

5-Port 10/100Mbps with 4-Port PoE

Industrial Fast Ethernet Switch

ISW-504PT / ISW-514PT / ISW-514PT15 / ISW-514PTF

User's Manual

Trademarks

Copyright © PLANET Technology Corp. 2010

Contents subject revision without prior notice

PLANET is a registered trademark of PLANET Technology Corp. All other trademarks belong to their respective owners.

Disclaimer

PLANET Technology does not warrant that the hardware will work properly in all environments and applications, and makes no warranty and representation, either implied or expressed, with respect to the quality, performance, merchantability, or fitness for a particular purpose.

PLANET has made every effort to ensure that this User's Manual is accurate; PLANET disclaims liability for any inaccuracies or omissions that may have occurred.

Information in this User's Manual is subject to change without notice and does not represent a commitment on the part of PLANET. PLANET assumes no responsibility for any inaccuracies that may be contained in this User's Manual. PLANET makes no commitment to update or keep current the information in this User's Manual, and reserves the right to make improvements to this User's Manual and/or to the products described in this User's Manual, at any time without notice.

If you find information in this manual that is incorrect, misleading, or incomplete, we would appreciate your comments and suggestions.

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 the Instruction manual, 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.

WEEE Warning



To avoid the potential effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment, end users of electrical and electronic equipment should understand the meaning of the crossed-out wheeled bin symbol. Do not dispose of WEEE as unsorted municipal waste and have to collect such WEEE separately.

Revision

PLANET 5-Port 10/100Mbps with 4-Port PoE Industrial Fast Ethernet Switch – Wide Temperature User's Manual

For ModelS: ISW-504PT / ISW-514PT / ISW-514PT15 / ISW-514PTF

Revision: 1.0 (July, 2010)

Part No: EM-ISW-5XXPT Series_v1.0 (2350-AH0230-000)

Table of Contents

1. Introduction.....	5
1.1 Package Contents	5
1.2 How to Use This Manual.....	5
1.3 Product Features.....	6
2. Installation	11
2.1 Product Description	11
2.1.1 Switch Front Panel	12
2.1.2 LED Indicators	12
2.1.3 Switch Upper Panel	13
2.1.4 Wiring the Power Inputs	14
2.1.5 Wiring the Fault Alarm Contact.....	15
2.2 Mounting Installation.....	15
2.2.1 Install DIN-Rail Mounting	16
3. Application.....	18
3.1 Installation Steps.....	19
4. Switch Operation.....	20
4.1 Address Table.....	20
4.2 Learning	20
4.3 Forwarding & Filtering	20
4.4 Store-and-Forward.....	21
4.5 Auto-Negotiation	21
5. Troubleshooting.....	22
APPENDIX A: Networking Connection.....	23
A.1 Switch's RJ-45 Pin Assignments	23
A.2 RJ-45 cable Pin Assignments	23

1. Introduction

1.1 Package Contents

Check the contents of your package for following parts:

- Industrial Fast Ethernet Switch x 1
- User's Manual x 1
- DIN Rail Kit x 1
- Wall Mount Kit x 1

If any of these are missing or damaged, please contact your dealer immediately, if possible, retain the carton including the original packing material, and use them against to repack the product in case there is a need to return it to us for repair.

1.2 How to Use This Manual

This Industrial Fast Ethernet Switch User Manual is structured as follows:

Chapter 2 Installation

The chapter explains the feature, functionality and the physical installation of the Industrial Fast Ethernet Switch.

Chapter 3 Application

The chapter explains the Industrial Fast Ethernet Switch application.

Chapter 4 Switch operation

The chapter explains the Industrial Fast Ethernet Switch transmit operation.

Chapter 5 Troubleshooting

The chapter explains the troubleshooting of the Industrial Fast Ethernet Switch.

Appendix A

This chapter contains cable information of the Industrial Fast Ethernet Switch.

1.3 Product Features

Physical Port

Model Name	Ports		Fiber Optical Interface		
	Copper	Optical	Mode	Connector	Distance
ISW-504PT	5 x 10 / 100Base-TX	NA	NA	NA	NA
ISW-514PT	4 x 10 / 100Base-TX	1 x 100Base-FX	Multi-Mode	SC	2km
ISW-514PT15			Single-Mode	SC	15km
ISW-514PTF			Optional SFP Module	LC	Depend on SFP Module

IEEE 802.3af PoE

- ☐ Comply with IEEE 802.3af Power over Ethernet End-Span PSE
- ☐ Up to 4 IEEE 802.3af devices powered
- ☐ Support PoE Power up to 15.4 Watts for each PoE port
- ☐ Auto detect powered device (PD)
- ☐ Circuit protection prevent power interference between ports
- ☐ Remote power feeding up to 100m

Layer 2 Features

- ☐ Complies with IEEE 802.3 10Base-T, IEEE 802.3u 100Base-TX / 100Base-FX Ethernet standard
- ☐ Supports Auto-Negotiation, 10/100Mbps Half / Full Duplex and Auto MDI/MDI-X
- ☐ High performance Store and Forward architecture, Runt/CRC filtering eliminates erroneous packets to optimize the network bandwidth
- ☐ Prevents packet loss with Back Pressure (Half-Duplex) and IEEE 802.3x PAUSE Frame Flow Control (Full-Duplex)
- ☐ Backplane (Switching Fabric): 1Gbps
- ☐ Automatic address learning and address aging

- ☐ Integrated address look-up engine, support 2K absolute MAC addresses
- ☐ CSMA/CD Protocol

Industrial Case / Installation

- ☐ IP-30 Aluminum Metal case / Protection
- ☐ DIN Rail and Wall Mount Design
- ☐ Redundant Power Design: 24 or 48V DC, redundant power with polarity reverse protect function
- ☐ Supports EFT protection 6000V DC for power line
- ☐ Supports 6000V DC Ethernet ESD protection
- ☐ -40 to 75°C operating temperature

1.4 Product Specifications

Model	ISW-504PT	ISW-514PT
Hardware Specification		
10/100Base-TX Ports	5	4
100Base-FX interface	N/A	1
IEEE 802.3af PoE ports	4	4
Dimensions (W x D x H)	135mm x 87.8mm x 56mm	
Weight	842g	
Power Requirement	24 or 48V DC	
Installation	DIN Rail Kit and Wall Mount Ear	
Power over Ethernet		
PoE Standard	IEEE 802.3af Power over Ethernet / PSE	
PoE Power Supply Type	End-Span	
PoE Power Output	48V DC Per Port, 350mA. Max. 15.4 Watts	
Power Pin Assignment	1/2(+), 3/6(-)	

Switch Specification		
Switch Processing Scheme	Store-and-Forward	
Address Table	2K entries	
Flow Control	Back Pressure for Half Duplex IEEE 802.3x Pause Frame for Full Duplex	
Switch fabric	1Gbps	
Throughput (Packet per second)	0.74Mpps	
Network cables	1. 10/100Base-TX: Cat. 3, 4, 5, 5e, 6 UTP cable (100meters max.) 2. EIA/TIA-568 100-ohm STP (100meters max.)	1. 10/100Base-TX: Cat. 3, 4, 5, 5e, 6 UTP cable (100meters max.) 2. EIA/TIA-568 100-ohm STP (100meters max.) 3. Multi-mode optic fiber 62.5/125μm, 50/125μm (2km max.)
Standards Conformance		
Standards Compliance	IEEE 802.3 Ethernet IEEE 802.3u Fast Ethernet IEEE 802.3x Full-Duplex Flow Control IEEE 802.3af Power over Ethernet	
Temperature	Operating: -40 to 75 Degree C Storage: -40 to 85 Degree C	
Humidity	Operating: 5~90% Storage: 5~90% (Non-condensing)	
Regulation Compliance	FCC Part 15 Class A, CE	
Stability testing	IEC60068-2-32 (Free Fall) IEC60068-2-27 (Shock) IEC60068-2-6 (Vibration)	

Model	ISW-514PT15	ISW-514PTF
Hardware Specification		
10/100Base-TX Ports	4	4
100Base-FX interface	1	1
IEEE 802.3af PoE ports	4	4
Dimensions (W x D x H)	135mm x 87.8mm x 56mm	
Weight	842g	
Power Requirement	24 or 48V DC	
Installation	DIN Rail Kit and Wall Mount Ear	
Power over Ethernet		
PoE Standard	IEEE 802.3af Power over Ethernet / PSE	
PoE Power Supply Type	End-Span	
PoE Power Output	48V DC Per Port, 350mA. Max. 15.4 Watts	
Power Pin Assignment	1/2(+), 3/6(-)	
Switch Specification		
Switch Processing Scheme	Store-and-Forward	
Address Table	2K entries	
Flow Control	Back Pressure for Half Duplex IEEE 802.3x Pause Frame for Full Duplex	
Switch fabric	1Gbps	
Throughput (packet per second)	0.74Mpps	

Network cables	1. 10/100Base-TX: Cat. 3, 4, 5, 5e, 6 UTP cable (100meters max.) 2. EIA/TIA-568 100-ohm STP (100meters max.) 3. Single-mode optic fiber 9 / 125μm (15km max.)	1. 10/100Base-TX: Cat. 3, 4, 5, 5e, 6 UTP cable (100meters max.) 2. EIA/TIA-568 100-ohm STP (100meters max.) 3. 50 / 125μm or 62.5 / 125μm multi-mode, 9 / 125μm single-mode cable (Vary on SFP Module)
Standards Conformance		
Standards Compliance	IEEE 802.3 Ethernet IEEE 802.3u Fast Ethernet IEEE 802.3x Full-Duplex Flow Control IEEE 802.3af Power over Ethernet	
Temperature	Operating: -40 to 75 Degree Storage: -40 to 85 Degree	
Humidity	Operating: 5~90% Storage: 5~90% (Non-condensing)	
Regulation Compliance	FCC Part 15 Class A, CE	
Stability testing	IEC60068-2-32 (Free Fall) IEC60068-2-27 (Shock) IEC60068-2-6 (Vibration)	

2. Installation

This section describes the functionalities of the Industrial Fast Ethernet Switch's components and guides how to install it on the desktop. Basic knowledge of networking is assumed. Please read this chapter completely before continuing.

In the following section, the term "**Industrial Fast Ethernet Switch**" means the ISW-504PT / ISW-514PT / ISW-514PT15 / ISW-514PTF.

2.1 Product Description

The PLANET ISW-504PT / ISW-514PT / ISW-514PT15 / ISW-514PTF are 5-Port 10/100Mbps with 4-Port PoE unmanaged Industrial Fast Ethernet Switch and provide non-blocking wire-speed performance, IP-30 aluminum metal shape for easily deployment in Heavy Industrial demanding environments.

The PoE in-line power follow the standard IEEE 802.3af and allows to power on 4 PoE compliant devices at the distance up to 100 meters through the 4-pair Cat 5 / 5e UTP wire. With **Data and Power** over Ethernet from one unit, the ISW-504PT / ISW-514PT / ISW-514PT15 / ISW-514PTF shall reduce cables deployment and eliminates the need for dedicated electrical outlets on the wall, ceiling or any unreachable place.

With 1Gbps internal switching fabric, the Industrial Fast Ethernet Switch can handle extremely large amounts of data in a secure topology linking to a backbone or high capacity servers.

The Industrial Fast Ethernet Switch has 2K MAC address table and offers wire-speed packets transfer performance without risk of packet loss. The stable throughput of the device makes it ideal for most Ethernet environments.

All RJ-45 copper interfaces support 10/100Mbps Auto-negotiation for optimal speed detection through RJ-45 Category 3, 4, 5, 5e or 6 cables. Support standard for Auto-MDI/MDI-X that can detect the type of connection to any Ethernet device without requiring special straight or crossover cables.

The Flow Control function allows Industrial Fast Ethernet Switch supported routers and servers to directly connect to this device for fast, reliable data transfer.

2.1.1 Switch Front Panel

Figure 2-1 & 2-2 & 2-3 show a front panel of Industrial Fast Ethernet Switch.

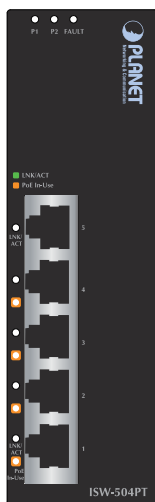


Figure 2-1 ISW-504PT front panel

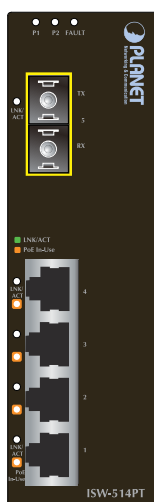


Figure 2-2 ISW-514PT / 514PT15 front panel

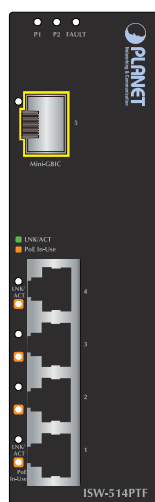


Figure 2-3 ISW-514PTF front panel

2.1.2 LED Indicators

■ System

LED	Color	Function
P1	Green	Indicate the power 1 has power.
P2	Green	Indicate the power 2 has power.
Fault	Green	Indicate the either power 1 or power 2 has no power.

■ Per 10/100Base-TX Port

LED	Color	Function	
Link / ACT	Green	Light	Indicate the link through that port is successfully established at 10 or 100Mbps.
		Blink	Indicate that the Switch is actively sending or receiving data over that port.

■ Per 100Base-FX Port

LED	Color	Function	
Link / ACT	Green	Light	Indicate the link through that port is successfully established at 100Mbps.
		Blink	Indicate that the Switch is actively sending or receiving data over that port.

■ PoE Port

LED	Color	Function
PoE In Use	Orange	Indicate the port is providing 48V DC in-line power. (1-4 ports)

2.1.3 Switch Upper Panel

The upper panel of the Industrial Fast Ethernet Switch consist one terminal block connector within two DC power inputs. Figure 2-4 shows the upper panel of the Industrial Fast Ethernet Switch.

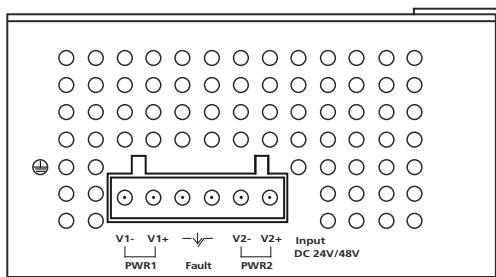
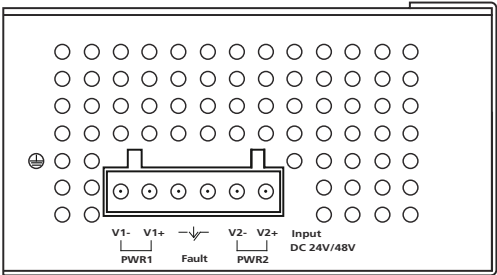


Figure 2-4 Industrial Fast Ethernet Switch upper Panel.

2.1.4 Wiring the Power Inputs

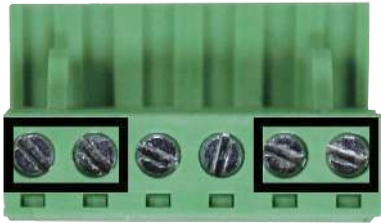
The 6-contact terminal block connector on the top panel of Industrial Fast Ethernet Switch is used for two DC redundant powers input. Please follow the steps below to insert the power wire.

1. Insert positive / negative DC power wires into the contacts 1 and 2 for POWER 1, or 5 and 6 for POWER 2.



V1- V1+ V2- V2+

2. Tighten the wire-clamp screws for preventing the wires from loosening.



1	2	3	4	5	6
Power 1		Fault		Power 2	
-	+			-	+

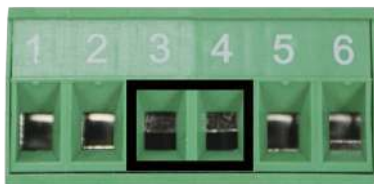


Note

The wire gauge for the terminal block should be in the range between 12 ~ 24 AWG.

2.1.5 Wiring the Fault Alarm Contact

The fault alarm contacts are in the middle of the terminal block connector as the picture shows below. Inserting the wires, the Industrial Fast Ethernet Switch will detect the fault status of the power failure, or port link failure (available for managed model) and then forms an open circuit. The following illustration shows an application example for wiring the fault alarm contacts.

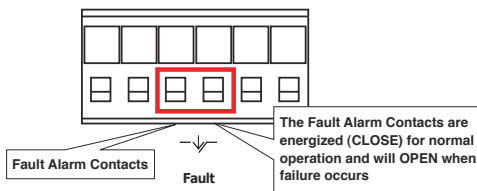


Insert the wires into the fault alarm contacts



Note

1. The wire gauge for the terminal block should be in the range between 12 ~ 24 AWG.
2. Alarm relay circuit accepts up to 30V, max. 3A currents.



2.2 Mounting Installation

This section describes how to install the Industrial Fast Ethernet Switch and make connections to it. Please read the following topics and perform the procedures in the order being presented.



Note

In the installation steps below, this Manual use IGS-801 (PLANET 8 Port Industrial Gigabit Switch) as the example. However, the steps for PLANET Industrial Switch & Industrial Media Converter are similar.

2.2.1 Install DIN-Rail Mounting

The DIN-Rail is screwed on the Industrial Fast Ethernet Switch when out of factory. When need to replace the wall mount application with DIN-Rail application on Industrial Fast Ethernet Switch , please refer to following figures to screw the DIN-Rail on the Industrial Fast Ethernet Switch. To hang the Industrial Fast Ethernet Switch, follow the below steps:



Step 1: Screw the DIN-Rail on the Industrial Fast Ethernet Switch.



Step 2: Lightly press the button of DIN-Rail into the track.



Step 3: Check the DIN-Rail is tightly on the track.

Step 4: Please refer to following procedures to remove the Industrial Fast Ethernet Switch from the track.



Step 5: Lightly press the button of DIN-Rail for remove it from the track.

2.2.2 Wall Mount Plate Mounting

To install the Industrial Fast Ethernet Switch on the wall, please follows the instructions described below.

Step 1: Remove the DIN-Rail from the Industrial Fast Ethernet Switch; loose the screws to remove the DIN-Rail.

Step 2: Place the wall mount plate on the rear panel of the Industrial Fast Ethernet Switch.



Step 3: Use the screws to screw the wall mount plate on the Industrial Fast Ethernet Switch.

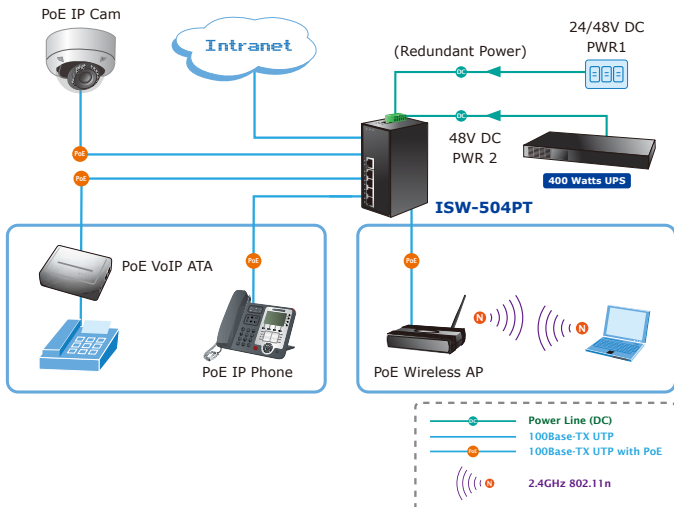
Step 4: Use the hook holes at the corners of the wall mount plate to hang the Industrial Fast Ethernet Switch on the wall.

Step 5: To remove the wall mount plate, reverse steps above.

3. Application

In this paragraph, we will describe how to install Industrial Fast Ethernet Switch and the installation points for the attention.

Providing up to 4 PoE, in-line power interfaces, the Industrial Fast Ethernet Switch can easily build a power central-controlled IP phone system, IP camera system, AP group for the enterprise. For instance, 4 camera / AP can be easily installed around the corner in the company for surveillance demands or build a wireless roaming environment in the offices. Without the power-socket limitation, the switch makes the installation of cameras or WLAN AP more easily and efficiently.



3.1 Installation Steps

- Step 1:** Unpack the Industrial Fast Ethernet Switch.
- Step 2:** Check the DIN-Rail is screwed on the Industrial Fast Ethernet Switch. (Please refer to DIN-Rail Mounting section for DIN-Rail installation. If you want to wall mount the Industrial Fast Ethernet Switch, then please refer to Wall Mount Plate Mounting section for wall mount plate installation.
- Step 3:** To hang the Industrial Fast Ethernet Switch on the DIN-Rail track or wall, please refer to the Mounting Installation section.
- Step 4:** Power on the Industrial Fast Ethernet Switch. (Please refer to the Wiring the Power Inputs section for power input) The power LED on the Industrial Fast Ethernet Switch will light up. Please refer to the LED Indicators section for meaning of LED lights.
- Step 5:** Prepare the twisted-pair, straight through Category 5 cable for Ethernet connection.
- Step 6:** Insert one side of Category 5 cables into the Industrial Fast Ethernet Switch Ethernet port (RJ-45 port) and another side of category 5 cables to the network devices' Ethernet port (RJ-45 port), ex: Switch, PC or Server. The UTP port (RJ-45) LED on the Industrial Fast Ethernet Switch will light up when the cable connected with the network device. Please refer to the LED Indicators section for LED light meaning.



Note

Be sure the connected network devices support MDI/MDI-X. If the network devices do not support MDI/MDI-X, please use the crossover category 5 Cable to connect.

- Step 7:** Insert fiber cable from the ISW-514PT / ISW-514PT15 / ISW-514PTF to the fiber network. The optical port LED on the Industrial Fast Ethernet Switch will light up when the cable connected with network device. Please refer to the LED Indicators section for LED light meaning.
- Step 8:** When all connections are set and the LEDs are light without any issue mean that the installation is complete.

4. Switch Operation

4.1 Address Table

The Industrial Fast Ethernet Switch is implemented with an address table. This address table composed of many entries. Each entry is used to store the address information of some node in network, including MAC address, Port No. and etc. This information comes from the learning process of Industrial Fast Ethernet Switch.

4.2 Learning

When one packet comes from any port of Industrial Fast Ethernet switch, the Industrial Fast Ethernet Switch will record the source address, port no. and the other related information in address table. This information will be used to decide either forwarding or filtering for future packets.

4.3 Forwarding & Filtering

When one packet comes from some port of the Industrial Fast Ethernet Switch, it will also check the destination address besides the source address learning. The Industrial Fast Ethernet Switch will lookup the address-table for the destination address. If not found, this packet will be forwarded to all the other ports except the port which this packet comes in. And these ports will transmit this packet to the network it connected. If found, and the destination address is located at different port from this packet comes in, the Industrial Fast Ethernet Switch will forward this packet to the port where this destination address is located according to the information from address table. But, if the destination address is located at the same port with this packet comes in, then this packet will be filtered.

4.4 Store-and-Forward

Store-and-Forward is one type of packet-forwarding techniques. A Store-and-Forward Industrial Switch stores the incoming frames in an internal buffer and checks any error from the frames before transmission. No error packets occurrence, it is the best choice when a network needs efficiency and stability.

The Industrial Fast Ethernet Switch scans the destination address from the packet-header, searches the routing table provided for the incoming port and forwards the packet, only if required. The fast forwarding makes the switch attractive for connecting servers directly to the network, thereby increasing throughput and availability. However, the switch is most commonly used to segment existing hubs, which nearly always improves overall performance. An Ethernet Switching can be easily configured in any Ethernet network environment to significantly boost bandwidth using conventional cabling and adapters.

Due to the learning function of the Industrial Fast Ethernet Switch, the source address and corresponding port number of each incoming and outgoing packet are stored in a routing table. This information is subsequently used to filter packets whose destination address is on the same segment as the source address. This confines the network traffic to its respective domain, reducing the overall load on the network.

The Industrial Fast Ethernet Switch performs **"Store-and-Forward"** therefore, no error packets occur. More reliably, it reduces the re-transmission rate. No packet loss will occur.

4.5 Auto-Negotiation

The STP ports on the Industrial Fast Ethernet Switch have built-in **"Auto-negotiation"**. This technology automatically sets the best possible bandwidth when a connection is established with another network device (usually at Power On or Reset). This is done by detect the modes and speeds at the second of both device is connected and capable of, both 10Base-T and 100Base-TX devices can connect with the port in either Half- or Full-Duplex mode.

5. Troubleshooting

This chapter contains information to help you solve issues. If the Industrial Fast Ethernet Switch is not functioning properly, make sure the Industrial Fast Ethernet Switch was set up according to instructions in this manual.

The Link LED is not light

Solution:

Check the cable connection of the Industrial Fast Ethernet Switch.

Performance is bad

Solution:

Check the speed duplex mode of the partner device. The Industrial Fast Ethernet Switch is operating at Auto-negotiation mode by default and if the partner is set to half duplex, then the performance will become bad.

Link LED is light, but the traffic is irregular

Solution:

Check that the attached device is not set to dedicate full duplex. Some devices use a physical or software switch to change duplex modes. Auto-negotiation may not recognize this type of full-duplex setting.

Why does the Industrial Fast Ethernet Switch not connect to the network?

Solution:

1. Check every port LED on the Industrial Fast Ethernet Switch.
2. Try another port on the Industrial Fast Ethernet Switch to make sure the cable is installed properly while make sure the cable is the right type.
3. Turn off the power and turn on the power again after a while.

Why I connect my PoE device to ISW-5xxPT series and it cannot power on?

Solution:

1. Please check the cable type of the connection from ISW-5xxPT series (port 1 to port 4) to the other end. The cable should be an 8-wire UTP, Category 5 or above, EIA568 cable within 100 meters. A cable with only 4-wire, short loop or over 100 meters, all will affect the power supply.
2. Please check and assure the device that fully complied with IEEE 802.3af standard.

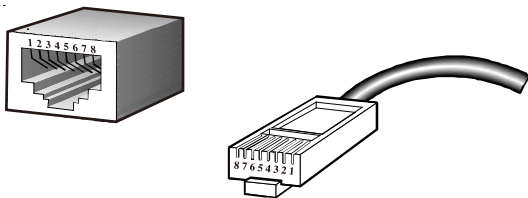
APPENDIX A: Networking Connection

A.1 Switch's RJ-45 Pin Assignments

10/100Mbps, 10/100Base-TX

RJ-45 Connector pin assignment		
Contact	MDI Media Dependant Interface	MDI-X Media Dependant Interface-Cross
1	Tx + (transmit)	Rx + (receive)
2	Tx - (transmit)	Rx - (receive)
3	Rx + (receive)	Tx + (transmit)
4, 5	Not used	
6	Rx - (receive)	Tx - (transmit)
7, 8	Not used	

A.2 RJ-45 cable Pin Assignments



The standard RJ-45 receptacle/connector

There are 8 wires on a standard UTP/STP cable and each wire is color-coded. The following shows the pin allocation and color of straight cable and crossover cable connection:

Straight Cable



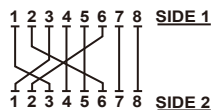
SIDE 1

1 = White/Orange
2 = Orange
3 = White/Green
4 = Blue
5 = White/Blue
6 = Green
7 = White/Brown
8 = Brown

SIDE 2

1 = White/Orange
2 = Orange
3 = White/Green
4 = Blue
5 = White/Blue
6 = Green
7 = White/Brown
8 = Brown

Cross Over Cable



SIDE 1

1 = White/Orange
2 = Orange
3 = White/Green
4 = Blue
5 = White/Blue
6 = Green
7 = White/Brown
8 = Brown

SIDE 2

1 = White/Green
2 = Green
3 = White/Orange
4 = Blue
5 = White/Blue
6 = Orange
7 = White/Brown
8 = Brown

Figure A-1: Straight-Through and Crossover Cable

Please make sure your connected cables are with same pin assignment and color as above picture before deploying the cables into your network.