GE
Security

GE-DSG-8 DSGH-5 and 8 Ethernet Switch User Manual

Content

Chapter 1
Introduction

| GE-DSGH-5 | GE-DSGH-8 | GE-DSG-8 |

The GE Security GE-DSG/DSGH series is a 5 and 8-Port 10/100/1000Mbps Industrial Gigabit Ethernet Switch with non-blocking wire-speed performance and new slim type IP 30 metal shape for easy deployment in Heavy Industrial demanding environments.

Package Contents

Check the contents of your package for following parts:

- Industrial Gigabit 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.

How to use this Manual

This User Manual is structured as follows:

Section	Section Content
INTRODUCTION	Product description with features and specifications
INSTALLATION	Explains the features/functions of the Industrial Gigabit Ethernet Switch, and how to physically install the Industrial Gigabit Ethernet Switch
APPLICATION	Explains the Industrial Gigabit Ethernet Switch application
SWITCH OPERATION	Explains the Industrial Gigabit Ethernet Switch transmit operation
TROUBLESHOOTING	Describes how to troubleshoot the Industrial Gigabit Ethernet Switch
APPENDIX A	Contains cable information for the Industrial Gigabit Ethernet Switch

Product Features

Physical Port

- 5-Port 10/100/1000Base-T RJ-45 with auto MDI/MDI-X function (GE-DSGH-5)

- 8-Port 10/100/1000Base-T RJ-45 with auto MDI/MDI-X function (GE-DSG-8 / GE-DSGH-8)

Layer 2 Features

- Complies with IEEE 802.3 10Base-T, IEEE 802.3u 100Base-TX, IEEE 802.3ab 1000Base-T Ethernet standard

- Supports Auto-negotiation and 10/100Mbps half / full duplex and 1000Mbps full duplex mode

- High performance Store and Forward architecture, broadcast storm control, 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)

- Integrated address look-up engine, support 8K absolute MAC addresses

- 9K Jumbo packet size support

- Automatic address learning and address aging

- CSMA/CD Protocol

Industrial Case / Installation

- IP-30 Metal case / Protection

- DIN Rail and Wall Mount Design

- 12 to 48V DC, redundant power with polarity reverse protect function and connective removable terminal block for master and slave power

- -10 to 60 Degree C operating temperature on MC-4TX1FXMM-2km / MC-4TX1FXSM-15KM / MC-4TX2FX

Product Specifications

Model	GE-DSGH-5	GE-DSGH-8	GE-DSG-8
Hardware Specification			
10/100/1000Base-T Ports	5	8	8
Installation	DIN rail kit and wall mount ear		
Dimension (W x D x H)	5.31 x 3.42 x 1.26 inch / 135 x 87 x 32mm		
Weight (lbs)	1.0 lbs	1.045 lbs	1.045 lbs
EFT	6KV		
ESD	6KV		
Electronic Specification			
Power Input	12~48 VDC, Redundant power		
Power Consumption	11.9 Watts / 40BTU	13.2 Watts / 45BTU	13.2 Watts / 45BTU
Power Connector	6-pin removable screw terminal		
Switch Specification			
Switch Processing Scheme	Store-and-Forward		
Address Table	8K entries		
Buffer	176 kilobytes		
Flow Control	Back pressure for half duplex, IEEE 802.3x Pause Frame for full duplex		
Switch fabric	10Gbps	16Gbps	16Gbps
Throughput (Packet per second)	7.44Mpps@64bytes	11.9Mpps@64bytes	11.9Mpps@64bytes
Jumbo Frame	9Kbytes		
Network cables	10/100/1000Base-T: Cat. 3, 4, 5, 5e, 6 UTP cable (100meters, max.) EIA/TIA-568 100-ohm STP (100meters, max.)		
Environment Specification			
Operating Temperature	-40°C ~75°C	-40°C ~75°C	-10°C ~60°C
Operating Humidity	5% ~ 95% (non-condensing)		
Storage Temperature	-40°C ~85°C	-40°C ~85°C	-40°C ~85°C
Storage Humidity	5% ~ 95% (non-condensing)		
Standards Conformance			
Standards Compliance	IEEE 802.3 Ethernet IEEE 802.3u Fast Ethernet IEEE 802.3ab Gigabit Ethernet IEEE 802.3x Full-duplex flow control		
Stability testing	IEC60068-2-32 (Free fall), IEC60068-2-27 (Shock), IEC60068-2-6 (Vibration)		

Chapter 2
Installation

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

Product Description

The GE Security GE-DSGH-5 and the GE-DSGH-8 are 5/8-Port 10/100/1000Mbps Industrial Gigabit Ethernet Switches with non-blocking wire-speed performance with a new slim type with IP 30 metal shape for easy deployment in Heavy Industrial demanding environments.

With a 10/16Gbps internal switching fabric, the Industrial Gigabit Ethernet Switch can handle extremely large amounts of data in a secure topology linking to a backbone or high capacity servers.

The Industrial Gigabit Ethernet Switch has 8K MAC Address table and offers wire-speed packets transfer performance without risk of packet loss. The Gigabit ports with 9K jumbo packet support can handle large amounts of data transmission in a secure topology linking to a backbone or high-power servers. The high data throughput of the device makes it ideal for most Gigabit environments.

All RJ-45 copper interfaces support 10/100/1000Mbps Auto-Negotiation for optimal speed detection through RJ-45 Category 6, 5 or 5e 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 Gigabit Ethernet Switch supported routers and Servers to directly connect to this device for fast, reliable data transfer.

Product Overview

The GE Security Industrial Gigabit Ethernet Switch with 5/8 RJ-45 10/100/1000Mbps ports for high-speed network connectivity. The Industrial Gigabit Ethernet Switch can also automatically identify and determine the correct transmission speed and half / full duplex mode of the attached devices with its 5/8 ports. The Gigabit port with 9K jumbo frame feature supported, can handle extremely large amounts of data transmission in a secure topology linking to a backbone or high-power servers.

The Industrial Gigabit Ethernet Switch also supports Store-and-Forward forwarding scheme to ensure low latency and high data integrity, eliminates unnecessary traffic and relieves congestion on critical network paths. With an intelligent address recognition algorithm, the Industrial Gigabit Ethernet Switch can recognize up to 8K different MAC address and enables filtering and forwarding at full wire speed.

Switch Front Panel

Figure 1 shows the front panels of Industrial Gigabit Ethernet Switch.

Figure 1: GE DSG-8 GE-DSGH-5 and GE-DSGH-8 front panels
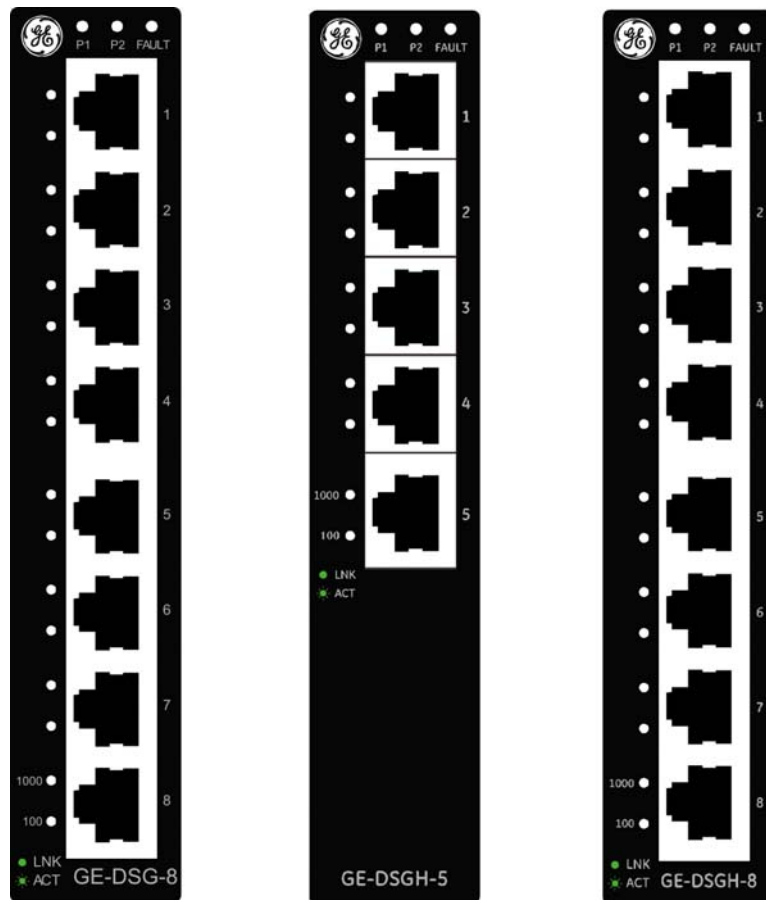
Led Indicators

LED Indicators

LED	Color	Function
P1	**Green**	Lit: **indicates the power 1 has power.**
P2	**Green**	Lit: **indicates the power 2 has power.**
FAULT	**Green**	Lit: **indicates the either power 1 or power 2 has no power.**
1000	**Green**	Lit: **indicates the Switch is successfully connecting to the network at 1000Mbps.** Off: **indicates that the Switch is successfully connecting to the network at 10 or 1000Mbps.** Blink: **indicates that the Switch is actively sending or receiving data over that port**
100	**Green**	Lit: **indicates the Switch is successfully connecting to the network at 100Mbps.** Off: **indicates that the Switch is successfully connecting to the network at 10 or 100Mbps.**

Switch Upper Panel

The upper panel of the Industrial Gigabit Ethernet Switch consists of one terminal block connector within two DC power inputs. Figure 2 shows the upper panel of the Industrial Gigabit Ethernet Switch.

Figure 2: Industrial Gigabit Ethernet Switch Upper Panel
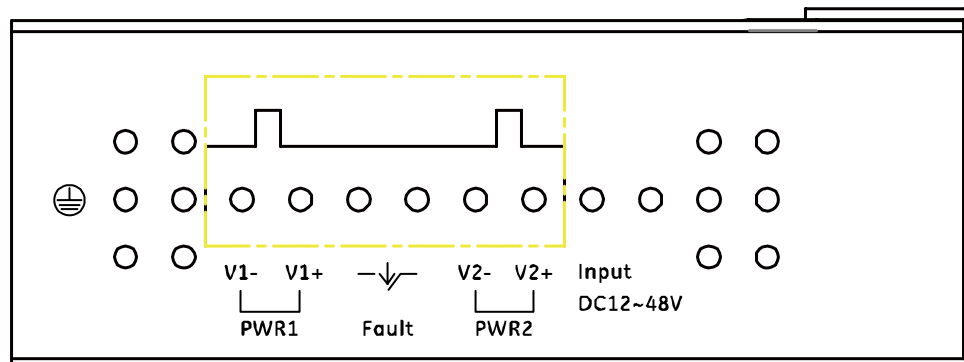
Wiring the Power Inputs

The 6-contact terminal block connector on the top panel of Industrial Gigabit 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.

NOTE: This product is intended to be supplied by a UL Listed Direct Plug-In Power Unit marked "Class 2" or "LPS" and output rated 48 VDC, 380 mA minimum.

Figure 3: Power Inputs
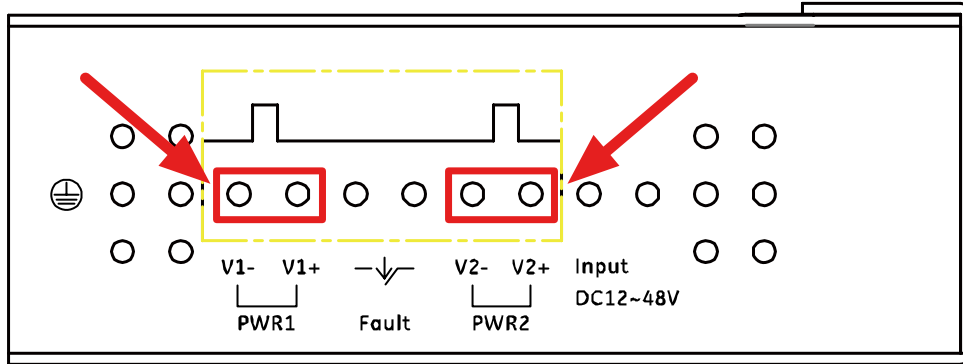
V1- V1 +   V2 - V2 +

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

Figure 3: Terminal Block
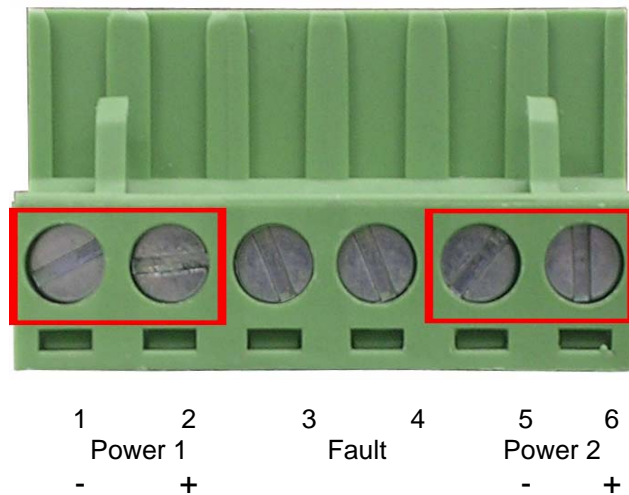
Note: The wire gauge for the terminal block should be in the range between 12 ~ 24 AWG.

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 Gigabit Ethernet Switch will detect the fault status of a 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.

Figure 4: Fault Alarm contacts

Insert the wires into the fault alarm contacts
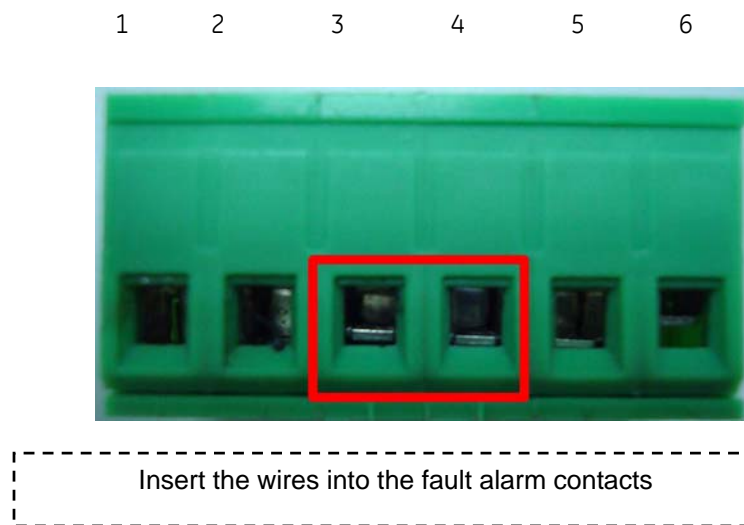
Note: The wire gauge for the terminal block should be in the range between 12 ~ 24 AWG. Alarm relay circuit accepts up to 30V, max. 3A currents.

Figure 5: Alarm schematic

Industrial Switch

The cloesd circuit will poen when the failure occurs.

Fault Alarm Contact 3 & 4
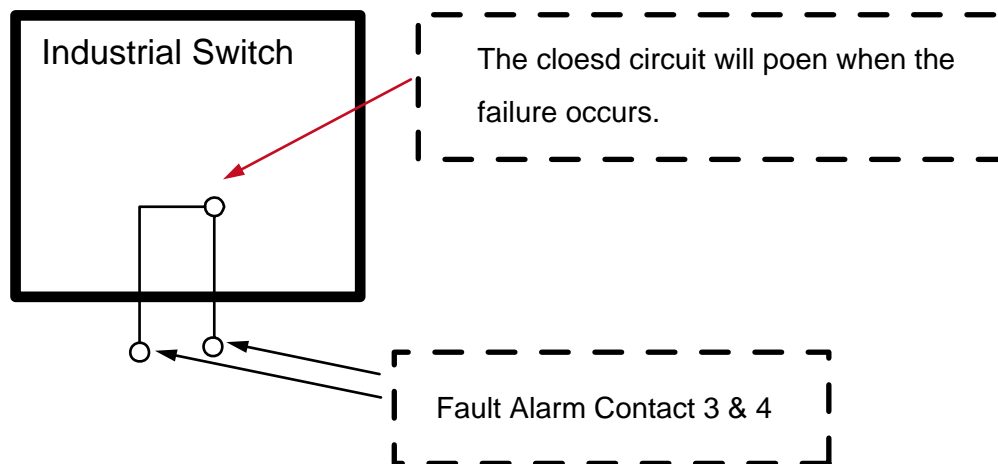
Mounting Installation

This section describes how to install the Industrial Gigabit 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 (GE Security 8 Port Industrial Gigabit Switch) as an example. However, the steps for GE Security Industrial Switch & Industrial Media Converter are similar.

Industrial DIN-Rail Mounting

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

1. Screw the DIN-Rail on the Industrial Gigabit Ethernet Switch.

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

3. Check that the DIN-Rail is tightly secured on the track.

4. Please refer to following procedures to remove the Industrial Gigabit Ethernet Switch from the track.

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

Wall Plate Mounting

To install the Industrial Gigabit Ethernet Switch on the wall, please follow the instructions described below.

1. Remove the DIN-Rail from the Industrial Gigabit Ethernet Switch; loosen the screws to remove the DIN-Rail.

2. Place the wall mount plate on the rear panel of the Industrial Gigabit Ethernet Switch.

3. Use the screws to secure the wall mount plate on the Industrial Gigabit Ethernet Switch.

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

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

Chapter 3
Application

In this section, we will describe how to install the Industrial Gigabit Ethernet Switch into a typical application environment

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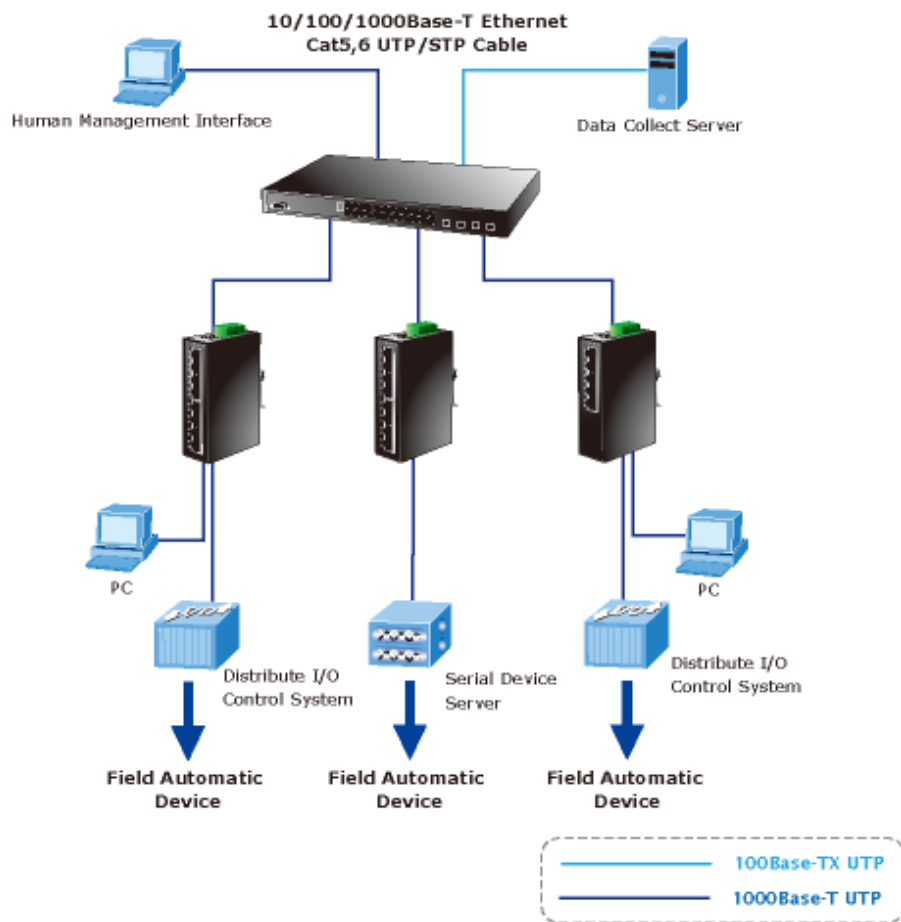
Installation Steps

1. Unpack the Industrial Gigabit Ethernet Switch.

2. Check the DIN-Rail is screwed on the Industrial Gigabit Ethernet Switch. (Please refer to DIN-Rail Mounting section for DIN-Rail installation. If the DIN-Rail is not screwed on the Industrial Gigabit Ethernet Switch.). If you want to wall mount the Industrial Gigabit Ethernet Switch, then please refer to Wall Mount Plate Mounting section for wall mount plate installation.

3. To hang the Industrial Gigabit Ethernet Switch on the DIN-Rail track or wall, please refer to the Mounting Installation section.

4. Power on the Industrial Gigabit Ethernet Switch. (Please refer to the Wiring the Power Inputs section for power input) The power LED on the Industrial Gigabit Ethernet Switch will light up. Please refer to the LED Indicators section for meaning of LED lights.

5. Prepare the twisted-pair, straight through Category 5 cable for Ethernet connection.

6. Insert one side of Category 5 cables into the Industrial Gigabit 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 Gigabit 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 it does not support then use the crossover category 5 Cable.

7. When all connections are all set and LED lights all show normal, the installation is complete.

Chapter 4
Switch Operation

Address Table

The Industrial Gigabit Ethernet Switch is implemented with an address table. This address table is composed of many entries. Each entry is used to store the address information of some node in network, including MAC address, port no., etc. This information is automatically obtained by the Industrial Gigabit Ethernet Switch.

Learning

When one packet comes in from any port. The Industrial Gigabit Ethernet Switch will record the source address,and port number, and the other related information in address table. This information will be used to decide either forwarding or filtering for future packets.

Forwarding & Filtering

When one packet comes from some port of the Industrial Gigabit Ethernet Switch, it will also check the destination address besides the source address learning. The Industrial Gigabit 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 Gigabit Ethernet Switch will forward this packet to the port where this destination address is located according to the

information from the address table. But, if the destination address is located at the same port with this packet comes in, then this packet will be filtered. Thereby increasing the network throughput and availability.

Store-and-Forward

Store-and-Forward is one type of packet-forwarding techniques. A Store-and-Forward Industrial Switch stores the incoming frame in an internal buffer, do the complete error checking before transmission. Therefore, no error packets occurrence, it is the best choice when a network needs efficiency and stability.

   The Industrial Gigabit 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 Gigabit 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 network traffic to its respective domain, reducing the overall load on the network.

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

Auto-negotiation

The STP ports on the Industrial Gigabit 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.

Chapter 5
Troubleshooting

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

The per port LED is not lit

Solution:

Check the cable connection of the Industrial Gigabit Ethernet Switch.

Performance is bad

Solution:

Check the speed duplex mode of the partner device. The Industrial Gigabit Ethernet Switch is run at Auto-negotiation mode and if the partner is set to half duplex, then the performance will be poor.

Per port LED is lit, 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 the Industrial Gigabit Ethernet Switch doesn't connect to the network

Solution:

Check per port LED on the Industrial Gigabit Ethernet Switch. Try another port on the Industrial Gigabit Ethernet Switch Make sure the cable is installed properly Make sure the cable is the right type Turn off the power. After a minnute, turn on the power again.

Why the Industrial Gigabit Ethernet Switch doesn't connect to the network

Solution:

Check per port LED on the Industrial Gigabit Ethernet Switch. Try another port on the Industrial Gigabit Ethernet Switch Make sure the cable is installed properly Make sure the cable is the right type. Turn off the power. After a while, turn on power again

Appendix A
# Network Connection

Switch's RJ-45 Pin Assignments

1000Mbps, 1000Base-T

| Contact	MDI	MDI-X
1	BI_DA+	BI_DB+
2	BI_DA-	BI_DB-
3	BI_DB+	BI_DA+
4	BI_DC+	BI_DD+
5	BI_DC-	BI_DD-
6	BI_DB-	BI_DA-
7	BI_DD+	BI_DC+
8	BI_DD-	BI_DC-

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	

RJ-45 Connector pin assignment
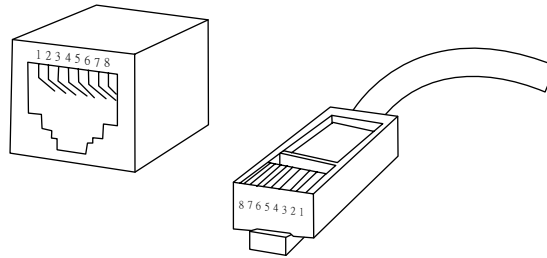
**The standard RJ-45 receptacle/connector**

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
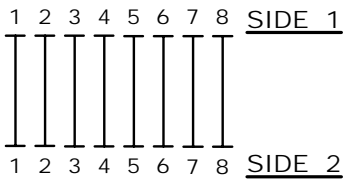
	SIDE_1	SIDE_2
1 2 3 4 5 6 7 8 SIDE_1	1 = White/Orange	1 = White/Orange
	2 = Orange	2 = Orange
	3 = White/Green	3 = White/Green
	4 = Blue	4 = Blue
	5 = White/Blue	5 = White/Blue
1 2 3 4 5 6 7 8 SIDE_2	6 = Green	6 = Green
	7 = White/Brown	7 = White/Brown
	8 = Brown	8 = Brown

Cross Over Cable
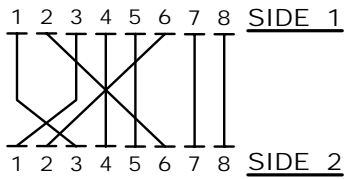
	SIDE_1	SIDE_2
1 2 3 4 5 6 7 8 SIDE_1	1 = White/Orange	1 = White/Orange
	2 = Orange	2 = Orange
	3 = White/Green	3 = White/Green
	4 = Blue	4 = Blue
	5 = White/Blue	5 = White/Blue
1 2 3 4 5 6 7 8 SIDE_2	6 = Green	6 = Green
	7 = White/Brown	7 = White/Brown
	8 = Brown	8 = Brown

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