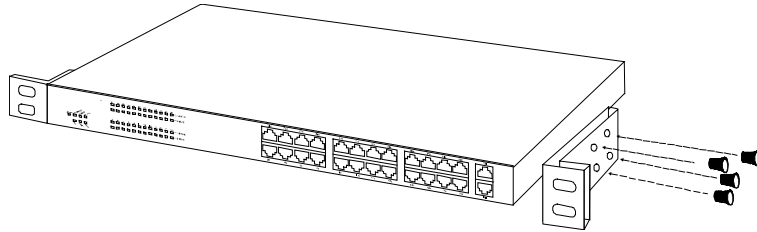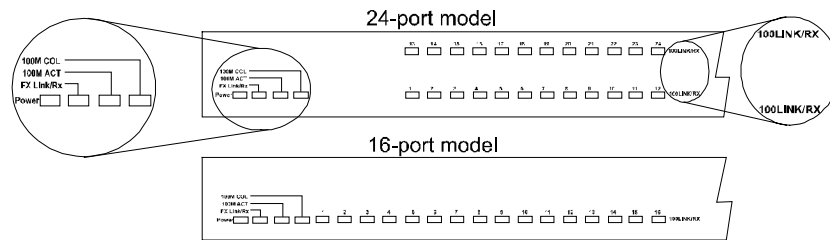
Then, use screws provided with the equipment rack to mount each hub in the rack.

3
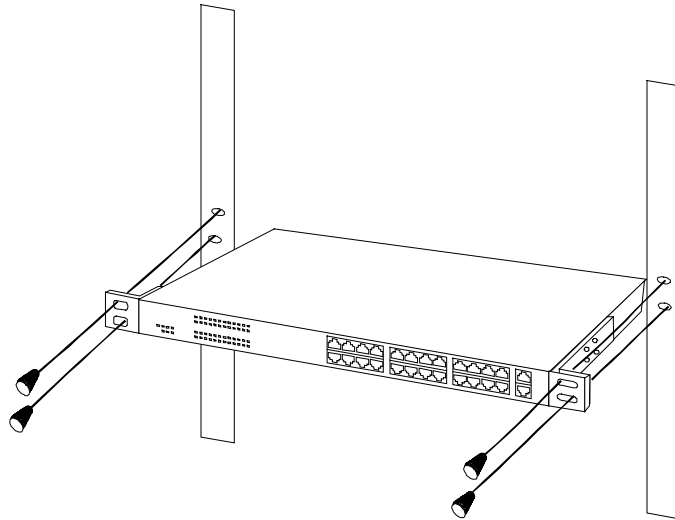
UNDERSTANDING INDICATORS

Before connecting network devices to the hub, take a few minutes to look over this section and familiarize you with the front panel LED indicators of your stackable Fast Ethernet hub, depicted below.

Hub State Indicators

♦ **Power Indicator**

This indicator lights green when the hub is receiving power; otherwise, it is off.

♦ **100M Activity**

This indicators indicate data packet on the respective 100Mbps Fast Ethernet segments will blink green.

♦ **100M Collision**

This indicators indicate data collisions on the respective 100Mbps Fast Ethernet segments of the hub. (If several hubs are stacked or linked together, all of them should detect and indicate the same collision, since collisions span the entire network segment.) Whenever a collision is detected, the respective COL indicator will briefly blink amber.

100BASE-FX Module Indicators

The FX Link/Rx, indicate a good link to a module installed.

Port State Indicators

There have provide state indicators for each of the twisted-pair ports on the hub. Each port's LED status indicators report the port and indicator for link or receive status.

The following describes each indicator and the meaning of each condition:

♦ **100M Link/Rx**

This indicator green when the port is connected to a 100Mbps Fast Ethernet station , If the station to which the hub is connected is powered off, or if there is a problem with the link, the LED will remain off. And the indicator blinking green when the data will be received to all other connected ports.

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MAKING CONNECTIONS

This chapter discusses how to make connections to the hub's twisted-pair, cascading hubs to create a stack, and linking with other hubs (or hub stacks).

Hub Cascading/Building a Stack

You can stack up to four hubs using the daisy-chain ports to form one logical hub. In this configuration, the interconnected hubs constitute a single logical unit, providing a maximum of 96 twisted-pair ports.

Use the provided daisy-chain cable to connect the Daisy-Chain OUT port on the rear panel of one hub to the Daisy-Chain IN port on the hub below it, as shown in the figure below. Repeat this procedure for each hub to be included in the stack.
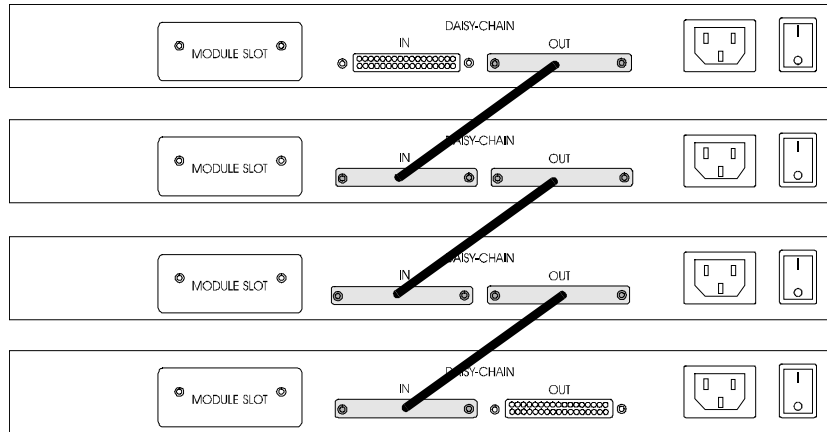
Hubs should not be added to the stack or removed from the stack while the power is on to any hub in the stack. **Always turn *OFF* power to the entire stack before adding or removing hubs.**

Connectivity Rules

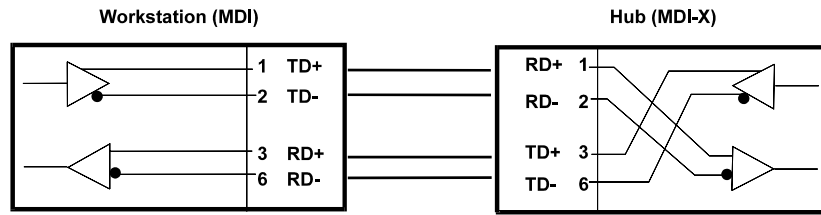Fast Ethernet (100Mbps) networks have the following connectivity rules:

♦ **The maximum length of a twisted-pair segment (that is, the distance between a port in the hub to a single-address network device such as a PC, server, or Ethernet switch) is 100 meters. Cabling and other wiring should be certified as Category 5 UTP or shielded twisted-pair (STP).**

♦ **The maximum diameter in a collision domain is about 205 meters using two Class II hubs (or hub stacks).**

♦ **Between any two end-stations in a collision domain, there may be up to three cable segments and two Class II hubs or hub stacks.**

Hub to End-Station Connection

After installing the hub properly, it can support up to 24 ports or 16 port end-station connections. Fast Ethernet connections require either a Category 5 UTP cable or a STP cable. These cables can be up to 100 meters long.

Each Fast Ethernet connection requires a Category 5 cabling for all connections, in order to make it easier to transition all stations to 100Mbps.

You can connect any combination of PCs, servers, and other single-address network devices to the twisted-pair ports using straight-through twisted-pair cables. These cables should not be crossed over. The following figure illustrates the pin assignments for a straight-through cable:

Workstation (MDI)   **Hub (MDI-X)**

```
            1   TD+                          RD+  1
            2   TD-                          RD-  2

            3   RD+                          TD+  3
            6   RD-                          TD-  6
```

When connecting a PC or a server, the system being connected should have a Fast Ethernet network interface card with a twisted-pair port. The following figure shows a typical connection between the hub and end-stations:

**Straight Twisted Pair Cable
(100m MAX.)**

24-port Fast Ethernet Hub
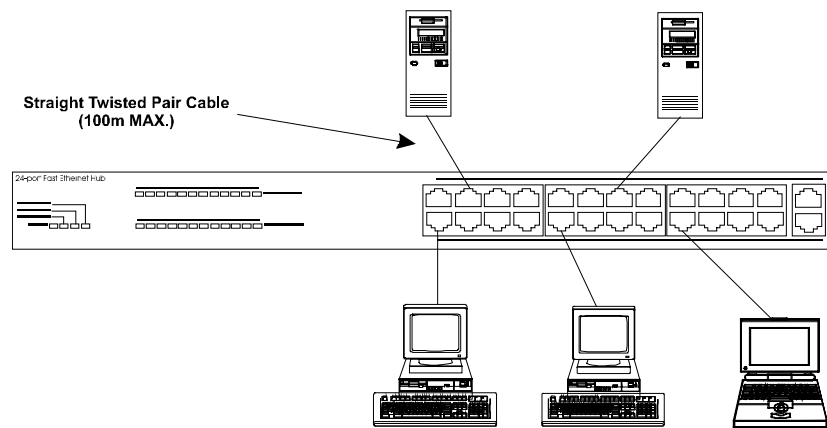
Hub-to-Hub Uplink

You can link two hubs or hub stacks to each other using any of the twisted-pair ports or the Uplink port. Linking hubs using ordinary twisted-pair ports requires crossover twisted-pair cables; linking using one ordinary twisted-pair port and the Uplink port requires an ordinary straight-through twisted-pair cable.

When connecting two hubs or hub stacks in this fashion, the maximum distance between any two end-stations in a collision domain is 205 meters. If each link between the hub and an end-station is 100 meters, then the hub-to-hub connection is limited to 5 meters. However, if the longest hub-to-end-station connection is less than 100 meters, then the hub-to-hub connection can be up to 100 meters long as long as the 205-meter total network diameter rule is followed. The following table describes different methods of linking hubs (or hub stacks):

HUB PORT USED	DEVICE	PORT TYPE	CABLE TO USE
Normal	Switch or Hub	Non-Uplink	Crossover (X)
		Uplink	Straight-Through (||)
	Server (or PC)		Straight-Through (||)
Uplink	Switch or Hub	Non-Uplink	Straight-Through (||)
		Uplink	Crossover (X)
	Server (or PC)		Crossover (X)

A crossover cable is a straight-through twisted-pair cable in which the wires have been crossed. The figure below shows the pin assignments for a Fast Ethernet crossover cable:
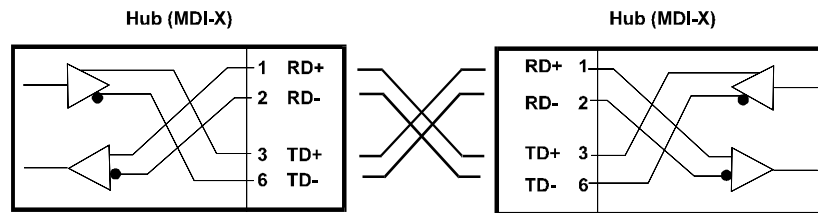

There is 100BASE-FX optional module that may be added to any of the hubs in the series. Each of the modules offers a 100BASE-FX additional network interface that allows for greater flexibility in how these hubs may be used in a network.

100Base-FX Module Installation

The installation procedure for each module is the same. Additional information about each module is provided below.

To install any of the modules: (Includes SC or ST type connectors)

1. Locate the module slot in the hub's rear panel.

2. Using a screwdriver, undo the two screws and remove the dust cover on the module slot.

3. Holding the module component-side up and connector-side in, gently slide the module along the guides and seat it in the internal connector.

4. Using a screwdriver, replace the two screws and tighten until snug.
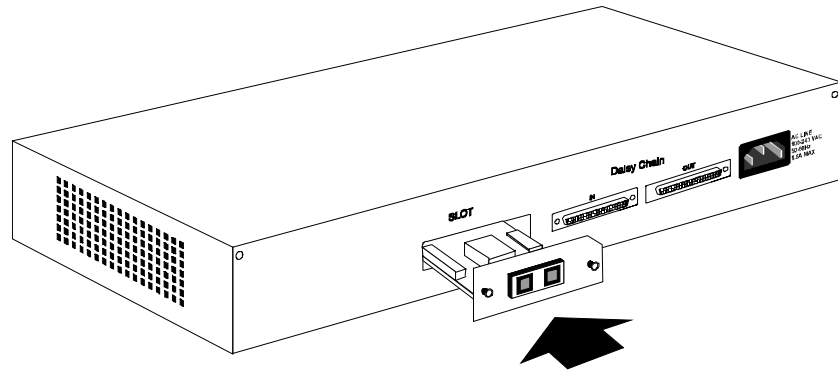
We recommend that you retain the dust cover in case you need to remove the module for an extended period sometime in the future.

A

CABLES AND CONNECTORS

100BASE-TX Fast Ethernet Cable and Connectors

♦ **Cable characteristics: 0.4 to 0.6 mm (22 to 26 AWG) 4-pair (only two pairs/four wires are used for 100BASE-TX); Category 5 unshielded twisted-pair or EIA/TIA-568 compliant, 100-ohm shielded twisted-pair**

♦ **Maximum segment length: 100 meters**

♦ **Maximum network diameter: 205 meters**

♦ **Connectors: RJ-45**
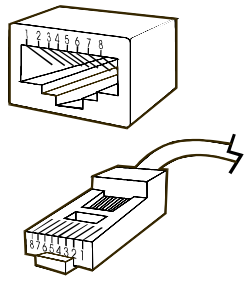

Straight Twisted Pair Cable Pinouts		
Contact	MDI-X Signal	MDI Signal
1	RD+ (receive)	TD+ (transmit)
2	RD- (receive)	TD- (transmit)
3	TD+ (transmit)	RD+ (receive)
4	Not used	Not used
5	Not used	Not used
6	TD- (transmit)	RD- (receive)
7	Not used	Not used
8	Not used	Not used

Workstation (MDI)　　　　　　　　　　　　**Hub (MDI-X)**

1	TD+	RD+	1
2	TD-	RD-	2
3	RD+	TD+	3
6	RD-	TD-	6
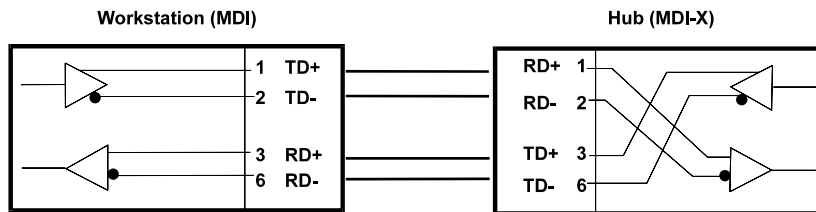
Crossover Cables

When cascading or connecting the hub to another switch, bridge, or hub through the UTP port, a modified crossover cable is necessary. With a crossover cable, two pairs of wires are switched at one connector end. Carry out the following steps to create a customized, crossover twisted-pair cable:

1. Leave one end of the cable as is, with the RJ-45 connector intact. The wiring at just one end of the cable needs to be modified.

2. At the other end of the cable, connect wires 1 and 2 to contacts 3 and 6 respectively. Likewise, connect wires 3 and 6 to contacts 1 and 2. Refer to the following diagram:

B
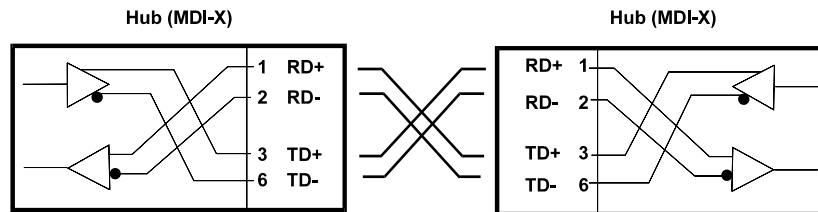
SPECIFICATIONS

General

Standards: IEEE 802.3u 100BASE-TX, 100BASE-FX

Topology: Star

Protocol: CSMA/CD

Network Data Transfer Rate: 100Mbps;

Number of Ports: 16 (16-port model) or 24 (24-port model) 100BASE-TX ports

Network Media: 100BASE-TX: UTP/STP Cat 5, 100-ohm twisted-pair (100m maximum)

100BASE-FX: 62.5/125-micron multimode optical fiber.

Hub-to-Hub Cascading

Number of Daisy-Chained Hubs: Maximum of 4 hubs per stack

Daisy-Chain Port: DB-25 connector × 2

Daisy-Chain Cable: DB-25 cable (supplied)

LED Indicators

Hub Status: Power, FX Link/Rx, 100M Activity, 100M Collision

Port Status (per port): 100M Link/Rx

Environmental and Physical

Power Supply: 100 to 240 VAC, 50 or 60 Hz internal universal power supply

Power Consumption: 40W (max.)

Dimensions: 440mm × 200mm × 44mm, 19-inch rack-mountable

Operating Temperature: –10 to 40°C

Storage Temperature: –20 to 70°C

Humidity: 10% to 90% non-condensing

Emissions: FCC Class A, CE

Safety: cUL, CE Mark (EN60950)