

EKI-2741F

**10/100/1000Base-T to SFP
(mini-GBIC) Type Fiber
Optic Media Converter**

EKI-2741SX

**10/100/1000Base-T to
1000Base-SX SC Type
Fiber Optic Media
Converter**

EKI-2741LX

**10/100/1000Base-T to
1000Base-LX SC Type
Fiber Optic Media
Converter**

User Manual

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Declaration of Conformity

CE

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) 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 which case the user will be required to correct the interference at his own expense.

Technical Support and Assistance

- Step 1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.

- Step 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 you call:
 - 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 Instructions

1. Read these safety instructions carefully.
2. Keep this User's Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it 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. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. 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 by transient overvoltage.
12. Never pour any 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 one of the following situations arises, get the equipment checked by service personnel:
 - a. The power cord or plug is damaged.
 - b. Liquid has penetrated into the equipment.
 - c. The equipment has been exposed to moisture.
 - d. The equipment does not work well, or you cannot get it to work according to the user's manual.
 - e. The equipment has been dropped and damaged.
 - f. The equipment has obvious signs of breakage.
15. **DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -40°C (-40°F) OR ABOVE 85°C (185°F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.**

Safety Precaution - Static Electricity

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

1. To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.
2. Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

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CHAPTER 1

Overview

Sections include:

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

Chapter 1 Overview

1.1 Introduction

The EKI-2741 is designed to convert Gigabit Ethernet networks to Gigabit fiber networks by transparently converting Ethernet signals to optic signals. The advantages of fiber optics are wide bandwidth, EMI immunity and long-distance transmission capability. Therefore, EKI-2741 is an ideal solution for “fiber to building” applications at central offices or local sites. EKI-2741 supports MDI/MDIX auto detection, so you don't need to use crossover wires. Furthermore, the EKI-2741 can work normally from $-10 \sim 60^{\circ}\text{C}$ and accepts a wide voltage range from $+12 \sim 48\text{ V}_{\text{DC}}$. Besides, it also provides $3,000\text{ V}_{\text{DC}}$ surge (EFT) protection against over-voltage, so it is suitable for harsh operating environments.

1.1.1 Fast Fiber Converters Module

The EKI-2741F/SX/LX provides you with one Fiber connector for your fiber optic cable and one Ethernet RJ-45 port (Auto MDI/MDIX) for your 1000Base-TX copper cable connection. There are two DIP-switches to set the operation mode for UTP, Fiber ports and link loss forwarding function.

1.1.2 Dual Power Input

To reduce the risk of power failure, the EKI-2741F/SX/LX provide $+12 \sim 48\text{ V}_{\text{DC}}$ dual power inputs. If there is power failure, EKI-2741F/SX/LX will automatically switch to the secondary power input.

1.1.3 Flexible Mounting

EKI-2741F/SX/LX are extremely compact 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

The power line of EKI-2741F/SX/LX supports up to $3,000\text{ V}_{\text{DC}}$ EFT protection, which secure equipment against unregulated voltage and make systems safer and more reliable. Meanwhile, $4,000\text{ V}_{\text{DC}}$ ESD protections for Ethernet ports make EKI-2741F/SX/LX more suitable for harsh environments.

1.1.5 Wide Operating Temperature

The operating temperature of the EKI-2741F/SX/LX is between $-40 \sim 75^{\circ}\text{C}$ (wide operating temperature model) or $-10 \sim 60^{\circ}\text{C}$ (standard model). With such a wide range, you can use the EKI-2741F/SX/LX in some of the harshest industrial environments that exist.

1.1.6 Easy Troubleshooting

LED indicators make troubleshooting quick and easy. The 10/100/1000 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 SFP (mini-GBIC) type connector (EKI-2741F)
- Provides 1 x 1000Base-SX or 1000Base-LX SC type connector (EKI-2741SX/LX)
- Provides 1 x 10/100/1000Mbps Ethernet ports with RJ-45 connector
- Supports full/half duplex flow control
- Supports MDI/MDI-X auto-crossover
- Supports surge (EFT) protection 3,000 V_{DC} for power line
- Supports 4,000 V_{DC} Ethernet ESD protection
- Embedded with a switch controller, supports auto-negotiation
- Supports store & forward transmission
- Supports redundant +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

Standard	IEEE 802.3, 802.3ab, 802.3u, 802.3x, 802.3z
LAN	10/100/1000Base-TX, 1000Base-SX, 1000Base-LX
Transmission Distance	Multi-Mode Fiber: 550m (EKI-2741SX) Single-Mode Fiber: 10km (EKI-2741LX) or SFP (mini-GBIC) Fiber: Up to 110km (EKI-2741F) Ethernet: Up to 100 meters (STP or UTP)
Transmission Speed	Up to 1000 Mbps

Interface

Connectors	Fiber : 1 x SFP(mini-GBIC) fiber connector (EKI-2741F) 1 x SC type fiber connector (EKI-2741SX/LX) 1 x RJ-45 6-pin removable screw terminal (power & relay)
LED Indicators	TX port: 10/100/1000M, Link/Active Fiber port: LNK/ACT Port Alarm, LFP

Power

Power Consumption	5.28 W (EKI-2741F) 5.18 W (EKI-2741SX) 5.30 W (EKI-2741LX)
Power Input	2 x Unregulated +12 ~ 48 V _{DC}
Fault Output	1 Relay Output

Mechanism

Dimensions (WxDxH)	37 x 95 x 140 mm
Enclosure	IP30, Metal shell with solid mounting kits
Mounting	DIN-rail, wall

Protection

ESD (Ethernet)	4,000 V _{DC}
Surge (EFT for power)	3,000 V _{DC}
Reverse Polarity	Yes
Overload	0.9A@12V _{DC} (25 °C)

Environment

Operating Temperature

-10 ~ 60 °C (14~140°F)

Wide temp. model: -40 ~ 75 °C (-40 ~ 167°F)

Storage Temperature

-40 ~ 85 °C (-40 ~ 185°F)

Operating Humidity

5 ~ 95% (non-condensing)

Storage Humidity

0 ~ 95% (non-condensing)

Certifications

Safety

UL, 60950-1, CAN/CSA-C22.2 No.60950

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-2741F or EKI-2741SX or EKI-2741LX Industrial Ethernet Switch
- 1 x eAutomation Industrial Communication CD-ROM with software, and User manual
- 2 x Wall Mounting Bracket and Screws
- 1 x DIN-rail Mounting Bracket and Screws
- 1 x EKI-2741F/SX/LX Startup Manual
- 1 x DC Jack Cable ϕ 2.0/150mm

1.5 Safety Precaution

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

Installation

Sections include:

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

Chapter 2 Installation

In this chapter, you will be given an overview of the EKI-2741F/SX/LX 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-2741F/SX/LX, each of them has its own specific meaning as the table below.

<i>Table 2.1: EKI-2741F/SX/LX LED Definition</i>			
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
LNK/ACT (fiber port)	Green	On	Connected to network
		Flashing	Networking is active
		Off	Not connected to network
1000M (RJ-45)	Yellow	On	Link to 1000M bps network
		Off	Not connected to 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: EKI-2741series 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

Link Fault Pass-Through (DIP-Switch 2): 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, a link loss forwarding feature is provided in both UTP and Fiber side.

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)

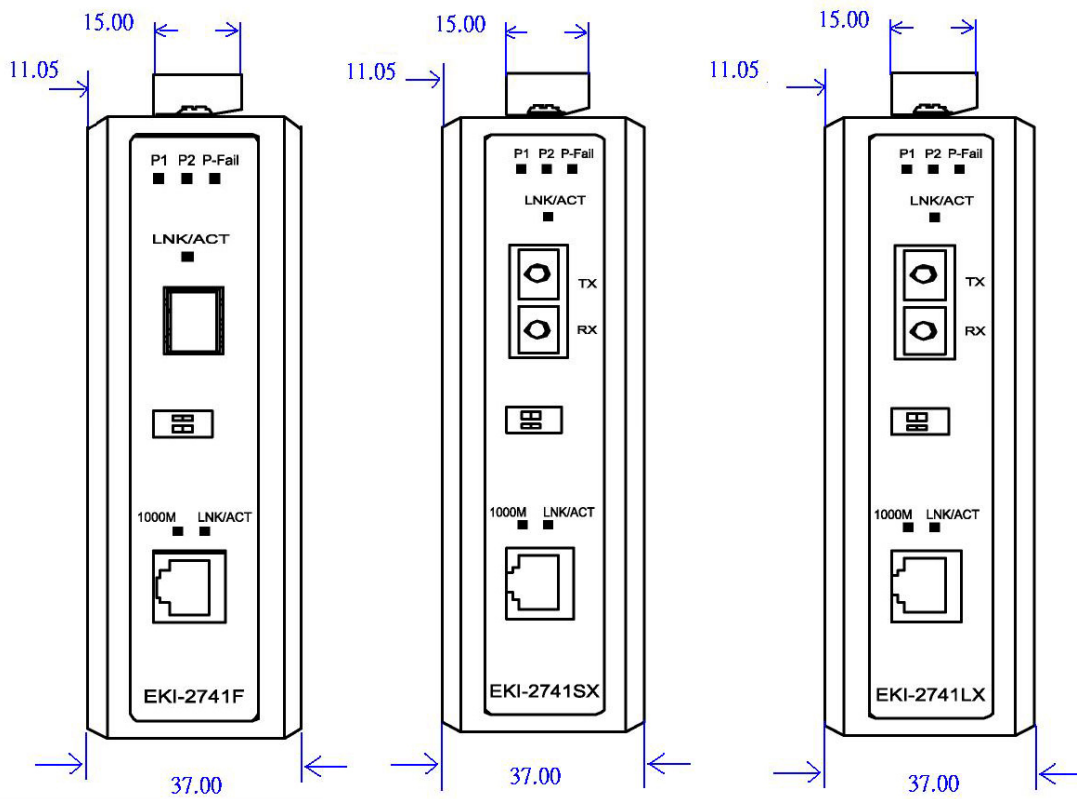


Figure 2.1: Front View of EKI-2741 series

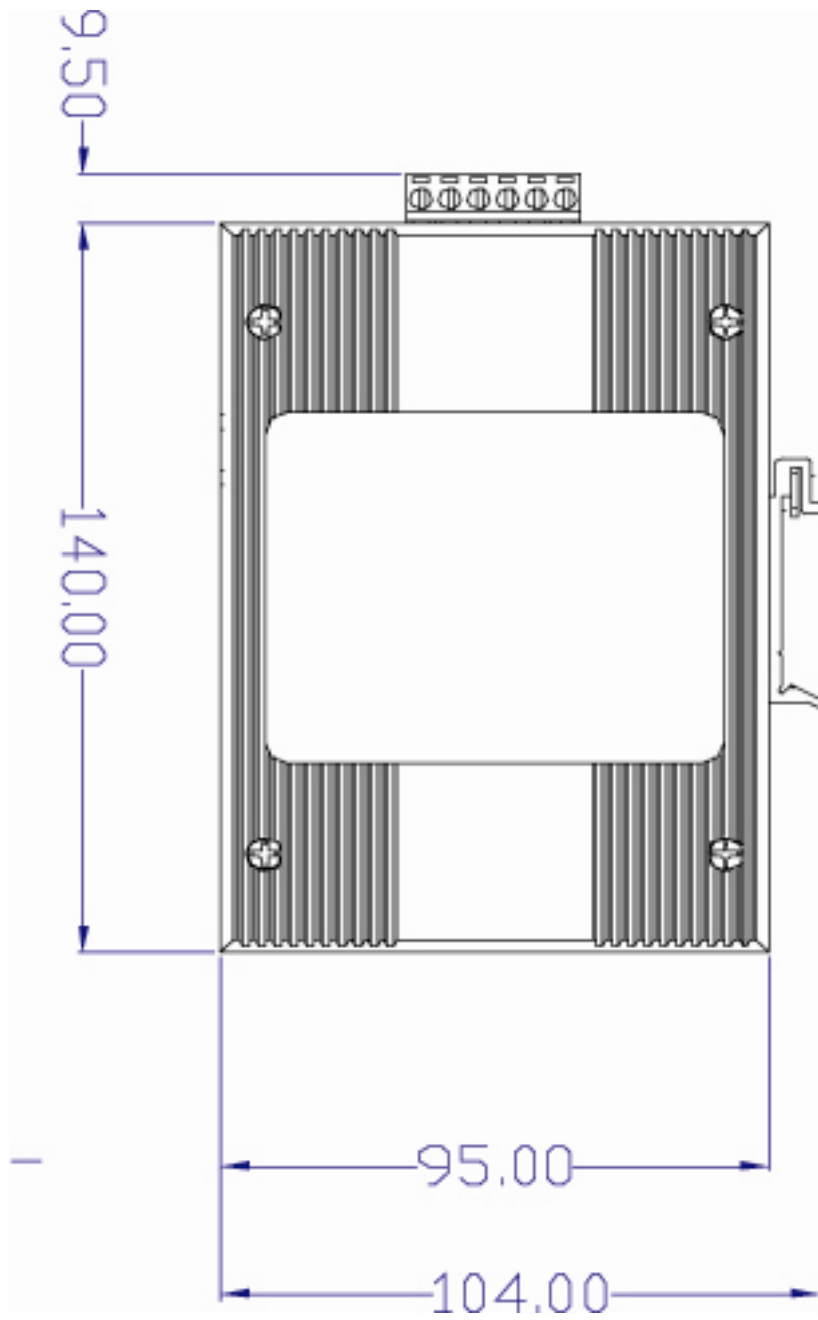


Figure 2.2: Side View of EKI-2741 series

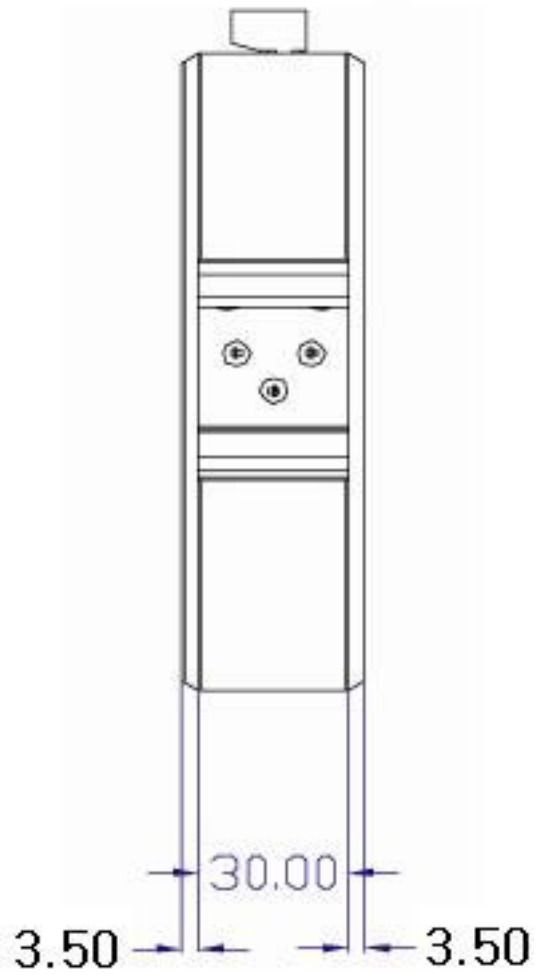


Figure 2.3: Rear View of EKI-2741 series

The terminal block of power & relay is located on the top side. Please refer to page 16 for pin assignment.

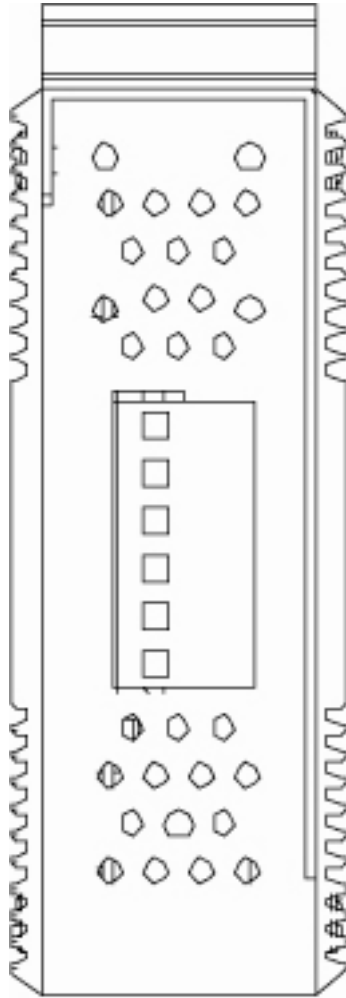


Figure 2.4: Top View of EKI-2741 series

2.4 Mounting

The EKI-2741F/SX/LX support two mounting methods: DIN-rail & Wall.

2.4.1 Wall mounting

EKI-2741F/SX/LX can be wall-mounted by using the included mounting kit. Then, hang on the EKI-2741F/SX/LX to the nails on the wall.

First, use the screws included in the package to combine the EKI-2741F/SX/LX 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-2741F/SX/LX 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.

First, hang the EKI-2741F/SX/LX to the DIN-rail with angle of inclination. See figure 2.6.

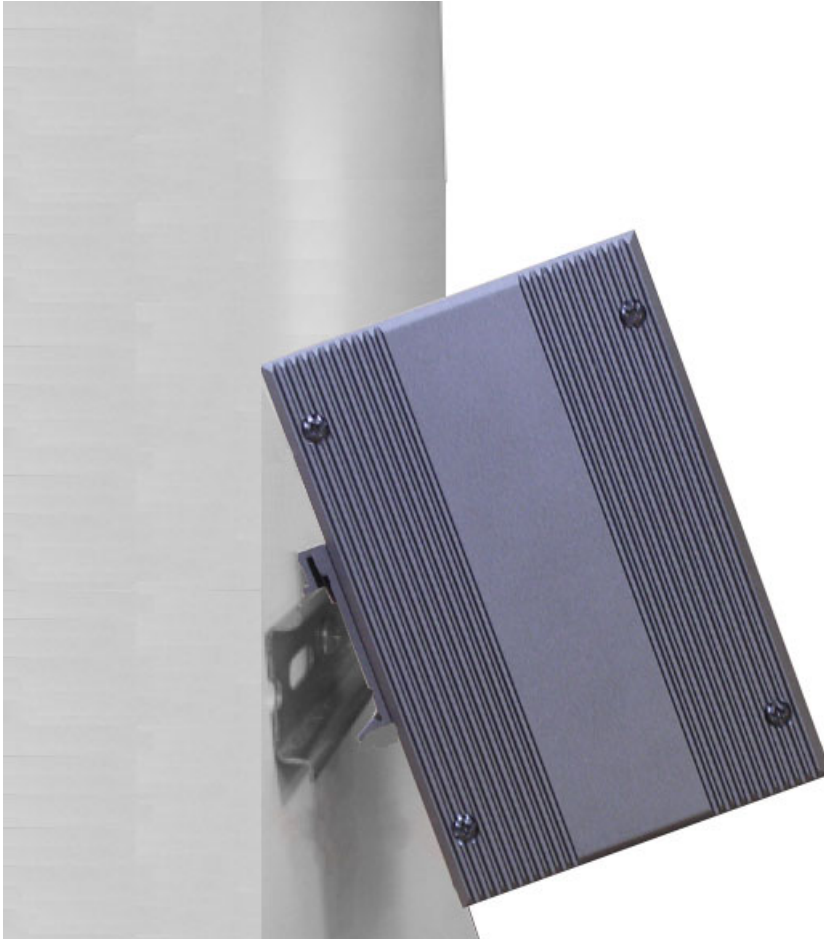


Figure 2.6: Installation to DIN-rail Step 1

Then, let the device down straight to slide over the rail smoothly. See Figure 2.7



Figure 2.7: Installation to DIN-rail Step 2

2.5 Network Connection

- Twisted-pair segment can use unshielded twisted pair (UTP) or shielded twisted pair (STP) cabling. The cable between the link partner (switch, hub, workstation, etc.) and the converter, must be less than 100 meters (328 ft.) long and comply with the IEEE 802.3ab 1000Base-T standard for Category 5e or above.
- Fiber segment using **single-mode** connector type must use 9/125 μm single-mode fiber cable. You can connect two devices in the distance of **10 km**.
- Fiber segment using **multi-mode** connector type must use 50/125 or 62.5/125 μm multi-mode fiber cable. You can connect two devices up to **550m** distances.
- The small form-factor pluggable (SFP) is a compact optical transceiver used in optical communications for both telecommunication and data communication applications.

To connect the transceiver and LC cable, please follow the steps shown below:

First, insert the transceiver into the SFP module. Notice that the triangle mark is the bottom of the module.

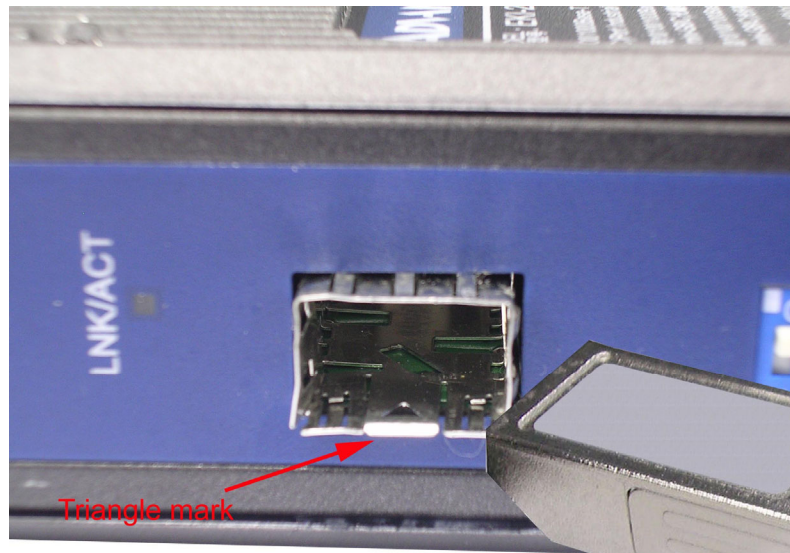


Figure 2.8: Transceiver to the SFP module



Figure 2.9: Transceiver Inserted

Second, insert the fiber cable of LC connector into the transceiver.



Figure 2.10: LC connector to the transceiver

To remove the LC connector from the transceiver, please follow the steps shown below:

First, press the upper side of the LC connector from the transceiver and pull it out to release.

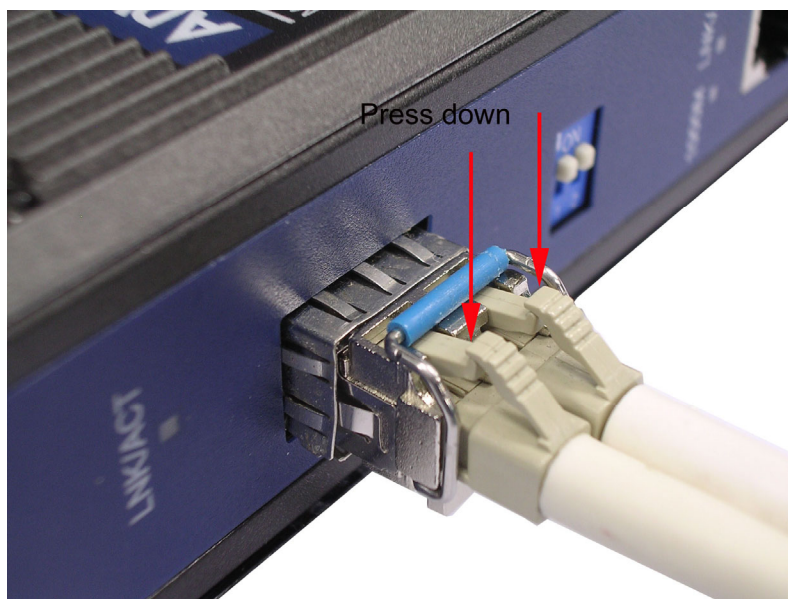


Figure 2.11: Remove LC connector

Second, push down the metal loop and pull the transceiver out by the plastic part.

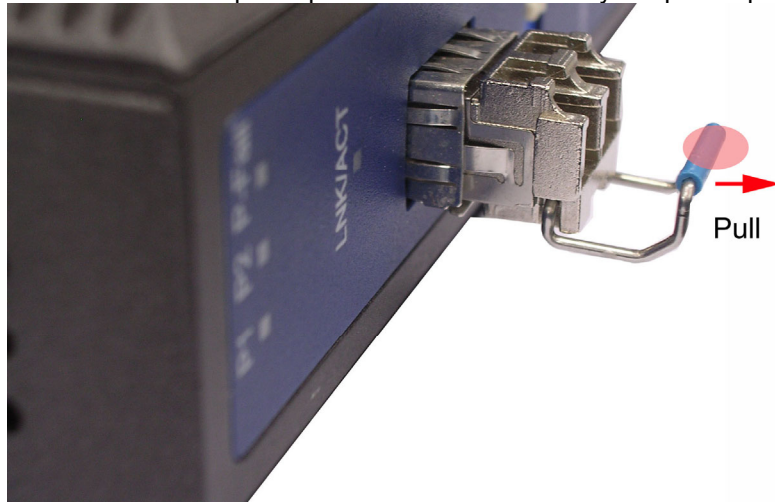


Figure 2.12: Pull out from the SFP module

2.6 Power Connection

The EKI-2741F/SX/LX support dual +12 ~ 48 V_{DC} power inputs and power-fail relay output.

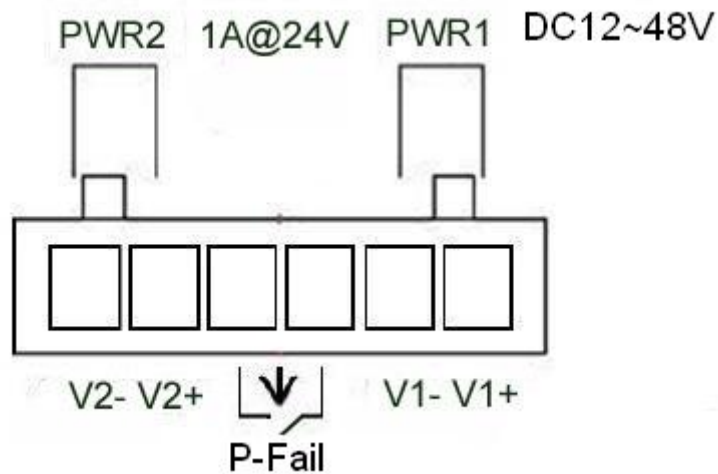


Figure 2.13: Pin Assignment of the Power Connector

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

Chapter 3 Troubleshooting

1. Power Input

Verify that is using the right power cord/adaptor (+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.

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. DIP Switch

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

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

Appendix A Pin Assignment & Wiring

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

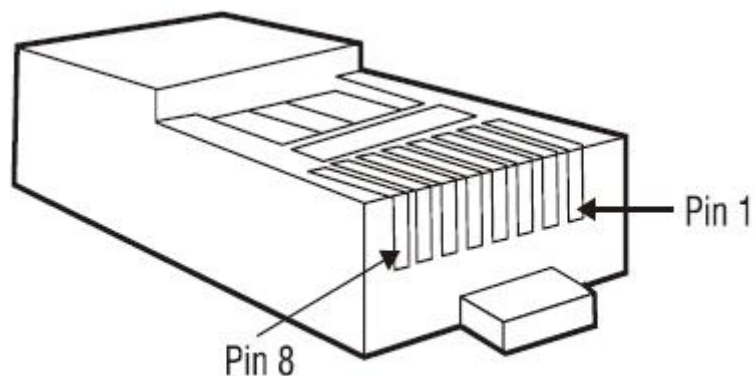


Figure A.1: RJ-45 Pin Assignment

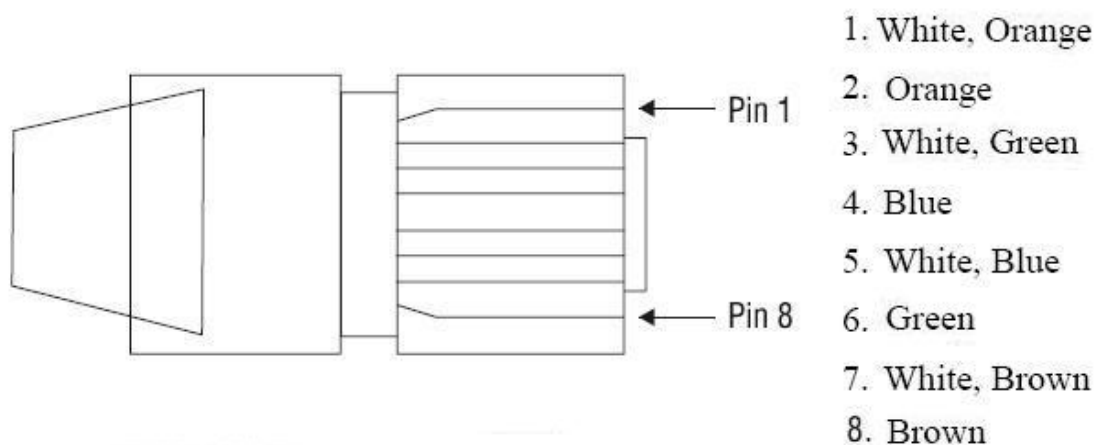


Figure A.2: EIA/TIA-568B

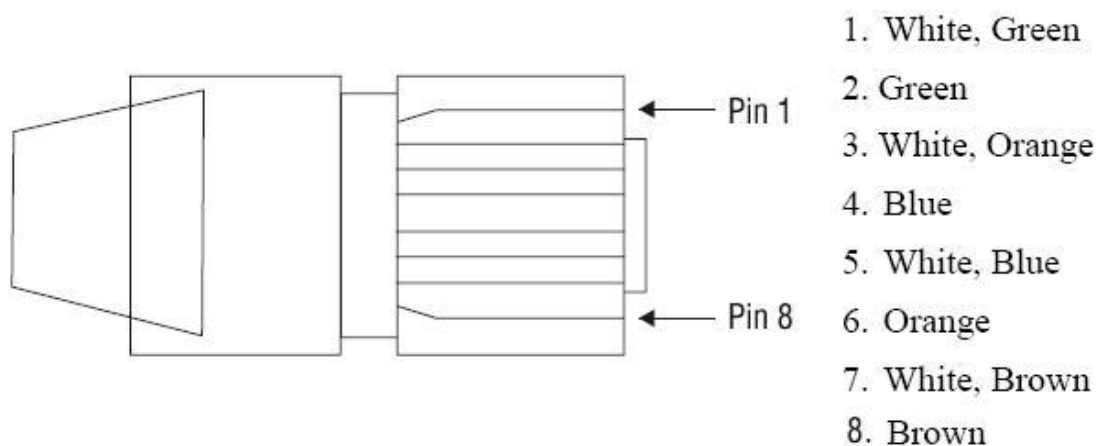


Figure A.2: EIA/TIA-568A

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