

# **Industrial 8-Port Fast Ethernet Switches with Fiber Connectivity**

**21.13.1150R**

**21.13.1051R (1ST)**

**21.13.1052R (1SC)**

**21.13.1053R (2ST)**

**21.13.1054R (2SC)**

## **Installation Guide**





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#### **TRADEMARKS**

Ethernet is a registered trademark of Xerox Corp.

#### **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 the instruction manual may cause harmful interference in which case the user will be required to correct the interference at his own expense.

#### **NOTICE:**

- (1) The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
- (2) Shielded interface cables and AC power cord, if any, must be used in order to comply with the emission limits.

#### **CISPR A COMPLIANCE:**

This device complies with EMC directive of the European Community and meets or exceeds the following technical standard.

EN 55022 - Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment. This device complies with CISPR Class A.

**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.

#### **CE NOTICE**

Marking by the symbol  indicates compliance of this equipment to the EMC directive of the European Community. Such marking is indicative that this equipment meets or exceeds the following technical standards:

EN 55022: Limits and Methods of Measurement of Radio Interference characteristics of Information Technology Equipment.

EN 50082/1: Generic Immunity Standard -Part 1: Domestic Commercial and Light Industry.

EN 60555-2: Disturbances in supply systems caused by household appliances and similar electrical equipment - Part 2: Harmonics.

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# 1. Introduction

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The NSD-800 series is 8-port full wire speed Fast Ethernet switches for industrial applications. Depending on the fiber connectivity, the series is provided in three types of configuration as follows:

| <u>Model series</u> | <u>10/100TX TP Ports</u> | <u>100FX fiber ports</u> |
|---------------------|--------------------------|--------------------------|
| 1150R               | 8 ports                  | -                        |
| 1151R/1152R         | 8 ports                  | 1 port                   |
| 1153R/1154R         | 8 ports                  | 2 ports                  |



The switches provide the following advantages:

## **Plug and Play**

The switches provide eight 10/100TX copper ports for connections to Ethernet devices or 100Mbps Fast Ethernet devices. With the featured auto-negotiation function, the switches can detect and configure the connection speed and duplex automatically. The switches also provide auto MDI/MDI-X function, which can detect the connected cable and switch the transmission wire pair and receiving pair automatically. This auto-crossover function can simplify the type of network cables used.

## **Selectable Copper/Fiber Connections**

The 100FX fiber ports can support 100Mbps fiber connection using optic fiber cable and extend a network connection up to several kilometers via fiber cables. The 100TX ports are designed to share the same switched ports with the associated 10/100TX copper ports. It means the switched port supports dual network media types, either copper cable or fiber cable.

## **Designed for Industrial Applications**

For industrial environment, the switches are designed with the following enhanced features:

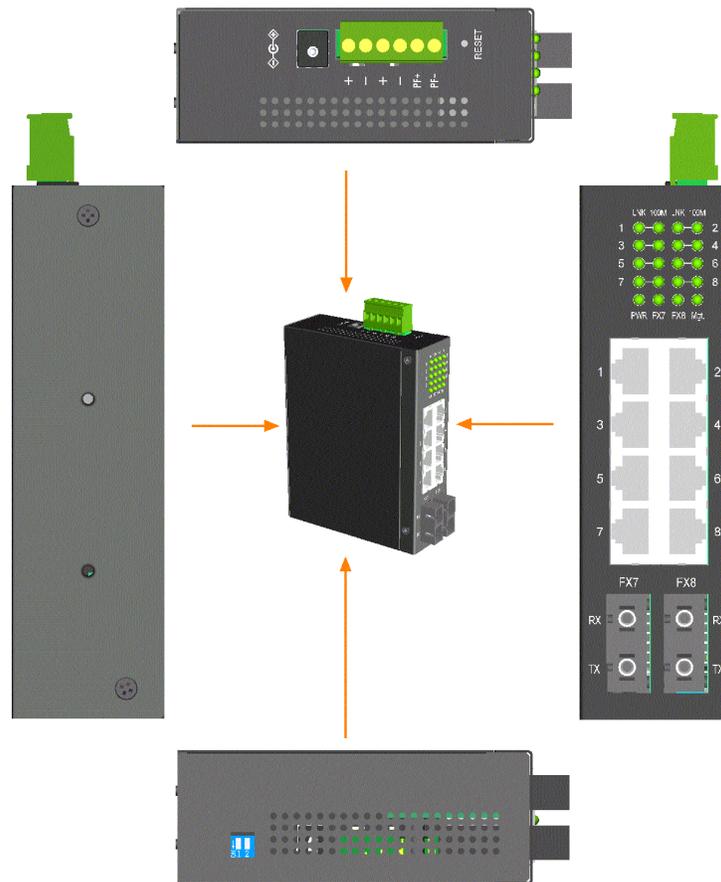
- High and wide operating Temperature
- Wide operating voltage range for DC power input
- Power input interface: Screw terminal block and DC jack for adapter
- Relay output for device power failure alarm
- DIN rail mounting support for industrial enclosure
- Panel mounting support for industrial enclosure

## 1.1 Features

- Fast Ethernet switch with 8 10/100TX copper ports
- Auto MDI/MDI-X detection on all 10/100TX ports
- Auto-negotiation capable on all 10/100TX ports
- 100FX slots support wide range of fiber options
  - ST, SC connectors
  - Multi-mode fiber, Single mode duplex fiber
- Far End Fault function on 100FX ports
- Back pressure flow control for half duplex operation
- IEEE 802.3x flow control for full duplex operation
- Broadcast storm protection function
- Provides comprehensive LED indication
- Support DIN-rail and panel mounting

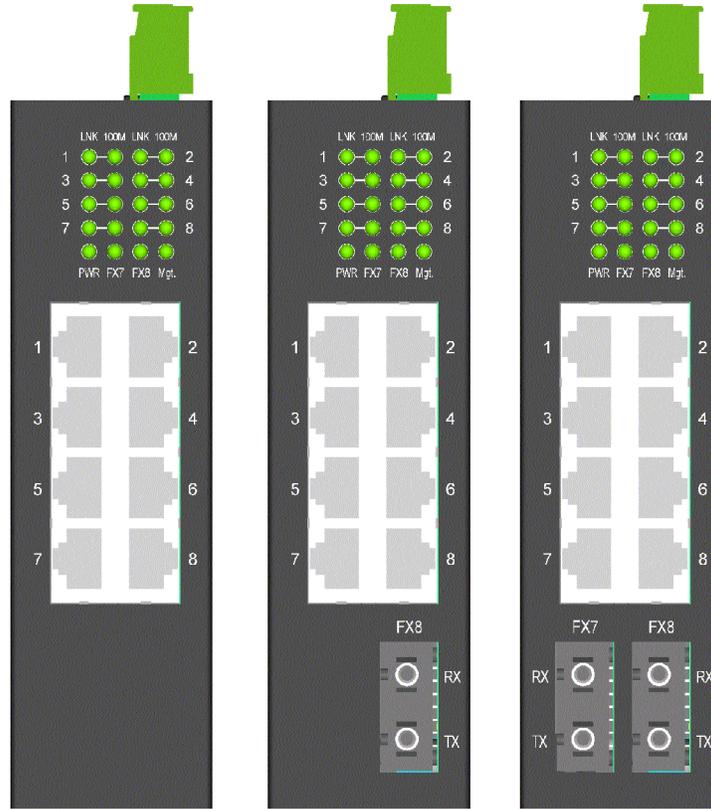
## 1.2 Product Panels

The following figure illustrates three major panels of model 800-2 series as example:



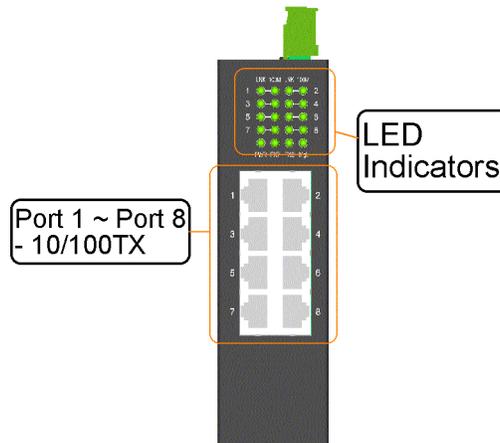
### 1.3 Front Panel

The figure below shows the individual front panel of three model series. The main difference is the number of the equipped fiber ports.

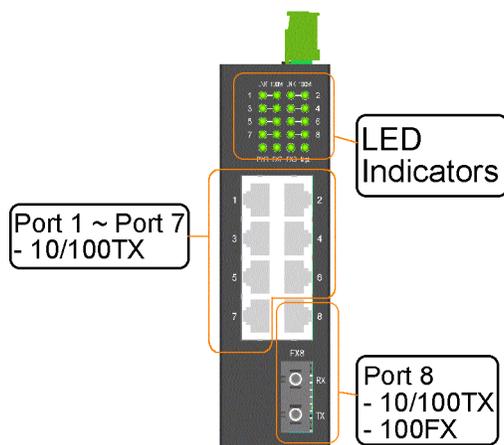


### 1.4 Network Ports

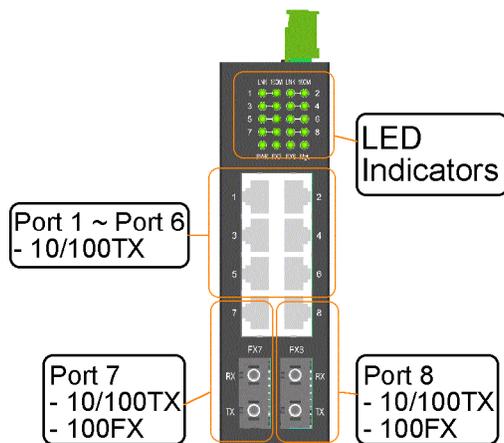
Model 1150R provides eight 10/100TX copper ports only. No fiber connectivity is equipped.



**Model 1151R/1152R** provide eight 10/100TX copper ports and one 100FX fiber connector on Port 8.



**Model 1153R/1154R series** provide eight 10/100TX copper ports and one 100FX fiber connector on Port 7 and Port 8 respectively.

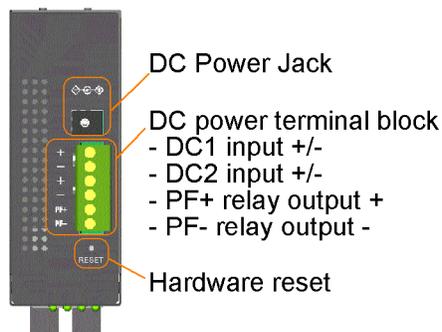


## 1.5 LED Indicators

| <b>LED</b> | <b>Function</b>  |
|------------|--|
| PWR        | Power status   |
| LNK        | Network port link status (per port)                          |
| 100M       | Network port speed status (per port)                         |
| FX7        | Fiber port link status (if fiber port is equipped on Port 7) |
| FX8        | Fiber port link status (if fiber port is equipped on Port 8) |
| Mgt.       | Factory reserved   |

## 1.6 Top Panel

All three model series provide same top panel as figure shown below:



The main functions are:

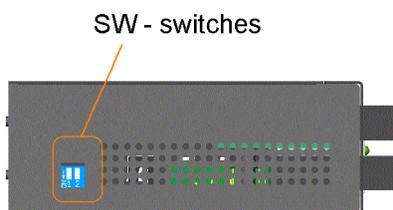
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|                |  |
|----------------|--|
| DC Power Jack  | This connector is used when a AC-DC power adapter is used as a power source to the switch.   |
| Terminal Block | This connector provides the following interfaces:<br>DC1 Positive(+) and Negative(-) - VDC power input from power system<br>DC2 Positive(+) and Negative(-) - VDC power cascaded to next device<br>PF Positive(+) and Negative(-) - Power failure relay output |
| Reset          | Hardware reset push button   |

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## 1.7 Bottom Panel

All three model series provide same bottom panel as figure shown below:



The switch block SW is used for selecting the media connector type for Port 7 and Port 8.

| <b><u>Model</u></b> | <b><u>SW</u></b> | <b><u>ON Position</u></b> | <b><u>OFF Position</u></b> |
|---------------------|------------------|---------------------------|----------------------------|
| 1150R               | SW1              | -                         | Reserved                   |
|                     | SW2              | -                         | Reserved                   |
| 1151R/1152R         | SW1              | -                         | Reserved                   |
|                     | SW2              | Select FX8                | Select 10/100TX RJ-45 TP8  |
| 1153R/1154R         | SW1              | Select FX7                | Select 10/100TX RJ-45 TP7  |
|                     | SW2              | Select FX8                | Select 10/100TX RJ-45 TP8  |

## 1.8 Specifications

### Network Ports

| <u>Switched Port Number</u> | <u>Model 1150R</u> | <u>1151R/1152R</u> | <u>1153R/1154R</u>         |
|-----------------------------|--------------------|--------------------|----------------------------|
| Port 1                      | 10/100TX           | 10/100TX           | 10/100TX                   |
| Port 2                      | 10/100TX           | 10/100TX           | 10/100TX                   |
| Port 3                      | 10/100TX           | 10/100TX           | 10/100TX                   |
| Port 4                      | 10/100TX           | 10/100TX           | 10/100TX                   |
| Port 5                      | 10/100TX           | 10/100TX           | 10/100TX                   |
| Port 6                      | 10/100TX           | 10/100TX           | 10/100TX                   |
| Port 7                      | 10/100TX           | 10/100TX           | 10/100TX                   |
| Port 8                      | 10/100TX           | 10/100TX<br>100FX  | 100FX<br>10/100TX<br>100FX |

Note: 10/100TX - TP RJ-45, 100FX - Fiber

### 10/100TX Twisted Pair Ports (TP)

|                   |   |
|-------------------|---|
| Compliance        | IEEE 802.3 10BASE-T, IEEE 802.3u 100BASE-TX   |
| Connectors        | Shielded RJ-45 jacks  |
| Pin assignments   | Auto MDI/MDI-X detection  |
| Configuration     | Auto-negotiation  |
| Transmission rate | 10Mbps, 100Mbps   |
| Duplex support    | Full/Half duplex  |
| Flow control      | IEEE 802.3x pause frame base for full duplex operation<br>Back pressure for half duplex operation |
| Network cable     | Cat.5 UTP   |

### 100FX Fiber Ports

|                        |  |
|------------------------|--|
| Compliance             | IEEE 802.3u 100BASE-FX   |
| Configuration          | Forced 100Mbps, Full duplex  |
| Transmission rate      | 100Mbps  |
| Far end fault function | Capable to receive FEFI (far end fault indication) signal<br>Capable to send FEFI signal when Rx link failure detected |
| Flow control           | IEEE 802.3x pause frame base for full duplex operation<br>Back pressure for half duplex operation                      |
| Network cables         | MMF 50/125 60/125, SMF 9/125   |
| Eye safety             | IEC 825 compliant  |

### **Switch Functions**

|                        |  |
|------------------------|--|
| MAC Addresses Table    | 1K entries   |
| Forwarding & filtering | Non-blocking, full wire speed<br>10Mbps - 14,880 pps at 64-byte packets<br>100Mbps - 148,800pps at 64-byte packets |
| Switching technology   | Store and forward  |
| Maximum packet length  | 1536 bytes   |
| Broadcast storm        | 64 consecutive broadcast packets in 800ms<br>Protection by dropping broadcast storm packets                        |

### **LED Indicators**

|                   |  |
|-------------------|--|
| System            | Power status                               |
| Per 10/100TX port | TP port link/activity status, speed status |
| Per 100FX port    | FX port link status                        |

### **DC Power Input**

|                          |   |                                     |
|--------------------------|---|-------------------------------------|
| Interfaces               | Euro type terminal block contacts<br>(DC1 DC2 : 2 sets for power wire cascading)<br>DC Jack ( -D 6.3mm / + D 2.0mm) |                                     |
| Operating Input Voltages | +7V ~ +30V(+5%)   |                                     |
| Power consumption        | Model 1150R   | 4.7W/7.5VDC input, 5.0W/30VDC input |
|                          | Model 1151R/1152R   | 5.3W/7.5VDC input, 5.6W/30VDC input |
|                          | Model 1153R/1154R   | 7.1W/7.5VDC input, 7.3W/30VDC input |

### **Mechanical**

|                  |  |
|------------------|--|
| Dimension (base) | 140 x 106 x 40 mm                                  |
| Housing          | Enclosed metal with no fan                         |
| Mounting         | Support DIN-rail mounting, Panel mounting          |
| Weight           | Model 800 455g, Model 800-1 465g, Model 800-2 475g |

### **Environmental**

|                       |                      |
|-----------------------|----------------------|
| Operating Temperature | Typical -20°C ~ 70°C |
| Storage Temperature   | -20°C ~ 85°C         |
| Relative Humidity     | 5% ~ 90%             |

### **Electrical Approvals**

|     |                      |
|-----|----------------------|
| FCC | Part 15 rule Class A |
| CE  | EMC, CISPR22 Class A |

## 1.9 Model Definitions

| <b>Model</b> | <b>FX Connectors</b> | <b>Wavelength (nm)</b> | <b>Reference Fiber Distance</b> | <b>Operating Temperature</b> |
|--------------|----------------------|------------------------|---------------------------------|------------------------------|
| 1151R        | FX8 : ST MMF         | 1310                   | 2 km                            | -10 ~ 70°C                   |
| 1152R        | FX8 : SC MMF         | 1310                   | 2 km                            | -10 ~ 70°C                   |
| 1153R        | FX7 : ST MMF         | 1310                   | 2 km                            | -10 ~ 70°C                   |
|              | FX8 : ST MMF         | 1310                   | 2 km                            | -10 ~ 70°C                   |
| 1154R        | FX7 : SC MMF         | 1310                   | 2 km                            | -10 ~ 70°C                   |
|              | FX8 : SC MMF         | 1310                   | 2 km                            | -10 ~ 70°C                   |

## Optical Specifications

| <b>Model</b> | <b>FX Connectors</b> | <b>WaveL.<br/>(nm)</b> | <b>TX Power<br/>(dBm)</b> | <b>Rx Sens.<br/>(dBm)</b> | <b>Rx max.<br/>(dBm)</b> |
|--------------|----------------------|------------------------|---------------------------|---------------------------|--------------------------|
| 1151R        | FX8 : ST MMF         | 1310                   | -19 ~ -14                 | -31 max.                  | -14 min.                 |
| 1152R        | FX8 : SC MMF         | 1310                   | -19 ~ -14                 | -31 max.                  | -14 min.                 |
| 1153R        | FX7 : ST MMF         | 1310                   | -19 ~ -14                 | -31 max.                  | -14 min.                 |
|              | FX8 : ST MMF         | 1310                   | -19 ~ -14                 | -31 max.                  | -14 min.                 |
| 1154R        | FX7 : SC MMF         | 1310                   | -19 ~ -14                 | -31 max.                  | -14 min.                 |
|              | FX8 : SC MMF         | 1310                   | -19 ~ -14                 | -31 max.                  | -14 min.                 |

WaveL. : Wavelength, Rx Sens. : Rx sensitivity, Rx max. : Maximum Rx power

## 2. Installation

---

### 2.1 Unpacking

The product package contains:

- The switch unit
- One DIN-rail mounting kit
- One product CD-ROM

### 2.2 Safety Cautions

To reduce the risk of bodily injury, electrical shock, fire, and damage to the equipment, observe the following precautions.

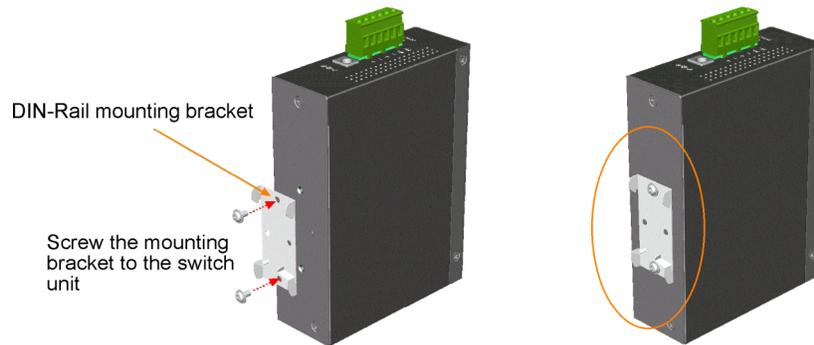
- Do not service any product except as explained in your system documentation.
- Opening or removing covers may expose you to electrical shock.
- Only a trained service technician should service components inside these compartments.
- If any of the following conditions occur, unplug the product from the electrical outlet and replace the part or contact your trained service provider:
  - The power cable, extension cable, or plug is damaged.
  - An object has fallen into the product.
  - The product has been exposed to water.
  - The product has been dropped or damaged.
  - The product does not operate correctly when you follow the operating instructions.
- Do not push any objects into the openings of your system. Doing so can cause fire or electric shock by shorting out interior components.
- Operate the product only from the type of external power source indicated on the electrical ratings label. If you are not sure of the type of power source required, consult your service provider or local power company.

## 2.3 DIN-Rail Mounting

In the product package, a DIN-rail bracket is provided for mounting the switch in a industrial DIN-rail enclosure.

The steps to mount the switch onto a DIN rail are:

1. Install the mounting bracket onto the switch unit as shown below:



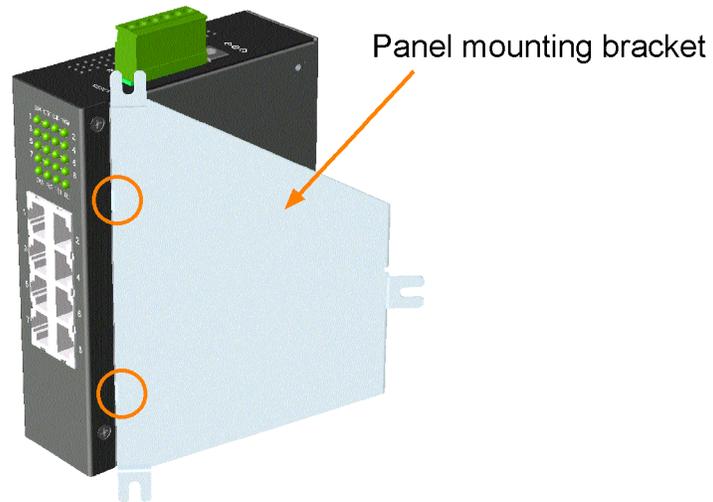
2. Attach bracket to the lower edge of the DIN rail and push the unit upward a little bit until the bracket can clamp on the upper edge of the DIN rail.
3. Clamp the unit to the DIN rail and make sure it is mounted securely.



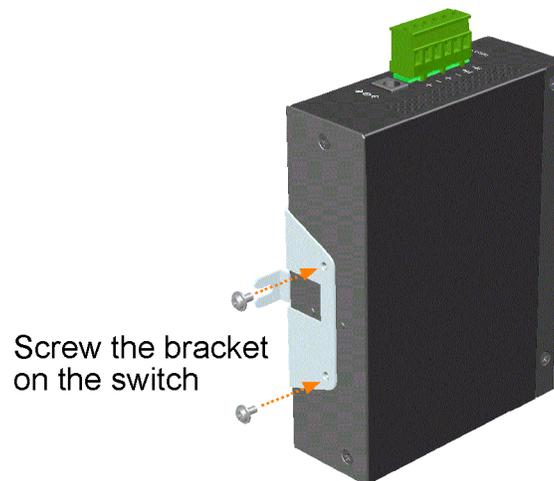
## 2.4 Panel Mounting

The switches are provided with an optional panel mounting bracket. The bracket support mounting the switch on a plane surface securely. The mounting steps are:

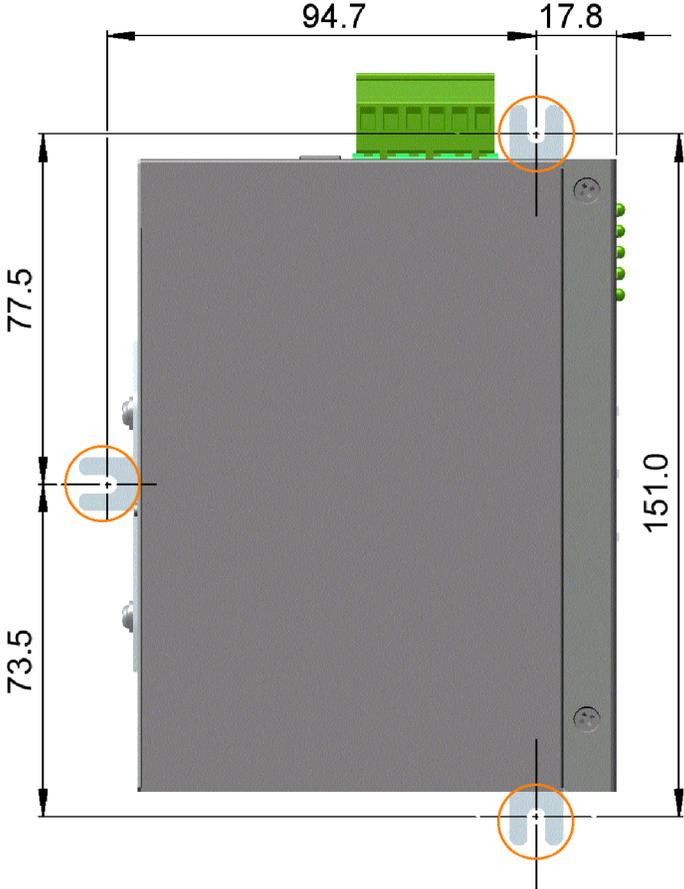
1. Install the mounting bracket on the switch unit.



2. Screw the bracket on the switch unit.



3. Screw the switch unit on a panel. Three screw locations are shown below:

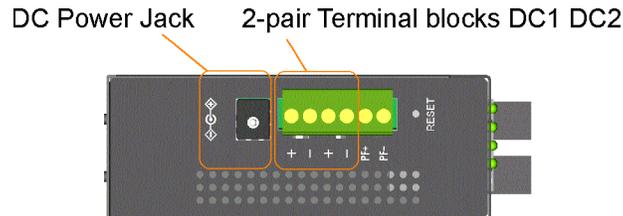


## 2.5 Applying Power

The power specifications of the switch are:

Operating Voltage    +7 ~ +30VDC  
Power Consumption    Max. 7.3W @30VDC

The switch provides two types of power interfaces, terminal block and DC power jack for receiving DC power input from external power supply.



### Using Terminal Blocks

Either DC1 interface or DC2 interface can be used to receive DC power from an external power system. Or, DC2 also can be used to deliver the power received on DC1 to next switch in cascading way.

DC1 +        Vdc Positive (+) terminal

DC1 -        Vdc Negative (-) terminal

DC2 +        Vdc Positive (+) terminal

DC2 -        Vdc Negative (-) terminal

Three 2P terminal plugs are provided together with the switch. Two of the three plugs are used for DC1 and DC2 interfaces respectively. The plug is shown below:



Power wires : 24 ~ 12AWG (IEC 0.5~2.5mm<sup>2</sup>)

Install the power source wires with the plug properly. Then, plug in DC1 contacts. If cascading the power to next switch device is needed, install the power wires and plug for another switch. Then, use DC2 contacts.

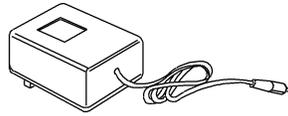
*Note: Only up to four device units can be cascaded to receive power from one main power input source.*

## Using DC Power Jack

When an external power system is not available, the switch provides a DC jack to receive power from typical AC-DC power adapter alternatively.



AC Power Adapters: Optional commercial rated adapters are available for purchasing.

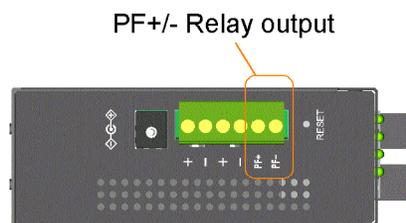


Rated AC120V/60Hz DC7.5V 1A  
Rated AC230V/50Hz DC7.5V 1A  
Rated AC100V/50-60Hz DC7.5V 1A  
Rated AC240V/50Hz DC7.5V 1A

*Note: Before you begin the installation, check the AC voltage of your area. The AC power adapter which is used to supply the DC power for the unit should have the AC voltage matching the commercial power voltage in your area.*

## 2.6 Power Failure Relay Output

The switch provides a relay output to report power failure event to a remote alarm monitoring system. The relay output is provided with two contacts in the terminal block next DC2 interface.

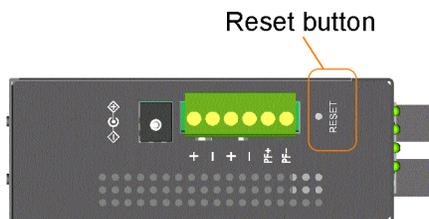


Use the provided 2P terminal plug for signal wiring and plug into the PF+/- contacts. The function is designed as :

Power is normal    PF+ contact is shorted with PF- contact.  
Power failure      PF+ contact is disconnected with PF- contact.

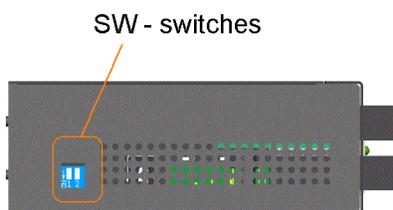
*Note: Be sure the voltage applied on PF+/- contacts is within the specification of 30VDC/1A max. or 120VAC/0.5A max.*

## 2.7 Reset Button



The reset button is used to perform a hardware reset to the switch. It is not used in normal cases and can be used for diagnostic purpose. If any network hanging problem is suspected, it is useful to push the button to reset the switch without turning off the power. Check whether the network is recovered.

## 2.8 Selecting UTP or Fiber



If the switch is equipped with FX7 port or FX8 port, it is required to select the media type to be used for the switched Port 7 and Port 8. Set the setting SW which is located on bottom panel to make the selection.

| <b><u>Model</u></b> | <b><u>SW</u></b> | <b><u>ON</u></b> | <b><u>OFF</u></b>    |
|---------------------|------------------|------------------|----------------------|
| 1150R               | SW1              | -                | Reserved             |
|                     | SW2              | -                | Reserved             |
| 1151R/1152R         | SW1              | FX8              | TP8 (10/100TX RJ-45) |
|                     | SW2              | -                | Reserved             |
| 1153R/1154R         | SW1              | FX8              | TP8 (10/100TX RJ-45) |
|                     | SW2              | FX7              | TP7 (10/100TX RJ-45) |

*Note: Do not change the reserved states specified in the above table.*

## 2.9 Making UTP Connections

The 10/100TX ports supports the following connection types and distances:

### Network Cables

10BASE-T: 2-pair UTP Cat. 3,4,5 , EIA/TIA-568B 100-ohm

100BASE-TX: 2-pair UTP Cat. 5, EIA/TIA-568B 100-ohm

Link distance: Up to 100 meters

The ports are equipped with auto MDI/MDI-X function and auto-negotiation function for the UTP connection.

### Auto MDI/MDI-X Function

This function allows the port to auto-detect the twisted-pair signals and adapts itself to form a valid MDI to MDI-X connection with the remote connected device automatically. No matter a straight through cable or crossover cable is connected, the ports can sense the receiving pair automatically and configure itself to match the rule for MDI to MDI-X connection. It simplifies the cable installation.

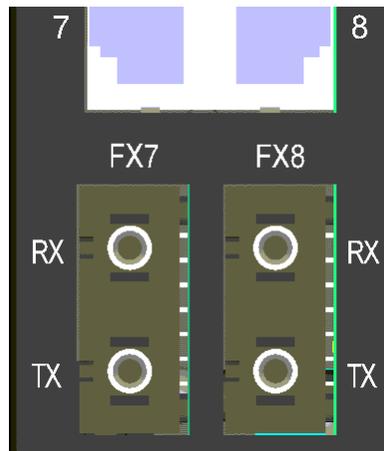
### Auto-negotiation Function

The ports are featured with auto-negotiation function and full capability to support connection to :

- Auto-negotiation devices
- Auto-negotiation incapable 10BASE-T devices
- Auto-negotiation incapable 100BASE-TX devices

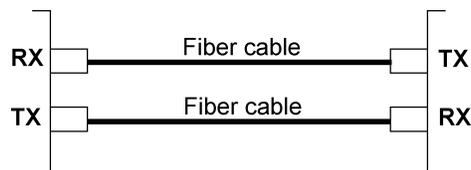
It performs a negotiation process for the speed and duplex configuration with the connected device automatically when each time a link is being established. If the connected device is also auto-negotiation capable, both devices will come out the best configuration after negotiation process. If the connected device is incapable in auto-negotiation, the switch will sense the speed and use half duplex for the connection.

## 2.10 Making Fiber Connections



FX7 port and FX8 port operate on 100Mbps and full duplex.

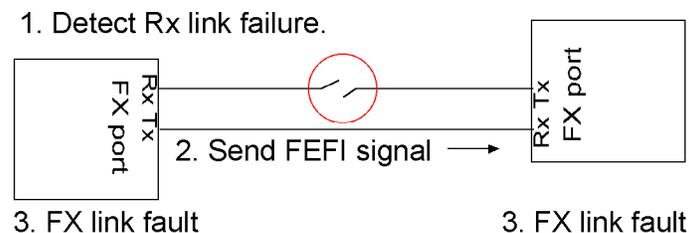
The following figure illustrates a connection example between two fiber ports:



Make sure the Rx-to-Tx connection rule is followed on the both ends of the fiber cable.

### Far End Fault Function

The FX ports are facilitated with this function, which conforms to IEEE 802.3u 100BASE-FX specifications. When the FX port detects a link failure on its receiving circuitry, it will send out an FEFI (Far End Fault Indication) signal to the remote connected device to indicate a remote fault is detected. It also is capable to receive FEFI signal sent from the remote link partner. Upon receiving an FEFI signal, it indicates a link failure occurred on the transmitting path. This function allows the switch to report a fiber link fault even when a link failure occurred on transmitting fiber cable.

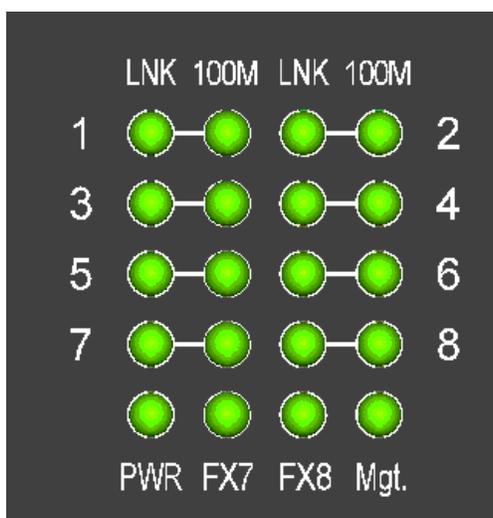


### Network Cables

Multimode (MMF) - 50/125, 62.5/125

Single mode (SMF) - 9/125

## 2.11 LED Indication



| LED  | Function          | State | Interpretation  |
|------|-------------------|-------|---|
| PWR  | Power status      | ON    | The power is supplied to the switch.                    |
|      |                   | OFF   | The power is not supplied to the switch.                |
| LNK  | Port link status  | ON    | An active link is established on the port. (No traffic) |
|      |                   | BLINK | Port link is up and there is traffic.                   |
|      |                   | OFF   | Port link is down.                                      |
| 100M | Port speed status | ON    | 100Mbps   |
|      |                   | OFF   | 10Mbps  |
| FX7  | FX7 link status   | ON    | FX7 port is link up.                                    |
|      |                   | BLINK | Port link is up and there is traffic.                   |
|      |                   | OFF   | Port link is down.                                      |
| FX8  | FX8 link status   | ON    | FX8 port is link up.                                    |
|      |                   | BLINK | Port link is up and there is traffic.                   |
|      |                   | OFF   | Port link is down.                                      |
| Mgt. | Factory Reserved  |       | Ignore the indication.                                  |

*Note: FX7 LED is reserved and can be ignored for Model 800 and Model 800-1 series.  
FX8 LED is reserved and can be ignored for Model 800.*