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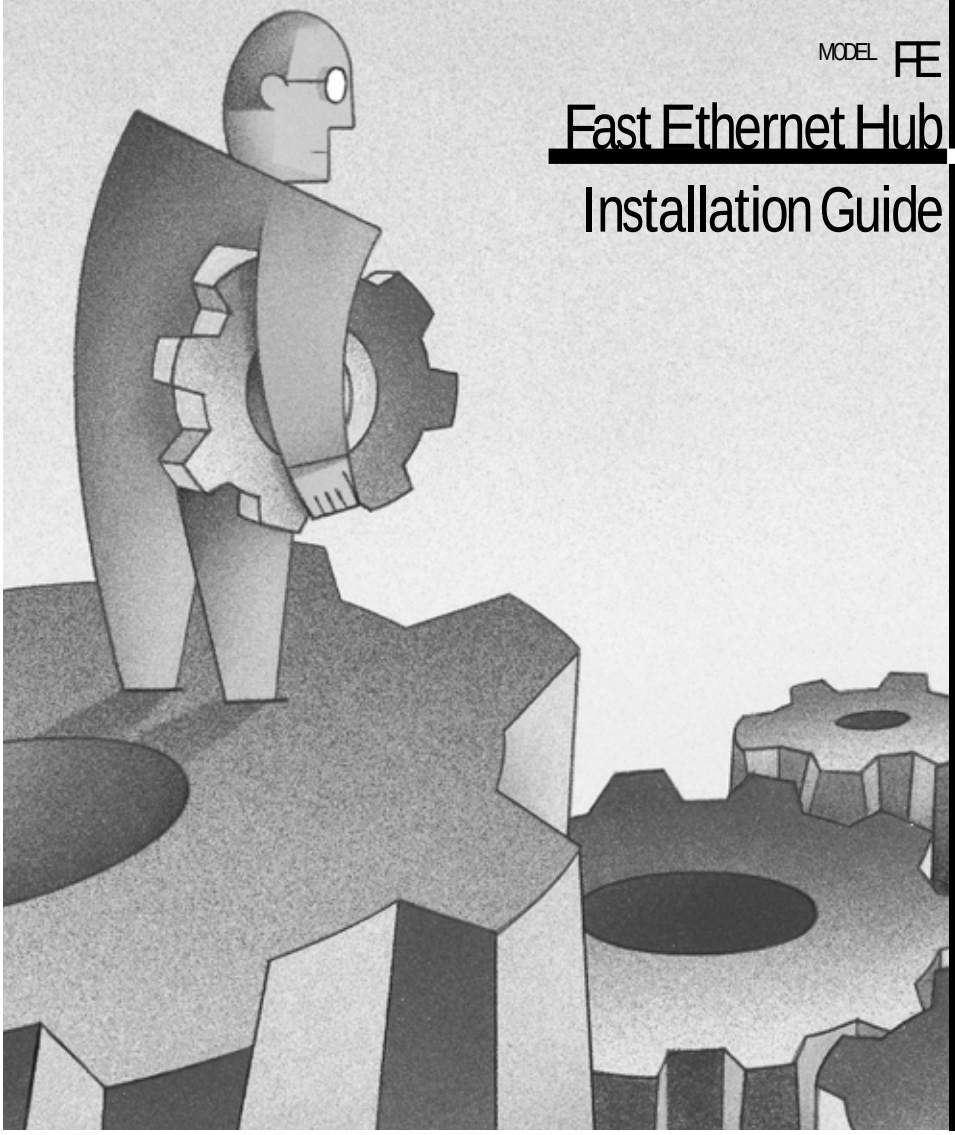


MODEL FE116

Fast Ethernet Hub

Installation Guide

Start Here

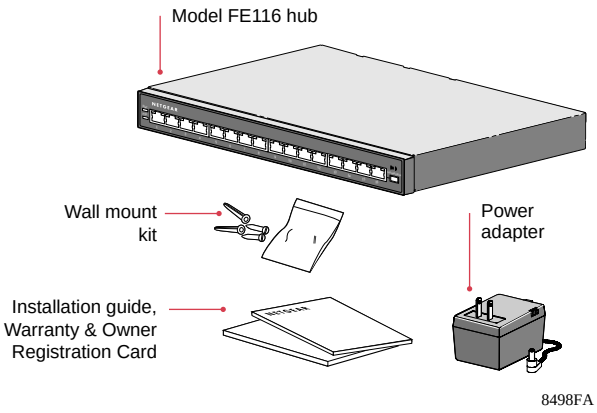
Congratulations on your purchase of the NETGEAR™ Model FE116 Fast Ethernet Hub. This hub delivers standards-based, plug-and-play networking solutions for small businesses, home offices, and low-density workgroups of larger companies.

Features

The Model FE116 hub has the following features:

- Sixteen IEEE 802.3-compliant 100BASE-T ports (sometimes referred to as RJ-45 or network ports) that provide effective information exchange, resource sharing, and a client/server or peer-to-peer applications solution with simple unshielded twisted pair (UTP) wiring (The network ports on the Model FE116 hub are referred to as vista RJ-45 network ports because they have built-in LEDs that monitor individual port status.)
- Class II compliance, which enables network expansion by connecting two hubs together
- Easy plug-and-play installation with no software to configure, thus saving time and minimizing the potential for configuration errors
- Normal/Uplink push button to simplify network extension and for connecting with other hubs (In the Uplink mode, two hubs can be daisy-chained using simple, straight-through UTP cables.)
- Automatic partitioning and reconnection of a port that has excessive collisions or is jabbering
- Limited five-year warranty on the unit and one-year warranty on the power supply

Package Contents



Verify that your package contains the following:

- Model FE116 hub
- Power adapter
- Installation guide
- Warranty & Owner Registration Card

Wall mount kit

Note: If the supplied power adapter does not meet your country requirements, make sure you use the appropriate power adapter as required by your national electrical codes and ordinances.

Customer Support

Call your reseller or customer support in your area if there are any wrong, missing, or damaged parts.

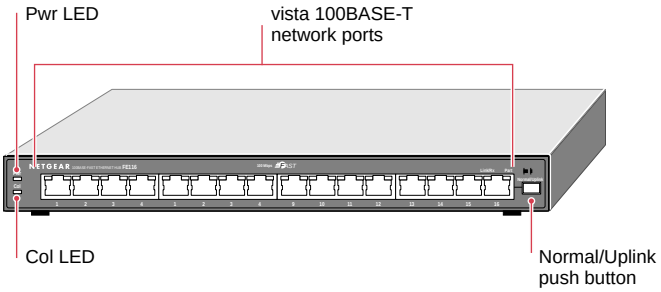
Keep the carton, including the original packing materials. Use them to repack the hub if you need to return it for repair.

To qualify for product updates and product warranty registration, complete the Warranty & Owner Registration Card within 30 days of purchase and return it to NETGEAR, Inc.

Product Illustration

The instructions provided in this guide are for installing and using the Model FE116 hub.

Front Panel of the Model FE116 Hub



LEDs

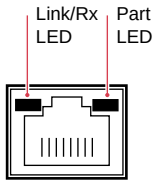
There are two LEDs on the front panel of the hub and two on each vista 100BASE-T network port (RJ-45 connector) that allow you to monitor the status of the hub and the network. The table describes the activity of the LEDs.

Label	Color	Activity	Description
Pwr (power)	Green	On	Power is supplied to the hub.
Col (collision)	Amber	Blinking	Data collision is occurring on the network. Note that occasional collisions are normal.
Link/Rx (Located on the top left corner of each vista network port)	Green	On Blinking	The link between this port and the connected device is good. There is incoming data on the port.
Part (partition) (Located on the top right corner of each vista network port)	Amber	On	The port is partitioned because of excessive collisions.

Vista 100BASE-T Network Ports with Built-in LEDs

The front panel of the Model FE116 hub has sixteen vista 100BASE-T ports. Two LEDs—the Link/Rx LED and the Part (partition) LED—are built into each 100BASE-T port.

vista 100BASE-T network port



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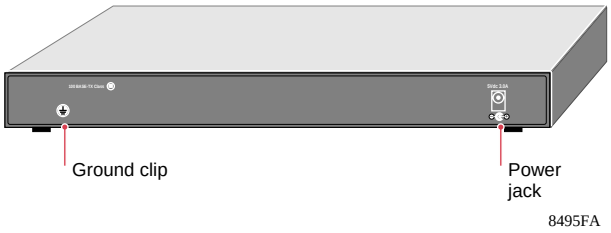
Normal/Uplink Push Button

The Normal/Uplink push button on the Model FE116 hub allows you to select Normal (MDI-X) or Uplink (MDI) wiring for port 16, eliminating the need to use a crossover cable. Ports 1 to 15 on the hub are permanently configured for Normal wiring.

Rear Panel

The rear panel of the Model FE116 hub has a DC power jack and a ground clip (not used). The Model FE116 hub accepts 5 V DC.

Rear Panel of the Model FE116 Hub



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Installation Procedures

1 Prepare the Site

Before you begin installing the hub, prepare the installation site. Make sure your operating environment meets the operating environment requirements of the equipment.

Characteristic	Requirement
Temperature	Ambient temperature between 0° and 40° C (32° and 104° F). No nearby heat sources such as direct sunlight, warm air exhausts, or heaters.
Operating humidity	90% maximum relative humidity, noncondensing.
Ventilation	Minimum 2 inches (5.08 cm) on all sides for cooling. Adequate airflow in room or wiring closet.
Operating conditions	At least 6 feet (1.83 m) to nearest source of electromagnetic noise (such as photocopy machine or arc welder).
Service access	Minimum 12 inches (19.68 cm) front and back for service access and maintenance. Front and back clearance for cables and wiring hardware such as punchdown blocks.
Power	Adequate power source within 6 feet (1.83 m).
Wiring hardware	Wiring hardware, such as punchdown blocks or patch panels, should be complete before installing the hub.

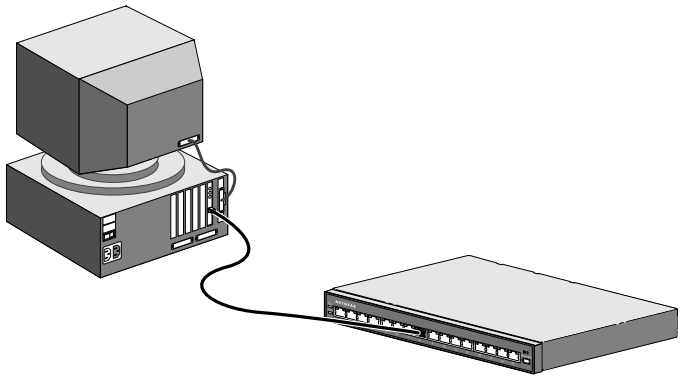
2 Installation

Place the Model FE116 hub on a flat surface or mount it on a wall with the hardware included in the wall mount kit. Be sure the hub is positioned with at least 2 inches of space on all sides for ventilation.

3 Connecting Devices

You can connect any device equipped with a 100BASE-T Ethernet interface to the RJ-45 ports on the Model FE116 hub. These standard RJ-45 ports accept either 2-pair or 4-pair Category 5 UTP cable (100BASE-TX networks require only 2-pair wiring). The RJ-45 interface is an 8-pin connector.

To connect any of the RJ-45 ports on your Model FE116 hub to a PC, use a regular straight-through UTP cable. If you are connecting using Port 16 on your hub, set the Normal/Uplink push button to Normal.



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Note: Ethernet specifications limit the cable length between your PC or server and the hub to 328 feet (100 meters) in length.

4 Connect the Hub to a Network

Cascading refers to connecting hubs together to increase the number of ports or the number of users supported on the network. The 100BASE-T ports can be used to cascade hubs together.

Connect to a Network Using the 100BASE-T Ports

The twisted pair cable extended from a 100BASE-T port is called a twisted pair segment and can be up to 100 meters (m) in length. The 100BASE-T ports, with the exception of port 16, are MDI-X (or Normal) ports. If you are connecting to ports 1 through 15, use either a straight-through or crossover cable as outlined in the following table.

Connecting Port on Model FE116 Hub	Connecting Device	Cable Used
Ports 1–15	PC or server	Straight-through cable
Ports 1–15	Hub, router, or switch	Crossover cable

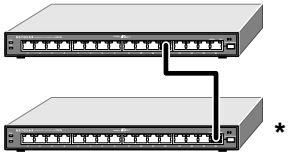
Set the Normal/Uplink Push Button

If you are connecting to port 16, use this table to determine the type of cable to use and how to set the Normal/Uplink push button for port 16.

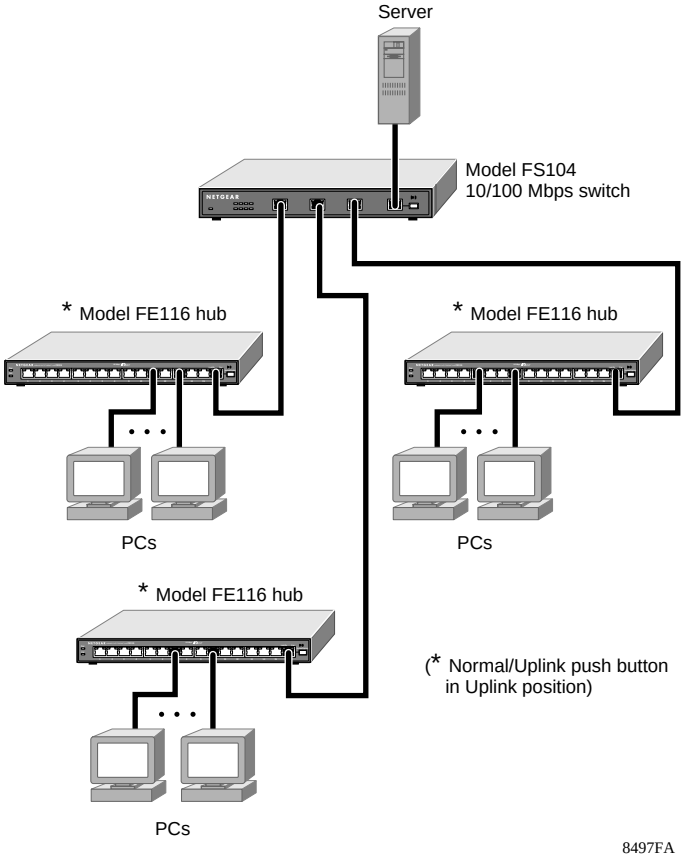
Connecting Port on Model FE116 Hub	Connecting Device	Cable Used
Port 16 set to Normal	PC or server	Straight-through cable
Port 16 set to Uplink	Hub, router, or switch	Straight-through cable

You can cascade hubs together through any of the ports. The following illustration shows cascading two hubs together daisy-chain style and cascading hubs together in a hierarchical star through the 100BASE-T ports.

Two Model FE116 hubs daisy-chained



Network with Model FE116 hubs



5 Verify the Installation

To complete the installation, connect the power adapter first to the power jack on the hub rear panel and then to the power outlet on the wall. When power has been applied to the hub:

- The green Pwr (power) LED on the front panel is on.
- The green Link/Rx LED on each connected port is on.
- The green Link/Rx LED on each connected port is blinking when data is being received by that port.

If there are any problems, refer to “Troubleshooting Information.”

Troubleshooting Information

Refer to this table and the information that follows the table to troubleshoot your Model FE116 hub.

Symptom	Cause	Solution
Amber Col (collision) LED blinks.	Data collision is normal on Ethernet networks.	No action is required.
Amber Col LED blinks excessively.	There is data collision on the network because the network is extremely busy or defective devices are connected on the network that cannot detect network traffic or collision.	Make sure connected devices are operating in half-duplex mode. The Model FE116 hub is not compatible with devices that operate in full-duplex mode. If you suspect that there might be a defective device on the network, disconnect devices one at a time to isolate the defective unit on the network. If the network is extremely busy, you may have to segment the network with a Fast Ethernet switch such as the NETGEAR Model FS104 switch.
	Wrong or miswired cables are used.	Make sure the correct UTP cables are used. See the table in the installation section of this guide for cable use and Normal/ Uplink push button information. Note that home telephone cables can cause a collision condition and cannot be used in place of UTP cables.

Symptom	Cause	Solution
Amber Part LED turns on.	The connected port is partitioned because of excessive collisions.	The 100BASE-T RJ-45 port is partitioned after 32 consecutive collisions are detected. When the first good packet without a collision is received, the port is reconnected and the amber Partition LED turns off. Check and correct causes listed in this table for excessive collisions and make sure that: The correct cable is used and the cable is not faulty. There are no faulty connectors. The network card in your PC is set to half-duplex mode.
Green Link/Rx LED on the 100BASE-T port is off when a cable is attached or not blinking when there is data transmission.	The port is not detecting a successful link or data transmission.	Check for a bad cable, cable pairs that are not correctly wired, or loose connectors. Make sure that there is power to the hub and the connected PC. Make sure the port has not been partitioned. Make sure the network card in the connected PC is configured for 100 Mbps operation. If the Green Link/Rx LED is on port 16, also check to make sure the Normal/ Uplink push button switch is set according to the instructions in “Installation Procedures.”

Make sure the network interface cards installed in the workstations are in working condition and the software driver has been installed.

If required, verify the integrity of the hub by resetting it. Turn power to the switch off and then back on. If the problem continues and you have completed all the preceding diagnoses, contact NETGEAR Customer Support. For the phone number of the representative in your area, see “Customer Support.”

Fast Ethernet Technology

Fast Ethernet is conventional Ethernet but faster. Fast Ethernet, or 100BASE-TX, operates at 100 Mbps instead of 10 Mbps. The 100BASE-TX technology uses the same frame format and length as Ethernet and does not require changes to the upper-layer protocols, applications, or networking software that run on

LAN workstations. If your network is migrating from 10 to 100 Mbps, you can switch and route data from 10 Mbps to 100 Mbps without protocol translation and its associated delays. Fast Ethernet is based on the proven CSMA/CD Media Access Control (MAC) Protocol.

The most popular cabling scheme in an Ethernet network today is star-wired topology, where the hub is in a central wiring closet and individual cables run out to each tabletop device. This topology is the same topology used by Fast Ethernet, although the maximum allowable network diameter is smaller because of the increase in packet speed.

Cable Guidelines for Fast Ethernet

Fast Ethernet uses UTP cable, as specified in the IEEE 802.3u standard for 100BASE-T. The specification recommends Category 5 UTP cable consisting of either 2-pair or 4-pair twisted insulated copper conductors bound in a single plastic sheath. Category 5 cable is certified up to 100 MHz bandwidth. 100BASE-TX operation uses one pair of wires for transmission and the other pair for receiving.

When installing Category 5 UTP cabling, use the following guidelines to ensure that your cables perform to the following specifications:

- Certification
  Make sure that your Category 5 UTP cable has completed the Underwriters Laboratories (UL) or Electronic Testing Laboratories (ETL) certification process.
- Termination method
  To minimize crosstalk noise, maintain the twist ratio of the cable up to the point of termination; untwist at any RJ-45 connector or patch panel should not exceed 0.5 inch (1.5 cm).

Cable Lengths for Fast Ethernet

Category 5 distributed cable that meets ANSI/EIA/TIA-568-A building wiring standards can be a maximum of 328 feet (100 m) in length, divided as follows:

- 20 feet (6 m) between the hub and the patch panel (if used)
- 295 feet (90 m) from the wiring closet to the wall outlet
- 10 feet (3 m) from the wall outlet to the desktop device

The patch panel and other connecting hardware must meet the requirements for 100 Mbps operation (Category 5). Workmanship quality is a must. Only 0.5 inch (1.5 cm) of untwist in the wire pair is allowed at any termination point.

Technical Specifications

General Specifications	
Network Protocol and Standards Compatibility	
IEEE 802.3u, 100BASE-TX, Fast Ethernet IEEE 802.3 CSMA/CD	
Data Rate	
100 Mbps with 4B/5B encoding and MLT-3 physical interface	
Interface	
16 100BASE-T network ports (RJ-45)	
Power Specifications	
Input voltage	100 to 240 VAC, 50 to 60 Hz
Output voltage	5V DC at 3.0 Amps, maximum
Power Consumption	13 W
Physical Specifications	
Width:	11.2 inches (28.5 cm)
Height:	1.1 inches (2.8 cm)
Depth:	4.0 inches (10.1 cm)
Weight:	1.61 lb (0.73 kg)
Environmental Specifications	
Operating temperature:	0° to 40° C (32° to 104° F)
Operating humidity:	90% maximum relative humidity, noncondensing
Electromagnetic Emissions	
CE mark, commercial	
FCC Part 15 Class A	
EN 55 022 (CISPR 22), Class A	
VCCI Class A ITE	
Safety Agency Approvals, Power Adapter	
CE mark, commercial	
UL listed (UL 1950)	
cUL listed	
CSA certified (CSA 22.2 #950)	
TUV licensed (EN 60 950)	
T-Mark	
Warranty Information	
Hub	5 years
Power adapter	1 year

Trademarks

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Statement of Conditions

In the interest of improving internal design, operational function, and/or reliability, NETGEAR reserves the right to make changes to the products described in this document without notice.

NETGEAR does not assume any liability that may occur due to the use or application of the product(s) or circuit layout(s) described herein.

Certificate of the Manufacturer/Importer

It is hereby certified that the Model FE116 Fast Ethernet Hub has been suppressed in accordance with the conditions set out in the BMPT-AmtsblVfg 243/1991 and Vfg 46/1992. The operation of some equipment (for example, test transmitters) in accordance with the regulations may, however, be subject to certain restrictions. Please refer to the notes in the operating instructions.

Federal Office for Telecommunications Approvals has been notified of the placing of this equipment on the market and has been granted the right to test the series for compliance with the regulations.

Voluntary Control Council for Interference (VCCI) Statement

This equipment is in the first category (information equipment to be used in commercial and/or industrial areas) and conforms to the standards set by the Voluntary Control Council for Interference by Data Processing Equipment and Electronic Office Machines that are aimed at preventing radio interference in commercial and/or industrial areas.

Consequently, when this equipment is used in a residential area or in an adjacent area thereto, radio interference may be caused to equipment such as radios and TV receivers.

Federal Communications Commission (FCC) Compliance Notice: Radio Frequency Notice

Note: 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. If it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to take whatever measures may be necessary to correct the interference at their own expense.

EN 55 022 Statement

This is to certify that the Model FE116 Fast Ethernet Hub is shielded against the generation of radio interference in accordance with the application of Council Directive 89/336/EEC, Article 4a. Conformity is declared by the application of EN 55 022 Class A (CISPR 22).

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 appropriate measures.

Canadian Department of Communications Radio Interference Regulations

This digital apparatus Model FE116 Fast Ethernet Hub does not exceed the Class A limits for radio-noise emissions from digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.

Règlement sur le brouillage radioélectrique du ministère des Communications

Cet appareil numérique Model FE116 Fast Ethernet Hub respecte les limites de bruits radioélectriques visant les appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique du ministère des Communications du Canada.

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Finland:	0800-111-036	Sweden:	0200-298-298
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Internet/World Wide Web
The NETGEAR web page is at http://www.netgear.com.

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