EKI-4524RI

24-port 10/100TX + 2-port 100 Mini-GBIC Ethernet Switch with AC/DC Power Input and Wide Operating Temperature

EKI-4524ARI

24-port 10/100TX + 2-port 100 Mini-GBIC Ethernet Switch with Wide Operating Temperature

User Manual

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5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

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℃ (-40℉) OR ABOVE 85℃ (185℉). 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 equipment chassis before you work on it.
2. Disconnect power before making any configuration changes.

Contents

Overview

Sections include:

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

Chapter 1   Overview

1.1   Introduction

The EKI-4524RI/4524ARI is a cost-effective solution, which meets the high reliability requirements demanded by industrial applications. The equipment is able to operate in wide temperature environments and supports variants of power input. Besides, the EKI-4524RI/4524ARI is designed for the applications supposed to have certain electric interference. Equipped with isolated power and isolated communication ports, the device has high resistance toward electrical noise. It has been proved to work well for harsh applications.

1.1.1   The SFP Advantage

The EKI-4524RI/4524ARI's two SFP fiber slots provide a lot of flexibility for planning and implementing a network. The slots can accept any SFP-type fiber transceivers designed for transmitting over distances of either 500m (multi-mode), 10km, 30km, 50km, 70km or 110km (single-mode), and the slots support SFP transceivers for WDM single-fiber transmissions. This means that you can easily change the transmission mode and distance of the industrial switch by simply pulling out the SFP transceiver and plugging in a different one. The SFP slots are hot-swappable and plug-and-play. Also, the fact that the switch has two of these slots means that the network manager can, for example, have one 10km transceiver in one slot and one 110km in the other.

1.1.2   High-Speed Transmissions

The EKI-4524RI/4524ARI includes a switch controller that can automatically sense transmission speeds (10/100 Mbps). The RJ-45 interface can also be auto-detected, so MDI or MDI-X is automatically selected and a crossover cable is not required. All Ethernet ports have memory buffers that support the store-and-forward mechanism. This assures that data is properly transmitted.

1.1.3   19" Rack Mounting

The EKI-4524RI/4524ARI comes with a rack-mounted kit and can be mounted in an EIA standard size, 19-inch Rack. The Switch can be placed in a wiring closet with other equipment.

1.1.4   Advanced Protection

The power line of EKI-4524RI/4524ARI supports up to 4,000 V_{DC} EFT protection, which secures equipment against unregulated voltage and makes systems safer and more reliable, while 8,000 V_{DC} ESD protection for Ethernet ports makes the equipment more suitable for harsh environments.

1.1.5   Easy Troubleshooting

LED indicators make troubleshooting quick and easy. Each 10/100 Base-TX port has LED indicators that display the link status, transmission speed and collision status.

1.2 Features

- System Interface/Performance
  - RJ-45 ports support Auto MDI/MDI-X Function
  - 2 x 100Mbps SFP (mini-GBIC) ports supported for long distance up-linking
  - Store-and-Forward Switching Architecture
  - Back-plane (Switching Fabric): 5.2Gbps
  - 4Mbits Packet Buffer
  - 8K MAC Address Table
- Power Supply
  - EKI-4524RI: 100 ~ 240 V_{AC}/V_{DC} Power Input
  - EKI-4524ARI: 12 ~ 48 V_{DC} Power Input
- Case/Installation
  - IP-30 Protection
  - 19-inch Rack-Mount Design
- Provides EFT protection 4,000 VDC for power line
- Supports 8,000 VDC Ethernet ESD protection

1.3   Specifications

Communications

IEEE Standard	IEEE 802.3, 802.3u, 802.3x
LAN	10/100Base-TX
	100Base-FX
Transmission Distance	UTP: Up to 100m
	SFP: Up to 110km (depends on the transceiver)
Transmission Speed	UTP: 10/100Mbps, Auto-Negotiation
	SFP: 100Mbps

Interface

Connectors	24 x RJ-45
	2 x SFP (mini-GBIC)
	10-pin barrier terminal block (EKI-4524RI)
	6-pin removable terminal block (EKI-4524ARI)
LED Indicators	System: PWR
	10/100TX: LNK/ACT, Speed
	SFP: Link/Activity

Power

Power Consumption	EKI-4524RI: 16.1 Watts max. @ 110 V_{DC}
	17.5 Watts max. @ 110 V_{AC}
	EKI-4524ARI: 13.9 Watts max. @ 48 V_{DC}
Power Input	EKI-4524RI: 100 ~ 240 V_{AC} 50/60Hz ($\pm$20%),
	100 ~ 240 V_{DC} (+20%)
	EKI-4524ARI: 12 ~ 48 V_{DC}
Relay Alarm	1 Relay Output

Mechanism

Dimensions (WxHxD)	440 x 44 x 280 mm
Enclosure	IP30, metal shell with solid mounting kits
Mounting	19-inch Rack Mount

Protection

ESD (Ethernet)	8,000 V_{DC}
Surge (EFT for Power)	4,000 V_{DC}
Reverse Polarity	Present
Overload Current Protection	Present

Environment

Operating Temperature	-40 ~ 75°C (-40 ~ 167°F)
Operating Humidity	5 ~ 95% (non-condensing)
Storage Temperature	-40 ~ 85°C (-40 ~ 185°F)
Storage Humidity	5 ~ 95% (non-condensing)

Certifications

Standard	Meets IEC 61850-3 & IEEE 1613
EMC	FCC Class A
	CE EN61000-6-4
	CE EN61000-6-2
	CE EN61000-4-2 (ESD)
	CE EN61000-4-3 (RS)
	CE EN61000-4-4 (EFT)
	CE EN61000-4-5 (Surge)
	CE EN61000-4-6 (CS)
	CE EN61000-4-8 (Magnetic Field)
Freefall	IEC60068-2-32
Shock	IEC60068-2-27
Vibration	IEC60068-2-6

1.4 Packing List

- 1 x EKI-4524RI/4524ARI Series Industrial Unmanaged Fast Ethernet Switch
- 1 x eAutomation Industrial Communication CD-ROM and User manual
- 2 x Rackl Mounting Bracket and Screws
- 1 x EKI-4524RI/4524ARI Startup Manual

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
- Connection to a Fiber Optic Network
- Power Connection

Chapter 2   Installation

In this chapter, you will be given an overview of the EKI-4524RI/4524ARI hardware installation procedures.

2.1   LED Indicators

The LED indicators located on the panel display the power status and network status of EKI-4524RI/4524ARI; each has its own specific meaning as the table shown below.

Table 2.1: EKI-4524RI/4524ARI LED Definition			
Front Panel			
LED	**Color**	**Description**	
PWR	Green	On	Power input is active
		Off	Power input is inactive
LNK/ACT (Port 1 ~ 26)	Green	On	Connected to network
		Flashing	Networking is active
		Off	Not connected to network
10/100 (Port 1 ~ 24)	Green	On	Connected to network at speed of 100Mbps
		Off	10Mbps or link-down
Rear Panel			
LED	**Color**	**Description**	
PWR	Green	On	Power input is active
		Off	Power input is inactive
LNK/ACT (Port 1 ~ 26)	Green	On	Connected to network
		Flashing	Networking is active
		Off	Not connected to network
SPEED (Port 1 ~ 24)	Amber	On	100M
		Off	10M or link-down

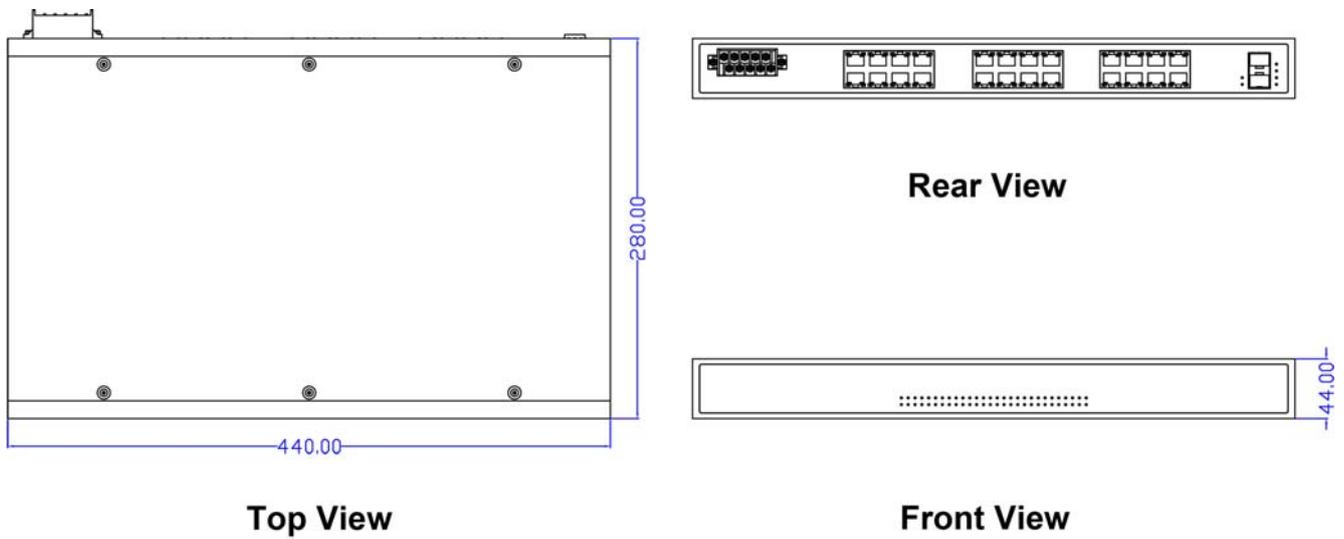## 2.2 Dimensions (units: mm)

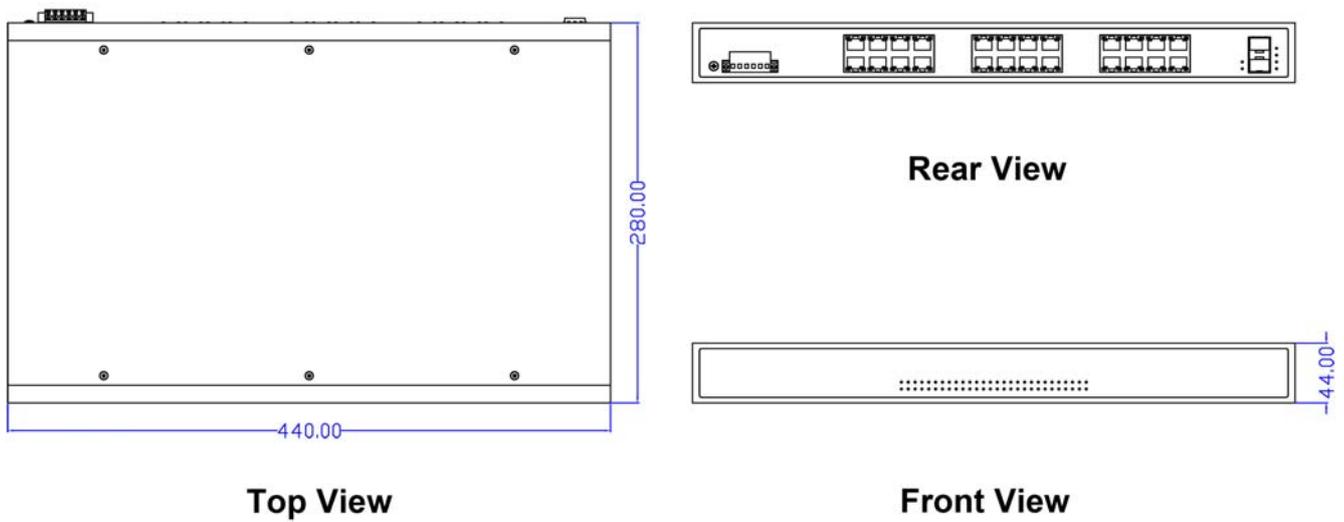*Figure 2.1: EKI-4524RI Mechanical Dimensions*

Figure 2.2: EKI-4524ARI Mechanical Dimensions

2.3 Mounting

2.3.1 Rack mounting

EKI-4524RI/4524ARI comes with a rack-mounted kit and can be mounted in an EIA standard size, 19-inch rack. The Switch can be placed in a wiring closet with other equipment.
Perform the following steps to rack-mount the switch:

1. Position one bracket to align with the holes on one side of the switch and secure it with the smaller bracket screws. Then attach the remaining bracket to the other side of the Switch.

Figure 2.3: Attach mounting brackets with screws

2. After attaching the mounting brackets, position the EKI-4524RI/4524ARI in the rack by lining up the holes in the brackets with the appropriate holes on the rack. Secure the Switch to the rack by a screwdriver with the rack-mounting screws.
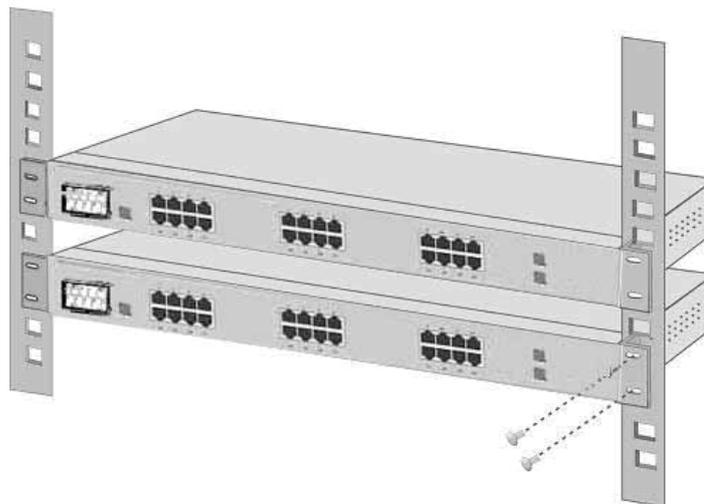

Figure 2.4: Mount the switch in the 19" rack

Note: For proper ventilation, allow about at least 4 inches (10 cm) of clearance on the front and 3.4 inches (8 cm) on the back of the Switch. This is especially important for enclosed rack installation.

2.4 Network Connection

The EKI-4524RI/4524ARI has 24 x RJ-45 ports that support connection to 10 Mbps Ethernet, or 100 Mbps Fast Ethernet, and half or full duplex operation. EKI-4524RI/4524ARI can be connected to other hubs or switches via a twisted-pair straight-through or crossover cable up to 100m long. The connection can be made from any TX port of the EKI-4524RI/4524ARI (MDI-X) to another hub or switch either MDI-X or uplink MDI port.

The EKI-4524RI/4524ARI supports auto-crossover to make networking more easy and flexible. You can connect any RJ-45 (MDI-X) station port on the switch to any device such as a switch, bridge or router.

2.5 Connection to a Fiber Optic Network

EKI-4524RI/4524ARI has two SFP slots for connecting to the network segment with single or multi-mode fiber. You can choose appropriate mini-GBIC transceiver to plug into the slot. Make sure the transceiver is aligned correctly and then slide the transceiver into the SFP slot until a click is heard. You can use proper multi-mode or single-mode fiber according to the used SFP transceiver. With fiber optic, it transmits speed up to 1,00 Mbps and you can prevent noise interference from the system and transmission distance up to 110 km, depending on the mini-GBIC transceiver.

The small form-factor pluggable (SFP) is a compact optical transceiver used in optical communications for both telecommunication and data communications applications.

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

First, insert the transceiver into the SFP slot. Note that the location of the triangle indicates the bottom of the slot.
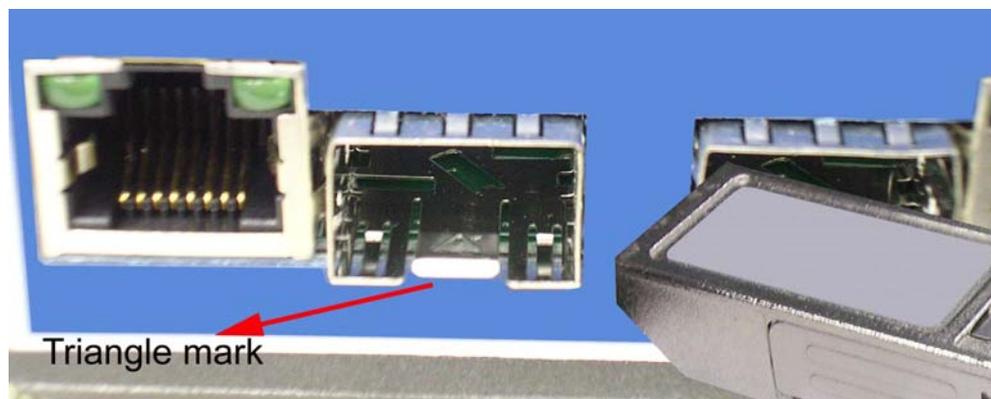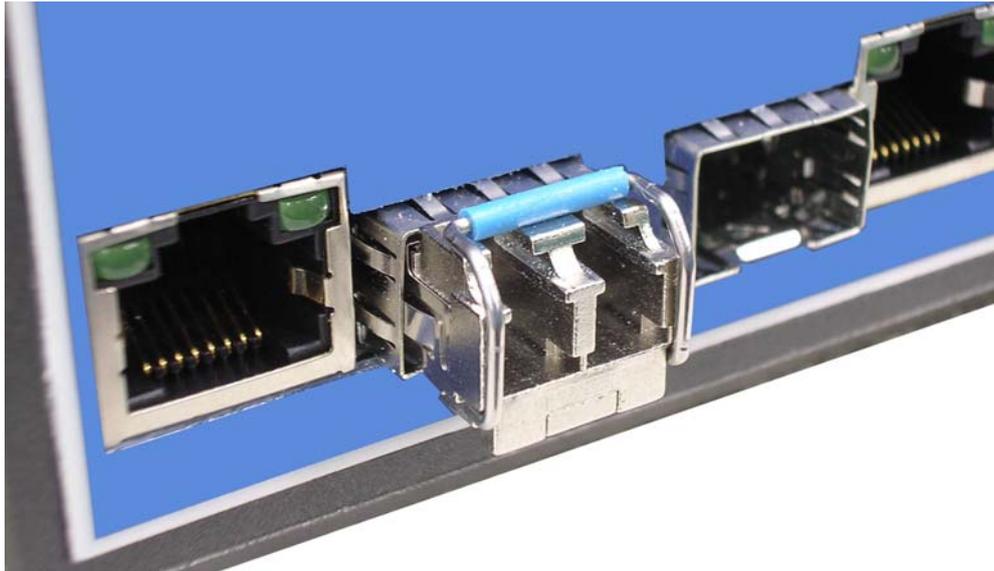

Figure 2.5: Transceiver to the SFP Slot

Figure 2.6: Transceiver Inserted

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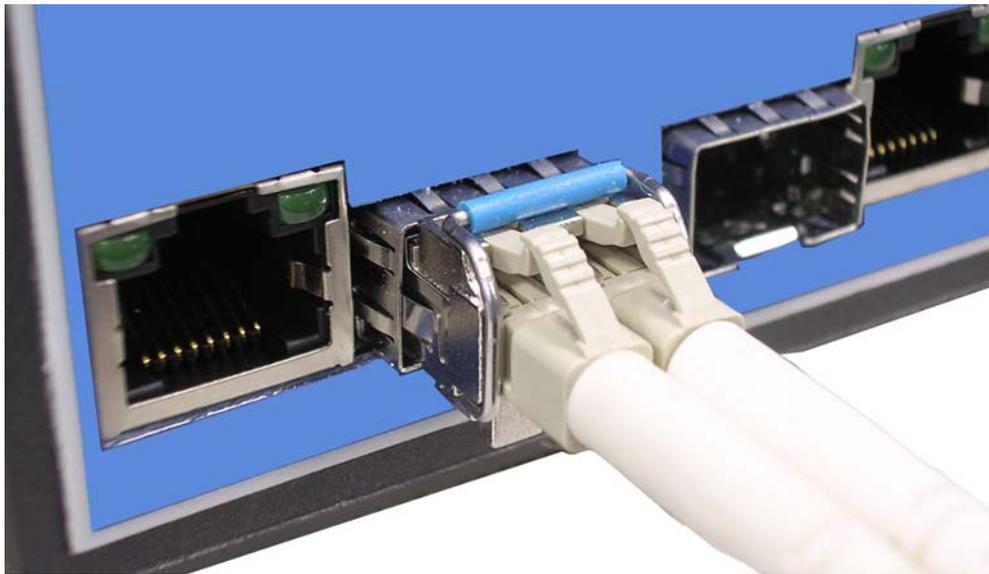

Figure 2.7: LC Connector to the Transceiver

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

First, press the latches of the LC connector and pull it out from the transceiver.
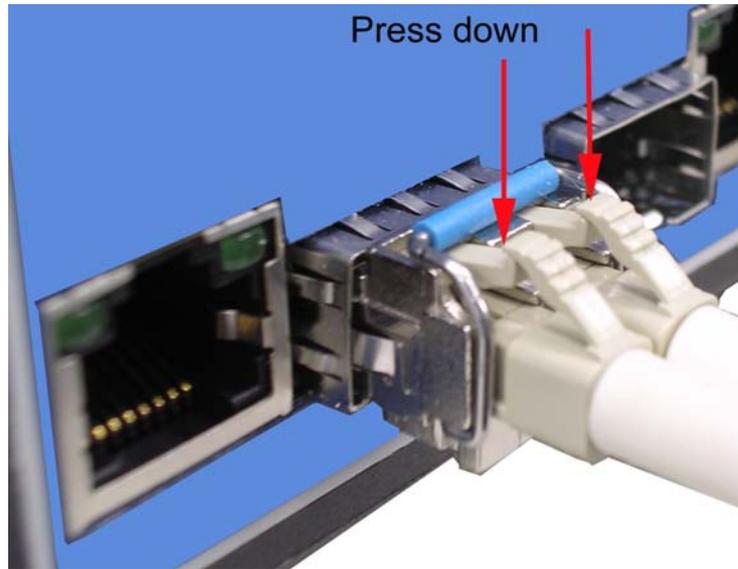

Figure 2.8: Removing the LC Connector

Second, push down the transceiver handle and pull it out by the plastic handle.
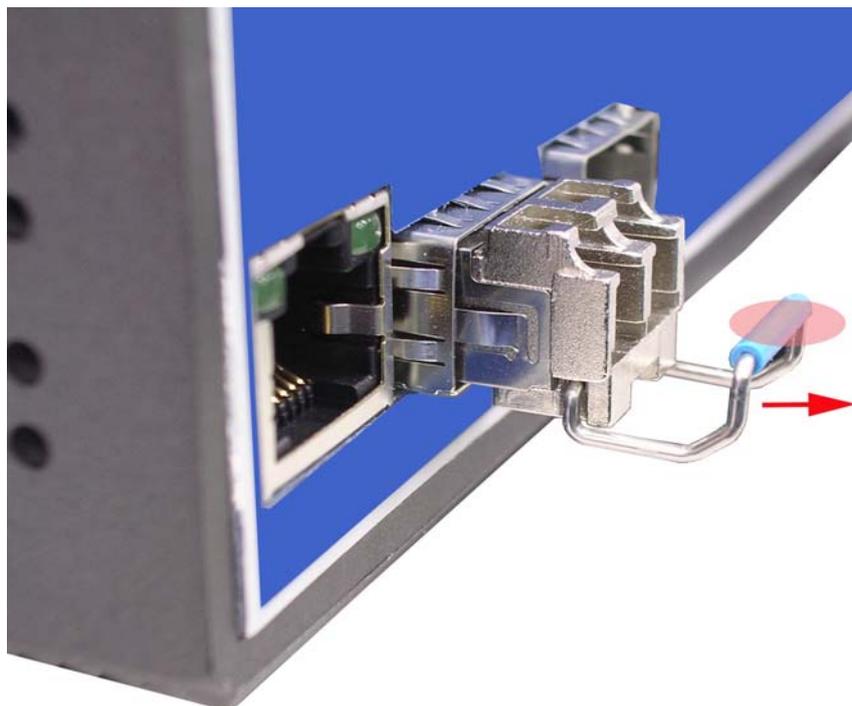

Figure 2.9: Pulling out from the Transceiver

2.6 Wiring the Power Input

EKI-4524RI Power Input Wiring

EKI-4524RI comes equipped with a 10-position cross screw terminal block on where power input and fail-safe relay are located. Please follow the steps below to wire the power connection.

Pin Number	Description	Definition
1	N	**Neutral** pin is wired to the *Neutral* point of the AC power system, or to the negative (-) point of the DC power source.
2	GND	Grounding pin
3	L	**Live** pin is wired to the *Live* point of the AC power system, or to the positive (+) point of the DC power source.
4	GND	Grounding pin
5	-NA-	Not available
6	-NA-	Not available
7	-NA-	Not available
8	Alarm Contact	Used for wiring to an external self-powered warning device
9	-NA-	Not available
10	Alarm Contact	Used for wiring to an external self-powered warning device

Table 2.2: Terminal Block Pinouts

1. Before wiring, make sure the power source is disconnected.
2. Prepare the bare wires or ring lugs for power connection.
3. Use a cross-head screw driver to loose the screws where the contacts are to be connected.
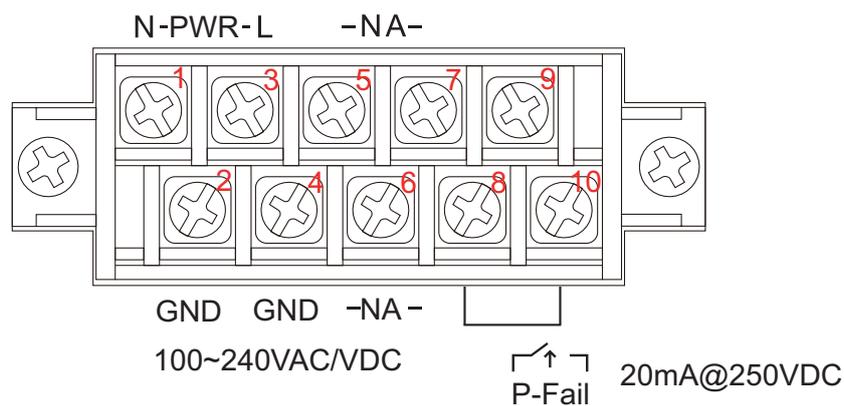4. Attach the AC or DC power wires to the contacts and secure the screws firmly.

Figure 2.10: 10-position Cross Screw Terminal Block

EKI-4524ARI Power Input Wiring

1. Insert DC power wires into the contacts.
   Pin 5: **Negative**
   Pin 6: **Positive**
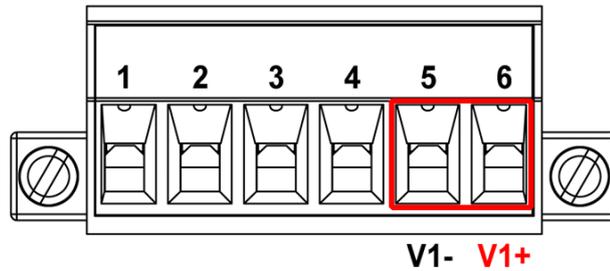   Pin 3 & 4: P-Fail Contacts
   Pin 1 & 2: NC

Figure 2.11: Power Contacts of the Terminal Block

2. Tighten the wire-clamp screws to prevent the wires from loosing.

Note
- *Use Copper Conductors Only, 60/75°C, tightening to 5 lb-in.*
- *The wire gauge for the terminal block should be in the range between 12~ 24 AWG.*

2.7 Wiring the Fail-Safe Alarm Contacts

With a **Normally Close** circuit formed by wiring with an external power and an alarm device (a buzzer or a flashing LED), system will detect the power failure event. If a failure event occurs, the relay inside the equipment will act as an open switch, and therefore break the external circuit. The fail-safe design is intended for triggering the connected alarm device for warning purposes.

EKI-4524RI P-Fail Alarm Wiring

The fail-safe relay alarm contacts of EKI-4524RI are labeled as 8 and 10 as the figure shown below.
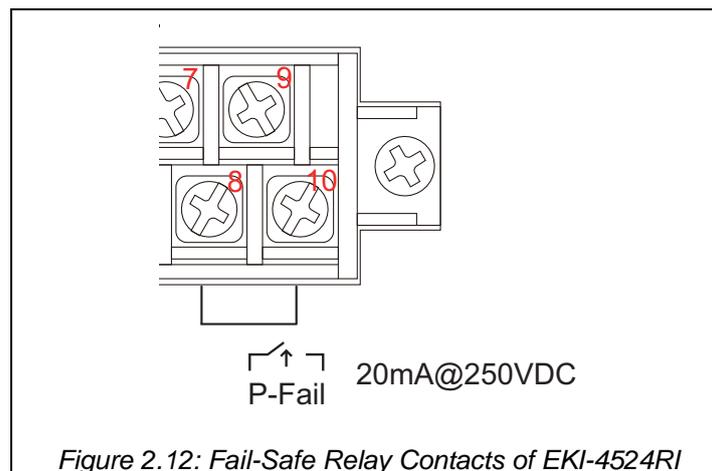

Figure 2.12: Fail-Safe Relay Contacts of EKI-4524RI

EKI-4524ARI P-Fail Alarm Wiring

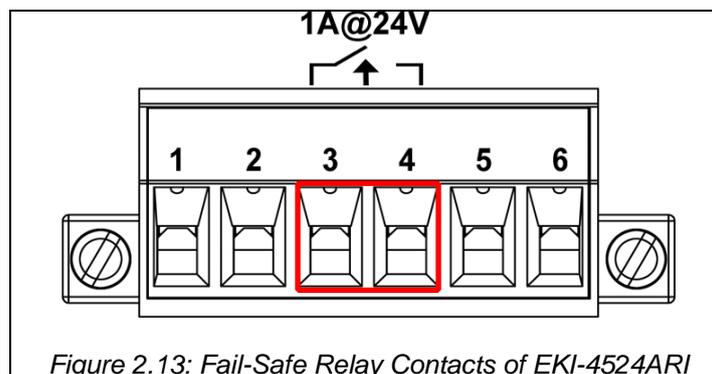The fail-safe relay alarm contacts of EKI-4524ARI are labeled as 3 and 4 as the figure shown below.

Figure 2.13: Fail-Safe Relay Contacts of EKI-4524ARI

Note
- *Use Copper Conductors Only, **60/75°C**, tightening to **5 lb-in***
- *The wire gauge for the terminal block should be in the range between **12~ 24 AWG**.*

Troubleshooting

Chapter 3   Troubleshooting

Verify that you are using the right power cord/adapter. Please don't use a power adapter with DC outputs higher than the power rating of this equipment, or it will be damaged.

Select the proper UTP cable to construct the user network. Use unshielded twisted-pair (UTP) or shielded twisted-pair (STP) cable for RJ-45 connections: 100Ω Category 3, 4 or 5 cable for 10Mbps connections, 100Ω Category 5 cable for 100Mbps connections, or 100Ω Category 5e/above cable for 1000Mbps connections. Also be sure that the length of any twisted-pair connection does not exceed 100 meters (328 feet).

Diagnosing LED Indicators
To assist in identifying problems, the switch can be easily monitored through panel indicators, which describe common problems the user may encounter and where the user can find possible solutions.
If the power indicator does not light up when the power cord is plugged in, you may have a problem with power cord. Then check for loose power connections, power losses or surges at power outlet. If you still cannot resolve the problem, contact the local dealer for assistance.
If the LED indicators are normal and the connected cables are correct but the packets still cannot be transmitted, please check the user system's Ethernet devices' configuration or status.

Pin Assignment & Wiring

Appendix A   Pin Assignments & Wiring

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

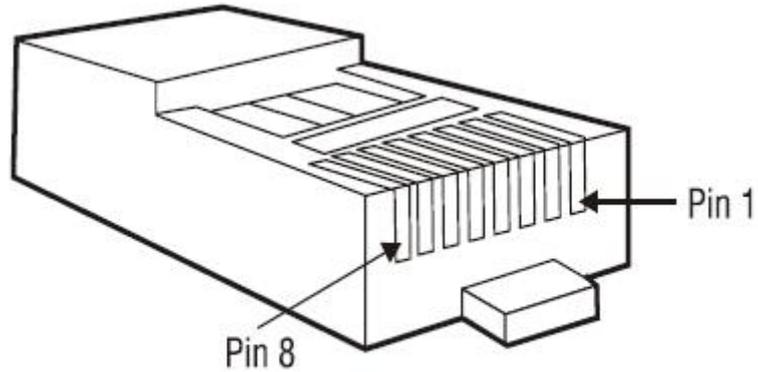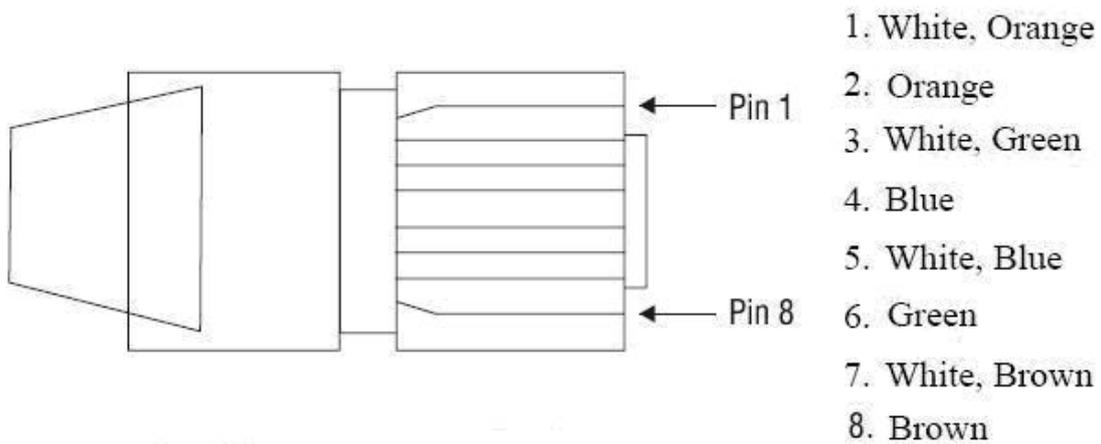*Figure A.1: RJ-45 Pin Assignment*

1. White, Orange
2. Orange
3. White, Green
4. Blue
5. White, Blue
6. Green
7. White, Brown
8. Brown

Figure A.2: EIA/TIA-568B

1. White, Green
2. Green
3. White, Orange
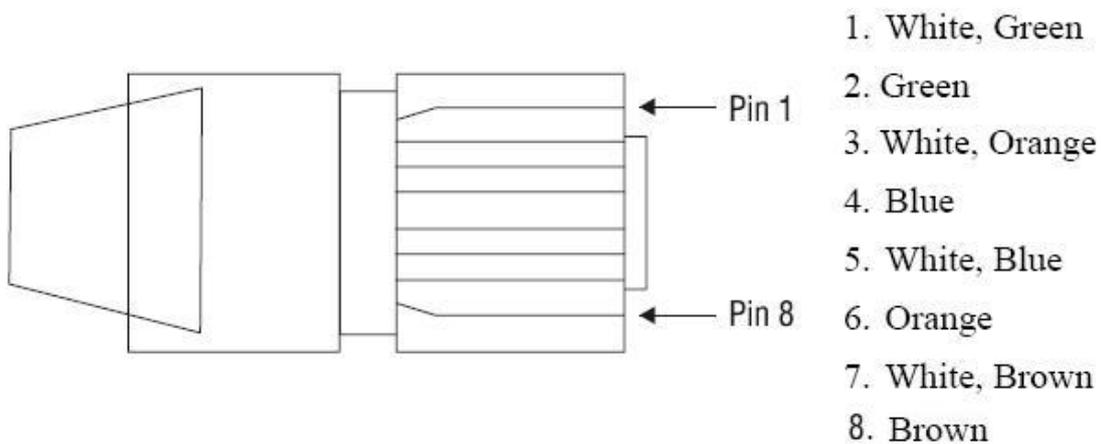4. Blue
5. White, Blue
6. Orange
7. White, Brown
8. Brown

Figure A.2: EIA/TIA-568A

Compatible SFP Transceivers

Appendix B   Compatible SFP Transceivers

The table below shows compatible SFP transceivers for EKI-4524RI/4524ARI.

Item	Brand	Part Number	Mode	Transmission Distance
1	AVAGO	AFBR-5710PZ	Multi-mode	550m
2	APAC	LM28-C3S-TC-N		550m
3	HOATECH	HTI8512-X5ATO		550m
4	SPACE SHUTTLE	S56L-S85-6L-N		550m
5	LuminentOIC	SP-GB-LX	Single-mode	10km
		SP-GB-ELX		20km
		SP-GB-XD		50km
6	AVAGO	AFCT-5710PZ		10km
7	APAC	LS38-C3M-TC-N		20km
8	SPACE SHUTTLE	S56L-L13-6L-N		10km