KTI
NETWORKS

Industrial 3-Port Fast Ethernet Media Converter Switches

KSD-103-A series
KSD-103-B series

Installation Guide

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TRADEMARKS
Ethernet is a registered trademark of Xerox Corp.

FCC NOTICE
This device complies with Class B Part 15 the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received including the interference that may cause.

CE NOTICE
Marking by the symbol   indicates compliance of this equipment to the EMC directive of the European Community. Such marking is indicative that this equipment meets or exceeds the following technical standards:

EMC Class B
EN 50081-1/1992 :EN55022:1994/A1:1995/A2:1997 Class B
       EN61000-3-2:2000
       EN61000-3-3:1995/A1:2001
EN 55024:1998/A1:2001
       IEC 61000-4-2:1995
       IEC 61000-4-3:1995
       IEC 61000-4-4:1995
       IEC 61000-4-5:1995
       IEC 61000-4-6:1996
       IEC 61000-4-8:1993
       IEC 61000-4-11:1994

Table of Contents

1. Introduction

The industrial rated KSD-103 Fast Ethernet switch series supports three switching-base segment communications and benefit the following applications and make fiber deployment easier :

● Copper to fiber bridging converter

● Multimode fiber to single mode fiber bridging converter

● Fiber cable extender

● Cascaded fiber networking

Depending on the types of the network ports, two different model series are defined as follows:

Model	Copper Port (RJ-45)	Fiber Port
KSD-103-A	2 ports	1 port
KSD-103-B	1 port	2 ports

The switch also provide the following advantages:

Plug and Play

No configuration is required in using the switches. With the featured auto-negotiation function, the switches can detect and configure the connection speed and duplex automatically for the copper ports. The switches also provide auto MDI/MDI-X function, which can detect the connected cable and switch the transmission wire pair and receiving pair automatically. This auto-crossover function can simplify the type of network cables used.

Industrial Features

For industrial environment, the devices are designed with the following enhanced features exceeding that of commercial Ethernet switches:

- High and wide operating Temperature

- Power input interface: Industrial screw terminal block and DC power jack for external commercial power adapter as option

- Screw panel and DIN rail mounting support for industrial enclosure

- Industrial-rated Emission and Immunity performance

1.1 Features

- Provide 3 switching-base network segments

- Auto MDI/MDI-X crossover function on the TP copper port

- Support IEEE 802.3x flow control for full-duplex operation

- Support Back-pressure flow control for half-duplex operation

- Wide operating temperature range for temperature critical environment

- Support DIN-rail mounting and panel mounting

- Provide two power input types to meet more application needs

- Accept wide power input voltage range for application flexibility

- Industrial-rated Emission and Immunity performance

1.2 Product Panels

The following figure illustrates the faces of the switches:

KSD-103-A
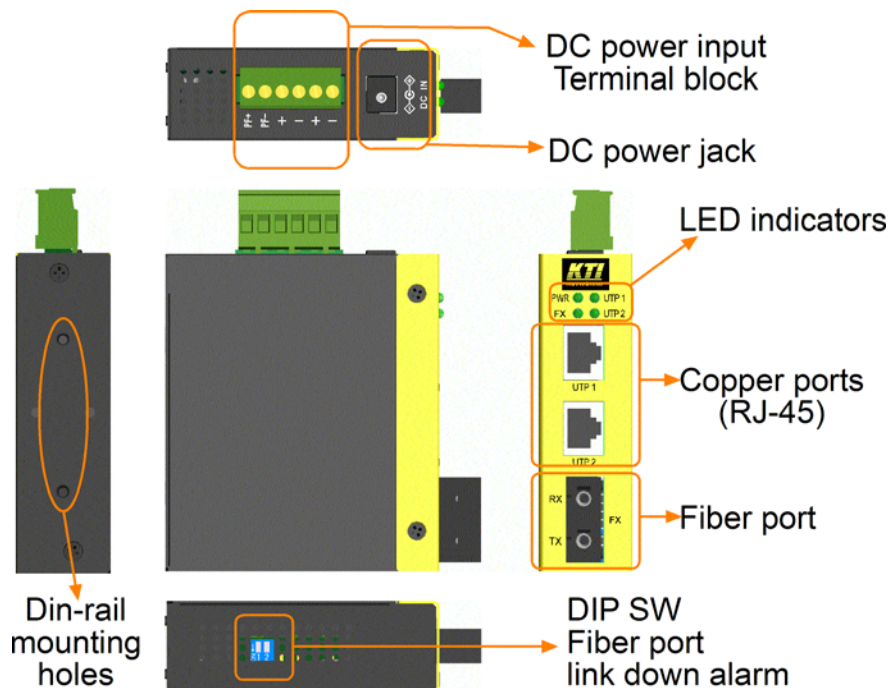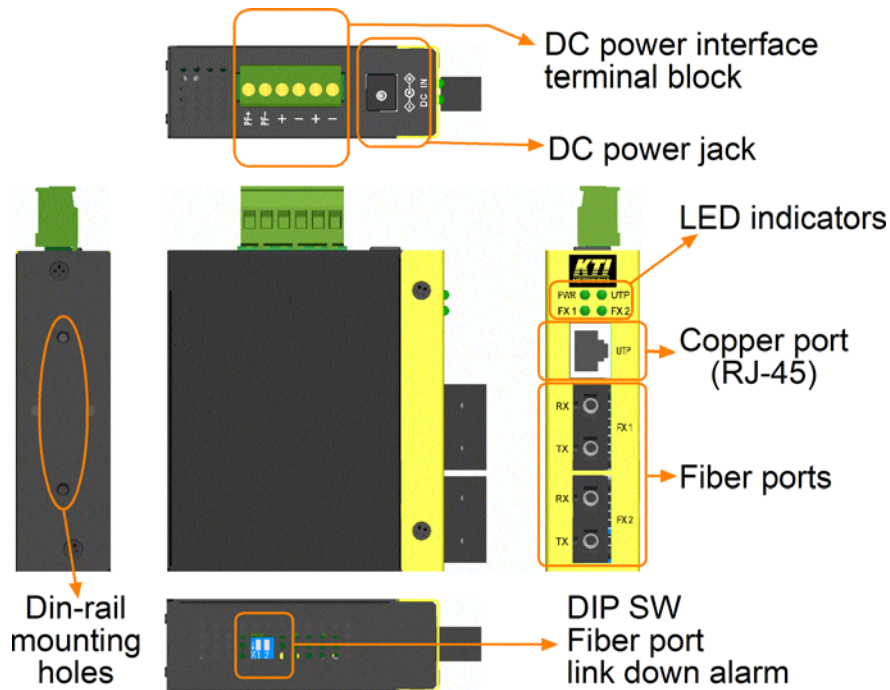
1.3 Specifications

Copper Ports

Compliance	IEEE 802.3 10Base-T, IEEE 802.3u 100Base-TX
Connectors	Shielded RJ-45 jacks
Pin assignments	Auto MDI/MDI-X detection
Configuration	Auto-negotiation
Transmission rate	10Mbps, 100Mbps
Duplex support	Full/Half duplex
Network cable	Cat.5 UTP up to 100 meters

Fiber Ports

Connectors	ST, SC, VF-45, Bi-Directional SC (model dependent)
Configuration	100Mbps, Full duplex
Network cables	MMF 50/125 60/125μm, SMF 9/125μm
Eye safety	IEC 825 compliant
Far end fault support	Enabled

Switch Functions

MAC Addresses Table	1K entries

Forwarding & filtering	Non-blocking, full wire speed
Switching technology	Store and forward
Maximum packet length	1536 bytes max.
Flow control	IEEE 802.3x pause frame base for full duplex operation
	Back pressure for half duplex operation
Broadcast Storm	Protection design

DC Power Interface

Interface	Screw-type terminal block
	1. Two pairs for power wire cascading
	2. One pair for alarm relay output
	DC Jack (-D6.3mm/+D2.0mm)
Operating voltages	+7V ~ +50V(+5%)
Power consumption	KSD-103-A
	2.1W max.@+7.5VDC input, 3.5W max.@+50VDC input
	KSD-103-B
	3.3W max.@+7.5VDC input, 4W max.@+50VDC input

DIP SW

KSD-103-A

SW1	Broadcast storm protection setting
SW2	Fiber port FX link down alarm setting

KSD-103-B

SW1	Broadcast storm protection setting
SW2	Fiber port FX1 link down alarm setting
SW3	Fiber port FX2 link down alarm setting

Mechanical

Dimension (base)	W 28mm x D 82mm x H 95mm
Weight	250g
Housing	Enclosed metal with no fan
Mounting support	DIN-rail mounting, Panel mounting

Environmental

Operating temperature	-20ºC ~ 70ºC
Storage temperature	-20ºC ~ 85ºC
Relative humidity	5% ~ 90%

Certificate

FCC	Part 15 Class B
CE/EMC	EMI EN50081-1 Class B
	EMS EN55024
CE/LVD Safety	EN 60950

EN 50081-1/1992 :

EN55022:1994/A1:1995/A2:1997

EN61000-3-2:2000

EN61000-3-3:1995/A1:2001

EN 55024:1998/A1:2001

IEC 61000-4-2:1995   ESD Test

IEC 61000-4-3:1995   RS Test

IEC 61000-4-4:1995   EFT/BURST Test

IEC 61000-4-5:1995   Surge Test

IEC 61000-4-6:1996   CS Test

IEC 61000-4-8:1993   Magnetic Field

IEC 61000-4-11:1994 Voltage Int. Dips

2.   Installation

2.1 Unpacking

Check that the following components have been included:

● Information CD

● The device unit

● DIN-rail mounting bracket

If any item is found missing or damaged, please contact your local reseller for replacement.

The following are available optional accessories:

● Panel Mounting Bracket

  The bracket is used for mounting the device on a panel surface.

● Commercial-rated AC power adapters:

  - Rated input AC120V/60Hz, AC230V/50Hz, AC100V/50-60Hz, AC240V/50Hz

  - Rated output DC7.5V 1A, DC7.5V 1.2A

● High temperature AC power adapters:

  - Rated -10 ^{o}C ~ 60°C, AC100-240V/50-60Hz DC12V 1A for USA and Germany

The adapters are used for supplying DC power to the switch via DC power jack interface.

2.2 Safety Cautions

To reduce the risk of bodily injury, electrical shock, fire, and damage to the product, observe the following precautions.

● Do not service any product except as explained in your system documentation.

● Opening or removing covers may expose you to electrical shock.

● Only a trained service technician should service components inside these compartments.

● If any of the following conditions occur, unplug the product from the electrical outlet and replace the part or contact your trained service provider:

  - The power cable, extension cable, or plug is damaged.

  - An object has fallen into the product.

  - The product has been exposed to water.

  - The product has been dropped or damaged.

  - The product does not operate correctly when you follow the operating instructions.

● Do not push any objects into the openings of your system. Doing so can cause fire or electric shock by shorting out interior components.

● Operate the product only from the type of external power source indicated on the electrical ratings

label. If you are not sure of the type of power source required, consult your service provider or local power company.
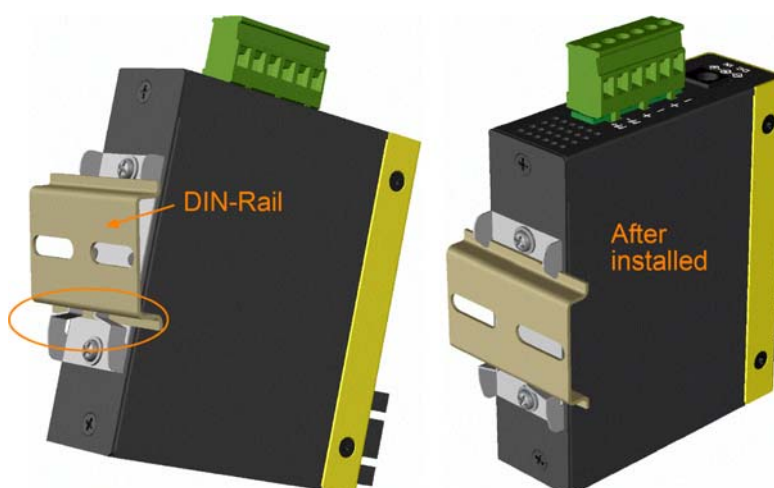
2.3 DIN-Rail Mounting

In the product package, a DIN-rail bracket is installed on the device for mounting the device in a industrial DIN-rail enclosure.

The steps to mount the device onto a DIN rail are:

1. Install the mounting bracket onto the device unit as shown below:
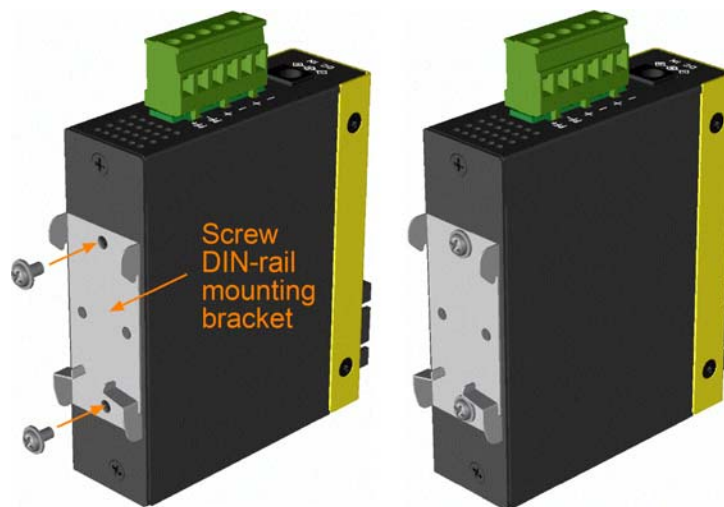
2. Attach bracket to the lower edge of the DIN rail and push the unit upward a little bit until the bracket can clamp on the upper edge of the DIN rail.

3. Clamp the unit to the DIN rail and make sure it is mounted securely.

4. Make sure that there are proper heat dissipation from and adequate ventilation around the device.
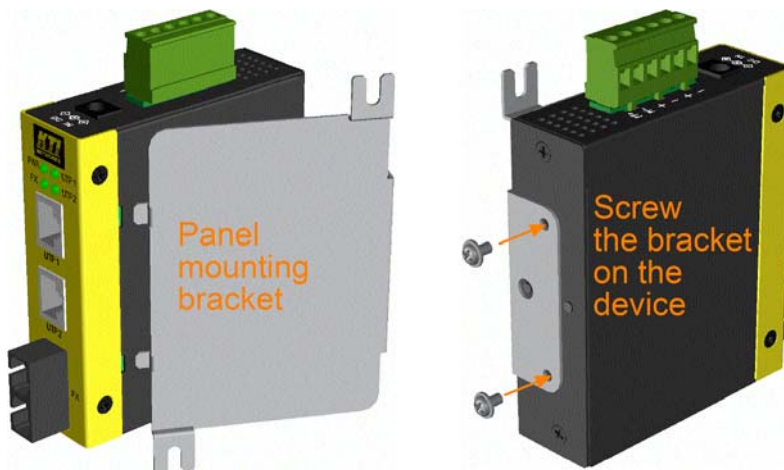
The final mechanical dimensions after installing DIN rail mounting bracket are:
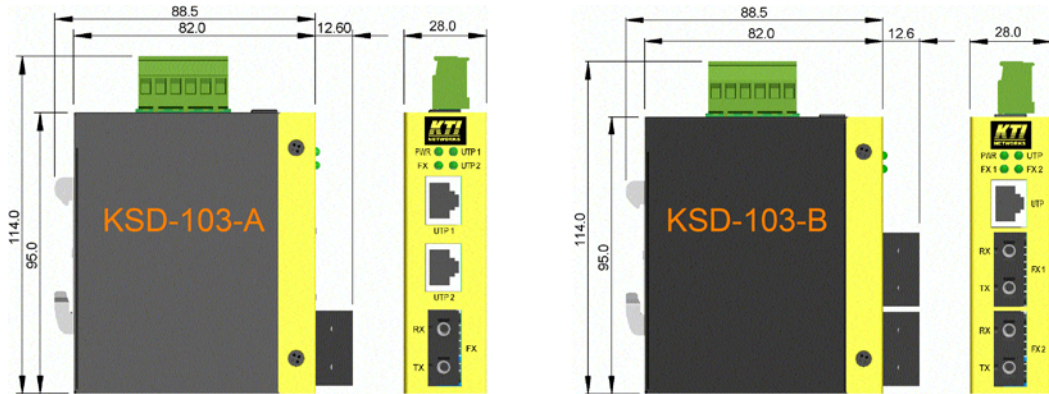

2.4 Panel Mounting

The product is provided with an optional bracket for panel mounting. The bracket supports mounting the device on a plane surface securely. The mounting steps are:

1. Install the mounting bracket on the device unit. Screw the bracket on the device unit.

2. Screw the device unit on a panel. Make sure that there are proper heat dissipation from and adequate ventilation around the device. Do not place heavy objects on the device.
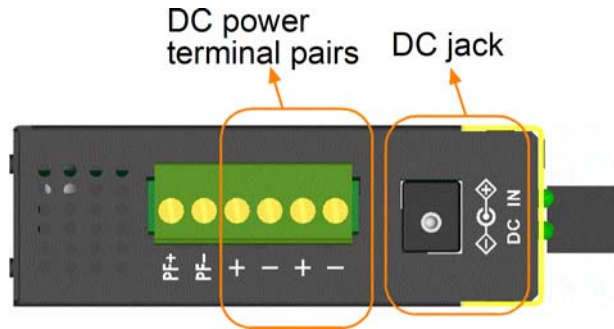
The screw locations and final dimension are shown below:
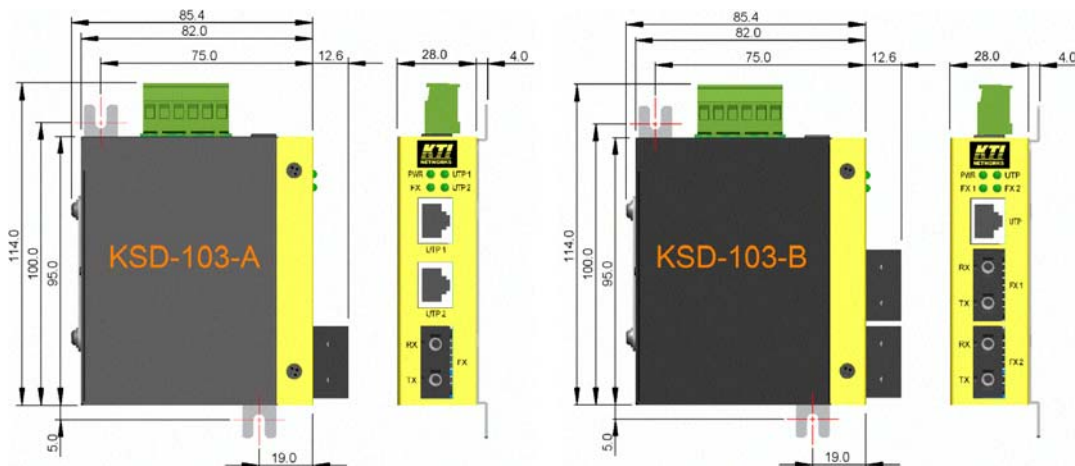
2.5 Applying Power

The power specifications of the device are:

Operating Voltage   +7 ~ +50VDC

Power Consumption   4W max. @+50VDC

Using Terminal Blocks

Either DC1 interface or DC2 interface can be used to receive DC power from an external power system. Or, DC2 also can be used to deliver the power received on DC1 to next device in cascading way.

DC1   +Vdc Positive (+) terminal

DC1   -Vdc Negative (-) terminal

DC2   +Vdc Positive (+) terminal

DC2   -Vdc Negative (-) terminal

Three 2P terminal plugs are provided together with the device. Two of the three plugs are used for DC1 and DC2 interfaces respectively. The plug is shown below:

Power wires: 24 ~ 12AWG (IEC 0.5~2.5mm²)

Install the power source wires with the plug properly. Screw the wire with plug securely. Then, plug in DC1 contacts.
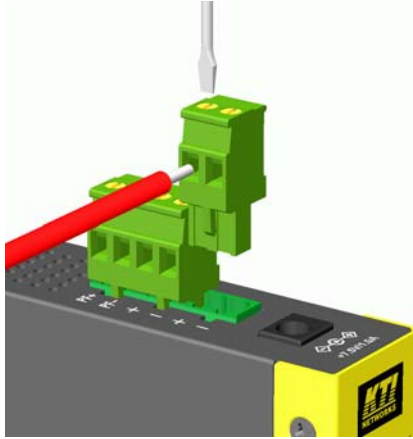
If cascading the power to next device is needed, install the power wires and plug for another switch. Then, use DC2 contacts.

Note: Only up to four device units can be cascaded to receive power from one main power input source.

Using DC Power Jack

DC Jack Connector: D 6.3mm $-$ —$($●$)$— $+$ D 2.0mm

AC Power Adapters: Optional power adapters are available for purchasing.

Connect power adapter DC plug to the DC power jack of the converter before connecting to the AC outlet. Connect the power adapter to the AC outlet.

Note: Before you begin the installation, check the AC voltage of your area. The AC power adapter that is used to supply the DC power for the unit should have the AC voltage matching the commercial power voltage in your area.

2.6 Failure Alarm Relay Output

The device provides a relay output to report failure events to a remote alarm monitoring system. The replay output is provided with two contacts labeled **PF+** and **PF-** in the terminal block interface.

Alarm relay output
PF+ / PF-
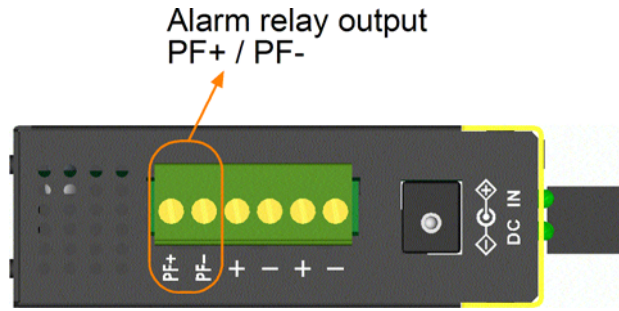
Use the provided 2P terminal plug for signal wiring and plug into the PF+/- contacts.
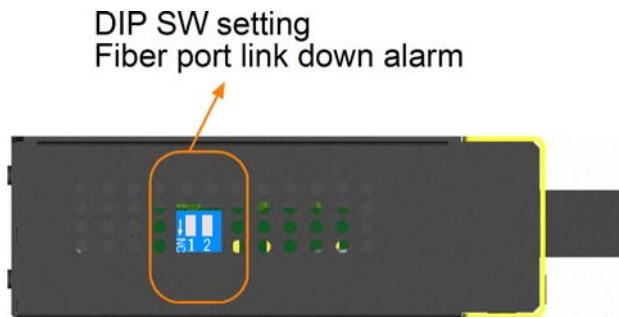
Relay Output Indication	Normal	PF+ and PF- contacts shorted
	Alarm	PF+ and PF- contacts open

Alarm Events:

- Input power failure

- Specific fiber port link down (To specify the fiber ports, use the DIP SW located on bottom.)

DIP SW setting
Fiber port link down alarm

KSD-103-A

SW1	ON	Enable broadcast storm protection
	OFF	Disable broadcast storm protection
SW2	ON	Enable FX port link down alarm
	OFF	Disable FX port link alarm

KSD-103-B

SW1	ON	Enable broadcast storm protection
	OFF	Disable broadcast storm protection
SW2	ON	Enable FX1 port link down alarm
	OFF	Disable FX1 port link alarm
SW3	ON	Enable FX2 port link down alarm
	OFF	Disable FX2 port link alarm

Note: Be sure the voltage applied on PF+/- contacts is within the specification of 30VDC/1A max. or 120VAC/0.5A max.

3.   Making LAN Connections

3.1 Making Copper Port (RJ-45) Connections

The copper ports support the following connection types and distances:

Network Cables

10BASE-T: 2-pair UTP Cat. 3,4,5 , EIA/TIA-568B 100-ohm

100BASE-TX: 2-pair / 4-pair UTP Cat. 5, EIA/TIA-568B 100-ohm

Link distance: Up to 100 meters

Auto MDI/MDI-X Function

This function allows the port to auto-detect the twisted-pair signals and adapts itself to form a valid MDI to MDI-X connection with the remote connected device automatically. No matter a straight through cable or crossover cable connected, the ports can sense the receiving pair automatically and configure self to match the rule for MDI to MDI-X connection. It simplifies the cable installation by using only straight-through cables.

Auto-negotiation Function

The ports are featured with auto-negotiation function and full capability to support connection to any Ethernet devices. The port performs a negotiation process for the speed and duplex configuration with the connected device automatically when each time a link is being established. If the connected device is also auto-negotiation capable, both devices will come out the best configuration after negotiation process. If the connected device is incapable in auto-negotiation, the switch will sense the speed and use half duplex for the connection.

3.2 Making Fiber Connections

The fiber ports operate on 100Mbps and full duplex. For different fiber connections, several alternative models can be selected for different fiber connections. The following figure illustrates a connection example between two SC fiber ports:
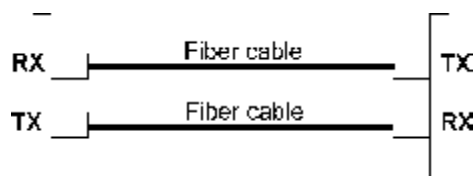
A variety of fiber options and the associated optical specifications are provided as listed in Appendix-1.
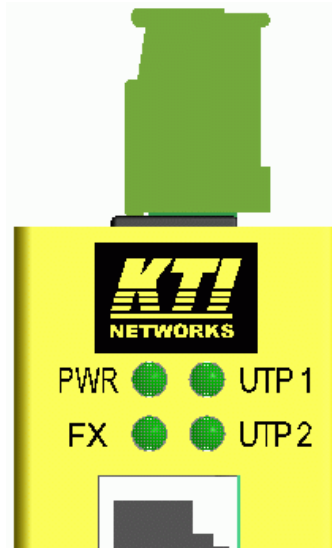
Network Cables

Multimode (MMF) - 50/125, 62.5/125

Single mode (SMF) - 9/125

3.3 LED Indication

KSD-103-A

KSD-103-B
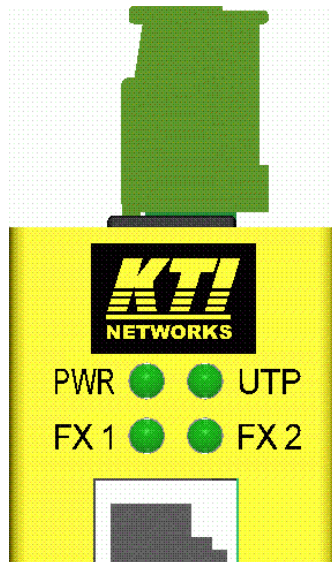
LED	Function	State	Interpretation
PWR	Power status	ON	The power is supplied to the device.
		OFF	The power is not supplied to the device.
UTPx	Copper port link status	ON	Port link is established. (No traffic)
		BLINK	Port link is up and there is traffic.
		OFF	Port link is down.
FXx	Fiber port link status	ON	Port link is established. (No traffic)
		BLINK	Port link is up and there is traffic.
		OFF	Port link is down.

Note: UTPx = UTP UTP1 UTP, FXx = FX FX1 FX2

4. Applications

4.1 Application in Industrial Networks

The following figure illustrates an application example in an industrial network. Four devices are cascaded by fiber cables.

Fiber Cascading
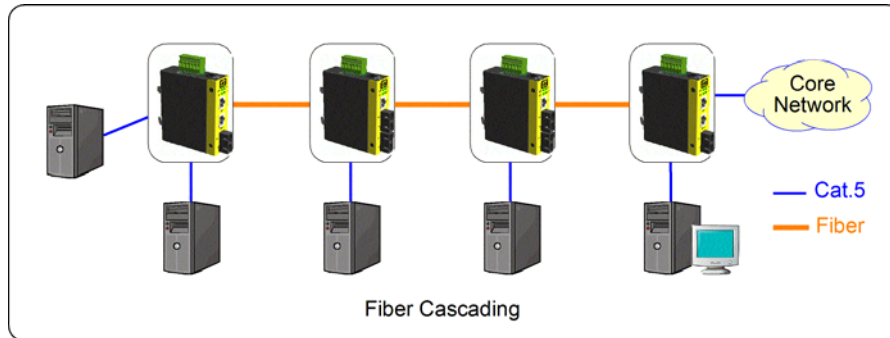
4.2 Copper to Fiber Bridging Media Converter Application

Copper to Fiber Conversion

4.3 Bridging Multimode to Single Mode Fiber Converter Application
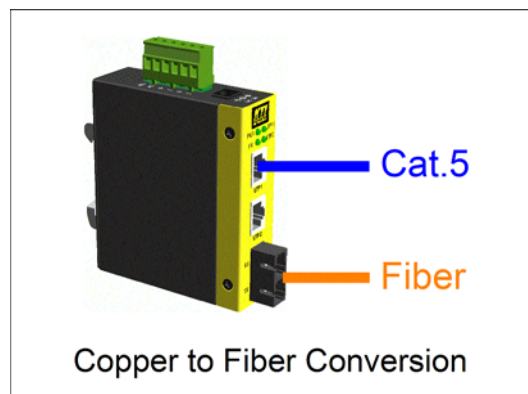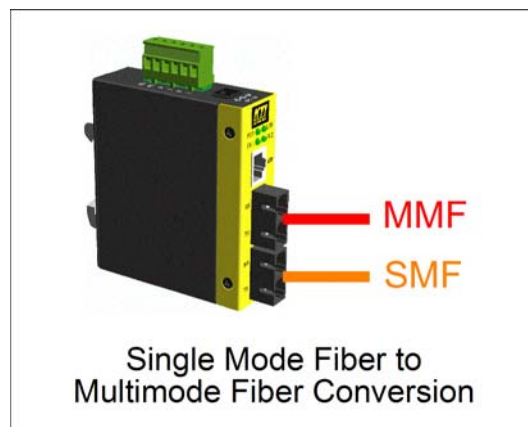

Single Mode Fiber to
Multimode Fiber Conversion

5. Appendix

5.1 Model Definition

KSD-103-A

Model Ext.	FX Connector	Cable	Ref. Distance	Operating Temperature
-T	Duplex ST	MMF	2km	-10 ~ 70°C
-C	Duplex SC	MMF	2km	-10 ~ 70°C
-C1	Duplex SC	MMF	2km	-20 ~ 70°C
-SA2	Duplex SC	SMF	20km	-20 ~ 70°C
-SL2	Duplex SC	SMF	20km	-20 ~ 70°C
-SL3	Duplex SC	SMF	30km	-20 ~ 70°C
-SL4	Duplex SC	SMF	40km	-20 ~ 70°C
-SL6	Duplex SC	SMF	60km	-20 ~ 70°C
-W3515	BiDi SC	SMF	15 ~ 20km	-20 ~ 70°C
-W5315	BiDi SC	SMF	15 ~ 20km	-20 ~ 70°C

KSD-103-B

Model Ext.	FX Ports	FX2 Connector	Cable	Ref. Distance	Operating Temperature
-T	FX1, FX2	Duplex ST	MMF	2km	-10 ~ 70°C
-C	FX1, FX2	Duplex SC	MMF	2km	-10 ~ 70°C
-C1	FX1, FX2	Duplex SC	MMF	2km	-20 ~ 70°C
-SA2	FX1, FX2	Duplex SC	SMF	20km	-20 ~ 70°C
-SL2	FX1, FX2	Duplex SC	SMF	20km	-20 ~ 70°C
-SL3	FX1, FX2	Duplex SC	SMF	30km	-20 ~ 70°C
-SL4	FX1, FX2	Duplex SC	SMF	40km	-20 ~ 70°C
-SL6	FX1, FX2	Duplex SC	SMF	60km	-20 ~ 70°C
-W3515	FX1, FX2	BiDi SC	SMF	15 ~ 20km	-20 ~ 70°C
-W5315	FX1, FX2	BiDi SC	SMF	15 ~ 20km	-20 ~ 70°C
-C1Sl2	FX1	Duplex SC	MMF	2km	-20 ~ 70°C
	FX2	Duplex SC	SMF	20km	-20 ~ 70°C

5.2 Optical Specifications

KSD-103-A

Model Ext.	FX Port	Wavelength	TX Power	Sensitivity	RX Max. Power
-T	FX	1310nm	-19 ~ -14dBm	-31dBm	-14dBm
-C	FX	1310nm	-19 ~ -14dBm	-31dBm	-14dBm
-C1	FX	1310nm	-20 ~ -14dBm	-31dBm	0dBm
-SA2	FX	1310nm	-15 ~ -8dBm	-31dBm	-7dBm
-SL2	FX	1310nm	-15 ~ -8dBm	-30dBm	0dBm
-SL3	FX	1310nm	-15 ~ -8dBm	-34dBm	0dBm
-SL4	FX	1310nm	-5 ~ 0dBm	-34dBm	0dBm
-SL6	FX	1310nm	-5 ~ 0dBm	-35dBm	0dBm
-W3515	FX	1310nm	-14 ~ -8dBm	-31dBm	0dBm
-W5315	FX	1550nm	-14 ~ -8dBm	-31dBm	0dBm

KSD-103-B

Model Ext.	FX Ports	Wavelength	TX Power	Sensitivity	RX Max. Power
-T	FX1, FX2	1310nm	-19 ~ -14dBm	-31dBm	-14dBm
-C	FX1, FX2	1310nm	-19 ~ -14dBm	-31dBm	-14dBm
-C1	FX1, FX2	1310nm	-20 ~ -14dBm	-31dBm	0dBm
-SA2	FX1, FX2	1310nm	-15 ~ -8dBm	-31dBm	-7dBm
-SL2	FX1, FX2	1310nm	-15 ~ -8dBm	-30dBm	0dBm
-SL3	FX1, FX2	1310nm	-15 ~ -8dBm	-34dBm	0dBm
-SL4	FX1, FX2	1310nm	-5 ~ 0dBm	-34dBm	0dBm
-SL6	FX1, FX2	1310nm	-5 ~ 0dBm	-35dBm	0dBm
-W3515	FX1	1310nm	-14 ~ -8dBm	-31dBm	0dBm
	FX2	1550nm	-14 ~ -8dBm	-31dBm	0dBm
-W5315	FX1	1550nm	-14 ~ -8dBm	-31dBm	0dBm
	FX2	1310nm	-14 ~ -8dBm	-31dBm	0dBm
-C1Sl2	FX1	1310nm	-20 ~ -14dBm	-31dBm	0dBm
	FX2	1310nm	-15 ~ -8dBm	-30dBm	0dBm