NS-105 5 Port Switch

10/100 Fast Ethernet Switch

Installation Guide

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1. Introduction

NS-105 Industrial Switches are DIN-Rail mounting and designed for industrial environments. Their rugged packaging and protected circuitry keep them working under conditions that may cause office-grade units to fail.

Industrial Ethernet applications are demanding - This 5-port Fast Ethernet switch become the basic unit of the whole Ethernet network. It is also the good companion of our I-7188EX and I-8000 ethernet embedded controller. The NS-105 comes with multiple ports, each capable of transmitting or receiving information simultaneously at full wire speed to control and allocate the network bandwidth. Besides that, the NS-105 Industrial Ethernet Switch automatically determines and remembers where an Ethernet device is located and routes the messages only through the appropriate port. This minimizes network loading and enables true deterministic communications over Ethernet
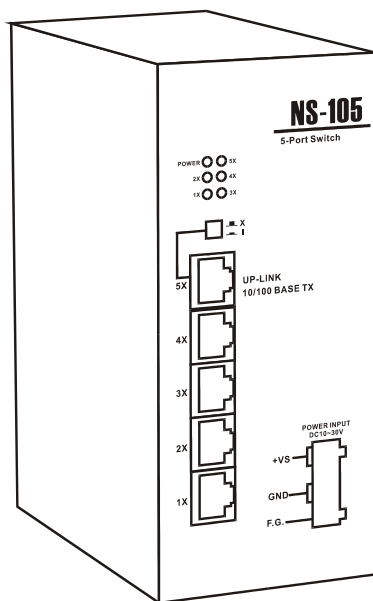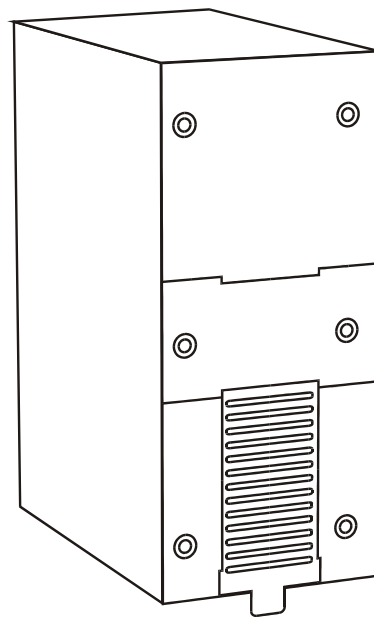
Front Panel   **Rear Panel**

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.

● **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.

1.1 Features

- IEEE 802.3 10BASE-T, and IEEE802.3u 100BASE-TX standards

- Five 10/100BASE-TX auto-negotiation switched ports for flexible connections to desktop PCs, servers and Ethernet hubs.

- The 10/100BASE-TX switched support :

  - Auto speed sensing for 100Mbps or 10Mbps connection

  - Auto Configuration with auto-negotiation devices

  - Full-duplex or half-duplex operation

- 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   10BASE-T/100BASE-TX connectivity
                      One MDI-X RJ-45 jack

Port 5   10BASE-T/100BASE-TX connectivity
                      One MDI-X RJ-45 / MDI RJ-45 jack
                      (by Push Button setting)

Cables   10BASE-T Cat.3,4,5 UTP cable (100meters max.)
                      100BASE-TX Cat.5 UTP cable (100meters max.)

LED indicators   Power status
                      Link/Activity/Speed/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 60^0C
                      Relative humidity   10% to 90% non-condensing

Dimensions   70mm x 160mm x 120mm

Power Requirement +10 ~ +30 VDC

Power Consumption 10 W

2. Installing the Switch

2.1 Unpacking

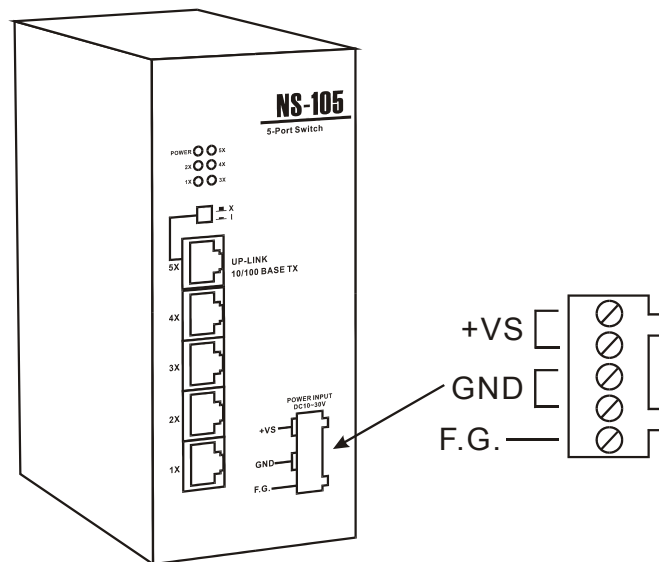Check to see that you have everything before you start the installation.
- Installation guide
- The switch unit

2.2 Checking Power

Since NS-105 consume 10 W power, make sure your power supply can meet this demand.
Input DC voltage range: 10~30V

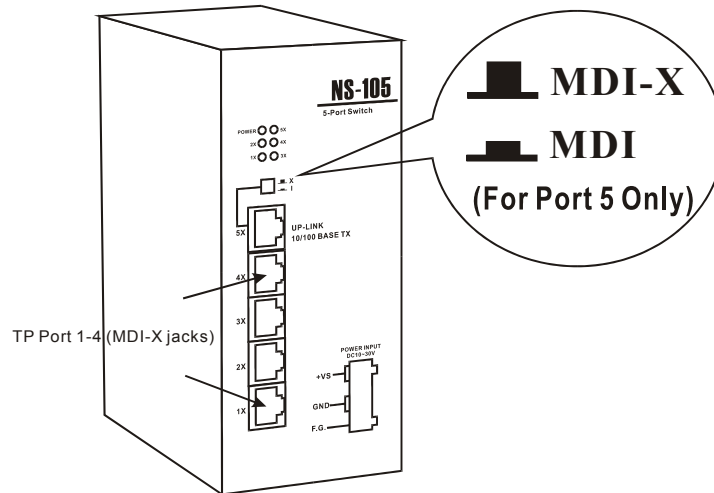The screw terminal of the DC power input is located on the front of the switch as shown below :

Front Panel

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.


- **Five 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.
- **MDI Jack support for Port 5**
  One additional push button is provided for Port 5 to switch MDI-X or MDI. It is useful when using Port 5 as an uplink port and using straight-through UTP cable for the connection to any device.

RJ-45	Pin Definition		Port 1-4	Port 5 (Push Button Setting)
MDI-X	1 2 3 6 4,5,7,8	RX+ RX- TX+ TX- NC	∨	∨
MDI	1 2 3 6 4,5,7,8	TX+ TX- RX+ RX- NC	N/A	∨

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 :
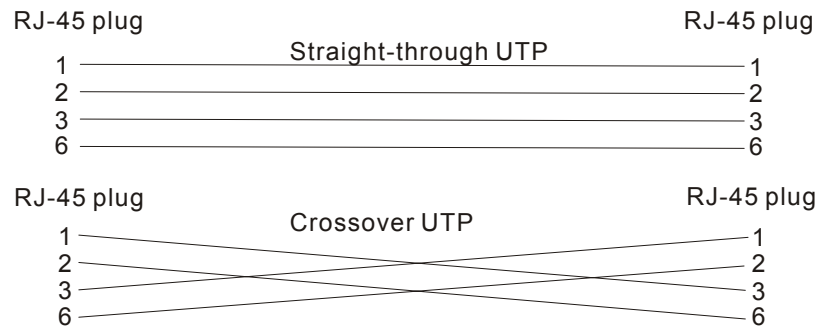
It is suggested to use straight-through UTP cables for all UTP connections. The maximum length and UTP cable categories used for the connections to a 10BASE-T device and 100BASE-TX device are :

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 UTP Connections

The NS-105 switch can support connections to the following devices:

- 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
- Ethernet devices
- Ethernet Embedded controller, such as I-7188EX, I-7188EA, I-8430,I-8431, I-8830, I-8831,I-8437, I-8837, I-8438, I-8838

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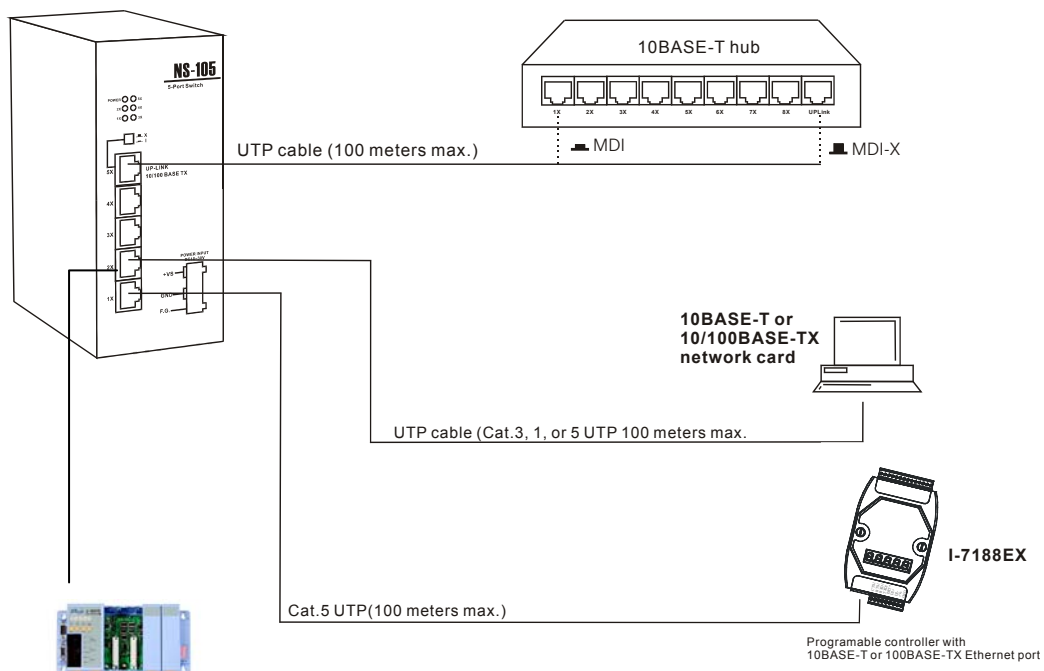
3.4 Operating Mode

All switched 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
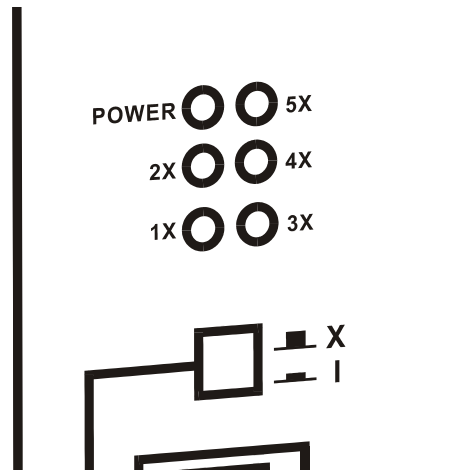*2 determined through auto-negotiation process
*3 speed is determined by auto-sensing function

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

4. LED Indicators

4.1 LED Panel

The NS-105 switch provides comprehensive LED indicators for diagnosing and monitoring the operation of the unit as shown below :

4.2 Interpretation

Each port has three LEDs to indicate the port status including cable link, connection speed, activity, collision and duplex mode. Every port has identical interpretations for the LED display as follows:

LED NAME	STATE	INDICATION
PWR	On	The power to the switch is on.
PWR	Off	The power to the switch is off
Link/Act.	On	An active link is established.
Link/Act.	Blink	Tx or Rx activities.
Link/Act.	On	There is no active link established.
10/100M	On	100Mbps link is established.
10/100M	Off	10Mbps link is established.
FDX/Col.	On	Full duplex is used.
FDX/Col.	Off	Half duplex is used.
FDX/Col.	Blink	Half duplex and collision occurrences.