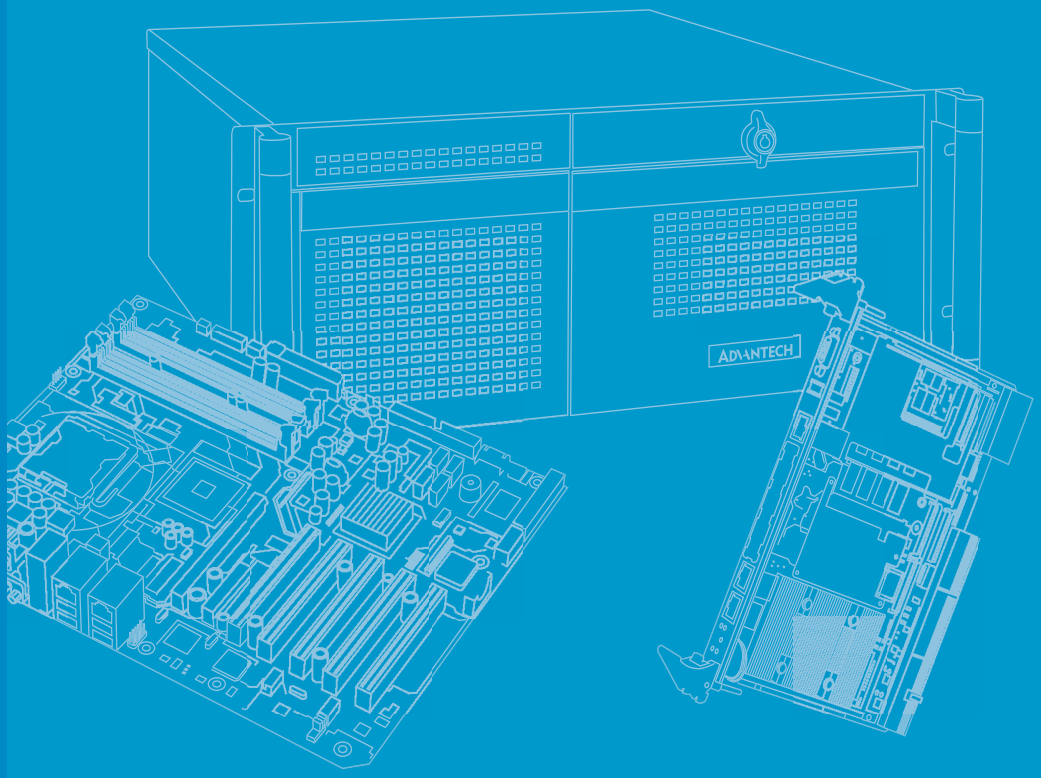

User Manual

EKI-2541M/SC

Ethernet to Multi-mode SC Type Fiber Optic Converter

EKI-2541S/SC

Ethernet to Single-mode SC Type Fiber Optic Converter

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Advantech warrants the original purchaser that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products that have been repaired or altered by persons other than repair personnel authorized by Advantech, or products that have been subject to misuse, abuse, accident, or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

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1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages displayed when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and a proof of purchase date (such as a photocopy of your sales receipt) into a shippable container. Products returned without a proof of purchase date are not eligible for warranty service.
5. Write the RMA number clearly on the outside of the package and ship the package prepaid to your dealer.

Part No. Edition 1

Printed in China July 2021

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This type of cable is available from Advantech. Please contact your local supplier for ordering information.

Test conditions for passing also include the equipment being operated within an industrial enclosure. In order to protect the product from damage caused by electrostatic discharge (ESD) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class A

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 this event, users are required to correct the interference at their own expense.

Technical Support and Assistance

1. Visit the Advantech website at www.advantech.com/support to obtain the latest product information.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before calling:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

Safety Precautions - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from the PC chassis before manual handling. Do not touch any components on the CPU card or other cards while the PC is powered on.
- Disconnect the power before making any configuration changes. A sudden rush of power after connecting a jumper or installing a card may damage sensitive electronic components.

Safety Instructions

1. Read these safety instructions carefully.
2. Retain this user manual for future reference.
3. Disconnect the equipment from all power outlets before cleaning. Use only a damp cloth for cleaning. Do not use liquid or spray detergents.
4. For pluggable equipment, the power outlet socket must be located near the equipment and easily accessible.
5. Protect the equipment from humidity.
6. Place the equipment on a reliable surface during installation. Dropping or letting the equipment fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. Do not cover the openings.
8. Ensure that the voltage of the power source is correct before connecting the equipment to a power outlet.
9. Position the power cord away from high-traffic areas. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage from transient overvoltage.
12. Never pour liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If any of the following occurs, have the equipment checked by service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated the equipment.
    - The equipment has been exposed to moisture.
    - The equipment is malfunctioning, or does not operate according to the user manual.
    - The equipment has been dropped and damaged.
    - The equipment shows obvious signs of breakage.
15. Do not leave the equipment in an environment with a storage temperature of below -40 °C (-40 °F) or above 85 °C (185 °F) as this may damage the components. The equipment should be kept in a controlled environment.

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Chapter 1

Overview

Sections include:

- Introduction
- Features
- Specifications
- Packing List
- Safety Precaution

1.1 Overview

The EKI-2541M/2541S is a cost-effective solution for the converting between 10/100Base-TX and 100Base-FX cabling, it allows you to extend the cabling distance of your 100Base-FX network up to 2 kilometers for multi-mode fiber or 30 kilometers for single-mode fiber. The Fast Fiber Converter module gives you the option to choose from the most popular fiber cabling connectors: SC multi-mode and single-mode connector.

1.1.1 Fast Fiber Converters Module

The EKI-2541M/2541S provides you with one Fiber connector for your fiber optic cable and one Ethernet RJ-45 port (Auto MDI/MDIX) for your 100Base-TX copper cable connection. There are four DIP-switches to set the operation mode for UTP, Fiber ports and Link Fault Pass-Through function.

1.1.2 Dual Power Input

EKI-2541M/2541S redundant power input design is with power reserve protection to prevent the switch device broken by wrong power wiring. When one of power input is fail, P-Fail LED will turn on and send an alarm through a relay output for notifying user.

1.1.3 Flexible Mounting

EKI-2541M/2541S is extremely compact (30 x 140 x 95 mm) and can be mounted on a DIN-rail or a panel, so it is suitable for any space-constrained environment.

1.1.4 Advanced Protection

EKI-2541M/2541S supports up to 3,000 V_{DC} surge protection for power line, and also supports 4000 V ESD for Ethernet ports. With these 2 strong protections, it can secure equipment against unregulated voltage and make systems safer and more reliable. Further, EKI-2541M/2541S provides currency overload protection with a resettable fuse to ensure that the device component won't be damaged by overload current.

1.1.5 Wide Operating Temperature

The operating temperature of the EKI-2541M/2541S is between -40 ~ 75 °C (wide operating temperature model) or -10 ~ 60 °C (standard model). With such a wide range, you can use the EKI-2541M/2541S in some of the harshest industrial environments that exist.

1.1.6 Easy Troubleshooting

LED indicators make troubleshooting quick and easy. The 10/100 Base-TX port has 2 LEDs that display the link status, transmission speed and collision status. Also the three power indicators P1, P2 and P-Fail help you diagnose immediately.

1.2 Features

- Provides 1 x 10/100Mbps Ethernet ports with RJ-45 connector
- Provides 1 x SC (multi-mode & single-mode) fiber connector
- Supports full/half duplex flow control
- Supports store & forward transmission
- supports auto-negotiation
- Supports MDI/MDI-X auto-crossover
- Provides surge protection (EFT) 3,000 V_{DC} for power line
- Supports 4,000 V_{DC} ESD protection for Ethernet
- Supports +12 ~ 48 V_{DC} power input
- Provides flexible mounting: DIN-rail, Wall Mounting
- Supports operating temperatures from -40 ~ 75 °C (wide operating temperature model) or -10 ~ 60 °C (standard model)

1.3 Specification

Communications	
Compatibility	IEEE 802.3, 802.3u, 802.3x
LAN	10/100Base-TX
Transmission Distance	■ Multi-mode Fiber: Up to 2km ■ Single-mode Fiber: Up to 30km
Transmission Speed	Up to 100 Mbps
Interface	
Connectors	■ 1 x RJ-45 ■ 1 x SC type fiber connector ■ 6-pin removable screw terminal (power & relay)
LED Indicators	■ Unit: P1, P2, P-Fail ■ Ethernet: 10/100M, LNK/ACT ■ Fiber: HDX/FDX, LNK/ACT
Power	
Current Overload Protection	0.9A@12V_{DC} (25 °C)
Power Consumption	■ 2.7 W (EKI-2541M) ■ 2.3 W (EKI-2541S)
Power Input	2 x Unregulated +12 ~ 48 V_{DC}
Fault Output	1 Relay Output
Mechanism	
Dimensions (WxHxD)	30 x 140 x 95 mm
Enclosure	IP30, Metal shell with solid mounting kits
Mounting	DIN-rail, Wall
Protection	
ESD (Ethernet)	4000 V_{DC}
Surge (EFT for power)	3000 V_{DC}
Reverse Polarity	Present
Environment	
Operating Temperature	■ -10 ~ 60 °C (EKI-2541M/2541S) ■ -40 ~ 75 °C (EKI-2541MI/2541SI)
Operating Humidity	5% ~ 95% (non-condensing)
Storage Temperature	-40 ~ 85 °C
Certifications	
Safety	UL 60950-1, CAN/CSA-C22.2 No.60950, EN62368 -1
EMC	U.S.A.: FCC Part 15 CISPR 22 EU: EN55011, EN61000-6-4, EN55022, Class A, EN61000-3-2/3, EN55024, IEC61000-4-2/3/4/5/6/8/11/12, EN61000-6-2
Free Fall	IEC60068-2-32
Shock	IEC60068-2-27
Vibration	IEC60068-2-6

1.4 Packing List

- 1 x EKI-2541M or EKI-2541S Industrial Ethernet to Fiber Optic Converter
- 2 x Wall Mounting Bracket and Screws
- 1 x DIN-rail Mounting Bracket and Screws
- 1 x EKI-2541M/2541S Startup Manual

1.5 Safety Precaution

Caution! *IF DC voltage is supplied by an external circuit, please use a protection device on the power supply input.*

Chapter 2

Installation

Sections include:

- LED Indicators
- Dimensions
- Mounting
- Network
- Power Connection

In this chapter, you will be given an overview of the EKI-2541M/2541S hardware installation procedures.

2.1 LED Indicators

There are few LEDs display the power status and network status located on the front panel of EKI-2541M/2541S, each of them has its own specific meaning as below table.

Table 2.1: EKI-2541M/S LED Definition

LED	Color	Description	
P1	Green	On	Power input 1 is active
		Off	Power input 1 is inactive
P2	Green	On	Power input 2 is active
		Off	Power input 2 is inactive
P-Fail	Red	On	Power input 1 or 2 has failed
		Off	Power input 1 and 2 are both functional, or no power input
HDX/FDX (fiber port)	Yellow	On	Ethernet port full duplex
		Off	Ethernet port half duplex or not connect to network
LNK/ACT (fiber port)	Green	On	Connected to network
		Flashing	Networking is active
		Off	Not connected to network
10/100M (RJ-45)	Yellow	On	Link to 100M bps network
		Off	Link to 10M bps network
LNK/ACT (RJ-45)	Green	On	Connected to network
		Flashing	Networking is active
		Off	Not connected to network

2.2 DIP-Switch

The DIP-Switch is used to configure operation mode for LFP (Link Fault Pass-Through) and operation mode for UTP/Fiber port. The default value of DIP-switch is OFF.

Table 2.2: Table 2.2: EKI-2541M/S DIP-Switch Definition

S/W No	Status	Description
1	ON	Enables Port/Power Alarm
	OFF	Disable Port/Power Alarm
2	ON	Enables LFP
	OFF	Disables LFP
3	ON	100Base-FX Half-mode
	OFF	100Base-FX Full-mode
4	ON	Pure Converter mode (100TX to 100FX)
	OFF	Switch Converter mode

LFP (Link Fault Pass-Through): When LFP is enabled, it allows UTP link failures to be reported to the fiber side and also allows Fiber link failures to be reported to the UTP side. Therefore, an LFP feature is provided in both UTP and Fiber side.

Pure Converter mode (DIP-Switch 4): When pure converter mode is enabled (on), it operates with the minimum latency. The transmission flow does not wait until entire frame is ready, but instead it forwards the received data immediately after the data being received. And UTP port should be forced at 100M in this application. When DIPSwitch is in Switch Converter mode (off), the converter function is same as Switch.

Note! *Please don't change the DIP-switch setting when UTP or fiber port is transmitting or receiving data. It may cause some data error. Besides, if you change the DIP-switch setting, please power off the converter and power on again to make the setting effective.*

2.3 Dimensions (units: mm)

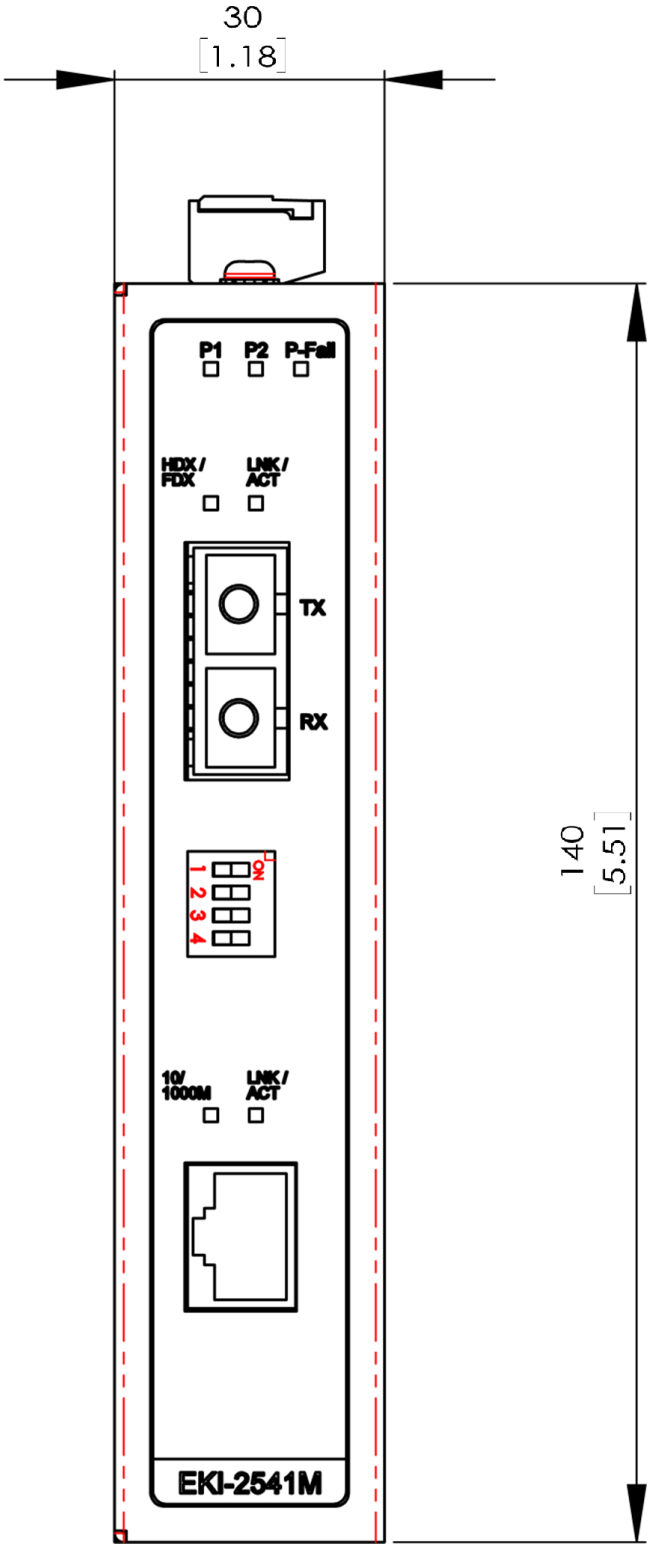

Figure 2.1 Front View of EKI-2541M/S

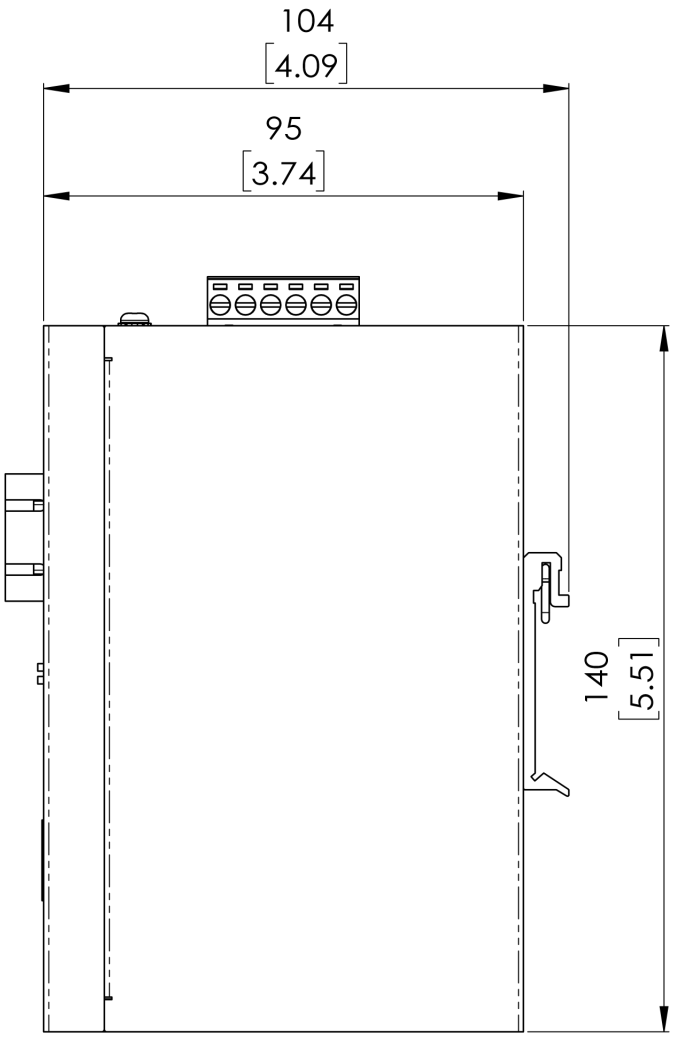

Figure 2.2 Side View of EKI-2541M/S

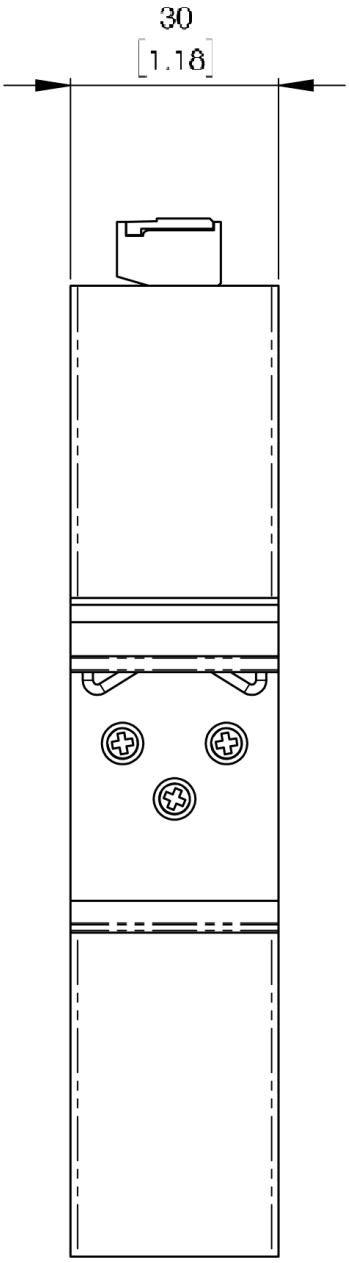

Figure 2.3 Rear View of EKI-2541M/S

Please refer to page 16 for pin assignment.

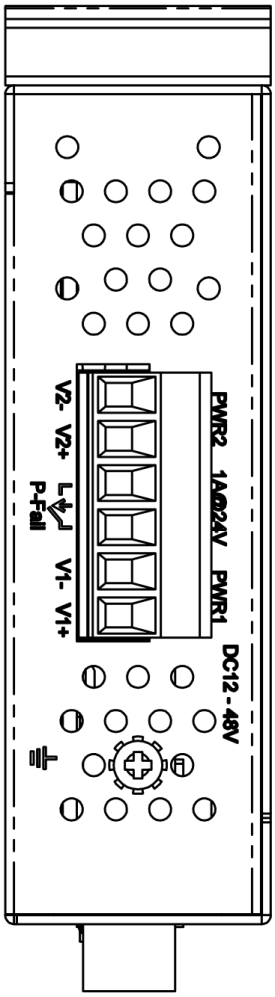

Figure 2.4 Top View of EKI-2541M/S

2.4 Mounting

The EKI-2541M/2541S supports two mounting methods: DIN-rail & Wall.

2.4.1 Wall mounting

EKI-2541M/2541S can be wall-mounted by using the included mounting kit. Then, hang on the EKI-2541M/2541S to the nails on the wall.

First, use the screws included in the package to combine the EKI-2541M/2541S and metal mounting kit. And then you can install the device firmly via the components, please see Figure 2.5 as below.

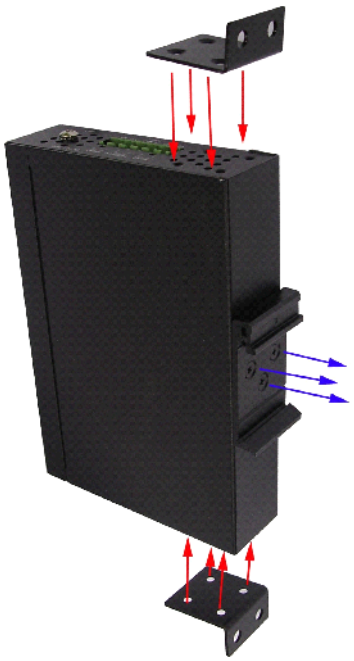

Figure 2.5 Combine the Metal Mounting Kit

2.4.2 DIN-rail Mounting

You can also mount EKI-2541M/2541S on a standard DIN-rail by below steps.

The DIN-rail kit is screwed on the industrial switch when out of factory. If the DIN-rail kit is not screwed on the industrial switch, please screw the DIN-rail kit on the switch first.

1. Hang the EKI-2541M/2541S to the DIN-rail with angle of inclination. See figure 2.6.

Figure 2.6 Installation to DIN-rail

2. Let the device down straight to slide over the rail smoothly. See Figure 2.7

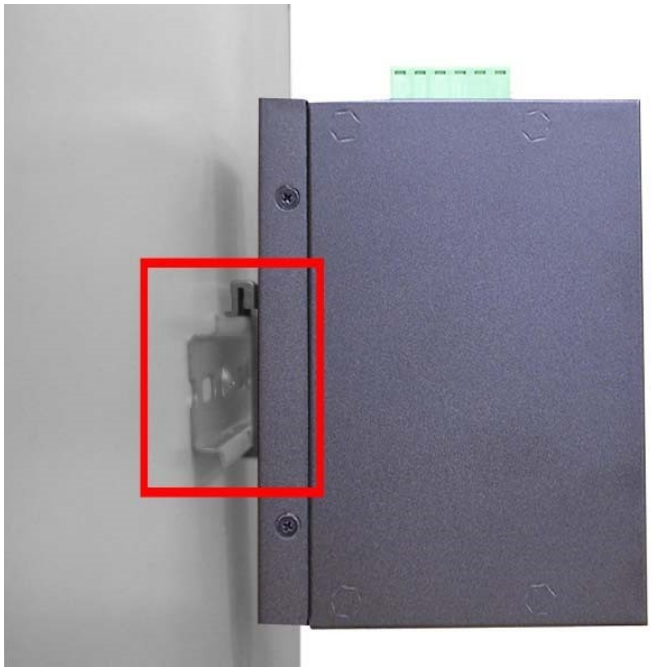

Figure 2.7 Installation to DIN-rail

2.5 Network Connection

- Twisted-pair segment can use unshielded twisted pair (UTP) or shielded twisted pair (STP) cabling. The cable must comply with the IEEE 802.3u 100Base-TX standard for Category 5. The cable between the converter and the link partner (switch, hub, workstation, etc.) must be less than 100 meters (328 ft.) long.
- Fiber segment using single-mode connector type must use 9/125μm single-mode cable. You can connect two devices in the distance of 30 kilometers in full-duplex operation. For half-duplex operation, the recommended maximum distance is 412 meters (1,352 ft.).
- Fiber segment using multi-mode connector type must use 50 or 62.5/125μm multi-mode fiber cable. You can connect two devices up to a 2-kilometer (6,562 ft.) distance.

2.6 Power Connection

The EKI-2541M/2541S supports dual +12 ~ 48 V_{DC} power inputs and power-fail relay output.

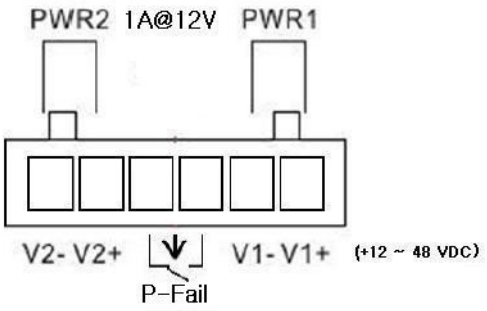

Figure 2.8 Pin Assignment of the Power Connector

You can connect an alarm indicator, buzzer or other signaling equipment through the relay output. The relay opens if power input 1 or 2 fails (“Open” means if you connect relay output with an LED, the light would be off).

Chapter 3

Troubleshooting

3.1 Power Input

Verify that is using the right power cord/adapter (+12~48 V_{DC}), please don't use the power adaptor with DC output voltage higher than 48V, or it will burn this converter down.

3.2 Cable

Select the proper UTP/Fiber cable to construct your network. The single-mode converter must use single-mode fiber cable. Please check that you are using the right cable.

3.3 DIP Switch

Check the configuration DIP-switch. It must be setting in the same operation mode with the link partner.

3.4 Diagnosing LED Indicators

The switch can be easily monitored through panel indicators, which describes common problems user may encounter and where user can find possible solutions, to assist in identifying.

If the power indicator does not light up when the power cord is plugged in, user may have a problem with power cord. Then check for loose power connections, power losses or surges at power outlet. If user still cannot resolve the problem, contact the local dealer for assistance.

If the Industrial switch LED indicators are normal and the connected cables are correct but the packets still cannot transmit, please check your system's Ethernet devices configuration or status.

Appendix A

Pin Assignment & Wiring

It is suggested to adopt ELA/TIA as the wiring of the RJ-45.

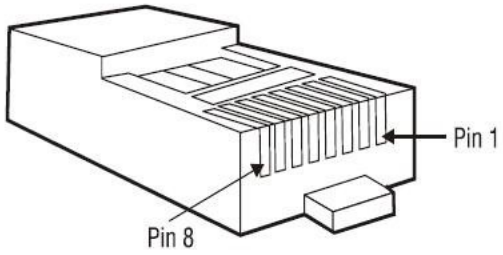

Figure A.1 RJ-45 Pin Assignment

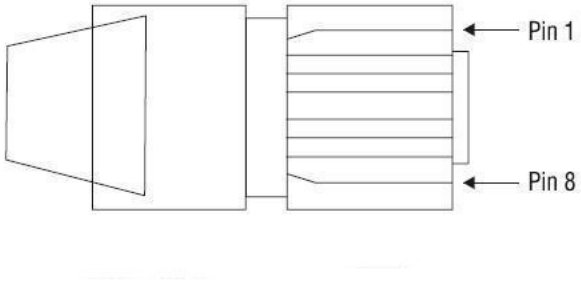

Figure A.2 EIA/TIA-568B

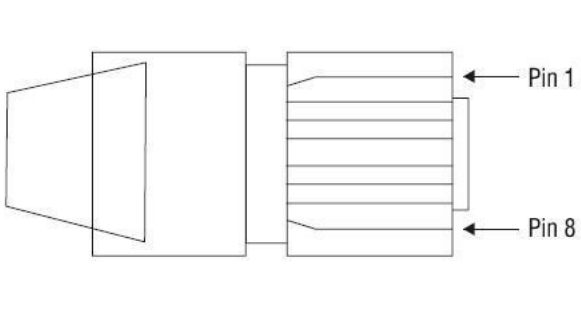

Figure A.3 EIA/TIA-568A

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