GE
Security

MC-4TX Series Industrial Ethernet Switch User Manual

Content

Chapter 1
Introduction

MC-4TX1FXMM-2Km   MC-4TX1FXSM-15Km   MC-4TX2FX

The GE Security **MC-4TX** Series of Industrial Ethernet Switches is an industrially hardened Ethernet Switch specifically designed to operate reliably in electrically harsh and climatically demanding environments.

The GE Security **MC-4TX** Series of Industrial Ethernet Switches has an IP-30 metal case.

 Each of them is equipped with 4 10/100Base-TX Auto-negotiation ports and one or two 100Base-FX optic-fiber SC interfaces. It provides a multi-mode or single mode 100Base-FX SC interface and the fiber transmission distance can be 2km or 15km away from the link to remote backbone.

The GE Security **MC-4TX** Series includes the following models:

MC-4TX1FXMM-2Km	4+1 100FX Port Multi-mode Industrial Ethernet Switch – SC/MM 2km
MC-4TX1FXSM-15Km	4+1 100FX Port Single mode Industrial Ethernet Switch – SC/SM 15km
MC-4TX2FX	4+2 100FX Port Multi-mode Industrial Ethernet Switch – SC/MM 2km

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.

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 and functions of the Industrial Fast Ethernet Switch, and how to physically install the Industrial Fast Ethernet Switch
APPLICATION	Explains the Industrial Fast Ethernet Switch application
SWITCH OPERATION	Explains the Industrial Fast Ethernet Switch transmit operation
TROUBLESHOOTING	Describes how to troubleshoot the Industrial Fast Ethernet Switch
APPENDIX A	Contains cable information for the Industrial Fast Ethernet Switch

Product Features

Physical Port

Model Name	Ports		Fiber Optical Interface	
	Copper	Optical	Mode	Distance
MC-4TX1FXMM-2Km	4 x 10/100Base-TX	1 x 100Base-FX	Mutil-mode	2km
MC-4TX1FXSM-15KM			Single-mode	15km
MC-4TX2FX		2 x 100Base-FX	Multi-mode	2km

Layer 2 Features

- Complies with IEEE 802.3, IEEE 802.3u 10/100Base-TX, 100Base-FX

- Supports Auto-negotiation and 10/100Mbps half / full duplex mode for each copper port

- 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)

- Backplane (Switching Fabric): MC-4TX1FXMM-2km Series: 1Gbps, MC-4TX2FX Series: 1.2Gbps

- Integrated address look-up engine, supports 2K absolute MAC addresses

- 1Mbit on-chip frame buffer on MC-4TX1FXMM-2km / MC-4TX2FX Series

- 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 protection function and connectivity with a removable terminal block for master and slave power

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

Product Specifications

Model	MC-4TX1FXMM-2km	MC-4TX2FX	MC-4TX1FXSM-15K
Hardware Specification			
Copper — Ports	4 x 10/100Base-TX, Auto-negotiation, Auto-MDI/MDI-X		
Copper — Cable	10Base-T : 2-pair UTP Cat. 3, 4, 5 cable (100meters, max.) 100Base-TX : 2-pair UTP Cat. 5 cable (100meters, max.)		
Fiber Optical — Port	1 x 100Base-FX	2 x 100Base-FX	1 x 100Base-FX
Fiber Optical — Connector	SC	SC	SC
Fiber Optical — Cable	50/125 μ m or 62.5/125 μ m fiber		9/125 μ m fiber
Fiber Optical — Mode	Multi-mode		Single-mode
Fiber Optical — Distance	2km		15km
Dimensions (W x D x H)	5.31" x 3.42" x 1.26" / 135 x 87 x 32mm		
Weight	0.965 lbs / 436g	0.965 lbs / 436g	0.977 lbs / 442g
Power Requirement	12-48 VDC Redundant power with polarity reverse protection function		
Power Consumption / Dissipation	9.1 Watts / 31BTU	11.6 Watts / 40BTU	9.1 Watts / 31BTU
Installation	DIN rail kit and wall mount ear		
Switch Specification			
Switch Processing Scheme	Store-and-Forward		
Address Table	2K entries		
Buffer	1Mbit		
Flow Control	Back pressure for half duplex, IEEE 802.3x Pause Frame for full duplex		
Switch Fabric	1Gbps		
Throughput (Packet Per Second)	0.74Mpps @ 64Bytes	0.89Mpps @ 64Bytes	0.74Mpps @ 64Bytes
Standards Conformance			
Standards Compliance	IEEE 802.3 Ethernet, 10Base-T IEEE 802.3u Fast Ethernet, 100Base-TX, 100Base-FX IEEE 802.3x Full-duplex flow control		
Temperature	Operating: -10-60 Degree C Storage: -40-85 Degree C		
Humidity Operating	Operating: 5% to 90% Storage: 5% to 90% (Non-condensing)		
Regulation Compliance	FCC Part 15 Class A, CE		

Chapter 2
Installation

This section describes the functions of the Industrial Fast 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 MC-4TX1FXMM-2km,/MC-4TX2FX series are 4-Port 10/100Mbps + 1/2 100FX Fiber Port Industrial Fast Ethernet Switches with non-blocking wire-speed performance and a new slim type chassis with an IP 30 metal shape for easy deployment in Heavy Industrial demanding environments.

With a 1/1.2Gbps 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 packet 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 5, 4 or 3 cables. Support is 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.

Switch Front Panel

Figure 1 shows the front panel of the Industrial Fast Ethernet Switch.

Figure 1: MC-4TX1FXMM and MC-4TX2FX front panels
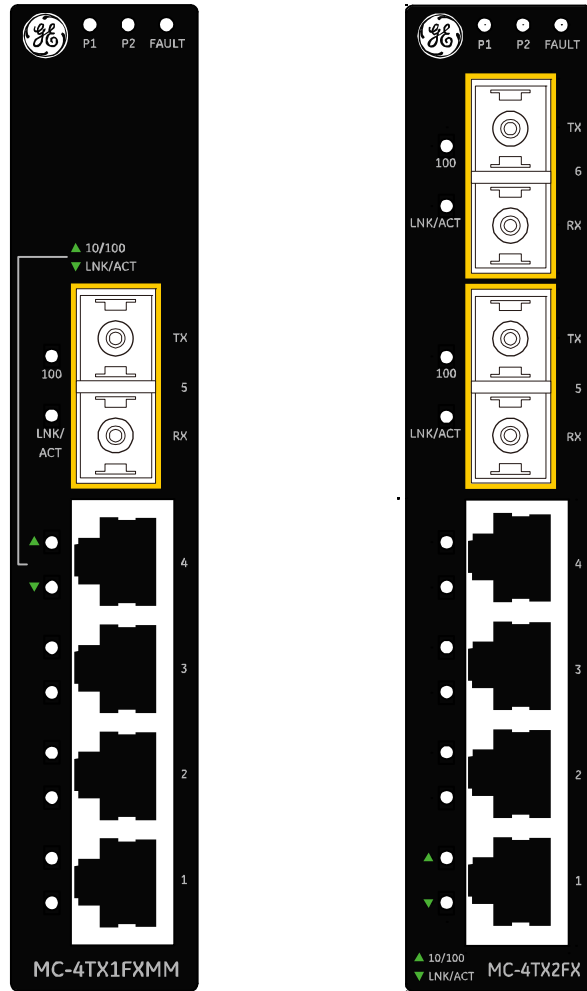
LED Indicators

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.**	
100	**Green**	Fiber Optical	Lit: **indicates the Fiber port is successfully connecting to the network at 100Mbps.**
10/100	**Green**	Copper	Lit: **indicates the Switch is successfully connecting to the network at 100Mbps.** Off: **indicates that the Switch is successfully connecting to the network at 10Mbps.**
LNK/ACT	**Green**	Fiber Optical	Lit: **indicates the link through that port is successfully established.** Blink: **indicates that the Switch is actively sending or receiving data over that port.**

Switch Upper Panel

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

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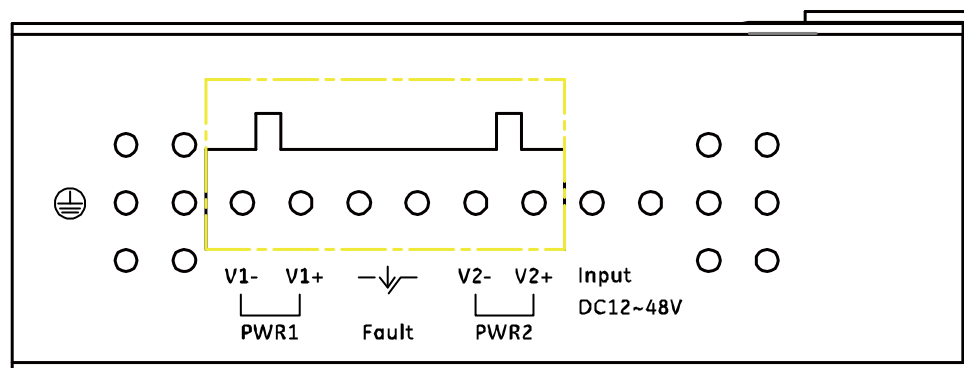
Wiring the Power Inputs

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

1. Insert the positive and 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
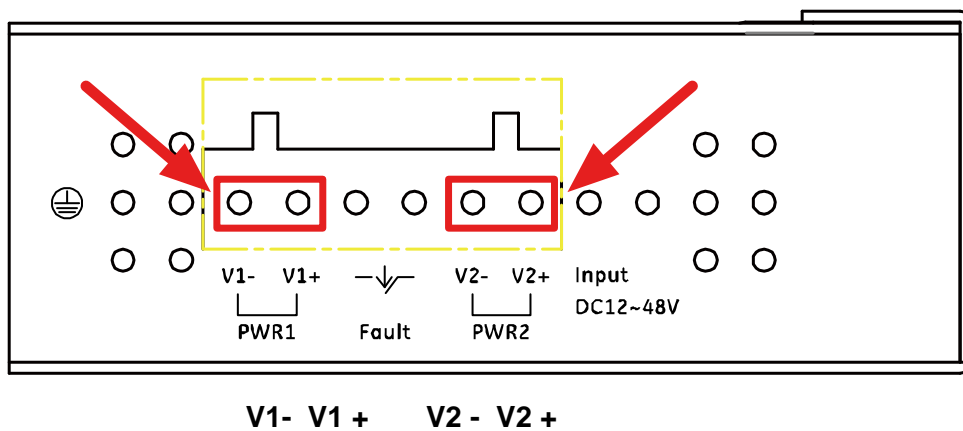
2. Tighten the wire-clamp screws securely to prevent the wires from loosing.

Figure 4: Terminal Block

1	2	3	4	5	6
Power 1		Fault		Power 2	
-	+			-	+
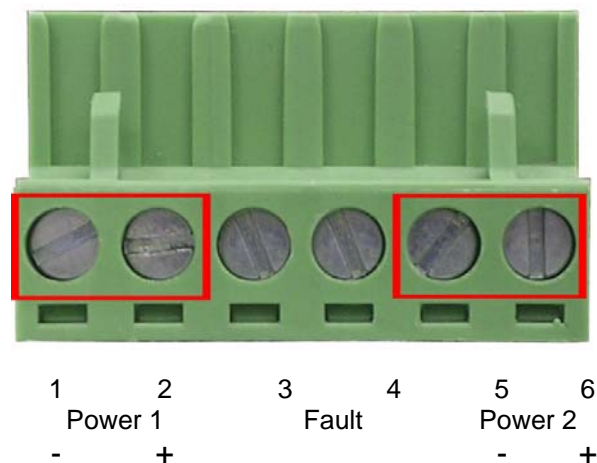
NOTE: The wire gauge for the terminal block should be in the range between 12-24 AWG.

Wiring the Fault Alarm Contact

The fault alarm contacts are in the middle of the terminal block connector as the picture shows below. After inserting the wires, the Industrial Fast 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 5: Fault Alarm contacts

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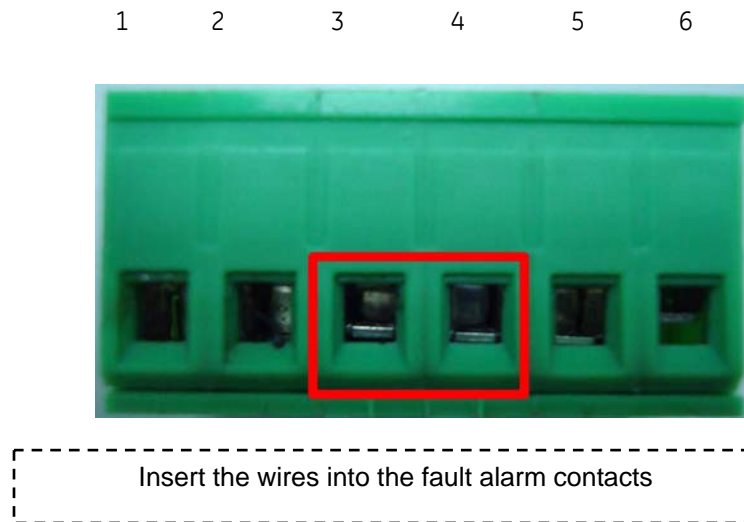
Note: The wire gauge for the terminal block should be in the range between 12-24 AWG. Alarm relay circuit accepts up to 30V, max. 3A currents.

Figure 6: Alarm schematic

Industrial Switch

The cloesd circuit will poen when the failure occurs.

Fault Alarm Contact 3 & 4
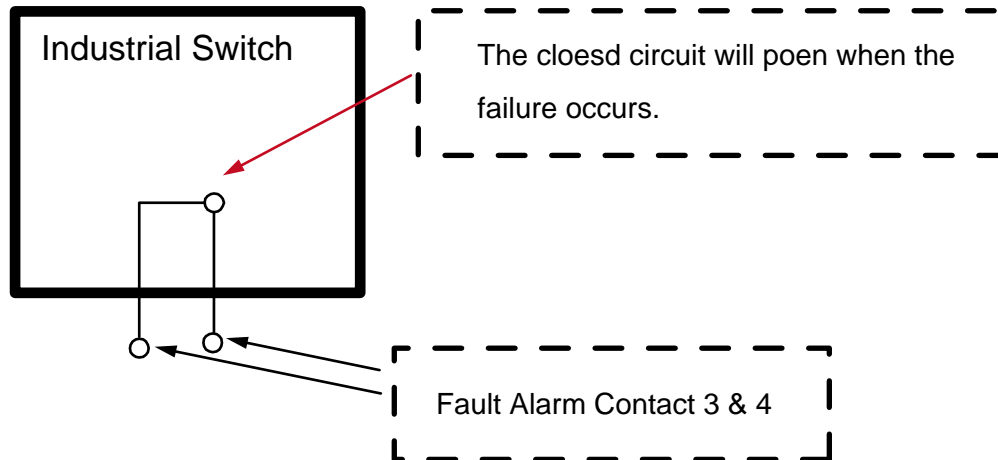
Mounting Installation

This section describes how to install the Industrial 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 uses the GE-DSGH-8 (GE Security's 8- Port Industrial Gigabit Switch) as an example. The steps for the GE Security Industrial Switch & Industrial Media Converter are the same.

Industrial DIN-Rail Mounting

The DIN-Rail is screwed on to the Industrial Fast Ethernet Switch when shipped from the factory. To replace the wall mount with a DIN-Rail on the Industrial Fast Ethernet Switch, please refer to following figures to screw the DIN-Rail onto the Industrial Fast Ethernet Switch. To hang the Industrial Fast Ethernet Switch, follow the below steps:

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

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

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

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

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

Wall Plate Mounting

To install the Industrial Fast Ethernet Switch on the wall, please do the following:

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

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

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

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

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

Chapter 3
Application

In this section, we describe how to install the Industrial Fast Ethernet Switch.
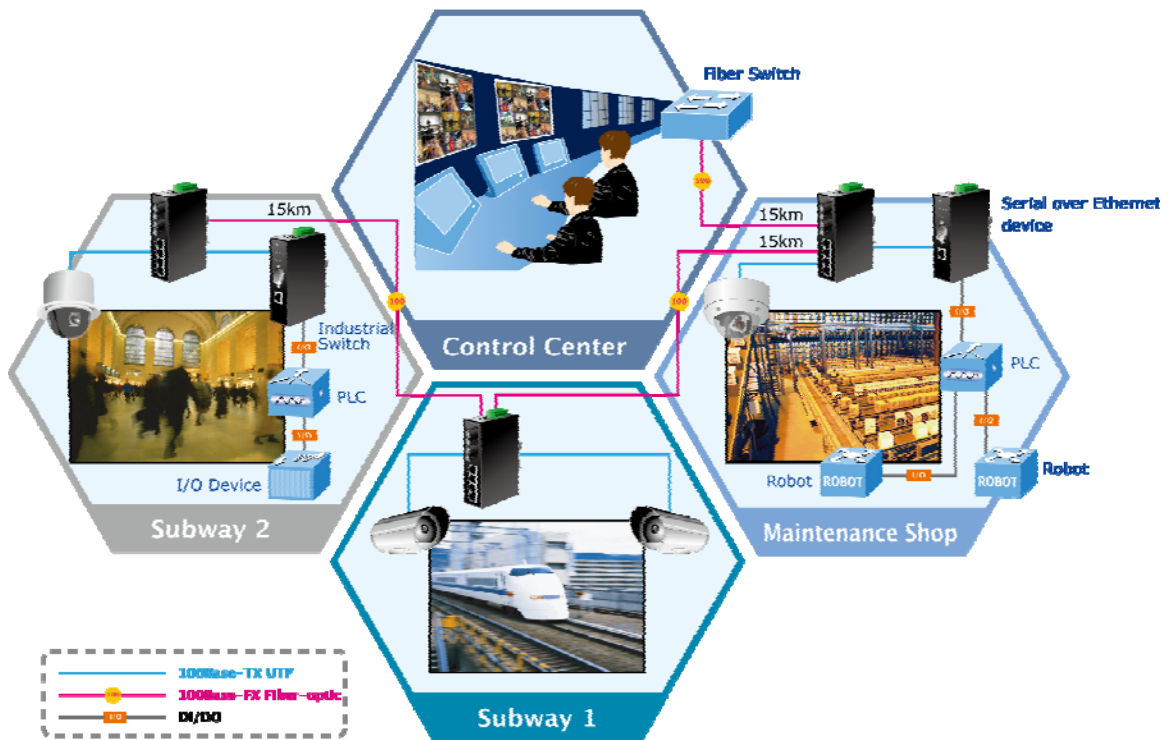
Installation Steps

1. Unpack the Industrial Fast Ethernet Switch.

2. Check that the DIN-Rail is screwed onto the Industrial Fast Ethernet Switch. (Please refer to DIN-Rail Mounting section for DIN-Rail installation If the DIN-Rail is not screwed on the Industrial Fast Ethernet Switch.). 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.

3. To hang the Industrial Fast Ethernet Switch on the DIN-Rail track or wall, please refer to the Mounting Installation section.
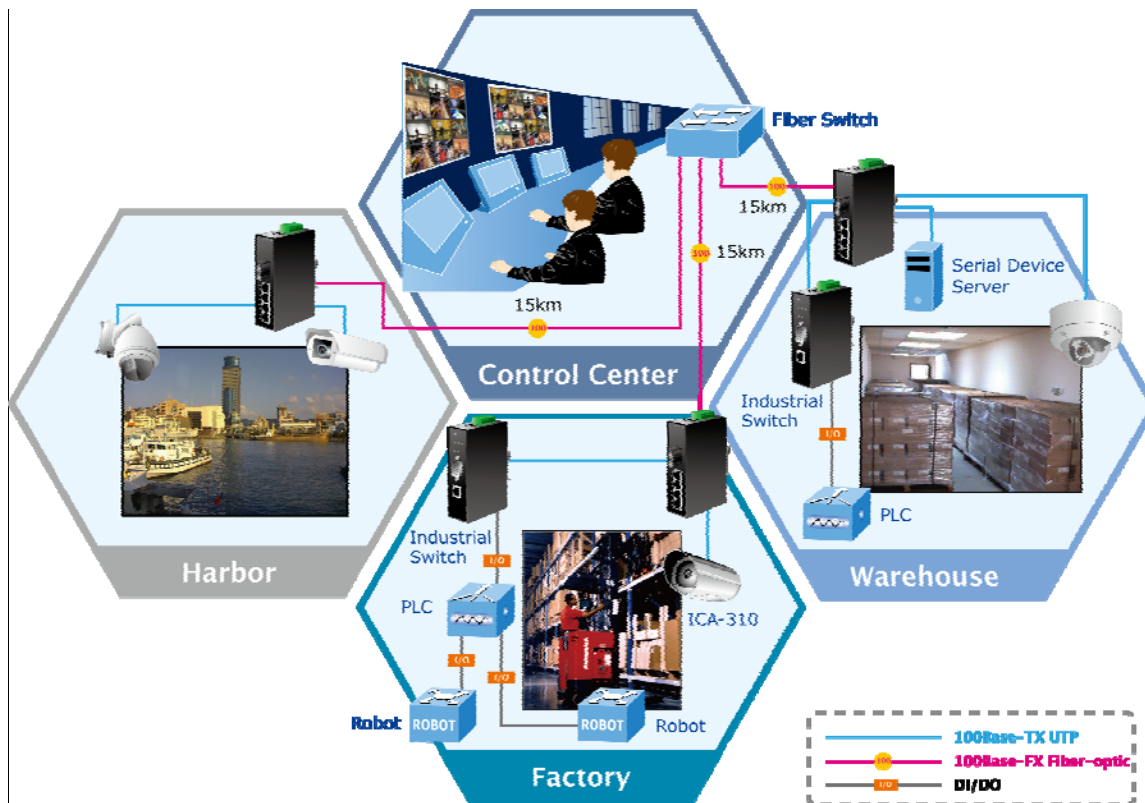
4. Supply power to the Industrial Fast Ethernet Switch. (Please refer to the Wiring the Power Inputs section for power input) The power LED on the Industrial Fast Ethernet Switch will light up. Please refer to the LED Indicators section for meaning of LED lights.

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

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 is connected to 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 it then use a crossover category 5 Cable.

7. Insert the fiber cable from the MC-4TX1FXMM-2km/MC-4TX2FX series to the fiber network. TX, RX must be paired at both ends. The optical port LED on the Industrial Fast Ethernet Switch will light up when the cable is connected to the network device. Please refer to the LED Indicators section for LED light meaning.

8. When all connections are finished and the LED lights all show a normal condition, the installation is complete.

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Chapter 4
Switch Operation

Address Table

The Industrial Fast 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 the network, including MAC address, port number, etc. This information comes from the learning process of Industrial Fast Ethernet Switch.

Learning

When one packet comes in from any port the Industrial Fast Ethernet Switch will record the source address, port number, and the other related information in the 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 Fast Ethernet Switch, it will also check the destination address besides the source address. 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 from which this packet comes in. And these ports will transmit this packet to the network it is connected to. If found, and the destination address is located at a different port from where 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 from where 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 can occur. This 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 improve overall performance. An Ethernet Switch 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 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.

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 detecting 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 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 per port LED is not lit

Solution:

Check the cable connection of the Industrial Fast Ethernet Switch.

Performance is poor

Solution:

Check the speed duplex mode of the partner device. The Industrial Fast 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 doesn't the Industrial Fast Ethernet Switch connect to the network?

Solution:

Check per the port LED on the Industrial Fast Ethernet Switch. Try another port on the Industrial Fast Ethernet Switch Make to sure the cable is installed properly. Make sure the cable is the right type. Turn off the power. After a while, turn the power back on.
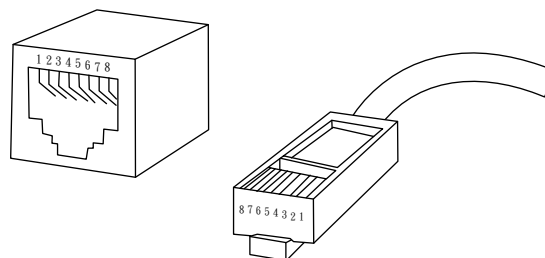
Appendix A
Network Connection

Switch's RJ-45 Pin Assignments

10/100Mbps, 10/100Base-TX

|	RJ-45 Connector pin assignment	
	MDI	**MDI-X**
Contact	Media Dependant Interface	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 figure shows the pin allocation and color of the straight and crossover cable connection:
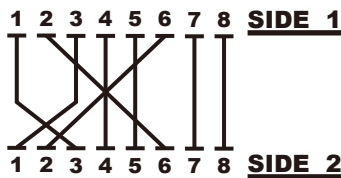
Straight Cable


```
1 2 3 4 5 6 7 8  SIDE 1



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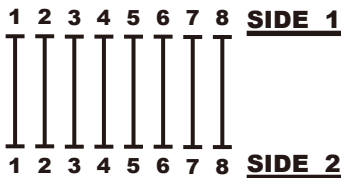
SIDE 1	SIDE 2
1 = White/Orange	1 = White/Orange
2 = Orange	2 = Orange
3 = White/Green	3 = White/Green
4 = Blue	4 = Blue
5 = White/Blue	5 = White/Blue
6 = Green	6 = Green
7 = White/Brown	7 = White/Brown
8 = Brown	8 = Brown

Cross Over Cable


```
1 2 3 4 5 6 7 8  SIDE 1



1 2 3 4 5 6 7 8  SIDE 2
```

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

Make sure that the cables you are using have the same pin assignments and color as the above picture before deploying the cables into your network.