



KGC-460

KGC-460-HP

Industrial Managed Multi-function
Gigabit Ethernet Media Converters

Firmware Rev **2.0** up

User's Manual



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FCC NOTICE

This device complies with Part 15 of 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 undesired operation.

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 A

EN 61000-6-4

EN 61000-3-2

EN 61000-3-3

EN 61000-6-2

IEC 61000-4-2

IEC 61000-4-3

IEC 61000-4-4

IEC 61000-4-5

IEC 61000-4-6

IEC 61000-4-8

VCCI-A Notice

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VCCI-A

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1. Introduction

The KGC-460 series is an industrial managed Gigabit Ethernet device which is featured with the following network ports:

- Two 10/100/1000Mbps Gigabit copper ports
- Two dual-speed SFP slots for 100Base-FX 1000Base-X

The device is featured the function modes:

- Dual media converts mode
- Dual media converters sharing redundant fiber uplink mode
- Fiber to fiber media converter mode
- 4-port switch mode



Model Definitions

Model	Copper ports	SFP slots	PoE PSE function	Power via DC input	Software managed
KGC-460-HP	2	2 dual-speed	2 PSE ports	✓	✓
KGC-460	2	2 dual-speed	-	✓	✓

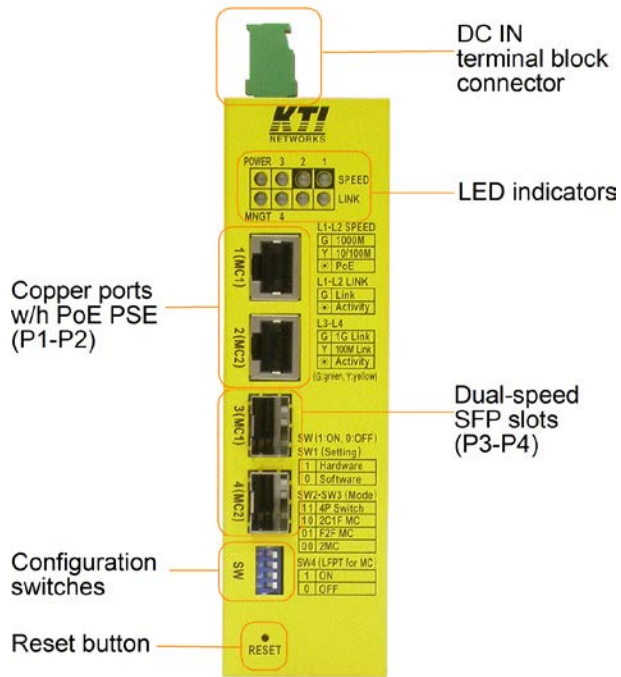
1.1 Features

- Provides 2 10/100/1Gbps copper ports and 2 dual-speed SFP fiber port slots
- Supports 802.3x flow control for full-duplex and backpressure for half-duplex
- All copper ports support auto-negotiation and auto-MDI/MDI-X detection
- Dual-speed SFP slots support 100BASE-FX and 1000BASE-X SFP
- SFP featured with Digital Diagnostic Monitoring (DDM) support
- Link fault pass through (LFPT) featured for all media converter modes
- Redundant ring function featured for 4-port switch mode
- Supports Gigabit full wire speed bridging & forwarding performance
- Jumbo frame support up to 9600 bytes
- Alarm relay output for events of power failure and configured port link down
- Green Ethernet power saving
- 802.3az Energy Efficient Ethernet (EEE) support
- Optional high power PoE PSE function on copper ports
- **Security upgrade with TLS 1.2/1.3 support**

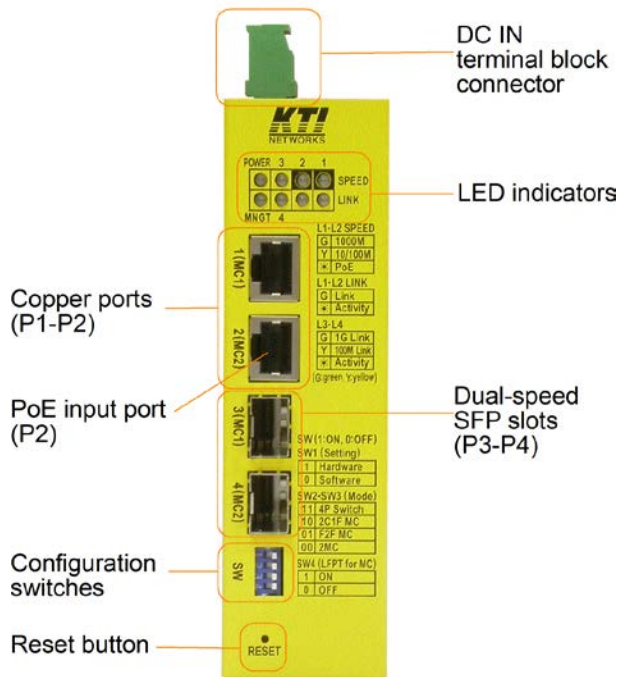
- Management:
 - HTTP/HTTPS/SSHv2/CLI telnet/CLI console/SNMP v1/v2c/v3/RMON
 - DHCP/DHCPv6 client, DHCP relay, DNS client, NTPv4
 - IPv6 support, System Syslog, Configuration down/upload, Software upload
 - **HTTPS with TLS 1.2/1.3 support**
- Security:
 - NAS, 802.1X, MAC-based/Web/CLI authentication
 - IP MAC binding, TACACS+, IP source guard
- Layer 2:
 - QoS, 802.1Q/MAC-based/Protocol-based/Private/IP subnet VLAN, Port Isolation
 - Storm control for UC/MC/BC packets, Static MAC configuration
 - IGMP v2/v3 snooping, MLD v1/v2 snooping, DHCP snooping
 - Multiple Spanning Tree – MSTP, RSTP, STP
- Auto Multi-Ring (KAMR) Technology:
 - Fast failover response time, Auto recovery when failure is repaired
 - Supports up to two redundant rings, Works with RSTP network

1.2 Product Panels

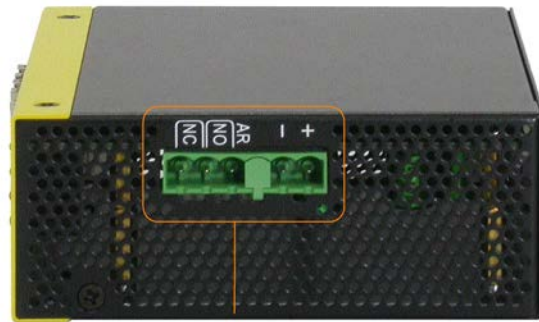
The following figure illustrates the front panel and rear panel of the device:



KGC-460-HP Front panel



KGC-460 Front panel



Terminal block connector

Up panel

1.3 LED Indicators

LED	Function
POWER	Power status
MNGT	Management status
P1, P2 SPEED LEDs	Speed status & PoE status
P1, P2 LINK LEDs	Link & activity status
P3, P4 LEDs	Speed & link & activity status of P3 & P4 SFP ports

1.4 Specifications

10/100/1000 Copper Ports (Port 1, Port 2)

Compliance	IEEE 802.3 10Base-T, IEEE 802.3u 100Base-TX, IEEE 802.3u 1000Base-T
Connectors	Shielded RJ-45 jacks
Pin assignments	Auto MDI/MDI-X detection
Configuration	Auto-negotiation or software control
Transmission rate	10Mbps, 100Mbps, 1000Mbps
Duplex support	Full/Half duplex
Network cable	Cat.5 UTP

Dual-speed SFP Slots (Port 3, Port 4)

Compliance	IEEE 802.3u 100Base-FX IEEE 802.3z 1000Base-SX/LX (mini-GBIC)
Connectors	SFP for optional SFP type fiber transceivers
Configuration	Auto 1000Mbps, Full duplex Forced 100Mbps, Full duplex
Transmission rate	100Mbps and 1000Mbps
Network cables	MMF 50/125 60/125, SMF 9/125
Eye safety	IEC 825 compliant

Power over Ethernet PSE Function (KGC-460-HP)

PSE Ports	Port 1, Port 2
Power output pins	Positive of power voltage: pin 1,2 Negative of power voltage: pin 3,6
Standard	IEEE 802.3at
Classification	PD Class 0 ~ 4 detection
Power Delivery	35W max. (per port) at port output for Cat.5 distance up to 100 meters
Protection	Under voltage protection Over voltage protection Over current detection

Switching Functions

MAC Addresses Table	8K entries
Forwarding & filtering	Non-blocking, full wire speed
Switching technology	Store and forward
Maximum packet length	9.6K bytes
IP Multicast groups	8192 supported
Flow control	IEEE 802.3x pause frame base for full duplex operation Back pressure for half duplex operation

Terminal Block Connector

DC power input	Screwed euro terminal block: + & – contacts
Operating Input Voltages	+8 ~ +60VDC (General applications) +45 ~ +57VDC (PoE applications) <i>* Warning: The -48VDC power supply is not supported.</i>
Power consumption	5W max. @12VDC (Full load with no PoE support) 75W max. (Full load with 2 PoE max. output)
Alarm relay output	3 terminal contacts (30VDC/1A max. or 120VAC/0.5A max.) NC contacts: normal – shored, alarm – open NO contacts: normal – open, alarm – shored
Alarm events	Power failure, Specific port link fault (software configured)

Mechanical

Dimension (base)	140 x 106 x 42 mm (HxDxW)
Housing	Enclosed metal with no fan
Mounting	Din-rail mounting, Panel mounting (optional)

Environmental

Operating Temperature Typical -30°C ~ +75°C*
Storage Temperature -40°C ~ +85°C
Relative Humidity 5% ~ 90% non-condensing

** ~~+60°C~~ ~~→~~ ~~+75°C~~ with 1m/s air flow*

Electrical Approvals

FCC Part 15 rule Class A
CE EMC Class A, EN 61000-6-4, EN 61000-6-2
Safety / LVD IEC 60950-1

2. Installation

2.1 Unpacking

The product package contains:

- The device
- One product CD-ROM

2.2 Safety Cautions

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

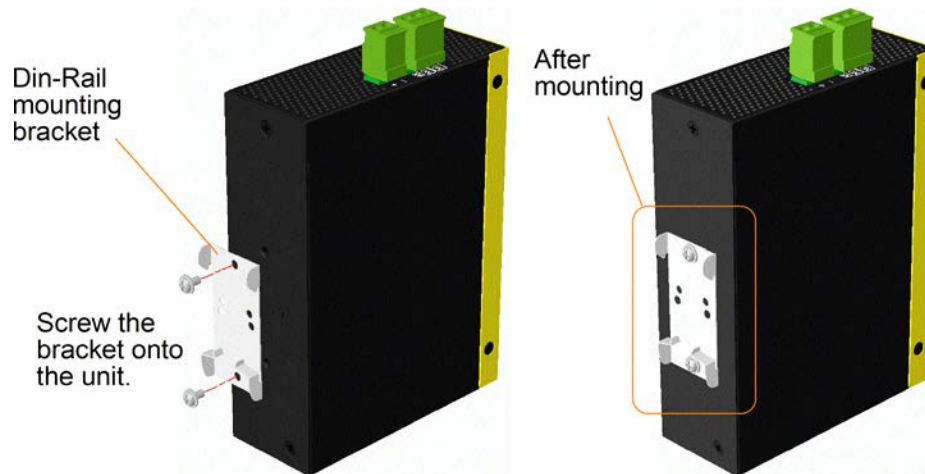
- Do not service any product except as explained in your system documentation.
- Opening or removing covers may expose you to electrical shock.
- Only a trained service technician should service components inside these compartments.
- If any of the following conditions occur, unplug the product from 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

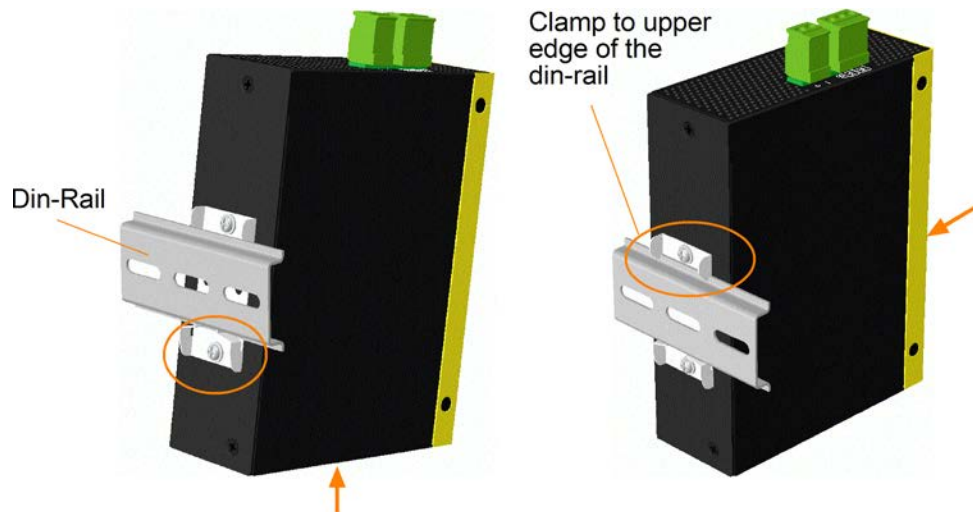
In the product package, a DIN-rail bracket is provided for mounting the switch in a industrial DIN-rail enclosure.

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

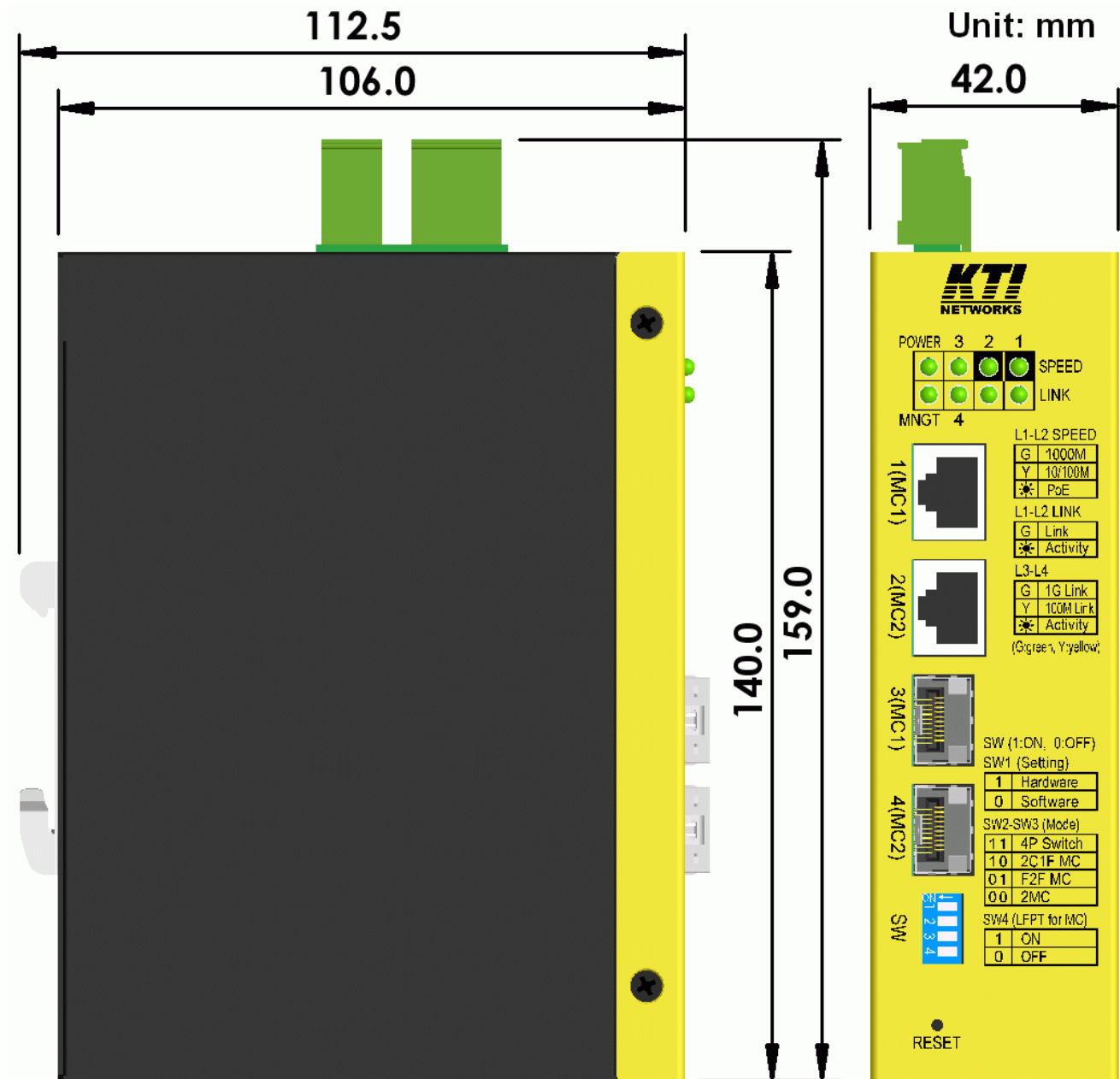
1. Install the mounting bracket onto the switch unit as shown below:



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.



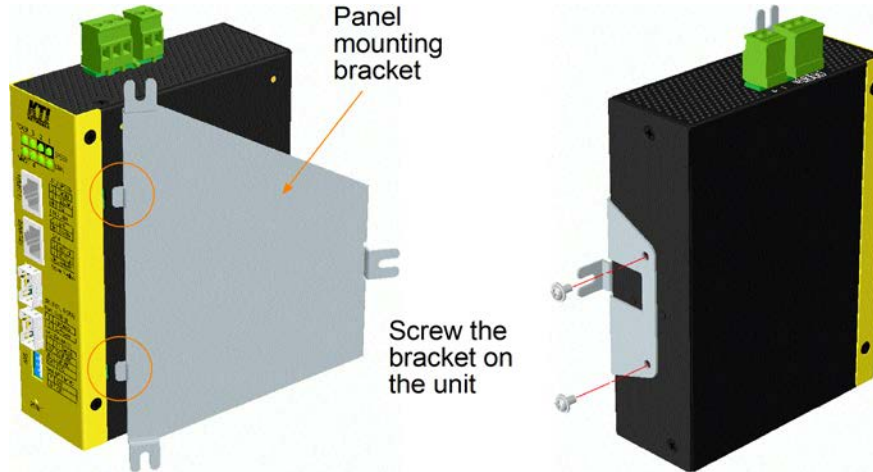
Dimensions:



2.4 Panel Mounting

The switches are provided with an optional panel mounting bracket. The bracket supports mounting the switch on a plane surface securely. The mounting steps are:

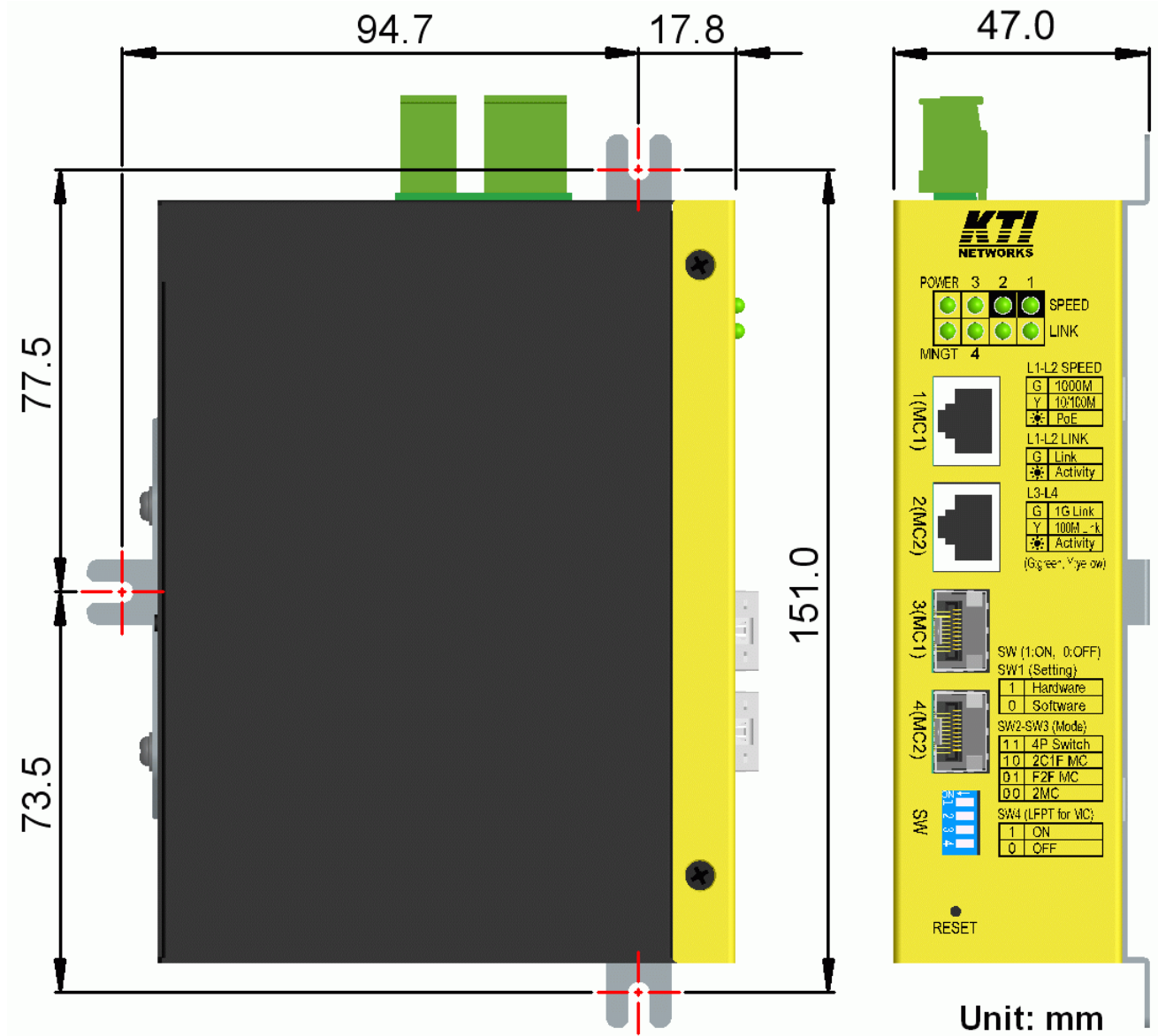
1. Install the mounting bracket on the switch unit.



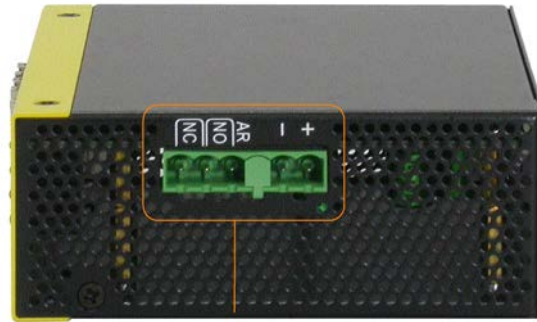
2. Screw the bracket on the switch unit.
3. Screw the switch unit on a panel. Three screw locations are shown below:



Dimensions:



2.5 Applying Power



Terminal block connector

Power pins of the terminal block connector

Pin	1	2	Vdc Positive (+) input terminal
	+	-	Vdc Negative (-) input terminal
Pin	3		NC, Reserved

Any of the Vdc+/Vdc- pairs can be used to receive DC power from an external power system. Or, one can be used to deliver the power received on another to next switch in cascading way.

Vdc Input specifications

Applications	Power per PSE port	DC working voltage
General	-	+8V ~ +60VDC
PoE	15.4W max.	+45V ~ +57VDC (Typical 48V)
High power PoE (PoE+)	35W max.	+45V ~ +57VDC (+52V up for 35W)

WARNING: The -48VDC power supply is not supported.

A 2P terminal plugs are provided together with the switch as shown below:



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

Install the power source wires with the plug properly. Then, plug in input contacts. If cascading the power to next switch device is needed, install the power wires and plug for another switch. Then, use another Vdc contacts.

Note:

1. Only up to four device units can be cascaded to receive power from one main power input source.
2. The maximal length of the power wire is 1 meter.

2.6 Alarm Relay Output

Alarm relay output is provided for reporting failure events to a remote alarm relay monitoring system. The relay output is provided with three contacts (support two logic types) in the terminal block connector next to Vdc interfaces.



Terminal block connector

Alarm Relay output pins and logic:

Pin	4	5	Alarm relay output, NO (Normal Open) contacts
	NO	NO	Open: normal, Shorted: Alarm
Pin	5	6	Alarm relay output, NC (Normal Closed) contacts
	NC	NC	Shorted: normal, Open: Alarm

Either pair can be used depending on the logic requirement for the relay monitoring system. Use the provided 3P terminal plug for signal wiring and plug into the contacts.

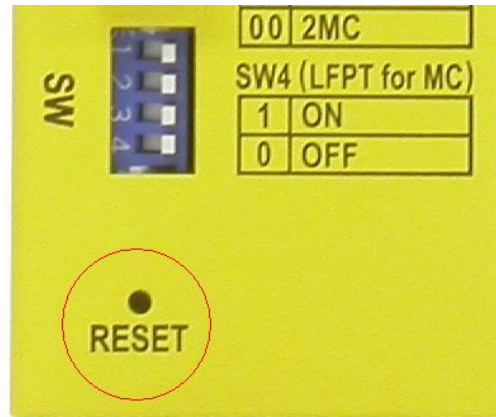
Alarm Events

- Input power failure
- Specific port link down (The specific ports can be configured by software.)

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

2.7 Reset Button

The reset button is used to perform a reset to the switch. It is not used in normal cases and can be used for diagnostic purpose. If any network hanging problem is suspected, it is useful to push the button to reset the switch without turning off the power. Check whether the network is recovered.



The button can also be used to restore the software configuration settings to factory default values.

The operations are:

Operation	Function
Press the button and release during switch operation	Reset & boot up the switch. The boot-up takes about 20 seconds and ends with all LED yellow ON and green ON then all OFF once.
Press the button until all LED yellow ON, green ON then all OFF.	Boot & restore all factory default settings

2.8 Making UTP Connections

The 10/100/1000 RJ-45 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 UTP Cat. 5, EIA/TIA-568B 100-ohm
1000BASE-T:	4-pair UTP Cat. 5 or higher (Cat.5e is recommended), EIA/TIA-568B 100-ohm
Link distance:	Up to 100 meters for all above

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 is connected, the ports can sense the receiving pair automatically and configure itself to match the rule for MDI to MDI-X connection. It simplifies the cable installation.

Auto-negotiation Function

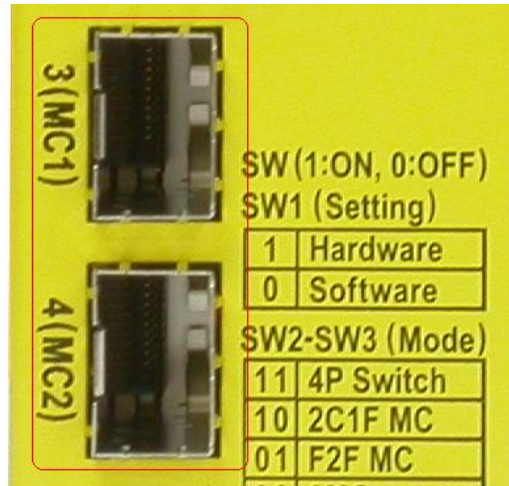
The ports are featured with auto-negotiation function and full capability to support connection to any Ethernet devices. The port performs a negotiation process for the speed and duplex configuration with the connected device automatically when each time a link is being established. If the connected 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.

Port Configuration Management

For making proper connection to an auto-negotiation incapable device, it is suggested to use port control function via software management to set forced mode and specify speed and duplex mode which match the configuration used by the connected device.

2.9 Making Fiber Connection

The dual-speed SFP slots, Port 3 and Port 4 must be installed with an SFP fiber transceiver for making fiber connection. The device may come with one or two SFP transceivers pre-installed when it is shipped.



Types of the SFP Fiber transceivers supported:

1000Mbps based 1000BASE-X SFP transceivers

100Mbps based 100BASE-FX SFP transceivers

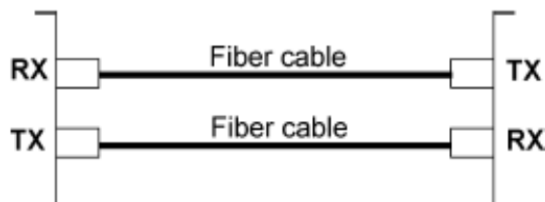
Installing SFP Fiber Transceiver

To install an SFP fiber transceiver into SFP slot, the steps are:

1. Turn off the power to the switch.
2. Insert the SFP fiber transceiver into the SFP slot. Normally, a bail is provided for every SFP transceiver. Hold the bail and make insertion.
3. Until the SFP transceiver is seated securely in the slot, place the bail in lock position.

Connecting Fiber Cables

LC connectors are commonly equipped on most SFP transceivers. Identify TX and RX connector before making cable connection. The following figure illustrates a connection example between two fiber ports:



Make sure the Rx-to-Tx connection rule is followed on the both ends of the fiber cable.

Network Cables

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

Single mode (SMF) - 9/125

Port Speed Configuration

There are three options for configuring port speed via software for SFP Port 9 and Port 10.

The options are:

Auto	Auto-detection for the type of the installed SFP transceiver by reading DDM data 100Mbps transceiver: Non-auto-negotiation (forced), 100Mbps, full duplex 1000Mbps transceiver: Auto-negotiation, 1000Mbps, full duplex
100Mbps FDX	Non-auto-negotiation (forced), 100Mbps, full duplex
1Gbps FDX	Auto-negotiation, 1000Mbps, full duplex

2.10 Making PoE PSE Connections (KGC-460-HP)

This section describes how to make a connection between a PSE port and a PoE PD device. The copper ports are equipped with PoE PSE function. The ports are enabled to deliver power together with network signal to a connected powered device via Cat.5 cable.

To make a PoE connection, the following check points should be noted:

1. For safety reason, the connected PoE PD (Powered Device) must be a IEEE 802.3at or IEEE 802.3af-compliant device. Incompliant devices are not supported by the PoE switch model.
2. The Cat.5 cables used for the connections must be 4-pair cables. The power is sent over the spare pairs (4,5) (7,8) of the cable. The maximum distance supported is 100 meters.
3. The power voltage supplied to the switch must be within the range as specified in [section 2.5](#) to make PoE function working.

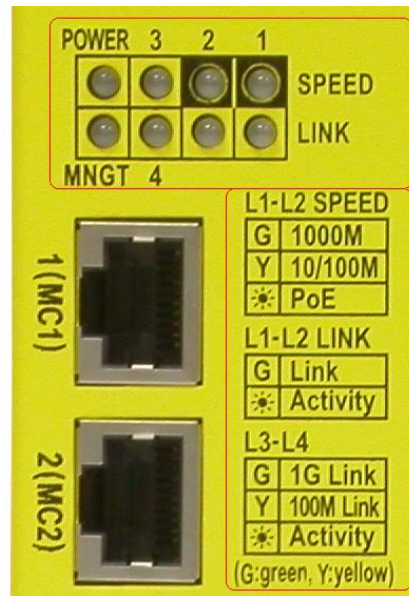
The PSE ports are equipped with the following capabilities:

1. Detection for an IEEE 802.3af /802.3at compliant PD.
2. No power is supplied to a device which is classified non-IEEE 802.3af compliant PD.
3. No power is supplied when no connection exists on the port.
4. The power is cut off immediately from powering condition when a disconnection occurs.
5. The power is cut off immediately from powering condition when overload occurs.
6. The power is cut off immediately from powering condition when over-current occurs.
7. The power is cut off immediately from powering condition when short circuit condition occurs.

The figure below illustrates a connection example:



2.11 LED Indication



LED	Function	Color	State	Interpretation	
POWER	Power status	Green	ON	The power is supplied to the switch.	
			OFF	The power is not supplied to the switch.	
MNGT	Management status	Green	OFF	The switch is in initialization and diagnostics.	
			G/Y*	BLINK	Initialization completed with diagnostic error or system error found during normal operation
			ON	Initialization completed with no error & operating in 2MC mode	
			BLINK	Initialization completed with no error & operating in F2F MC mode	
			ON	Initialization completed with no error & operating in 2C1F MC mode	
			BLINK	Initialization completed with no error & operating in 4P SW mode	
Port 1, Port 2					
SPEED_LED	Port speed status	Green	ON	Speed is 1000Mbps.	
			ON	Speed is 10Mbps or 100Mbps.	
			BLINK	PoE power is on.	
LINK_LED	Port link status	Green	ON	Port link is established. (No traffic)	
			BLINK	Port link is up and there is traffic.	
			OFF	Port link is down.	

Port 3, Port 4

SPEED_LED	Port speed/link status	Green	ON	A 1000Mbps link is established.
		Yellow	ON	A 100Mbps link is established.
			BLINK	Activity status
			OFF	Port link is down.

* G/Y BLINK: Green and yellow light in turn

3. Manage the Device

The device provides the following methods for configuration and monitoring as follows:

- Making in-band management via telnet CLI over TCP/IP network
- Making in-band management via web interface over TCP/IP network
- Making in-band SNMP management over TCP/IP network

3.1 IP Address & Password

The IP Address is an identification of the device in a TCP/IP network. Each device should be designated a new and unique IP address in the network. The device is shipped with the following factory default settings for software management:

Default IP address of the switch: **192.168.0.2 / 255.255.255.0**

The device uses local authentication instead of RADIUS authentication with factory defaults.

Fixed Username: **admin**

Default password:

No password is required with factory default. However, the password is used for local authentication in accessing to the device via telnet and Http web-based interface. For security reason, it is recommended to change the default settings before deploying it to your network.

3.2 Configuring IP Address & Password via telnet

[IP Address] setting command is in IP command group.

```
>IP Setup [<ip_addr>] [<ip_mask>] [<ip_router>] [<vid>]
```

Parameters:

<ip_addr>	: IP address (a.b.c.d)
<ip_mask>	: IPv4 subnet mask (a.b.c.d)
<ip_router>	: IPv4 router (a.b.c.d)
<vid>	: VLAN ID (1-4095)

[IPv6 Address] setting command is also in IP command group.

```
>IP IPv6 Setup [<ipv6_addr>] [<ipv6_prefix>] [<ipv6_router>]
```

Parameters:

<ipv6_addr> : IPv6 address is in 128-bit records represented as eight fields of up to four hexadecimal digits with a colon separates each field (:).
<ipv6_prefix> : IPv6 subnet mask
<ipv6_router> : IPv6 router

[Password] setting command is also in Security/Switch/Users command group.

Security Switch Users Configuration

Security Switch Users Add <user_name> <password> <privilege_level>

Security Switch Users Delete <user_name>

Refer to “Operation manual for telnet management”.

3.3 Configuring IP Address via Web Interface

Start Web Browser

Start your browser software and enter the default IP address for the unit to which you want to connect. The IP address is used as URL for the browser software to search the device.

URL: <http://192.168.0.2/>

Login to Unit

When browser software connects to the unit successfully, a Login screen is provided for you to login to the device as the left display below:



Enter the following default values in the login page:

Default username: *admin*

Default password: ↵

No password is required.

Click to login into the device.

Web Page after a Successful Login

KTI NETWORKS
KGC-460 Multi-Function GigaBit Ethernet Media Converters

Setting - Software
Operating - 4P Switch Mode

- ▶ Configuration
- ▶ Monitor
- ▶ Diagnostics
- ▶ Maintenance

Auto-refresh Refresh

Port State Overview

1 (MC1) L1-L2 SPEED
 G 1000M
 Y 10/100M
 PoE

2 (MC2) L1-L2 LINK
 G Link
 Activity

3 (MC1) L3-L4
 G 1G Link
 Y 100M Link
 Activity
 (Green Y yellow)

4 (MC2)

SW (1:ON, 0:OFF)
 SW1 (Setting)
 Hardware
 Software

SW2-SW3 (Mode)
 11 4P Switch
 10 2C1F MC
 01 F2F MC
 00 2MC

SW4 (LFPT for MC)
 1 ON
 0 OFF

RESET

Select [Configuration] -> [System] -> [IP] to configure IP address

IP Configuration

	Configured	Current
DHCP Client	<input type="checkbox"/>	<input type="button" value="Renew"/>
IP Address	192.168.0.179	192.168.0.179
IP Mask	255.255.255.0	255.255.255.0
IP Router	0.0.0.0	0.0.0.0
VLAN ID	1	1
DNS Server	0.0.0.0	0.0.0.0

IP DNS Proxy Configuration

DNS Proxy

Configuration **Description**

DHCP Client	Enable the DHCP client by checking this box.
IP Address	Provide the IP address of this unit.
IP Mask	Provide the IP mask of this unit.
IP Router	Provide the IP address of the default router for this unit.
VLAN ID	Provide the managed VLAN ID. The allowed range is 1 through 4095.
DNS Server	Provide the IP address of the DNS Server in dotted decimal notation.
DNS Proxy	When DNS proxy is enabled, DUT will relay DNS requests to the current configured DNS server on DUT, and reply as a DNS resolver to the client device on the network.

<input type="button" value="Save"/>	Click to save the changes.
<input type="button" value="Reset"/>	Click to undo any changes made locally and revert to previously saved values.
<input type="button" value="Renew"/>	Click to renew DHCP. This button is only available if DHCP is enabled.

3.4 Reference Manuals for Web, Telnet Management

The following operation manuals are also provided separately for Telnet and Web management:

Operation manual - telnet management xxxxxx.doc

Operation manual - web management xxxxx.doc

The manuals describe the detailed commands and information.

3.5 Configuration for SNMP Management

The device supports SNMP v1, SNMP v2c, and SNMP v3 management. Make sure the related settings are well-configured before you start the SNMP management from an SNMP manager.

Using Telnet Interface

The following are available commands in telnet SNMP command group to configure SNMP-related settings:

```
>SNMP Configuration
>SNMP Mode [enable/disable]
>SNMP Version [1|2c|3]
>SNMP Read Community [<community>]
>SNMP Write Community [<community>]
>SNMP Trap Mode [enable/disable]
>SNMP Trap Version [1|2c|3]
>SNMP Trap Community [<community>]
>SNMP Trap Destination [<ip_addr_string>]
>SNMP Trap IPv6 Destination [<ipv6_addr>]
>SNMP Trap Authentication Failure [enable/disable]
>SNMP Trap Link-up [enable/disable]
>SNMP Trap Inform Mode [enable/disable]
>SNMP Trap Inform Timeout [<timeout>]
>SNMP Trap Inform Retry Times [<retries>]
>SNMP Trap Probe Security Engine ID [enable/disable]
>SNMP Trap Security Engine ID [<engineid>]
>SNMP Trap Security Name [<security_name>]
>SNMP Engine ID [<engineid>]
>SNMP Community Add <community> [<ip_addr>] [<ip_mask>]
>SNMP Community Delete <index>
>SNMP Community Lookup [<index>]
>SNMP User Add <engineid> <user_name> [MD5/SHA] [<auth_password>] [DES] [<priv_password>]
>SNMP User Delete <index>
>SNMP User Changekey <engineid> <user_name> <auth_password> [<priv_password>]
>SNMP User Lookup [<index>]
>SNMP Group Add <security_model> <security_name> <group_name>
>SNMP Group Delete <index>
>SNMP Group Lookup [<index>]
>SNMP View Add <view_name> [included/excluded] <oid_subtree>
```

>SNMP View Delete <index>
>SNMP View Lookup [<index>]
>SNMP Access Add <group_name> <security_model> <security_level> [<read_view_name>] [<write_view_name>]
>SNMP Access Delete <index>
>SNMP Access Lookup [<index>]

Using Web Interface



The commands supports configuration for:

- Basic system configuration for SNMP v1 and SNMP v2c
- Basic system configuration for SNMP v1 trap, SNMP v2c trap and SNMP v3 trap
- Communities that permit to access to SNMPv3 agent
- USM (User-based Security Model) user table for SNMPv3
- VACM (View-based Access Control Model) Viewer table for SNMPv3
- Group table for SNMPv3
- Accesses group table for SNMPv3

3.6 SNMP MIBs

The switch provides the following SNMP MIBs:

- RFC 1213 - MIB II
- RFC 2674 - QBridge MIB (VLAN MIB)
- RFC 2819 - RMON (Group 1, 2, 3 & 9)
- RFC 2863 - Interface Group (IF) MIB
- RFC 3411 - SNMP Management Frameworks
- RFC 3414 - User Based Security Model (USM)
- RFC 3415 - View Based Access Control Model (VACM)
- RFC 3621 - Power Ethernet MIB
- RFC 3635 - EtherLike MIB
- RFC 3636 - 802.3 Medium Attachment Units (MAUs) MIB
- RFC 4133 - Entity MIB
- RFC 4188 - Bridge MIB

- RFC 4668 - RADIUS Authentication Client MIB
- RFC 5519 - Multicast Group Membership Discovery (MGMD) MIB
- IEEE 802.1 MSTP MIB
- IEEE 802.1AB LLDP MIB
- IEEE 802.1X Port Access Entity (PAE) MIB
- TIA 1057 LLDP Media Endpoint Discovery (MED) MIB
- IEEE 802.1-Q-BRIDGE MIB
- Private SFPDDM MIB

One product MIB file is also available in the product CD for SNMP manager software.

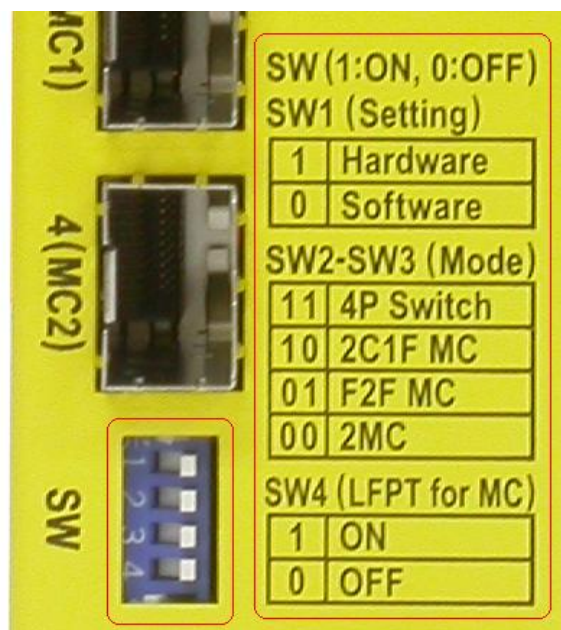
4. Function Modes

The device can be configured to perform one of the following function operating modes:

- Dual media converts mode
- Dual media converters sharing redundant fiber uplink mode
- Fiber to fiber media converter mode
- 4-port switch mode

4.1 Operating Mode Configuration

One setting SW is provided for operating mode configuration as shown below:



The functions of the SW switch settings are:

SW1	1	Hardware	<ol style="list-style-type: none"> 1. The operating mode is determined by SW1 and SW3 settings. 2. LFPT function configuration which is used for all media converter modes is determined by SW4 setting. 3. All software setting configurations are ignored. 4. The operation status can be monitored via software management interface.
	0	Software	<ol style="list-style-type: none"> 1. Settings of SW2 SW3 SW4 are ignored. 2. The operating mode and LFPT function configuration are determined by configuration via software interfaces.

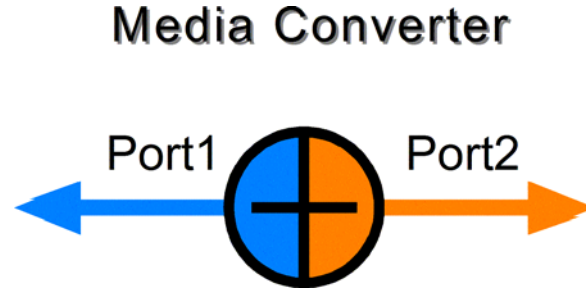
SW2 SW3	00	2MC mode	Dual media converter mode
	01	F2F MC mode	Fiber to fiber media converter mode
	10	2C1F mode	Dual media converters sharing one fiber uplink mode
	11	4P Switch mode	4-port Gigabit Ethernet switch mode
SW4	1	LFPT ON	LFPT function is enabled.
	0	LFPT OFF	LFPT function is disabled.

* 1: SW ON, 0: SW OFF

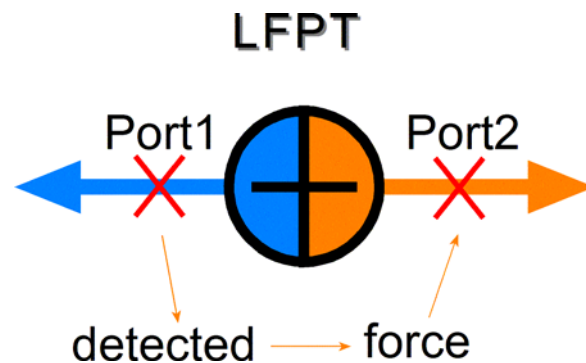
* LFPT: Link Fault Pass Through function

LFPT Function

A media converter performs frame forwarding between two port segments. The port segments may be different media types, a copper cable, a multi-mode fiber cable or single mode fiber cable. They also may be in different speeds.



The Link Fault Pass Through (LFPT) function is an important optional function to a media converter device. As it is enabled the media converter detects a link fault on one port segment, it will force the other port segment link down. It looks like that a link fault status is passed from one port segment to the other.



Advantage

The function allows two remote link partners of the media converters detect the link fault finally no matter where the exact fault occurs. It allows the upper application takes necessary action in case a real link fault occurs in any cable segment.

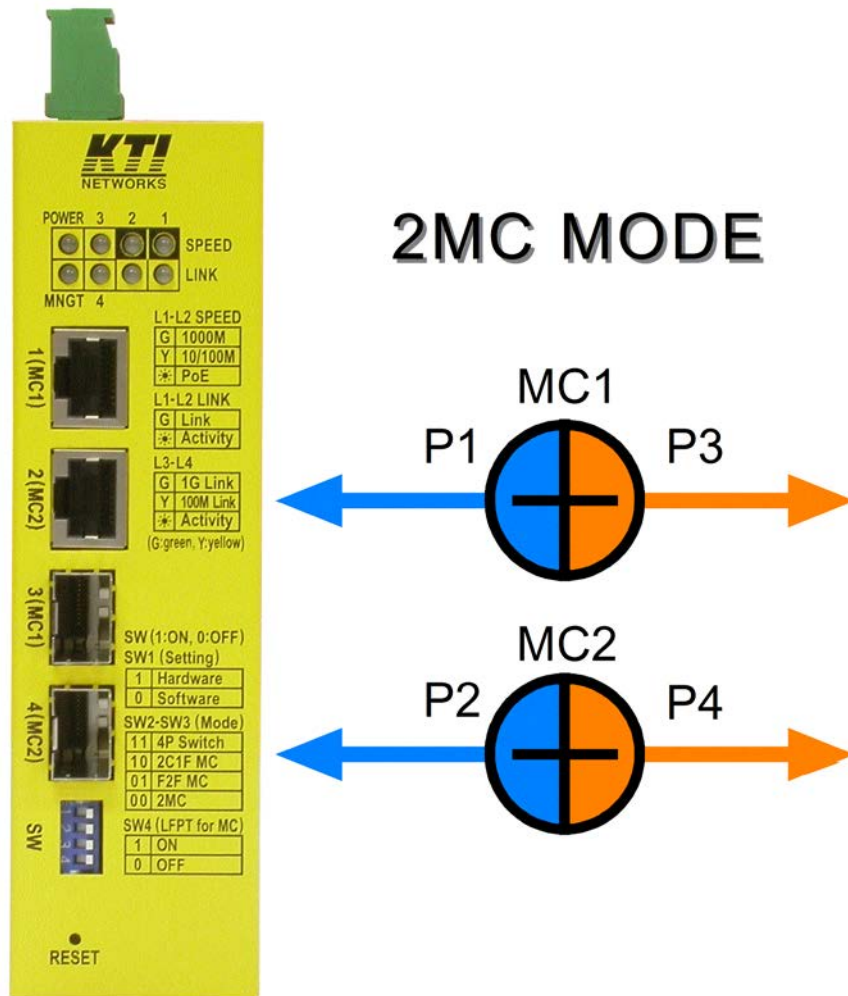
Function List for Different Operating Modes:

Operating Mode	Function	SW=1 (Hardware)	SW=0 (Software)
2MC	Management configuration * ¹	Available	Available
	LFPT	SW4 setting	Software configuration
	Port operating mode	Auto for all ports	Software configuration
	IGMP	Disabled	Software configuration
	LLDP	Disabled	Software configuration
	DDM	Available	Available
	PoE * ²	Enabled, Auto	Software configuration
F2F MC	Management configuration * ¹	Available	Available
	LFPT	SW4 setting	Software configuration
	Port operating mode	Auto for all ports	Software configuration
	IGMP	Disabled	Software configuration
	LLDP	Disabled	Software configuration
	DDM	Available	Available
	PoE * ²	Enabled, Auto	Software configuration
2C1F MC	Management configuration * ¹	Available	Available
	LFPT	SW4 setting	Software configuration
	Port operating mode	Auto for all ports	Software configuration
	IGMP	Disabled	Software configuration
	LLDP	Disabled	Software configuration
	DDM	Available	Available
	PoE * ²	Enabled, Auto	Software configuration
4P Switch	All functions	Software configuration	Software configuration
	LFPT	Disabled	Disabled

*¹: Management configuration: software settings related to management interfaces

*²: PoE function available for KGC-460-HP only.

4.2 2MC Mode



“2MC” mode is dual media converter mode. As configured, the device becomes two media converters in one box. Port 1 and Port 3 are ports of MC1 converter. Port 2 and Port 4 are ports of MC2 converter. Both media converters are functioning independently.

4.3 F2F MC Mode

“F2F MC” mode is called Fiber to Fiber media converter. The device can serve as a converter between a optical fiber cable and the other optical fiber cable. Port 3 and Port 4 are ports of the F2F converter. Port 1 and Port 2 have no logic connection to Port 3 and Port 4 under this mode.

Multi-mode fiber (MMF) to single mode fiber (SMF) conversion is the most popular application with this operating mode.



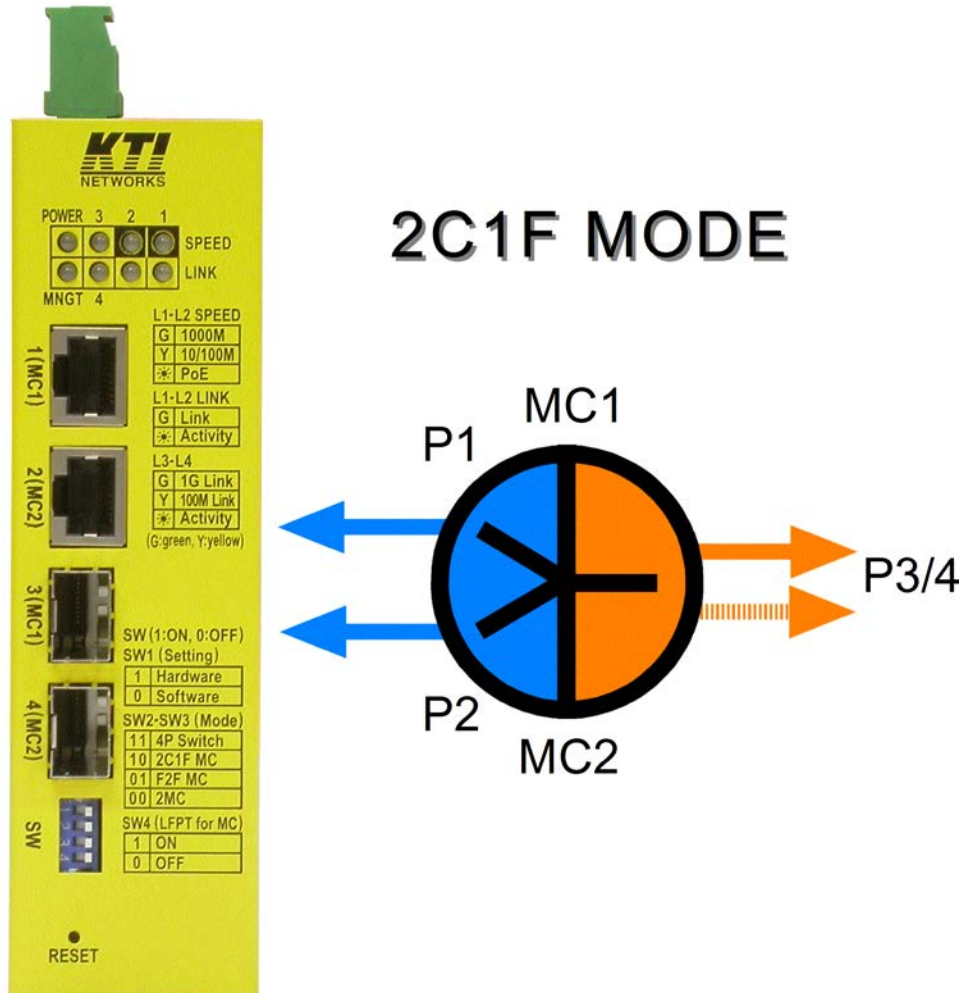
LFPT function option is also available for this mode. Occurrence of one port link failure will force the other port link down.

Remark:

Under “F2F MC” mode Port 1 and Port 2 are available for software management interface, but isolated from Port 3 and Port 4.

4.4 2C1F Mode

“2C1F” mode is an operating mode that dual media converters shares one fiber segment. Under this mode Port 3 and Port 4 become a link aggregation port “P3/4”. It is also called a trunk port.



P1 port and P3/4 port are ports of MC1. P2 port and P3/4 port are ports of MC2. Both MC1 and MC2 are independent, but just share one trunk port for uplink. Trunk port P3/4 is LACP compliant. Both P3 and P4 are operating at the same time normally. When any is link fault, the other will take over the transmission duty for both MC1 and MC2. LFPT function is also available for this mode.

LFPT operations are:

1. When trunk port P3/4 link failed (both P3 and P4 port link failed), P1 port and P2 port are forced to link down.
2. When both P1 and P2 port link failed, trunk port P3/4 is forced to link down. (Both P3 and P4 are link down.)
3. Only one link failure within P1 and P2 will not cause P3/4 link down.

Advantages of “2C1F” mode:

1. Sharing of uplink fiber channel by two independent media converters
2. Redundancy support on the fiber uplink

Uplink function is working for both converters even either one fiber cable is faulty.

4.5 4P Switch Mode

“4-P Switch” mode is an operating mode that the device works like a typical managed Gigabit Ethernet switch which has 2 10/100/1000M copper ports and 2 SFP-based dual-speed fiber ports.

The switch is featured:

- Management functions:
 - HTTP/HTTPS/SSHv2/CLI telnet/CLI console/SNMP v1/v2c/v3/RMON
 - DHCP/DHCPv6 client, DHCP relay, DNS client, NTPv4
 - IPv6 support, System Syslog, Configuration down/upload, Software upload
- Security functions:
 - NAS, 802.1X, MAC-based/Web/CLI authentication
 - IP MAC binding, TACACS+, IP source guard
- Layer 2 functions:
 - QoS, 802.1Q/MAC-based/Protocol-based/Private/IP subnet VLAN, Port Isolation
 - Storm control for UC/MC/BC packets, Static MAC configuration
 - IGMP v2/v3 snooping, MLD v1/v2 snooping, DHCP snooping
 - Multiple Spanning Tree- MSTP. RSTP, STP
- Auto Multi-Ring (KAMR) Technology:
 - Fast failover response time, Auto recovery when failure is repaired
 - Supports up to five redundant rings, Works with RSTP network

5. Redundant Ring Application

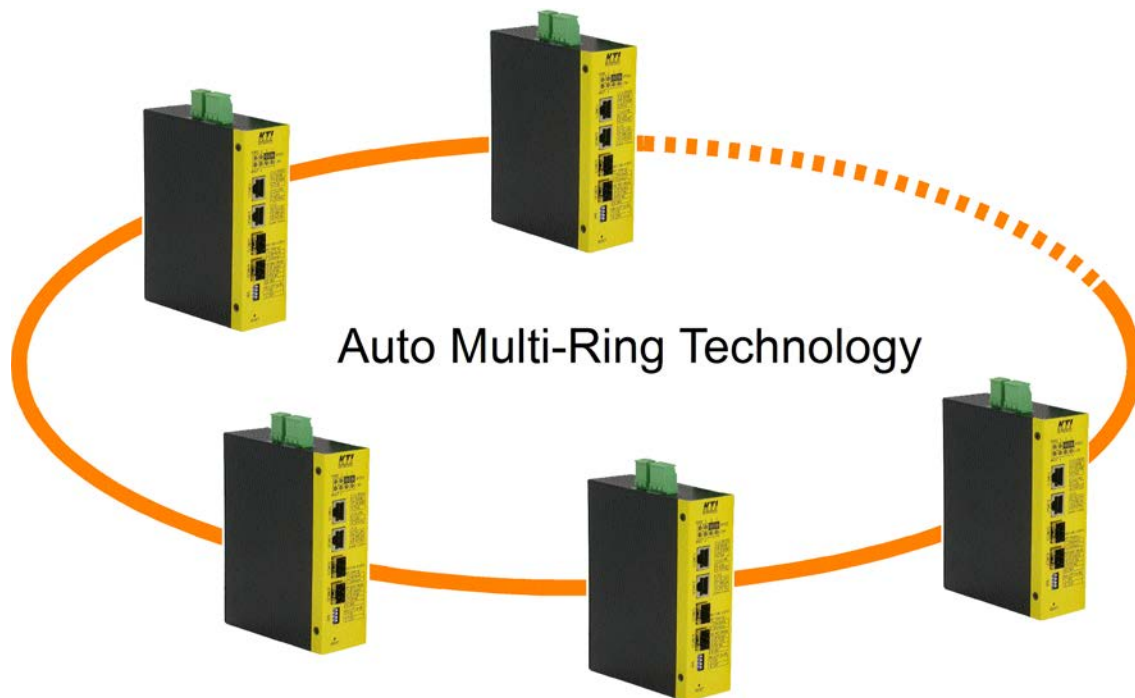
5.1 Auto Multi-Ring Technology for 4-Port Switch Mode

Auto Multi-Ring Technology was developed especially for switches connected in ring topology which needs redundant support when any failure occurs in ring. For large network, more than one ring connections are very common. Auto Multi-Ring Technology implementation can support more than one ring connection within a switch. It is also able to work with RSTP support concurrently in the switch.

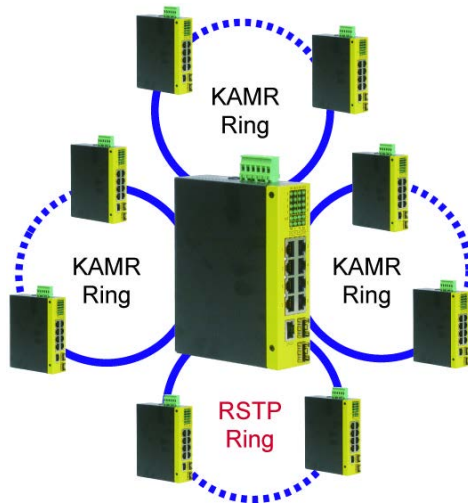
Some basic information is:

- Supports up to two rings in one switch
- Supports ring member status monitoring for up to 100 member switches in one ring
- Supports ring connection for up to 250 switches
- Auto backup is activated when one or more than one fault occur
- Auto recovery when fault is repaired (Limited in cases of more than one faults)
- Provides fast response time than RSTP protocol
- Works with RSTP protocol concurrently within one switch

The following figure illustrates a ring configuration composed of the devices connected via fiber:



The following figure shows one switch is configured to support three redundant rings and one RSTP ring at the same time.



5.2 Redundant Ring Applications with industrial standard RSTP protocol

It also can be done to support a ring connection using industrial standard RSTP function and establish a backup path. In case that any link failure occurs, the backup path can link up immediately to recover the network operation.