# Installation Guide
10/100 Fast Ethernet Switch
NS-115F 4 port Switch with One Port Fiber
NS-105 5 Port Switch

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1. Introduction

Driven by recent advances in desktop computing technology, today's network applications have increased in speed, power and the ability to process information. To meet the demands of these more powerful applications, this affordable switch device provides significant increase in performance for your Ethernet or Fast Ethernet network. This 5-port Fast Ethernet switch comes with four 10/100 TP ports and one fiber port(NS-115F), each capable of transmitting or receiving information simultaneously at full wire speed to control and allocate the network bandwidth.

NS-115F Series   NS-105
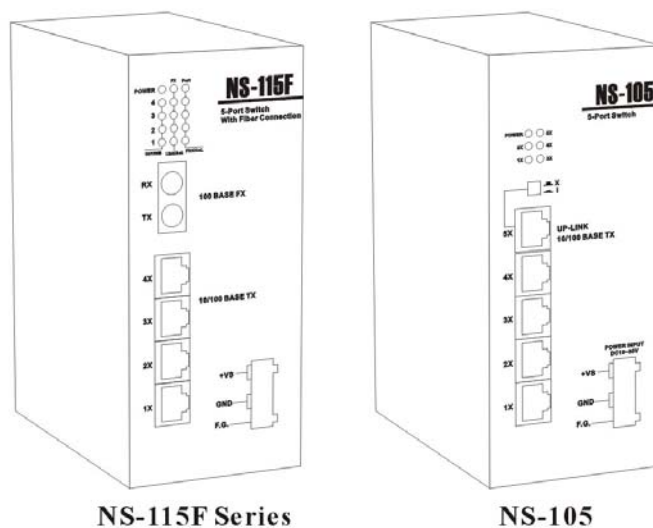
The key features of this switch unit are:

- **Optimized Bandwidth :** Combining five 10/100Mbps-based Fast Ethernet switched ports, the switch delivers a high network bandwidth for your Fast Ethernet network
- **Easy Migration :** With 10BASE-T support on each port, the switch provides a non-disruptive and smooth migration path from Ethernet to a Fast Ethernet network.
- **Fiber Uplink Support(NS-115F) :** With 100BASE-FX port, the switch provides a connectivity to a Fast Ethernet network via fiber cable.
- **Easy Installation :** With the functions of auto-speed-sensing and auto-negotiation on each port, the switch supports plug-and-play installation which eliminates configuration problems.
- **DIN-Rail Mount**: Support 35mm Industrial standards DIN-Rail Mount.
- **Aluminum Metal Shell:** The metal shell provides good heat sink and EMI shielding.

1.1 Features

Designed for resolving congestion problems caused by bandwidth-hungry devices and bandwidth-intensive applications as well as a high number of users, the switches not only adhere to the IEEE 802.3 10BASE-T, 802.3u 100BASE-TX and 100BASE-FX (NS-115F) standards, but also feature:

● Four/Five (NS-115F/NS-105) 10/100BASE-TX auto-negotiation switched ports and one 100BASE-FX port for flexible connections to desktop PCs, servers and Ethernet hubs.

● The 10/100NASE-TX switched support :

■ Auto speed sensing for 100Mbps connection

■ Auto Configuration with auto-negotiation devices

■ Full-duplex or half-duplex operation

● For the fiber port (NS-115F), the switch series support variety of fiber connection for different application needs. The fiber connectors include ST,SC,MT-TJ, and VF-45 types for multimode and single mode fiber cables.

● Supports duplex mode selector for the 100BASE-FX fiber port.

● Self learning for active MAC addresses

● Store and forward switching to ensure only good packets are forwarded

● Forwarding and filtering at full wire speed

● Supports IEEE 802.3x flow control for full-duplex operation

● Supports back-pressure flow control for half-duplex operation

● Comprehensive LED indicators provide quick, easy to read port and switch information

1.2 Specifications

Port 1-4	MDI-X RJ-45 jacks for 10/100BASE-TX connectivity
Port 5	One fiber connector for 100BASE-FX connectivity (NS-115F) One RJ-45 jack for 10/100BASE-TX normal or up-link connectivity by switch setting.
Cables	100BASE-T Cat.3,4,5 UTP cable(100meters max.)
LED indicators	Power status 10/100M,Link/Activity,Duplex/Collision status per port
Filtering rate	14,880pps for Ethernet(100BASE-T) 148,800pps for Fast Ethernet(100BASE-TX)
Forwarding rate	14,880pps for Ethernet(10BASE-T) 148,800pps for Fast Ethernet(100BASE-TX)
Filtering address	Multicast/Broadcast/Unicast address 8K MAC address per unit
RAM buffers	256KB
Environment	Temperature 0^0C to 40^0C Relative humidity 10% to 90% non-condensing
Dimensions	70mm x 160mm x 120mm
Power	+5V 1.2A minimum

Models vs Fiber Specifications

Model	Connector	Fiber Cable	Max. Distance	Power Input
NS-115FT	ST	MM[1]	2Km	DC10~30V
NS-115FT-AC	ST	MM	2Km	AC85~230V
NS-115FC	SC	MM	2Km	DC10~30V
NS-115FC-AC	SC	MM	2Km	AC85~230V

*1 : Multimode fiber
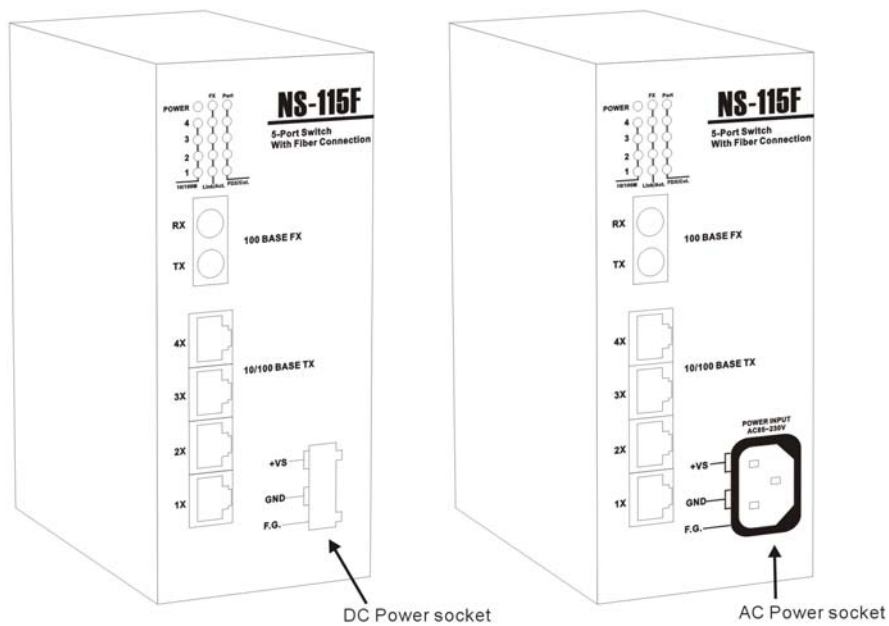
2. Installing the Switch

1.1 Unpacking

Check to see that you have everything before you start the installation.
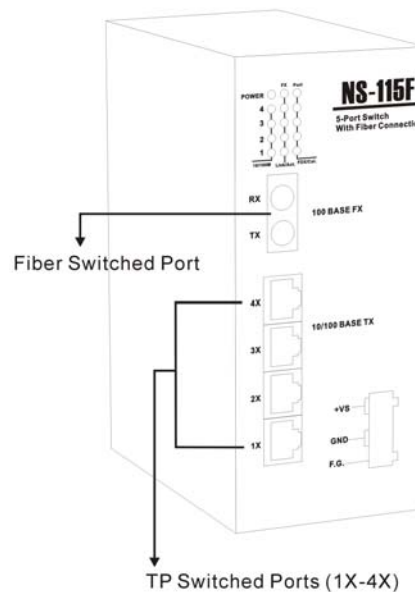- Installation guide
- The switch unit

2.2 Checking　Power

- AC input power: AC85~230V
- DC input power: DC10~30V

3. Making Network Connections

3.1 Network Switched Ports

There are five ports on the switch for connection to five LAN segments. Each segment is an independent shared network in one collision-domain.

● **Four 10/100BASE-TX switched ports**
Each port consists of one RJ-45 connector and is used for connection to either a 10BASE-T or 100BASE-TX device. The RJ-45 connectors are fixed MDI-X jacks which are designed with internal crossover function. It allows a connection to an end station using straight-through UTP cable.

● **One 100BASE-FX fiber switched port**
This fiber port comes with one fiber connector. For ST and SC connectors, the contact labeled **TX** is used for transmission and the other one labeled one labeled **RX** is used for reception. One duplex mode selector is located on the rear panel. Either full duplex or half duplex mode can be selected(factory default : full-duplex).

Setting Position	Duplex Mode
FDX.	Full duplex
HDX.	Half duplex

The Following figure illustrates the front panels with different fiber connectors:

ST Type   SC Type
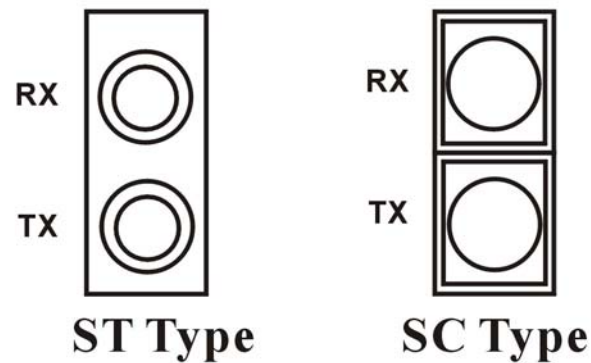
3.2 UTP Cable

When making a connection to another device using straight-through UTP cable, make sure MDI-X to MDI connection rule is followed. The following figure illustrates the pin assignments of a straight-through UTP and a crossover UTP cable :
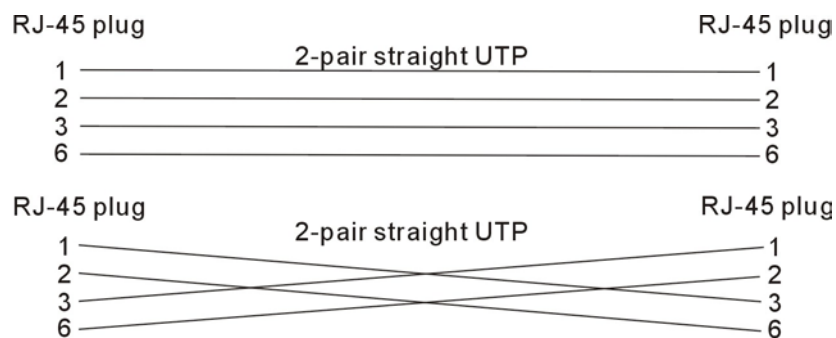
It is suggested to use straight-through UTP cables for all UTP connections. The maximum length and UTP cable categories used for the connections to a 10BASE-T device and 100BASE-TX device are :

CONNECTED DEVICE UTP CABLE USED & MAXIMUM LENGTH
10BASE-T device   Cat. 3,4,5 UTP(100meters)
100BASE-TX device   Cat. 5 UTP(100meters)

3.3 Fiber Cables

For different fiber connectors, several alternative models can be selected for different fiber connections as follows :

Model	Connector	Wavelegth	Cable	Max. Distance
NS-115FT	ST	1300nm	MM[*1]	2 Km
NS-115FT-AC	ST	1300nm	MM	2 Km
NS-115FC	SC	1300nm	MM	2 Km
NS-115FC-AC	SC	1300nm	MM	2 Km

*1 : Multimode fiber cable

The recommended multimode fiber is 62.5/125μm and 9/125μm for single mode fiber.

The following figure illustrates a connection example between two SC fiber ports :
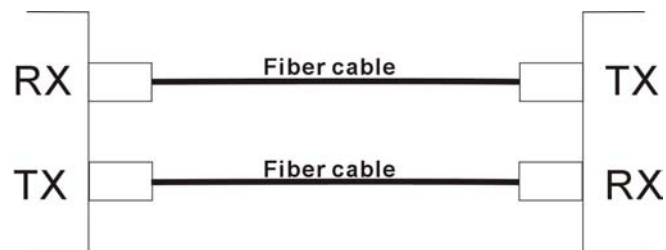
3.4 Network Connections

The switch can support connections to the following device :

● 10BASE-T network cards
● 10/100BASE-TX network cards
● 10BASE-T hub ports
● 100BASE-TX hub ports
● 10/100BASE-TX dual speed hub ports
● 10/100BASE-TX switch ports
● 100BASE-FX switch ports

The following figure illustrates some connection examples and also specifies the maximum distance of each connections :
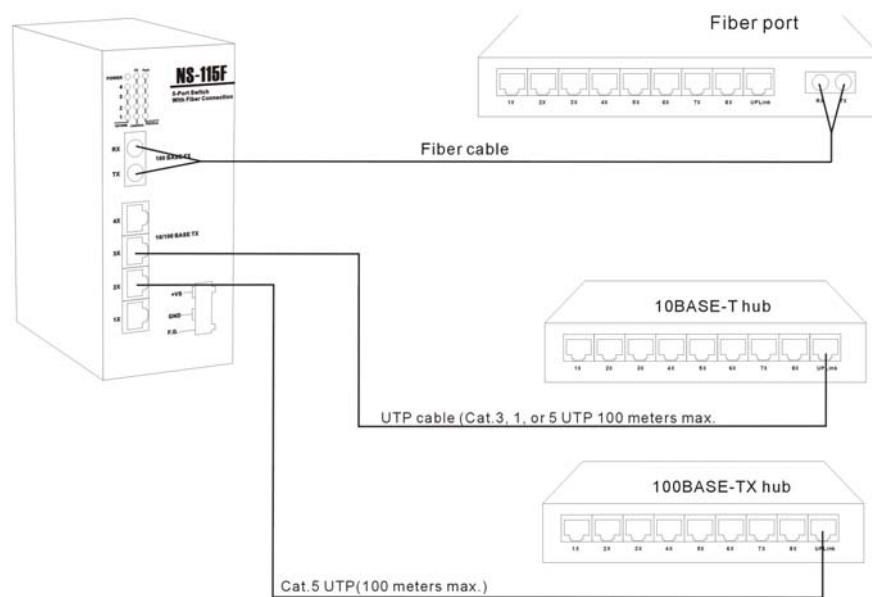
3.5 Operating Mode

Four TP ports are designed as auto-negotiation capable switched ports. Each port can determine the speed and duplex type used automatically through an auto-negotiation process with the remote connected auto-negotiation device. The auto-negotiation process is performed when the connection is made. When connecting to a non-auto-negotiation device, each TP port also features the capability to auto-sense the connection speed.

The following table lists the operation mode used for the switched port when it connects to different devices. The operating mode includes the connection speed and duplex type.

Connected Device	Operation Mode Used
10BASE-T hub	10Mbps, half-duplex
100BASE-TX hub	100Mbps, half-duplex
Auto-negotiation device	Auto-negotiation[2]
Non-auto[1] half-duplex device	Auto-speed-sensing[3], half-duplex
Non-auto full-duplex device	Not supported

*1 Non-auto : non-auto-negotiation
*2 determined through auto-negotiation process
*3 speed is determined by auto-sensing function

Most of 10BASE-T hubs and 100BASE-TX hubs are non-auto-negotiation devices and operate on half-duplex mode.

The operating mode of the fiber port is determined by the setting of duplex mode selector located on rear panel. The following table lists the maximum **MM** fiber cable length connecting to different devices :

Connected Device	Duplex Mode	Distance(MM cable)
Network card	Half-duplex	400m
Network card	Full-duplex	2Km
Class I hub	Half-duplex	160m
2 class II hubs	Half-duplex	112m
Switched fiber port	Half-duplex	400m
Switched fiber port	Full-duplex	2Km

4. LED Indicators

4.1 LED Panel

The switch provides comprehensive LED indicators for diagnosing and monitoring the operation of the unit as illustrated below :
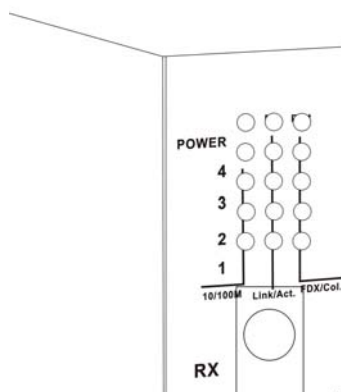
4.2 Interpretation

PWR LED :   indicates the status of the power supplied to the switch.
10/100M LED   indicates the connection speed between the TP port and the associated connected device.
Link/Act. LED   indicates the link status with a connected device
FDX/Col. LED   indicates the duplex mode and collision occurrences

The following table lists the LED states and the indications:

LED	STATE	INDICATION
Power	Off	No power is supplied to the device.
Power	On	Power is supplied to the device.
10/100	Off	10Mbps is used.
10/100	On	100Mbps is used.
Link/Act.	Off	No active cable link.
Link/Act.	On	An active link is established.
Link/Act.	Blink	Tx/Rx activities.
FDX/Col	On	Full duplex is used.
FDX/Col	Off	Half duplex is used.
FDX/Col	Blink	Half duplex and collision occurrences