Slim Line (SL/SLX) Series
Industrial Ethernet Switches & Media Converter

Installation Guide

Revision: 22 October 2012

http://www.sixnet.com

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This manual applies to the following products:

- **SL-2ES-#** 2-port unmanaged Ethernet media converter
- **SLX-3ES-#** 3-port unmanaged Ethernet media converter
- **SLX-3EG-1** 3-port unmanaged Gigabit Ethernet converter
- **SLX-5EG-1** 5-port unmanaged Gigabit Ethernet switch
- **SLX-5EG-2SFP** 5-port unmanaged Gigabit Ethernet switch with 2 fiber SFPs
- **SL/SLX- 5ES-#** 5-port unmanaged Ethernet switch with 5 10/100 ports
- **SL/SLX- 5MS-#** 5-port managed Ethernet switch with 5 10/100 ports
- **SL/SLX-5MS-MDM-1** 5-port managed Ethernet land-line modem with 5 10/100 ports
- **SL/SLX- 6ES-#** 6-port unmanaged Ethernet switch
- **SL/SLX- 8ES/9ES-#** 8/9-port unmanaged Ethernet switch with 8 or 9 10/100 ports
- **SL/SLX- 8MS-#** 8-port managed Ethernet switch with 8 10/100 ports
- **SL/SLX- 8MG-1** 8-port managed Ethernet switch with 8 Gigabit ports
- **SLX-10MG-1** 10-port managed Gigabit Ethernet switch with 10 ports
- **SLX-16MS-1** 16-port managed Ethernet switch with 16 10/100 ports
- **SLX-18MG-1** 18-port managed Gigabit Ethernet switch with 18 ports

To obtain support for Sixnet products:

Latest product info: http://www.sixnet.com

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SIXNET Protected Technology Policy - Sixnet protects your investment in Sixnet systems with long-term planned technology and our unique Protected Technology Policy. We will continue to support the specified capabilities of standard Sixnet products for at least five years (twenty years for Industrial Managed Switches). We plan each product improvement and new feature to be upward compatible with existing designs and installations. Our goals are to make each new software release bring new power to your Sixnet systems and have every existing feature, applications program and data file continue to work. We protect your investment even further with a liberal five-year trade-in policy. Exchange standard products for upgraded versions of the same product to take advantage of new features and improvements at any time for five years. A prorated trade-in allowance will be given for your existing unit. Sixnet protects your long-term productivity with state-of-the-art planned technology and continued support.

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INSTALLATION WARNINGS - These products should not be used to replace proper safety interlocking. No software-based device (or any other solid-state device) should ever be designed to be responsible for the maintenance of consequential equipment or personnel safety. In particular, Sixnet disclaims any responsibility for damages, either direct or consequential, that result from the use of this equipment in any application. All power, input and output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods and in accordance with the authority having jurisdiction. This equipment is suitable fro use in Class I, Division 2, Groups A, B, C, D or non-hazardous locations only.

WARNING: Explosion Hazard
Substitution of any components may impair suitability for Class I, Division 2
Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous

FCC Statement - This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: Reorient or relocate the receiving antenna; Increase the separation between the equipment and receiver; Connect the equipment into an outlet on a circuit different from that to which the receiver is connected; Consult the dealer or an experienced radio/TV technician for help.

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Note: All information in this document is subject to change without notice.

Section 1 General Information

Overview

This manual will help you install and maintain these industrial Ethernet switches. Installation of these switches is very easy and they will begin to operate as soon as they are powered up. For the unmanaged models (denoted by ES in their part number) there are no user settings so they are truly plug and play. The managed models (denoted by MS in their part number) will act as unmanaged switches until they are configured otherwise. Refer to the managed switch software manual for configuration of advanced network functionality.

Note: This manual only covers the installation and wiring of these switches. For the managed models refer to the separate Software User Manuals for details on configuring and using any of the management functions such as SNMP, RSTP, IGMP, VLANs, security, port mirroring and much more.

Note: This Equipment is Suitable for Use in Class I, Division 2, Groups A, B, C, D or Non Hazardous Locations Only

Operation

Unlike an Ethernet hub that broadcasts all messages out all ports, these industrial Ethernet switches will intelligently route Ethernet messages only out the appropriate port. The major benefits of this are increased bandwidth and speed, reduction or elimination of message collisions, and deterministic performance when tied with real-time systems.

These industrial Ethernet switches can support 10BaseT (10 Mbps), 100BaseT (100 Mbps) and 1000BaseT (100 Mbps) on their RJ45 ports (depending on the model). Each of these ports will independently auto-sense the speed/duplex, mdi/mdix-crossover and polarity allowing you to use straight, crossed or even mis-wired cables. Some models also have one or more fiber optic ports for making noise immune connections up to 120 km.

Performance Specifications

These general specifications apply to these industrial Ethernet switches. Refer to Section 7 for complete technical specifications.

Number of ports	2,3, 5, 6, 8, 9, 10, 16 or 18 Ethernet ports
Ethernet Switch Type	Unmanaged (ES/EG models) or managed (MS models)
Ethernet Switch Mode	Store and forward, wire-speed, non-blocking
Ethernet Protocols	All standard IEEE 802.3 protocols supported
RJ45 Ports Speed	10/100 or 10/100/1000 Mbps
RJ45 Ports Operation	Auto-negotiation, auto-mdi/mdix-crossover and auto-polarity
Fiber Optic Port Speed	100 Mbps (SC or ST) or 1000 Mbps (SFP/LC)
Fiber Optic Type	Multimode, singlemode, long-haul or special application

Safety Standards

These industrial Ethernet Switches meet the following standards plus others:

Note: Some ratings may be pending on newer models. Contact Sixnet for latest info.

Sixnet, LLC is an ISO9001:2000 certified company (FM 65232) since 1996. These devices are design, developed and manufactured per an ISO9001 quality management system.

Electrical safety –

- CE per Low Voltage Directive and EN61010-1 (IEC1010)
- UL recognition per UL508 (UL File # E179490)
- CSA per C22.2/14 (cUL File # E179490)

See warnings below.

Install the Managed Switches in accordance with local and national electrical codes.

Lightning Danger: Do not work on equipment during periods of lightning activity. Do not connect a telephone line into one of the Ethernet RJ45 connectors.

EMC (emissions and immunity) –

- CE per the EMC directive, EN 55022 or IEC 61326-1 or EN 61000-6-2/4
- FCC part 15 and ICES 003; Class B. **See FCC statement on previous page.**

Marine, maritime and offshore –
These devices, when installed in an appropriately IP rated enclosure, comply with the ABS standards which is similar to DNV No. 2.4 and equivalent Lloyds. **See warning below.**

For marine and maritime compliance, do not install this product within 5 meters of a standard or a steering magnetic compass.

WEEE compliance –
These devices comply with the WEEE directive. Do not throw away these devices in the standard trash. Contact Sixnet regarding proper disposal.

✓RoHS

RoHS compliance –
These devices comply with the RoHS directive and are consider lead and other hazardous substance free.

Hazardous Locations –

- CE per ATEX directive and EN50021/EN60079-15 (Zone 2); EEx nA II T4 X (-40°c $\leq T_a \leq$ +85°C)
- UL per UL1604 (Class I, Div. 2), Groups A,B,C,D (UL File # E192531)
- CSA per C22.2/213 (Class 1, Div. 2), Groups A,B,C,D (cUL File # E192531)

See warnings below.

WARNING (EXPLOSION HAZARD) SUBSTITUTION OF ANY COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS 1, DIVISION 2 (ZONE 2).

WARNING (EXPLOSION HAZARD) WHEN IN HAZARDOUS LOCATIONS, DISCONNECT POWER BEFORE REPLACING OR WIRING UNITS.

WARNING
(EXPLOSION HAZARD)

DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.

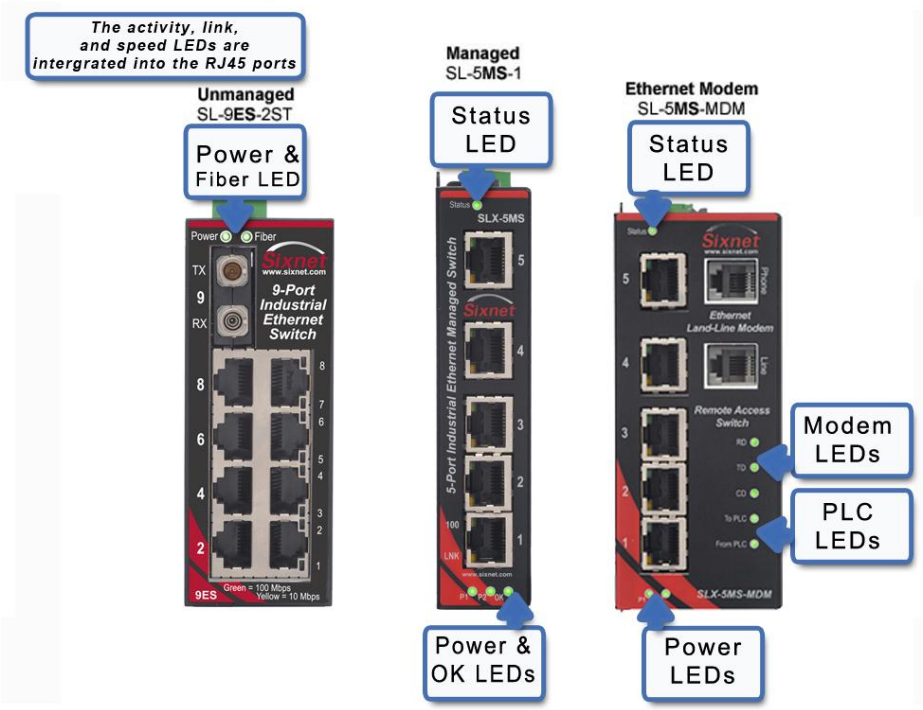
WARNING
(EXPLOSION HAZARD)

IN HAZARDOUS OR POTENTIALLY HAZARDOUS LOCATIONS, DO NOT SEPARATE ANY PART OF THE UNIT WHEN ENERGIZED. USE THE UNIT FOR INTERNAL CONNECTIONS ONLY.

Section 2 LED Indicators

Overview

All these industrial Ethernet switches have 1 or 2 communication LEDs for each port and a power LED. The managed models also have an “OK” output LED, a status LED and dual power LEDs. Refer to the sample pictures below for the location of these LEDs.



Typical LED Location (varies with model)

Status LED

Managed Models Only: The Status LED indicates the overall health of the switch. It is normally ON solid indicating that no internal CPU or software problems are detected. It will flash when loading firmware and briefly on power up or reset. Otherwise, if it is OFF or flashing for an extended period of time then a problem is detected. In this case, please contact Sixnet for support.

Power LED

On unmanaged models there is typically one power LED that is ON if either power input (P1 or P2) has power applied to it. On the managed models (and some unmanaged models) there are two Power LEDs that indicate if there is power applied to the respective input.

ACT / LNK LED

This is the **Yellow** LED on models with two LEDs per RJ45 port.

ON (yellow) (not flashing)	Indicates that there is a proper Ethernet connection (Link) between the port and another Ethernet device, but no communications activity is detected.
ON (yellow) (flashing)	Indicates that there is a proper Ethernet connection (Link) between the port and another Ethernet device, and that there is communications activity.
OFF	Indicates that there is not a proper Ethernet connection (Link) between the port and another Ethernet device. Make sure the cable has been plugged securely into the ports at both ends.

Speed 10/100 LED

This is the **Green** LED on models with two LEDs per RJ45 port.

ON (green)	A 100 Mbps (100BaseT) connection is detected.
OFF	A 10 Mbps (10BaseT) connection is detected.

ACT / LNK / Speed LED

This is a bi-color (**green and yellow or orange**) LED on models with one LED per RJ45 port.

ON Solid (not flashing)	Indicates that there is a proper Ethernet connection (Link) between the port and another Ethernet device, but no communications activity is detected.
Flashing	Indicates that there is a proper Ethernet connection (Link) between the port and another Ethernet device, and that there is communications activity.
Green	On 10/100 ports, a 100 Mbps connection is detected. On 10/100/1000 ports, a 1000 Mbps connection is detected.
Yellow or Orange	On 10/100 ports, a 10 Mbps connection is detected. ON 10/100/100 ports, a 10 or 1000 Mbps connection is detected.
OFF	Indicates that there is not a proper Ethernet connection (Link) between the port and another Ethernet device. Make sure the cable has been plugged securely into the ports at both ends.

PoE LED

ON	A valid Powered Device(PD) is detected and the switch is sourcing power on this port.
OFF	No valid Powered Device(PD) is detected and no power is sourced.
Periodically Blinks ON	No valid Powered Device (PD) is detected or the connected device is drawing too little current (<10 mA) so no power is being sourced. Once the connected device is loaded and draws more than 10 or 15 mA then power will be sourced.
Error Code Blink	If you see the same sequence of blinks repeatedly then contact Sixnet for more information.

OK LED

Managed Models and Some Unmanaged Models: This LED indicates the status of the power inputs. There is an output screw terminal that can be connected as shown in the wiring diagram. The output voltage from the screw terminal marked 'OK' will be the same as the applied switch input voltage. The output will be ON when both the PI and P2 terminals have power applied to them. It will be OFF if either input does not have power or the switch software is not running.

From PLC Input LED

5MS-MDM Models Only: This LED indicates status of the Discrete "From PLC" input on the modem. There is an input screw terminal that can be connected as shown in the diagram. When voltage is applied to the From PLC input the LED will be ON. When no voltage is applied the LED will be OFF.

To PLC Output LED

5MS-MDM Models Only: This LED can indicate Power Status or Modem Connection status. There is an output screw terminal. That can be connected as shown in the wiring diagram. . The output voltage from the screw terminal marked 'OK' will be the same as the applied switch input voltage. In "OK output" mode the output will be ON when both P1 and P2 terminals have power applied to them. It will be OFF if either input does not have power or the switch software is not running. In "Carrier Detect" mode the output will be ON when the CD LED is ON and will be OFF when the CD LED is OFF.

CD LED

5MS-MDM Models Only: The CD LED indicates when there is a carrier (successful connection) established between the SL-5MS-MDM and another modem. When OFF the connection is not established, and when ON the Carrier is established.

RD LED

5MS-MDM Models Only: The RD LED flashes when the SL-5MS-MDM is receiving data from the phone line port. Flashing on this LED when the CD LED is OFF could indicate a Ring coming in from a calling device. When the CD LED is ON and the RD LED is flashing will indicate communication coming in from the remote device.

TD LED

5MS-MDM Models Only: The TD LED will flash on as the SL-5MS-MDM transmits data out to the modem. The flashing of TD LED while the CD LED is ON will indicate communications between the SL-5MS-MDM and device connected to the other modem.

Section 3 Installation

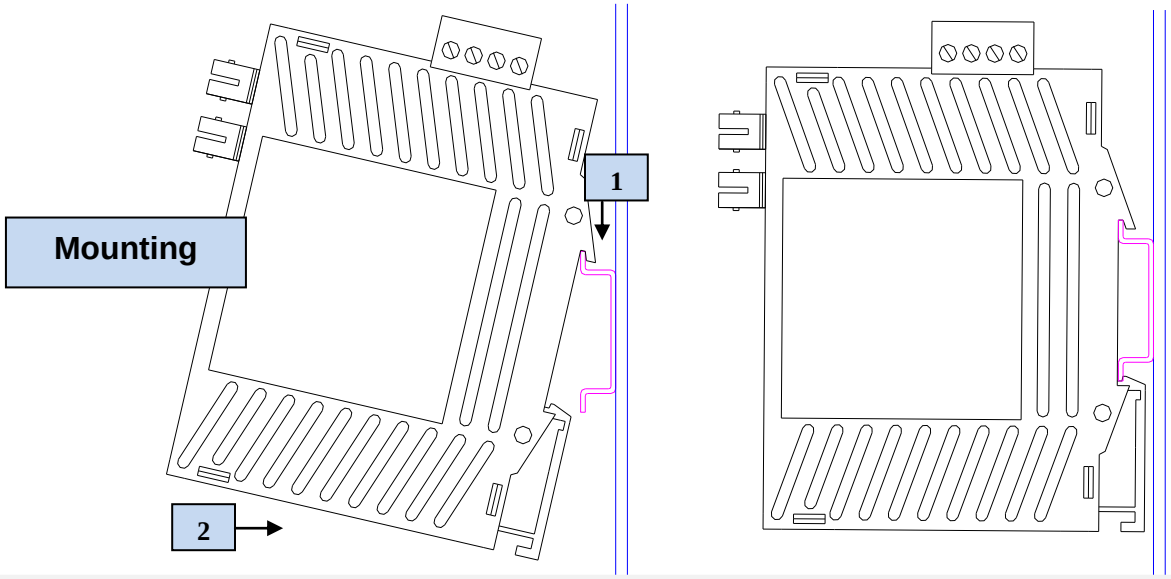
Overview

These industrial Ethernet switches can be snapped onto a standard DIN rail (EN50022) or screwed directly to a flat panel. Refer to the mechanical drawings below to properly mount your switch.

Note: Make sure to allow enough room to route your Ethernet copper or fiber optic cables.

SL- or SLX-#ES models in Lexan case:

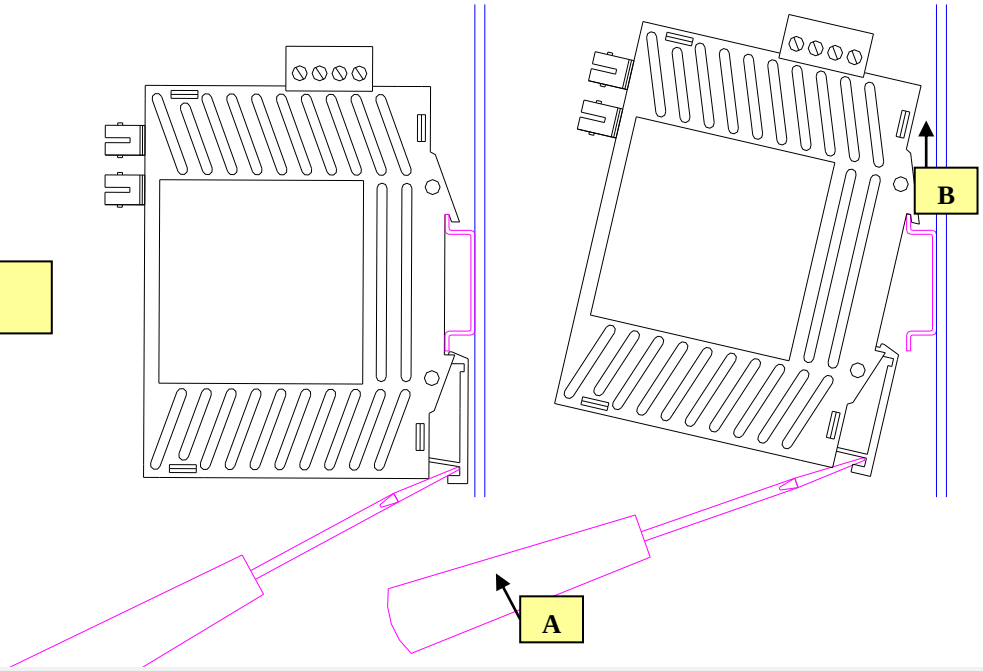
Mounting



Recommended DIN rail mounting steps:

1. Hook the top back of the unit over the DIN rail.
2. Push the bottom of the unit towards the DIN rail until it snaps into place.

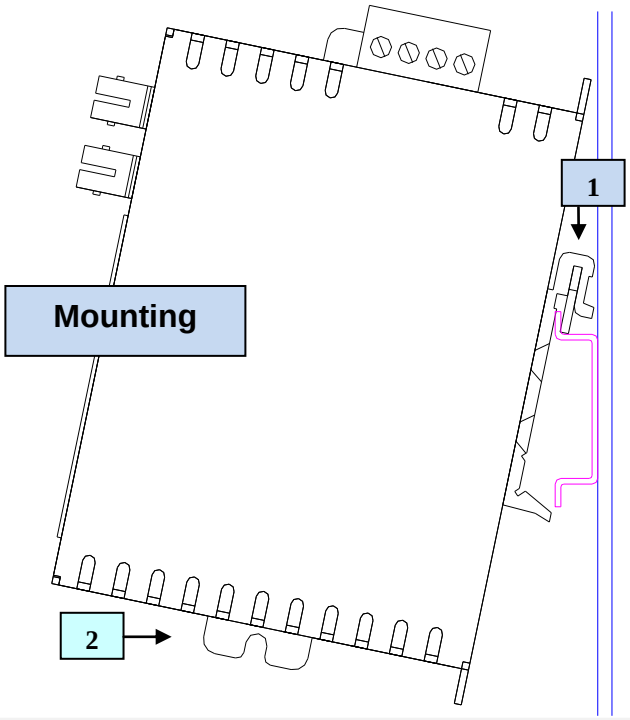
Removal

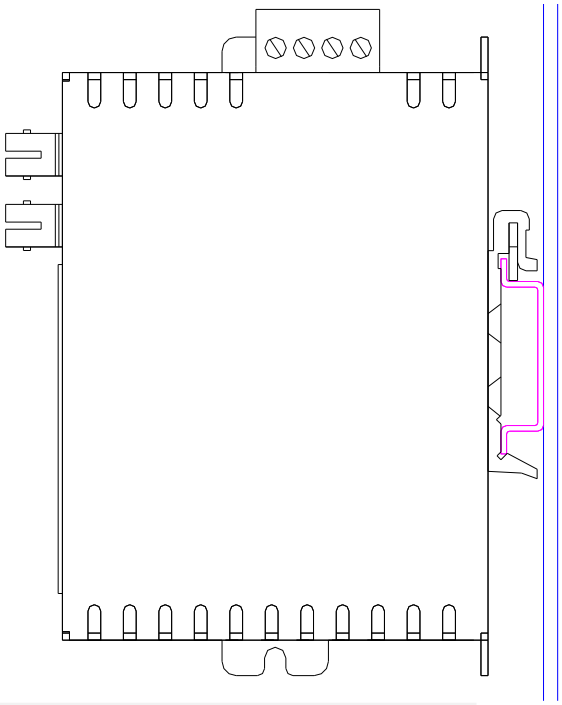


Recommended DIN rail removal steps:

A. Insert screwdriver into DIN clip and pry until the bottom of the unit releases from the din rail.
B. Unhook the top of the unit and remove it from the DIN rail.

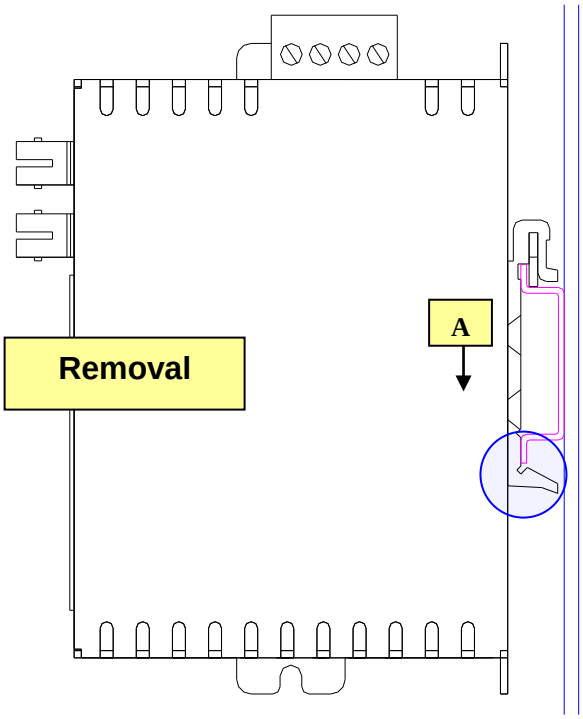
SL- or SLX-#ES models in metal case:

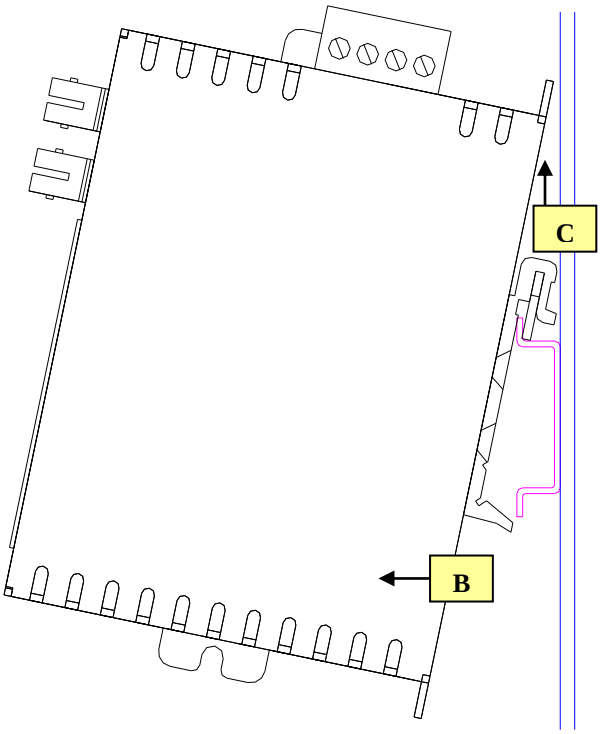




Recommended DIN rail mounting steps:

1. Hook the top back of the DIN rail clip on the unit over the din rail.
2. Push the bottom of the unit towards the DIN rail until it snaps into place.

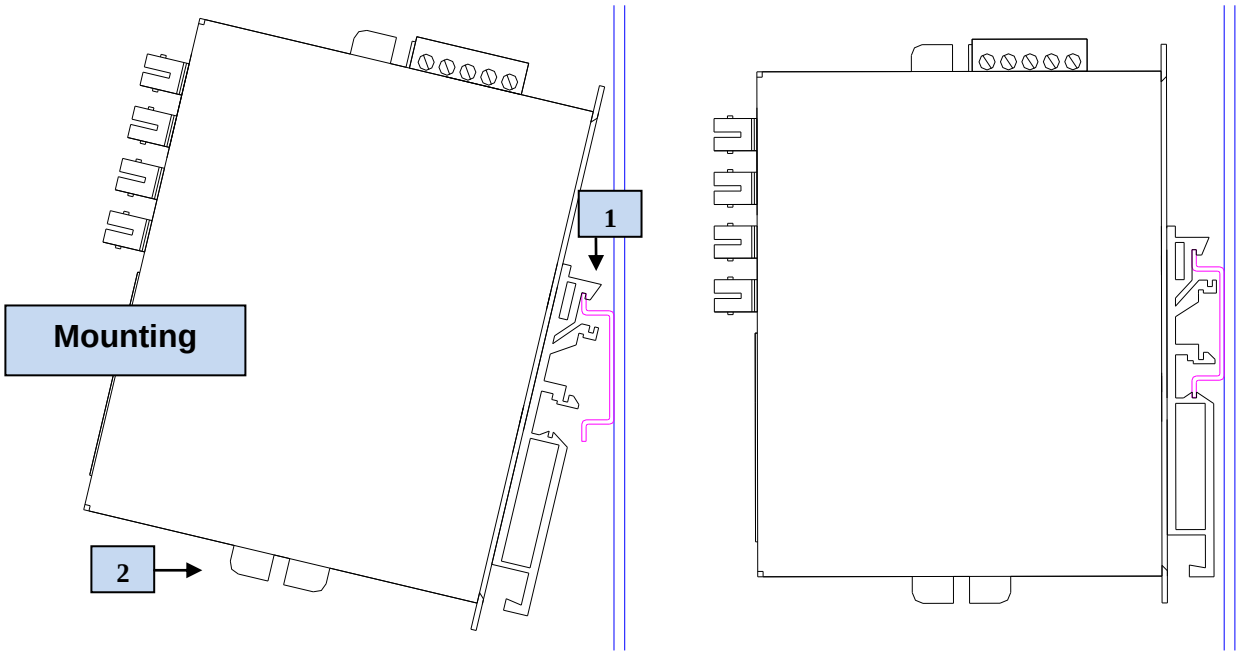




Recommended DIN rail removal steps:

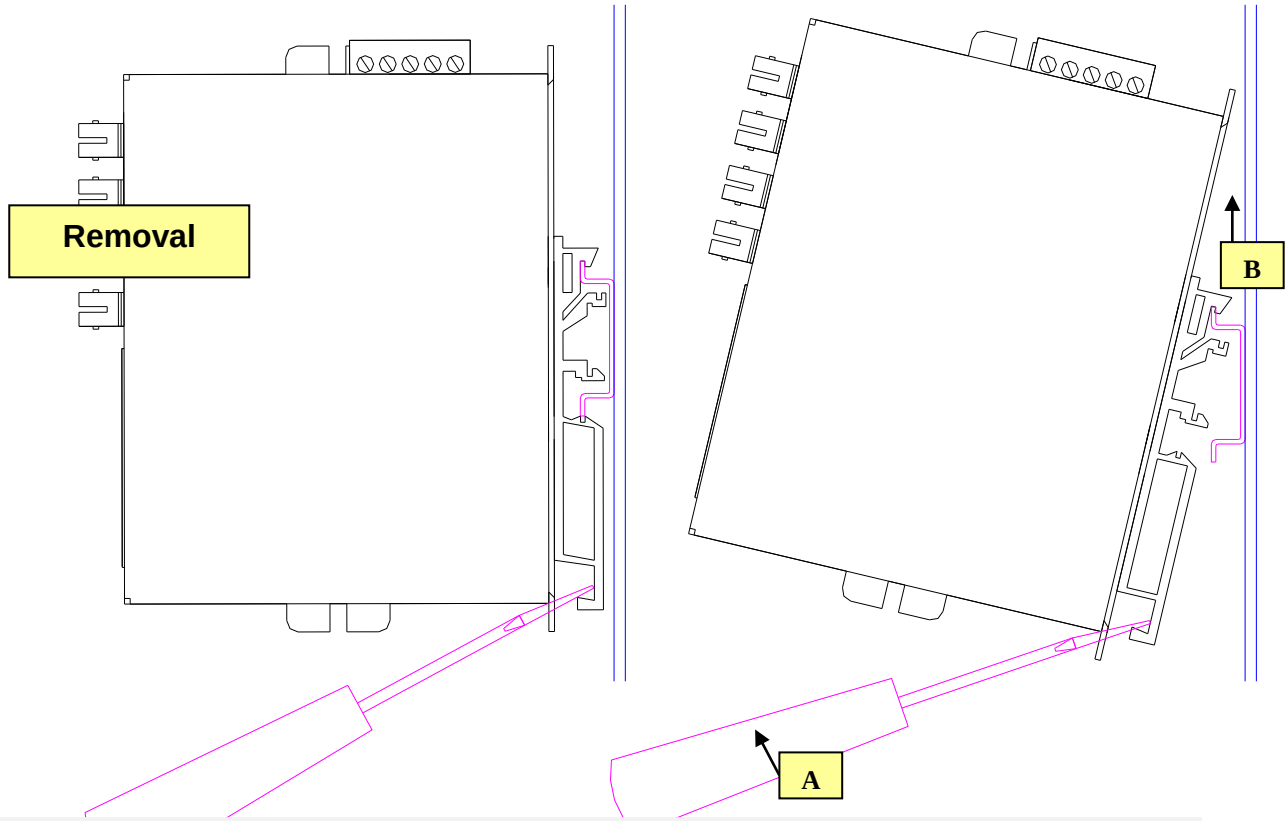
A. Push the whole unit down to free the bottom of the DIN rail clip. See blue circle area.
B. Pull the bottom of the unit away from the DIN rail.
C. Unhook the top of unit and remove it from the DIN rail.

SL- or SLX-#MS models in metal case with plastic DIN rail clip (older models):



Recommended DIN rail mounting steps:

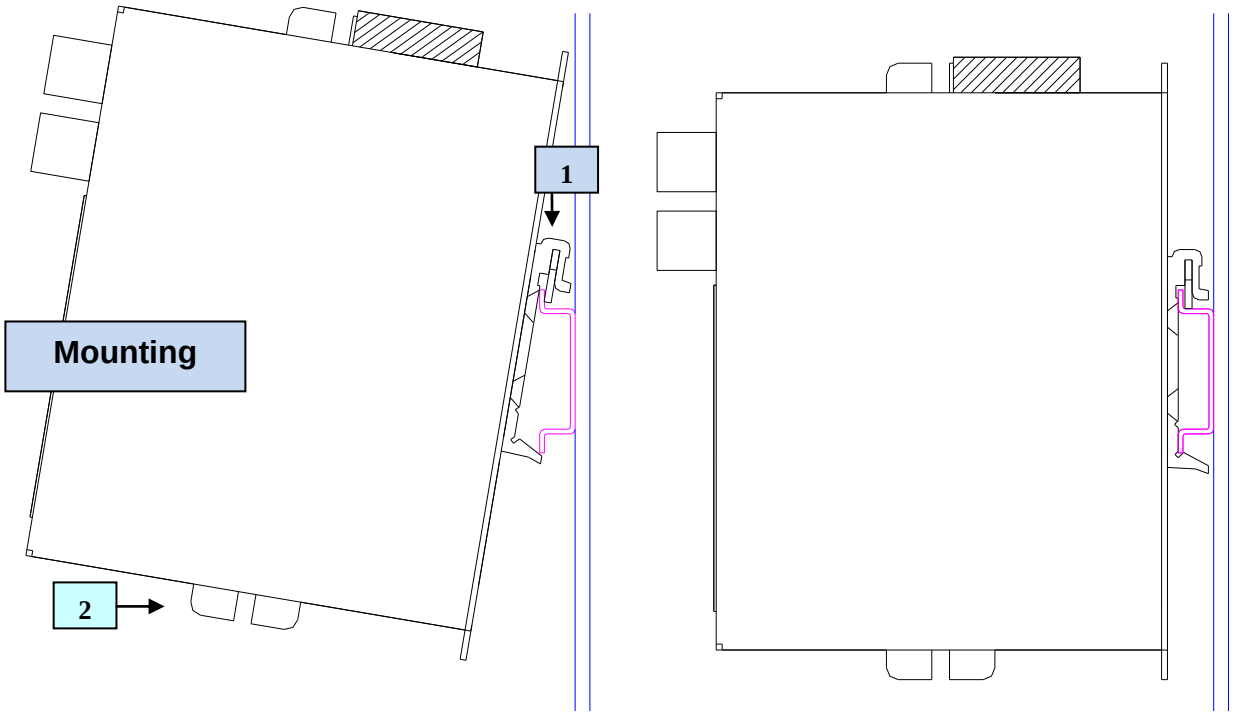
1. Hook the top back of the unit over the DIN rail.
2. Push the bottom of the unit towards the DIN rail until it snaps into place.



Recommended DIN rail removal steps:

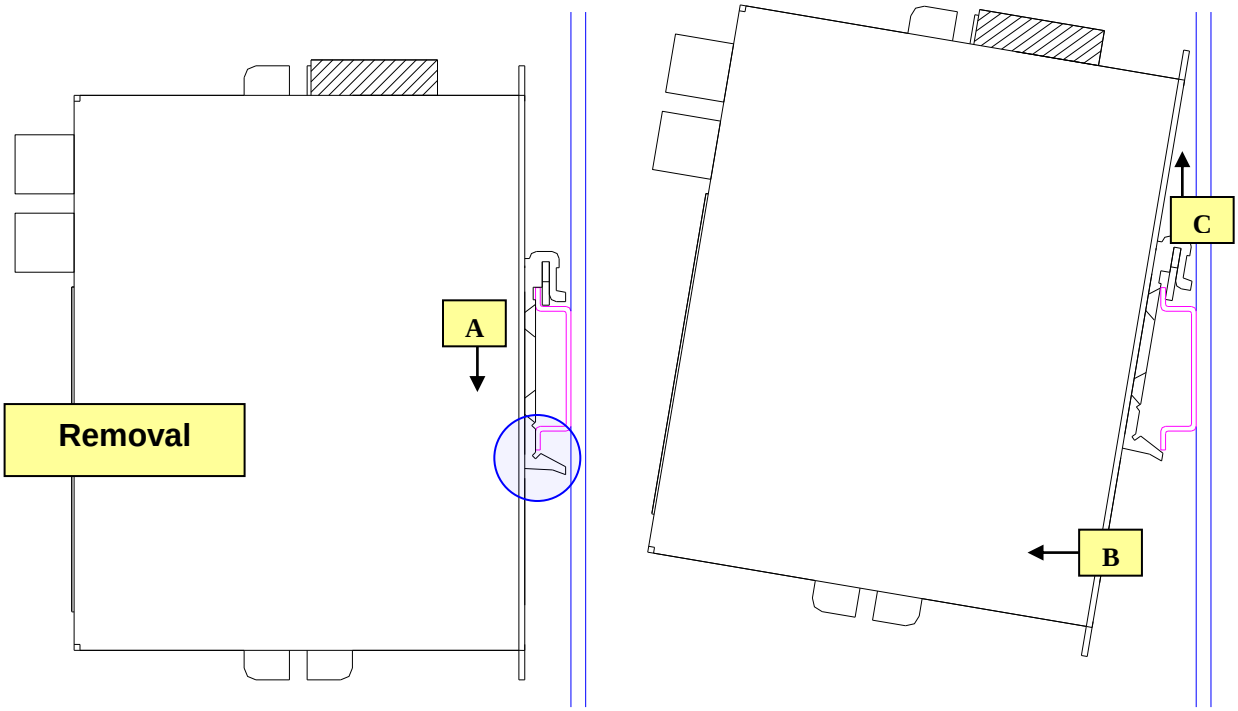
A. Insert screwdriver into DIN clip and pry until the bottom of the unit releases from the din rail.
B. Unhook the top of the DIN clip and remove the unit from DIN rail.

SL/SLX-#MS and -#MG models in metal case with metal DIN rail clip:



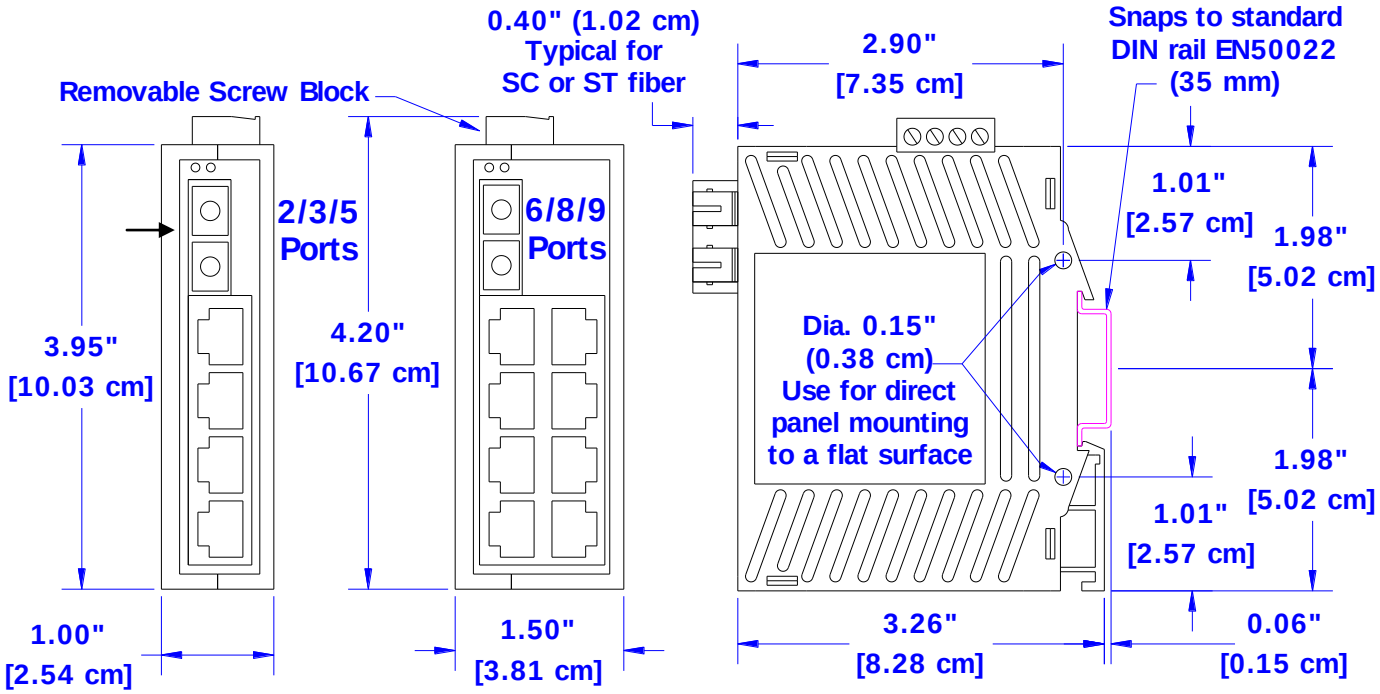
Recommended DIN rail mounting steps:

1. Hook the top back of the DIN rail clip on the unit over the din rail.
2. Push the bottom of the unit towards the DIN rail until it snaps into place.

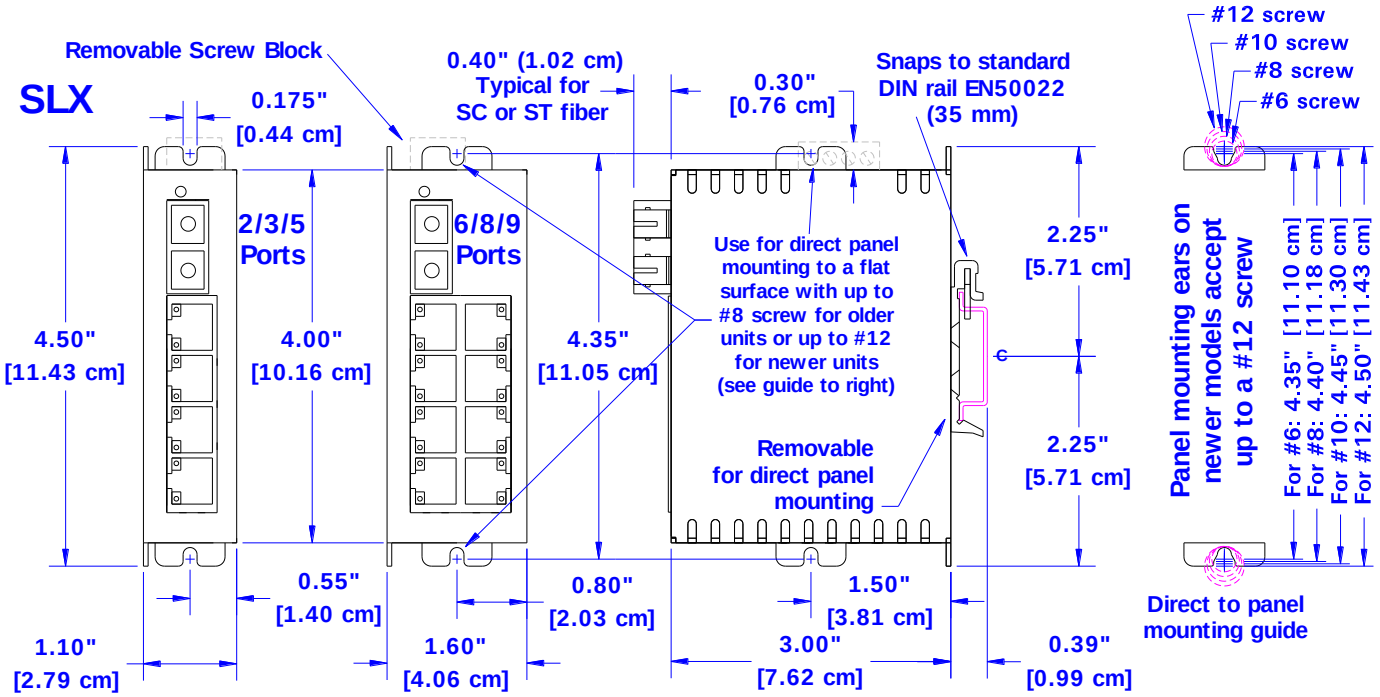


Recommended DIN rail removal steps:

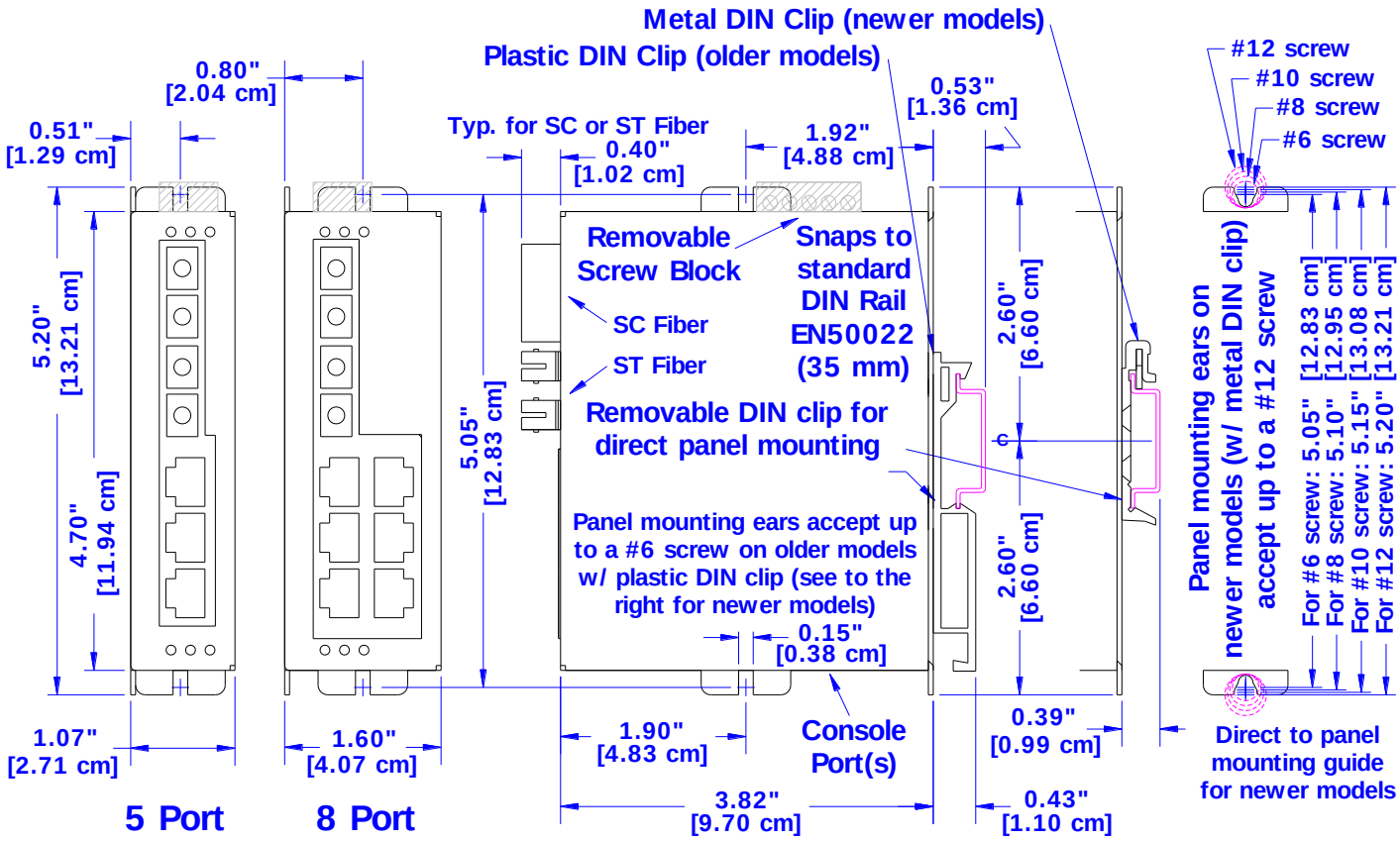
A. Push the whole unit down to free the bottom of the DIN rail clip. See blue circle area.
B. Pull the bottom of the unit away from the DIN rail.
C. Unhook the top of unit and remove it from the DIN rail.



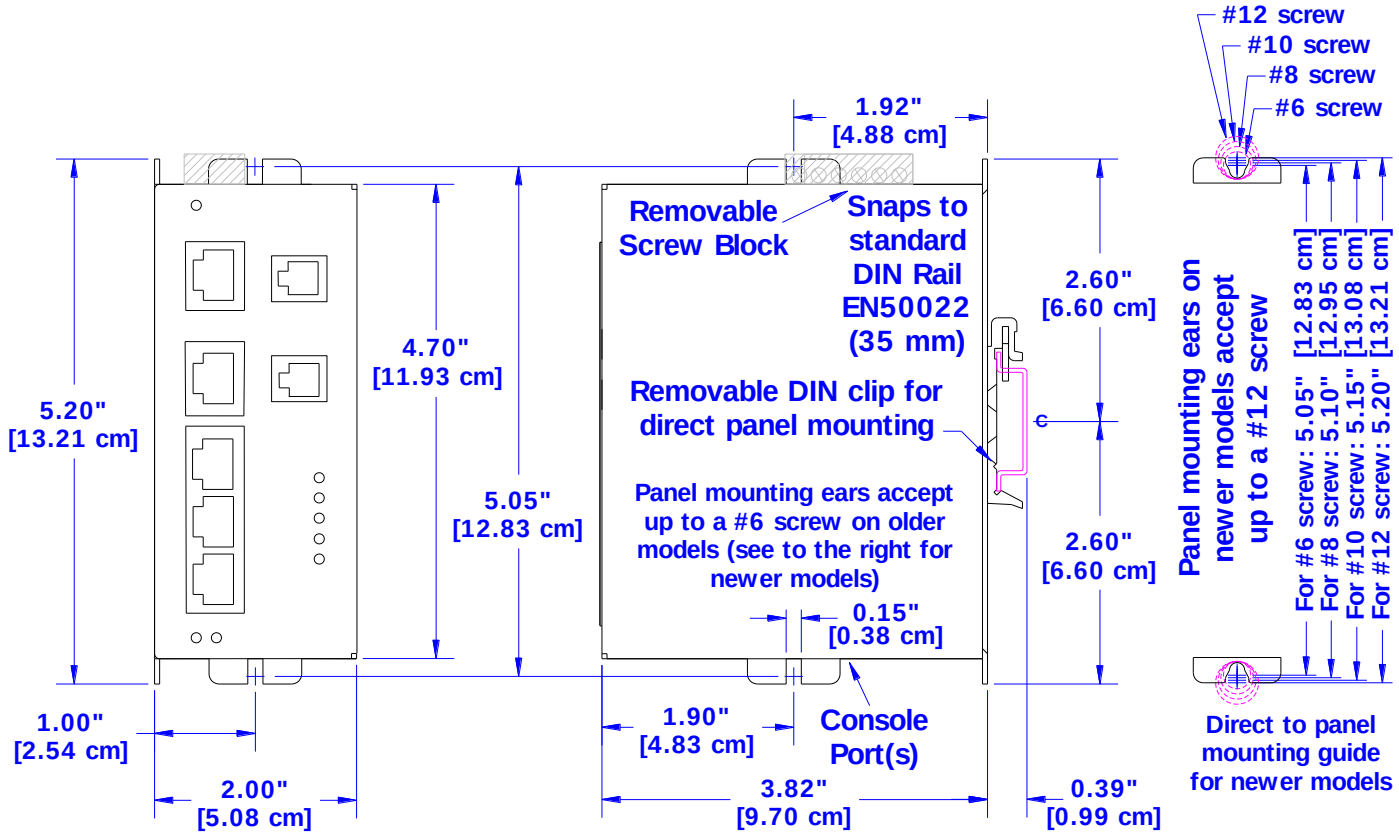
Mechanical Dimensions for SL-2/3/5/6/8/9ES-1/2/3 in Lexan Packaging



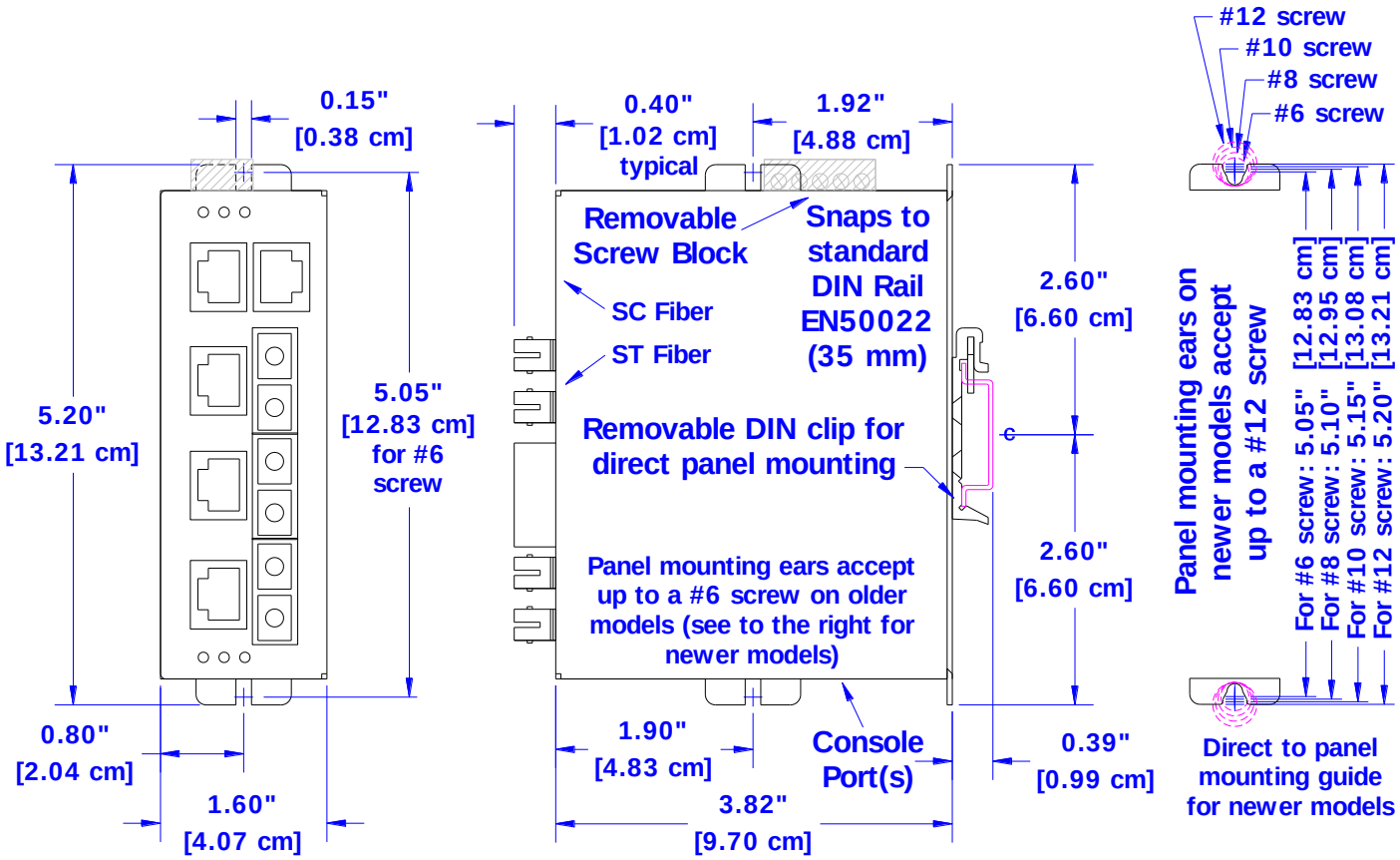
Mechanical Dimensions for SLX-2/3/5/6/8/9ES-1/2/3 in Metal Packaging



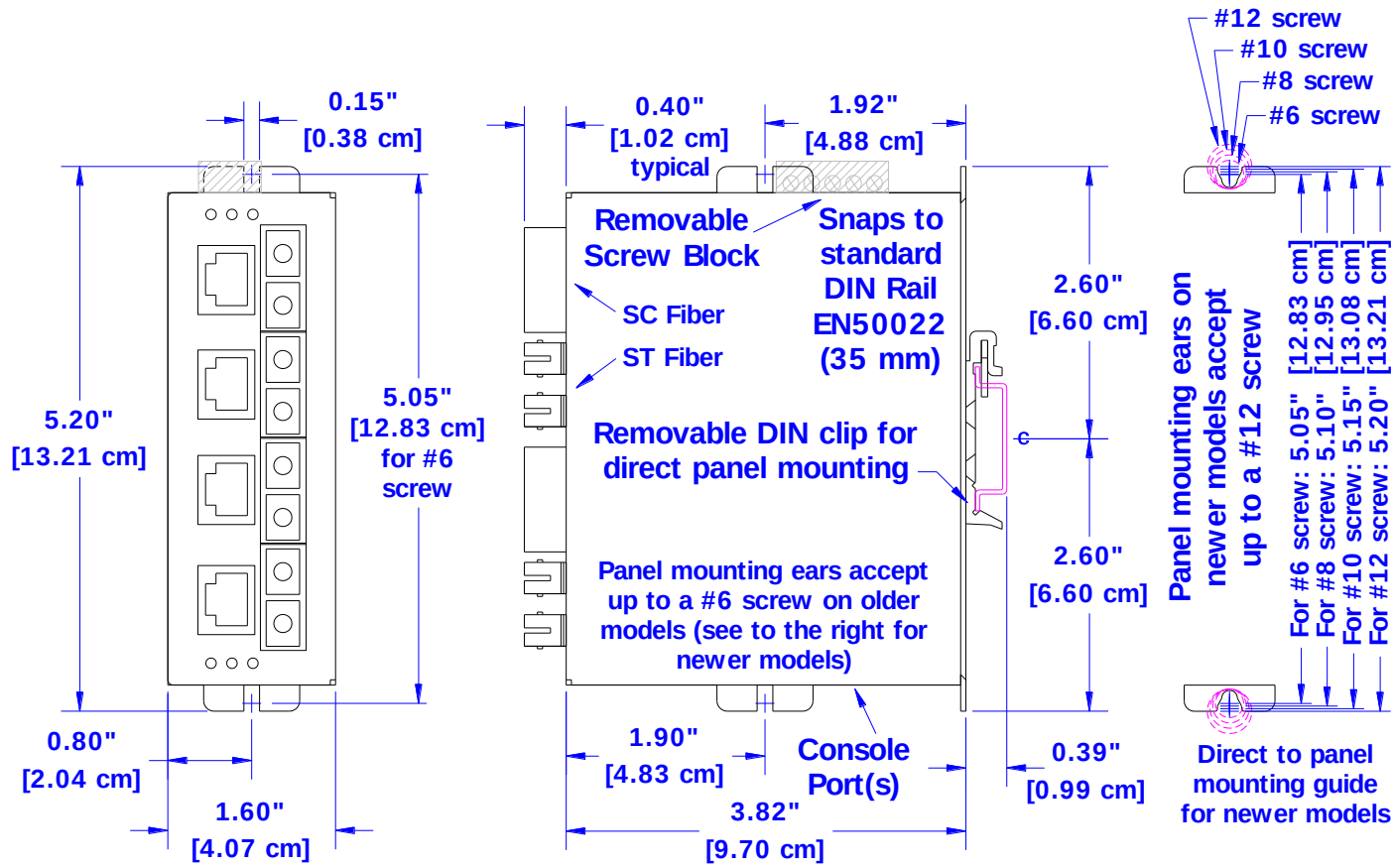
Mechanical Dimensions for SL/SLX-5/8MS-1/4/5 with up to 2 Fiber Ports



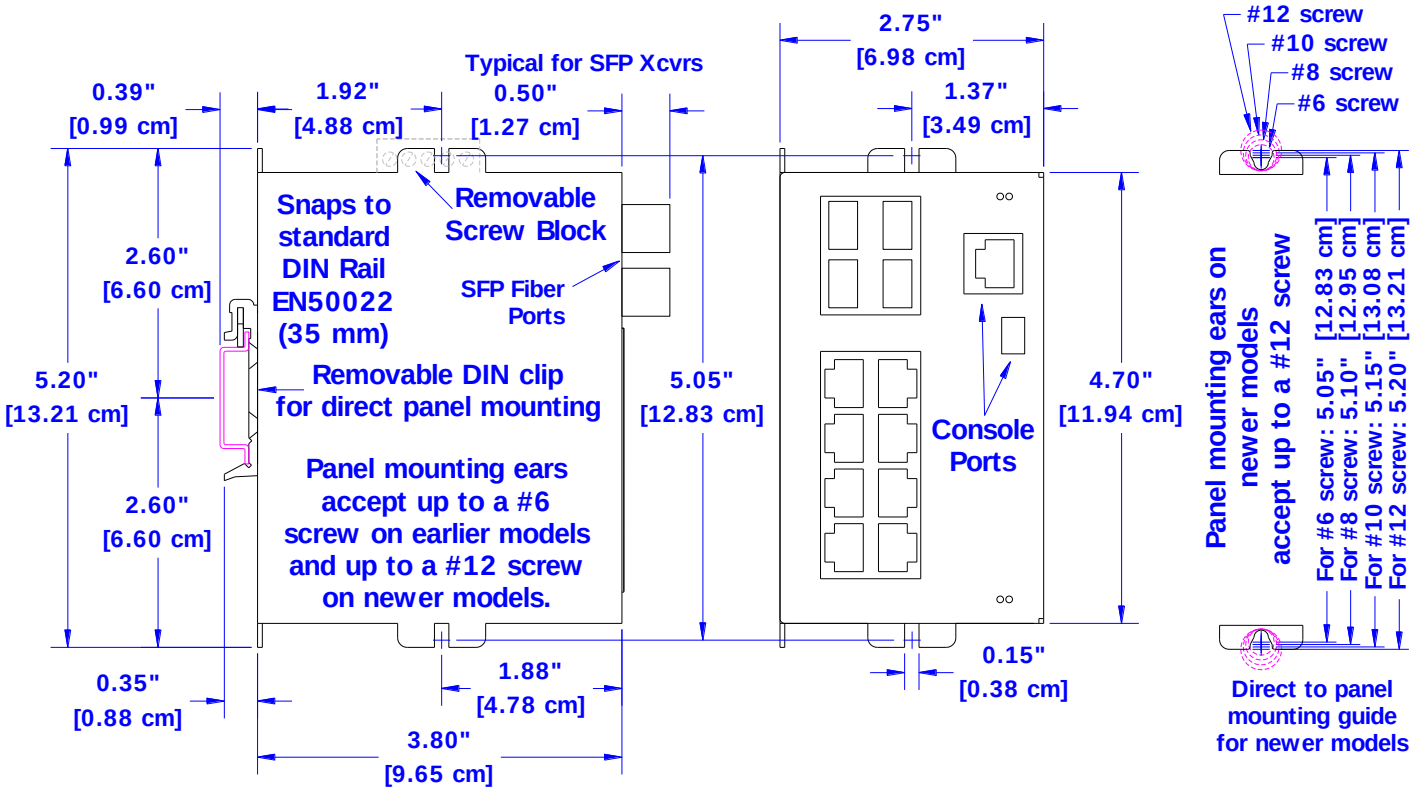
Mechanical Dimensions for SL/SLX-5MS-MDM-1



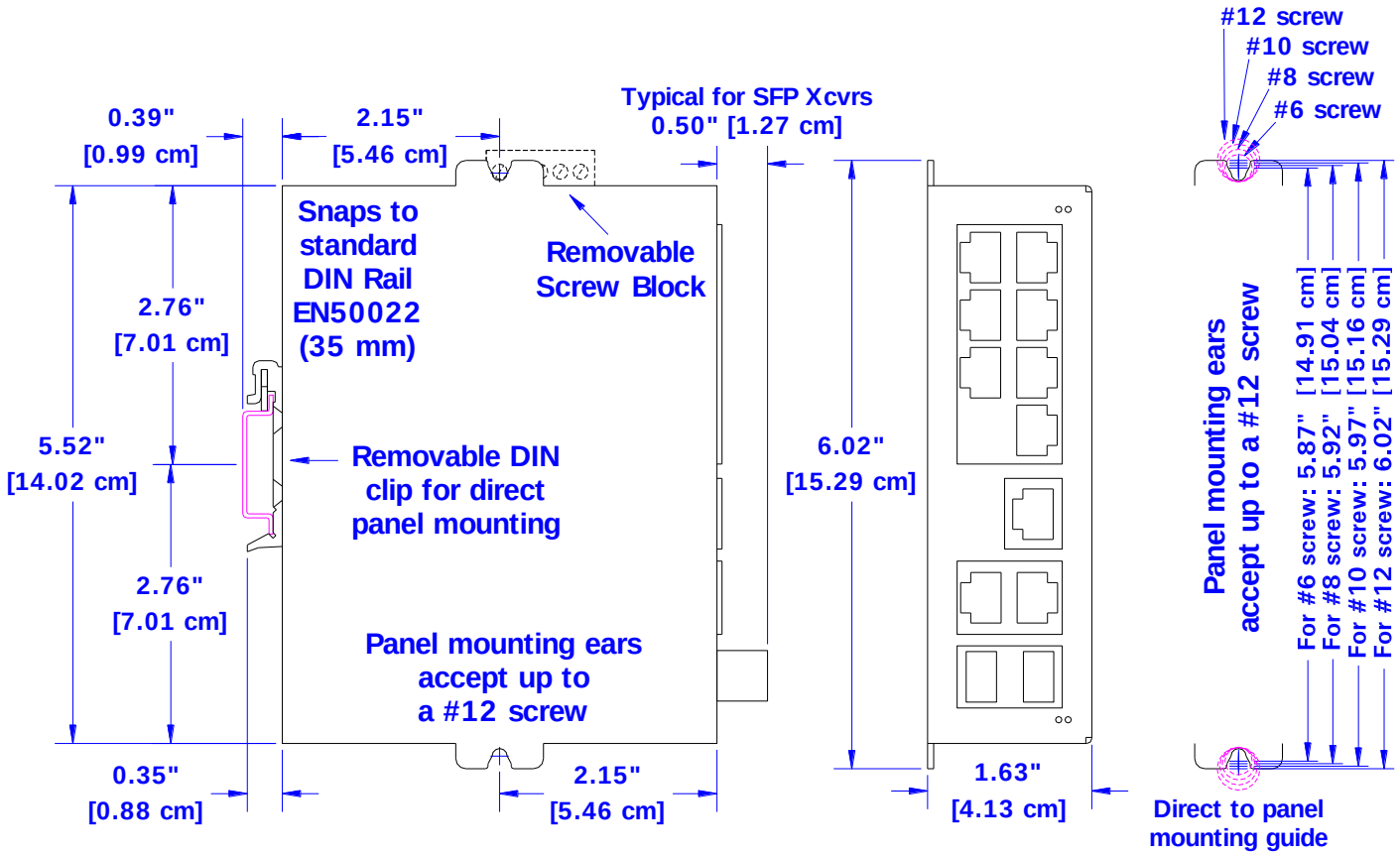
Mechanical Dimensions for SL/SLX-8ES-6/7 with 3 Fiber Ports



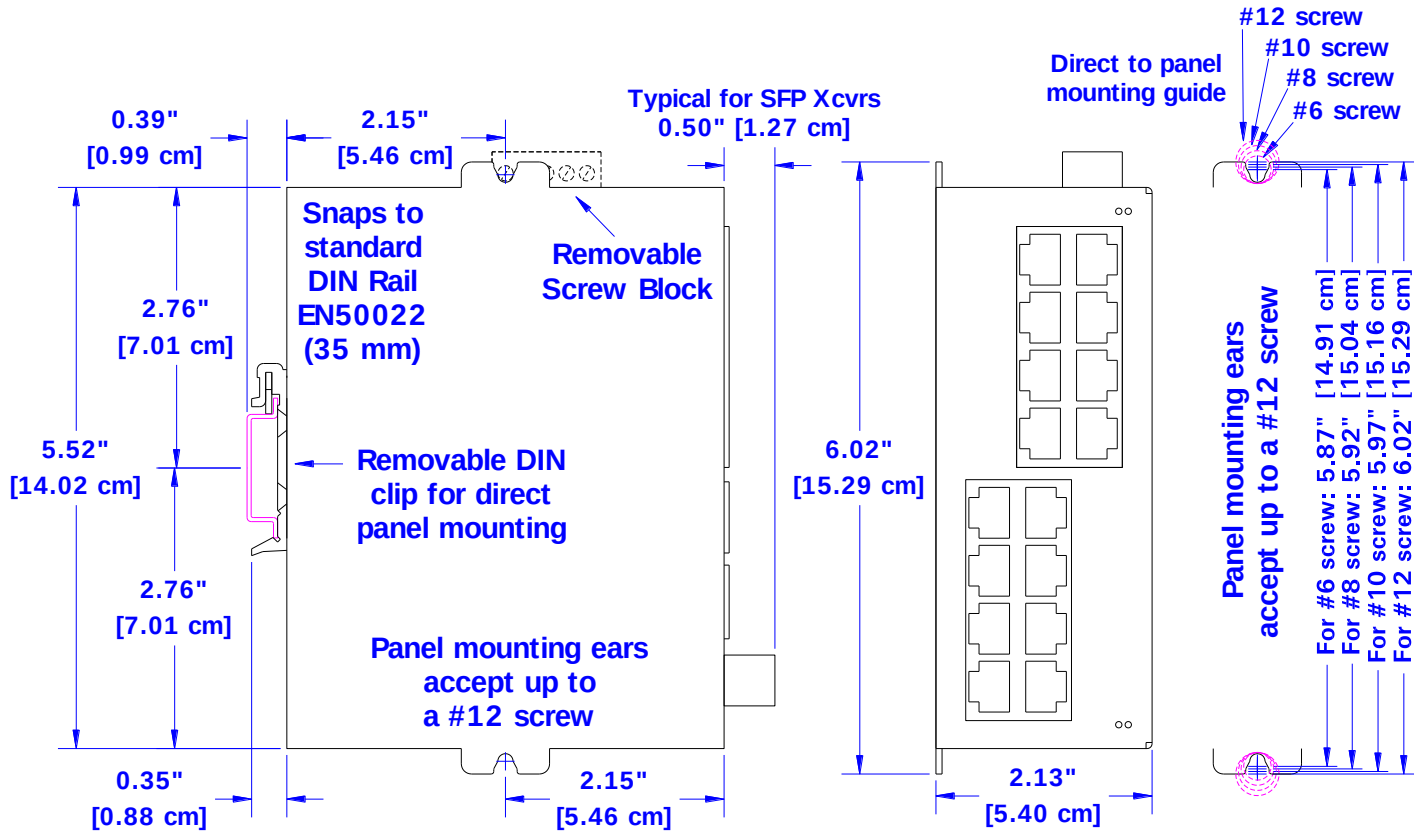
Mechanical Dimensions for SL/SLX-8MS-8/9 with 4 Fiber Ports



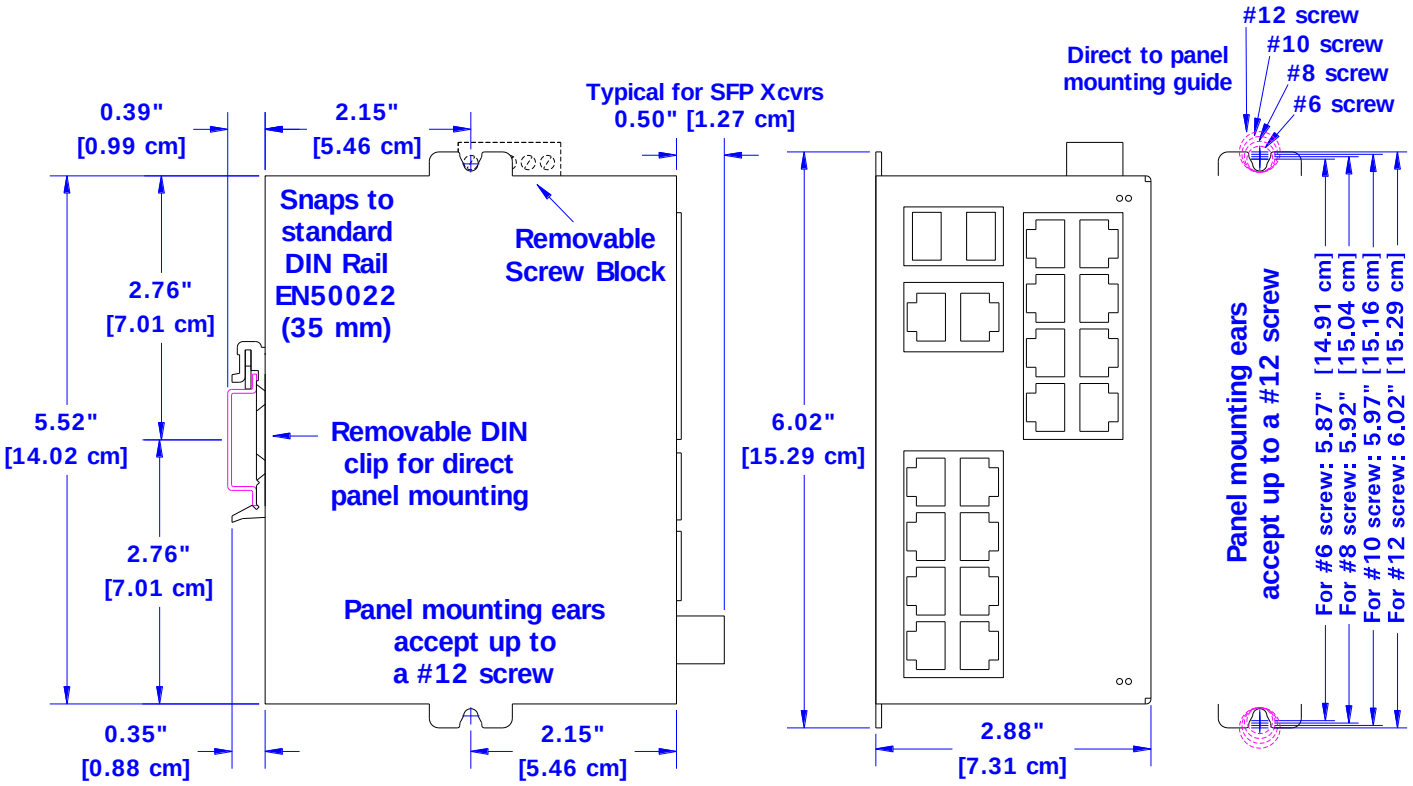
Mechanical Dimensions for SL/SLX-8MG with 8 Gigabit Ports



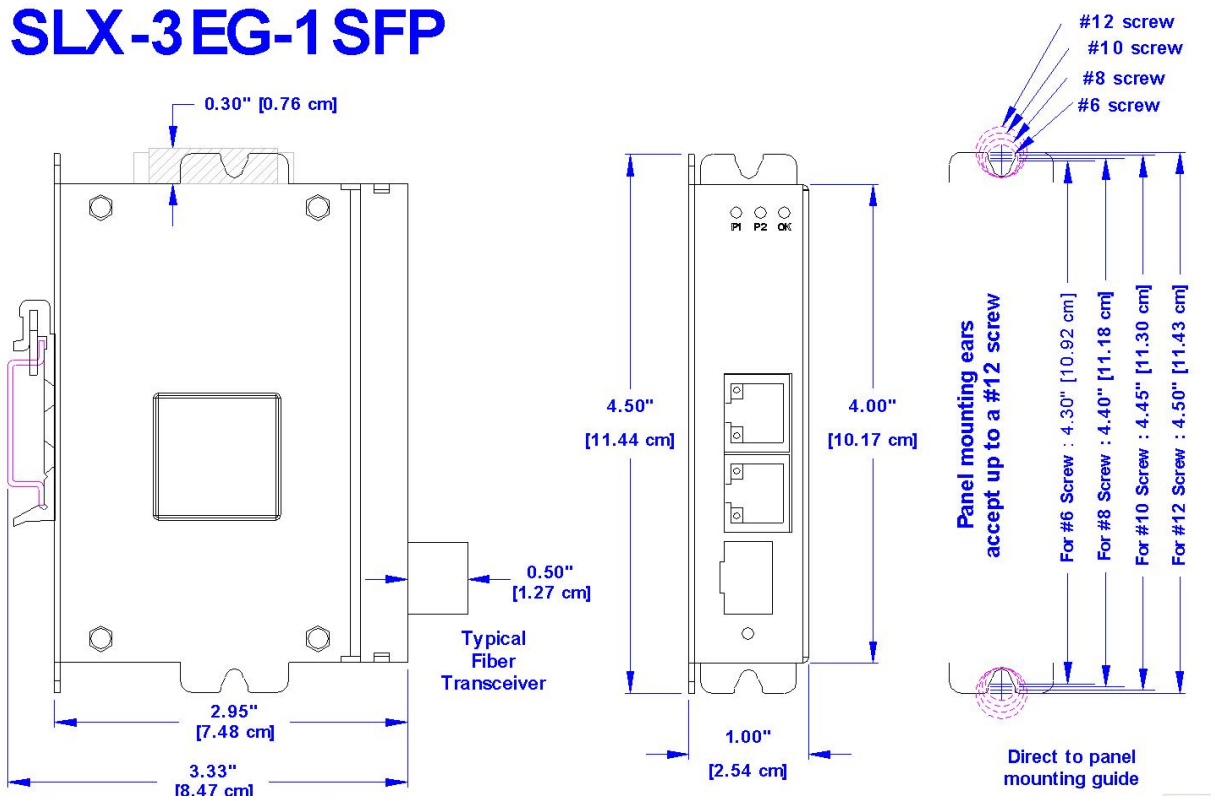
Mechanical Dimensions for SLX-10MG-1



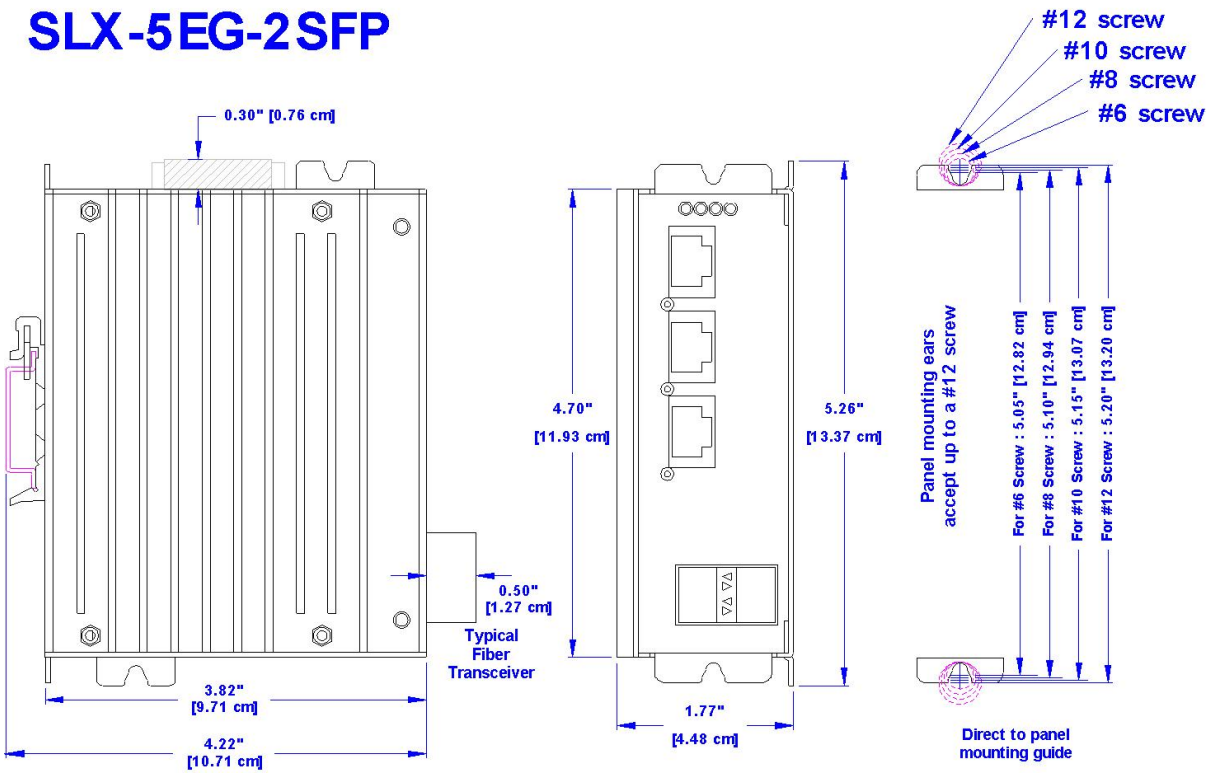
Mechanical Dimensions for SLX-16MS-1



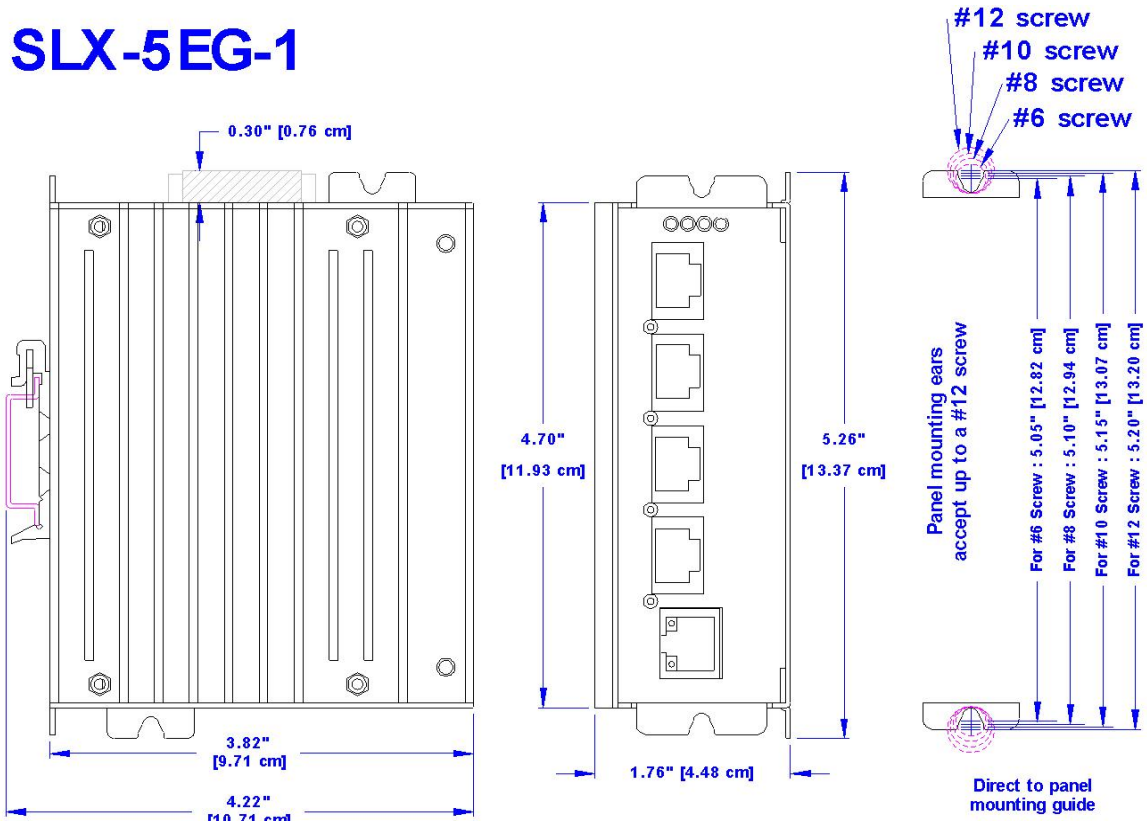
Mechanical Dimensions for SLX-18MG-1



Mechanical Dimensions for SLX-3EG-1SFP



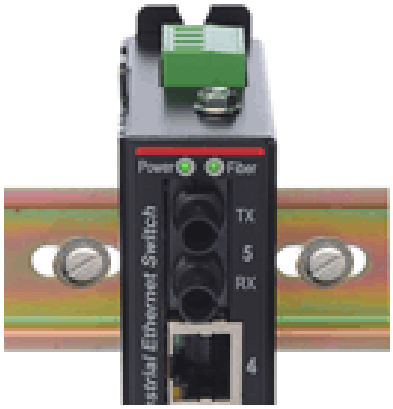
Mechanical Dimensions for SLX-5EG-2SFP



Mechanical Dimensions for SLX-5EG-1

The metal packaged models allow you to choose the mounting method that best fits your requirements. (Note: Not all methods are available on all models. Refer to the mechanical diagrams for details.)

Vertical snap-on DIN rail mounting for quickest installation and optimal utilization of your rail space.

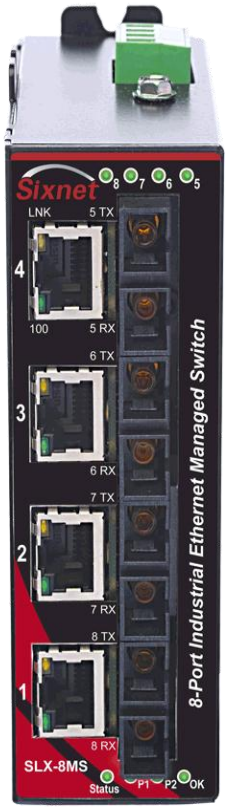


Vertical screw-to-panel mounting for better shock and vibration resistance.

Flat screw-to-panel mounting for low profile orientation in shallow boxes plus best shock and vibration resistance.

Overview of Optional Mounting Methods

Important Notes about Thermal Performance:



The Slim Lines switches with metal cases use an innovative technique to remove excess heat from the product and its components. This technique effectively utilizes the heavy-gauge all-aluminum case as a large heat-sink. Therefore, you may notice the case becoming warm during operation (especially with large loads such as all ports linked and active). This is normal operation. For best performance it is recommended that a DIN rail spacer (such as an end clamp) be used between the switch and adjacent devices. This will leave an air gap for best heat dissipation off the case. Also, do not block the air slots.

For best thermal performance when direct panel mounting to a metal surface, you may use a thermal compound or pad between the mounting face and the mounting surface. This will reduce any air gaps and optimize the transfer of heat from the case to the mounting surface

.

Section 4 Power and Output Wiring

Overview

These industrial Ethernet switches can be powered from the same DC source that is used to power your other devices. A voltage in the range of 10 to 30 VDC needs to be applied between the P1 (plus) terminal and the Minus terminal as shown in the diagrams on the next page. The chassis screw terminal should be tied to panel or chassis ground. To reduce down time resulting from power loss, these industrial Ethernet switches can optionally be powered redundantly with a second power supply as shown in the diagrams.

The managed models also have an “OK” output that can be tied to a PLC input or other device to indicate when there is a power loss. When ON, this output will source the same voltage that is applied to the switches power terminals. See the wiring diagrams on the next page.

Models with PoE accepts power in the range of 12 to 48 VDC and can source 48 VDC power to four PoE devices. For PoE sourcing (PSE) operation, the power must be in the range of 45 to 50 VDC. Otherwise, the switch will function properly as an industrial Ethernet switch but will not source any PoE power. For PoE operation, make sure your 48 VDC supply is rated for at least 16 Watts per PoE channel being sourced, plus some overhead for the switch. It is recommended that a supply with 75 Watts or more of power be used. PoE switchs support dual power inputs allowing you to connect a backup power source. The backup power should have the same voltage as the primary power.

The PoE ports when sourcing power will put out 48 VDC* (see note below) over the signal pair of the RJ45 connection:

- V+ on RX lines 1 and 2
- V- on TX lines 3 and 6
- Lines 4, 5, 7 and 8 are unused

*** Note:** When the supply voltage is 45 to 47 VDC then the power output for the PoE will be the same as the supply voltage. For example, if the supply voltage is 45 VDC then the PoE output will also be 45 VDC. If the supply voltage is 48 to 50 VDC then the PoE output will be regulated at 48 VDC.

Screw Torque

When tightening the screws be careful to tighten to a max. torque of 5 in/lb (0.57 Nm).

WIRING WARNINGS

BEFORE PERFORMING ANY WIRING TO THESE SWITCHES MAKE SURE …

- THE AREA IS CURRENTLY NONHAZARDOUS (ESPECIALLY WHEN WORKING IN CLASS I, DIV 2 OR ZONE 2 HAZARDOUS LOCATIONS)
- TO TURN OFF THE POWER TO THE SWITCH
- TO UNPLUG THE SCREW TERMINAL BLOCK (This is especially important on the units that have a metal case as shown below. Connecting or disconnecting wires to the screw block when it is in place and the power is turned on can allow the screwdriver to short the power to the case.)

TO PREVENT SHORTING THE POWER TO THE CASE ALWAYS UNPLUG THE SCREW TERMINAL BLOCK BEFORE PERFORMING ANY WIRING!

UL Requirements

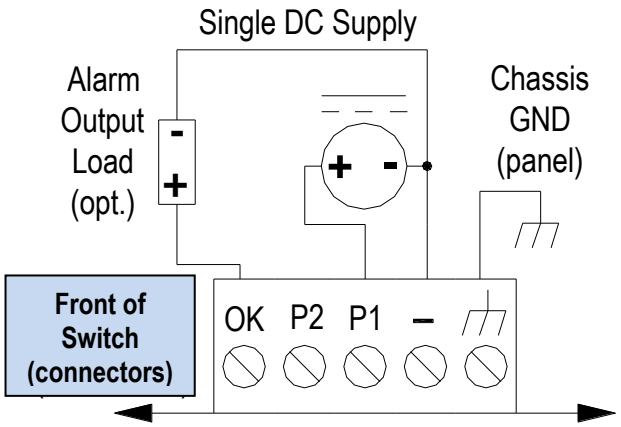
c UL us LISTED

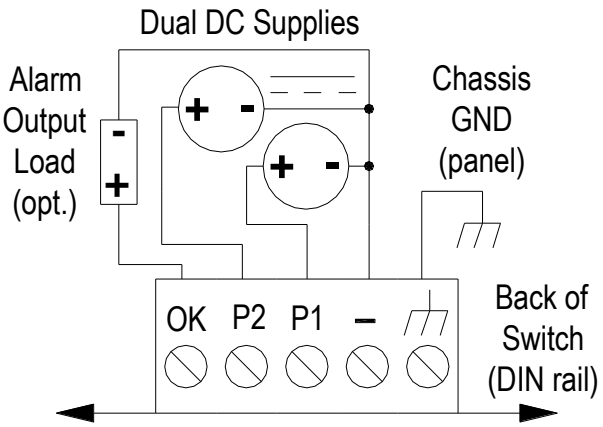
To meet the requirements for UL you must do one of the following:

1. Install a 3.33 Amp maximum fuse at the input of the switch.

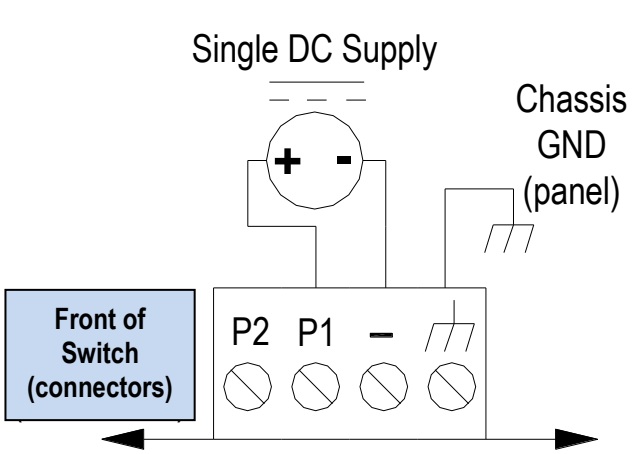
   OR

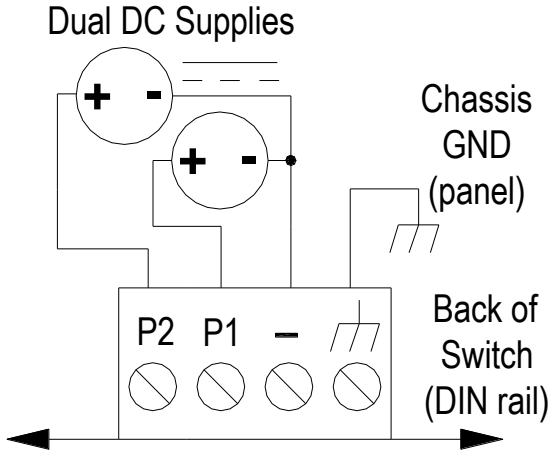
2. Use a Class 2 rated power supply to power the switch.



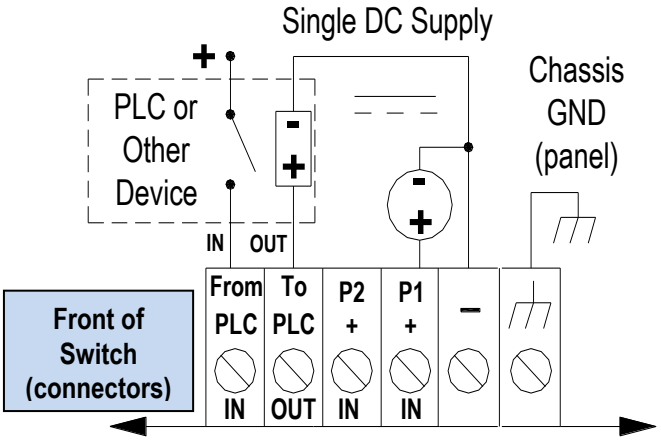


Power & Alarm Wiring for
SL/SLX-5/8MS Managed Switches

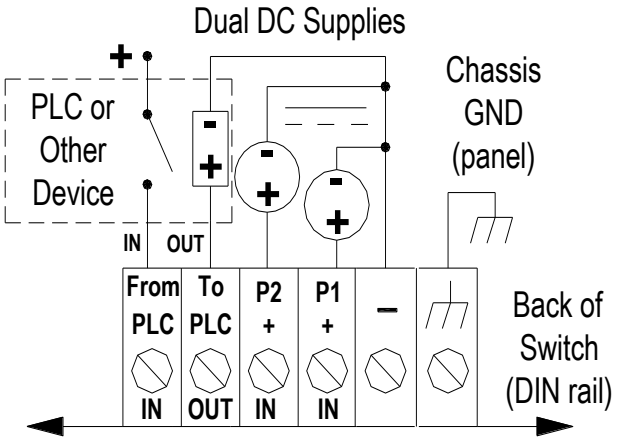




Power Wiring for
SL/SLX-5/8/9ES Unmanaged Switches
and SL-2ES Media Converter

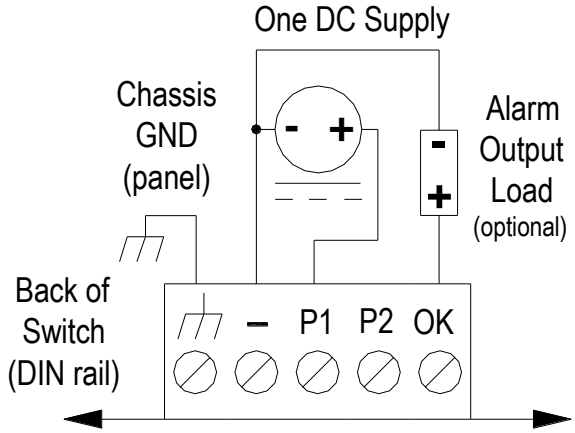


Single DC Power

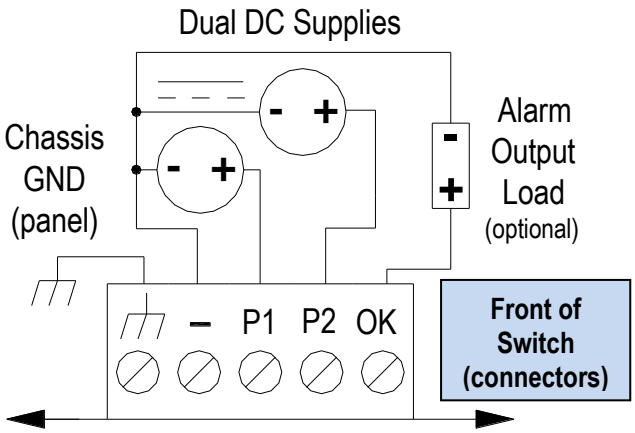


Redundant DC Power

Power & PLC Wiring for SL/SLX-5MS-MDM Ethernet Modem

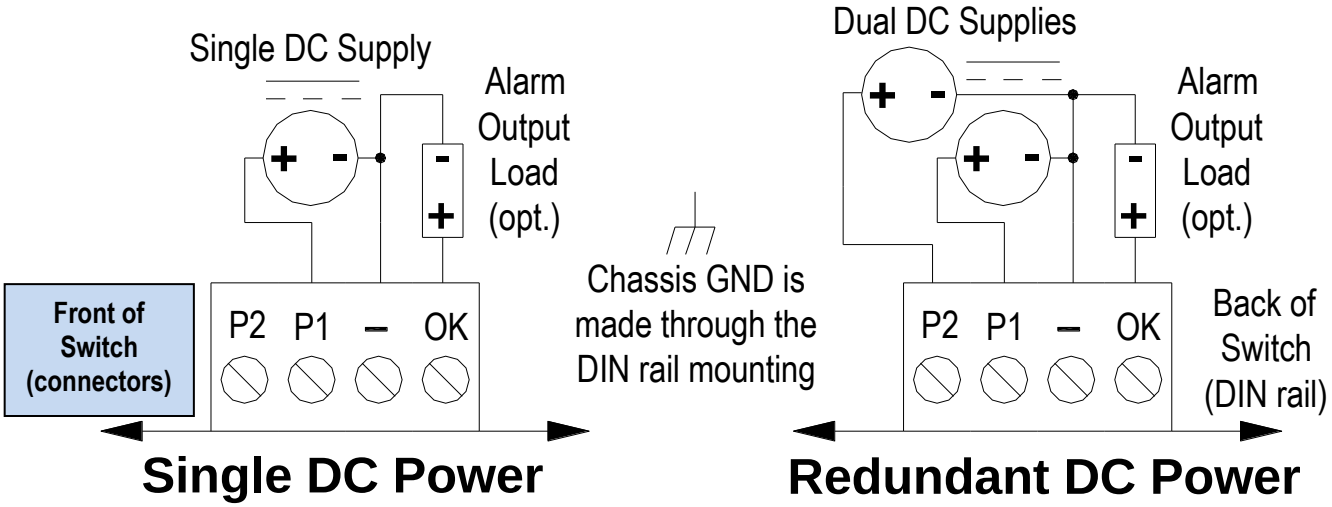


Single DC Power

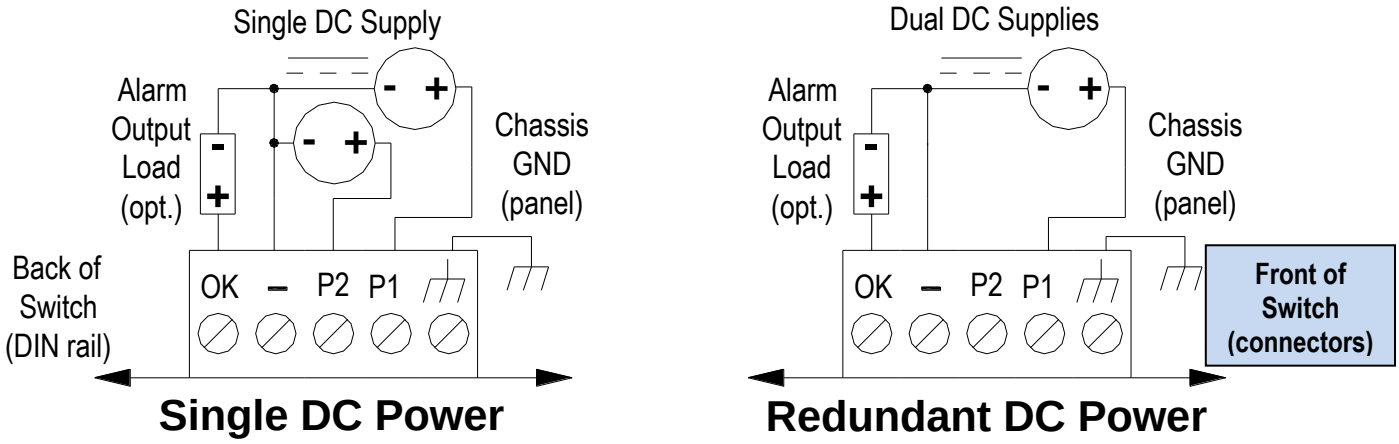


Redundant DC Power

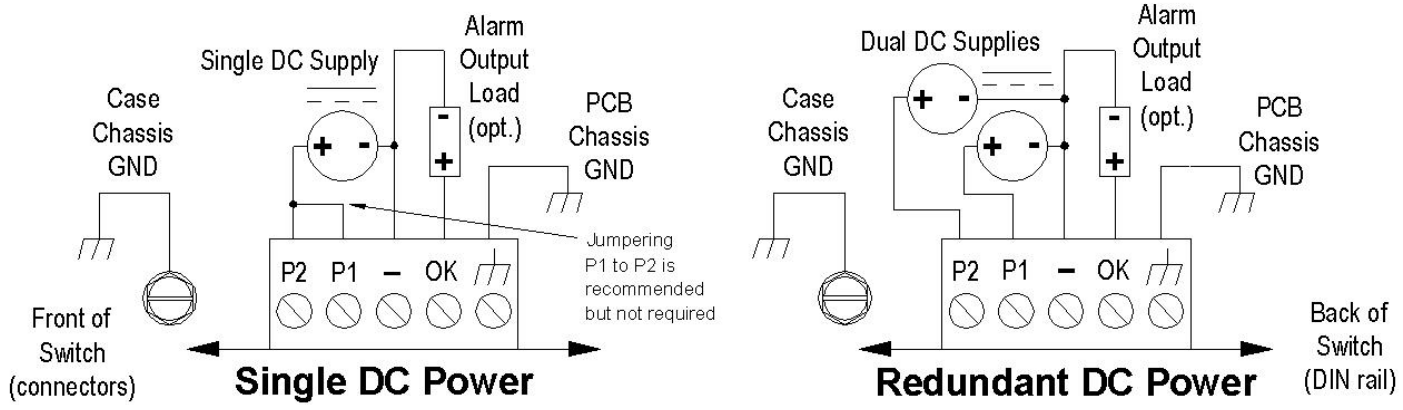
Power & Alarm Wiring for SL/SLX-8MG Managed Switches



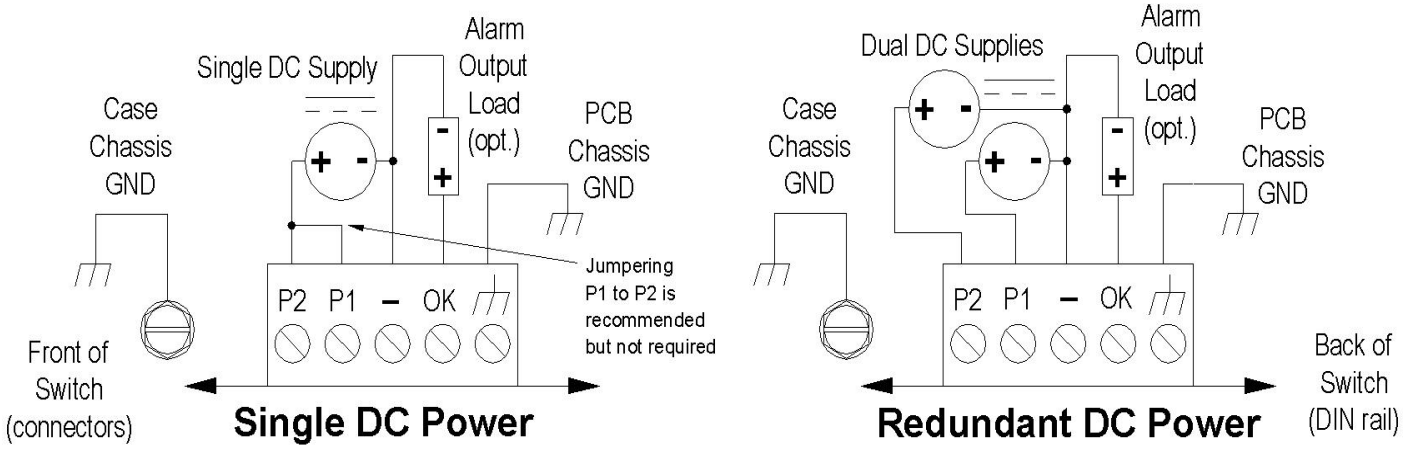
Power and Alarm Wiring For
SL/SLX-6ES Unmanaged Switches



Power and Alarm Wiring for
SLX-10/16/18-Mx Managed Switches



Power and Alarm Wiring for
SLX-3EG-1 Managed Switches



Power and Alarm Wiring for
SLX-5EG-1 Managed Switches

Section 5 Communication Ports Wiring

Overview

These industrial Ethernet switches provide connections to standard Ethernet devices such as PLCs, Ethernet I/O, industrial computers and much more. Three types of communication ports may be found on these switches: RJ45 (copper) Ethernet ports, fiber optic Ethernet ports and a serial or USB console port for management (managed models).

RJ45 Ethernet Wiring

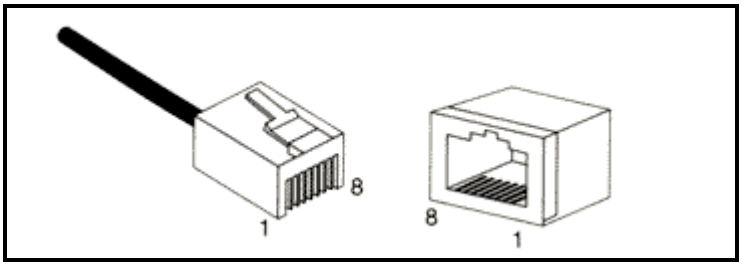
Use data-quality (not voice-quality) twisted pair cable rated category 5 (or better) with standard RJ45 connectors. For best performance use shielded cable. Straight through or crossover RJ45 cable can be used regardless of the device the switch is to be connected to as all the ports are capable of auto-mdi/mdix-crossover detection.

The RJ45 Ethernet port connector bodies on these products are metallic and are connected to the Chassis GND terminal. Therefore, shielded cables may be used to provide further protection. To prevent ground loops, the cable shield should be tied to the metal connector body at one end of the cable only. Electrical isolation is also provided on the Ethernet ports for increased reliability.

For Reference Only. Either cable wiring will work!

Straight-thru Cable Wiring	
Pin 1	Pin 1
Pin 2	Pin 2
Pin 3	Pin 3
Pin 6	Pin 6

Cross-over Cable Wiring	
Pin 1	Pin 3
Pin 2	Pin 6
Pin 3	Pin 1
Pin 6	Pin 2



Ethernet Plug & Connector Pin Positions

RJ45 Cable Distance

The maximum cable length for 10/100/1000BaseT is typically 100 meters (328 ft.).

Ethernet Fiber Wiring Guidelines

Depending on the model these industrial Ethernet switches may have up to four fiber optic ports. All 100 Mbps fiber ports are available with dual SC or ST style connectors. They are also available with multimode, singlemode, long-haul (for connections up to 120+ km) or special-application transceivers. Refer to the technical specifications for details.

All 1000 Mbps fiber ports are provided as mini-gbic SFP (small form pluggable). These accept plug in fiber transceivers that typically have an LC style connector. They are available with multimode, singlemode, long-haul (for connections up to 80+ km) or special-application transceivers. Refer to the technical specifications for details.

For each fiber port there is a transmit (TX) and receive (RX) signal. When making your fiber optic connections, make sure that the transmit (TX) port of the switch connects to the receive (RX) port of the other device, and the receive (RX) port of the switch connects to the transmit (TX) port of the other device.

Use standard fiber optic wiring techniques (not covered by this manual) to make your connections. The corresponding ACT/LNK LED will be ON solid or flashing when you have made a proper connection.

For more fiber optic guidelines go to: http://www.sixnet.com

See images below for typical fiber optic port placement on these switches.

Typical Fiber Ports on Unmanaged Models

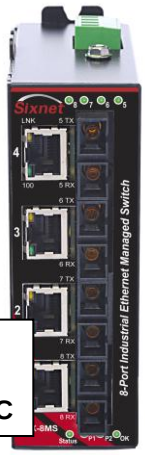
Typical SC style connector on a SL-5ES-2/3SC

Typical ST style connector on a SL-5ES-2/3ST

Typical Fiber Ports on Managed Models

Typical SC style connector on a SLX-5MS-4/5SC

Typical ST style connector on a SLX-5MS-4/5ST



Typical SC style connector on a SLX-8xS-6/7/8/9SC

Typical Fiber Ports on an SL-8MG

SLX-8MG with no transceivers installed

SLX-8MG with four transceivers installed

Duplex Operation

The RJ45 ports will auto-sense for Full or Half duplex operation, while the fiber ports are configured for full duplex operation. Note: Fiber devices with half duplex settings should still communicate with the switch. If otherwise then please contact Sixnet. On managed models the duplex setting is software configurable.

Verifying Connectivity

After all Ethernet and/or fiber connections are made, check the LED's corresponding to the ports that each of the devices are connected to. Ensure that for each port that is in use, the LED is on or blinking. If a port LED is off, go back and check for connectivity problems between that port and the network device connected to that particular port. In addition, the color of the LED should indicate the speed for which your device is connected at (see prior section on LEDs).

Telephone Port Wiring (MDM models)

A standard cross-wired telephone patch cable should be used to connect to the phone line provided by the phone company. Tip and Ring are the only two pins used on the Ethernet Land-Line modem.

Telephone Ports on Modem Models

Serial Console Port Wiring

An optional way to configure the switch is through the RJ45 console RS232 port. Use a DB9F to RJ45F adapter along with a RJ45 male to RJ45 male straight-thru-wired patch cable to make a connection between a com port on your PC (DB9 male) and the RS232 port of the Managed Switch (RJ45 female). Contact Sixnet or your switch vendor to purchase this adapter as an accessory.

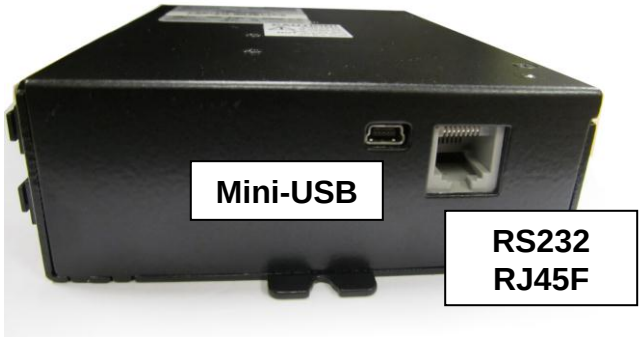
A typical DB9F to RJ45F adapter should be wired as follows:

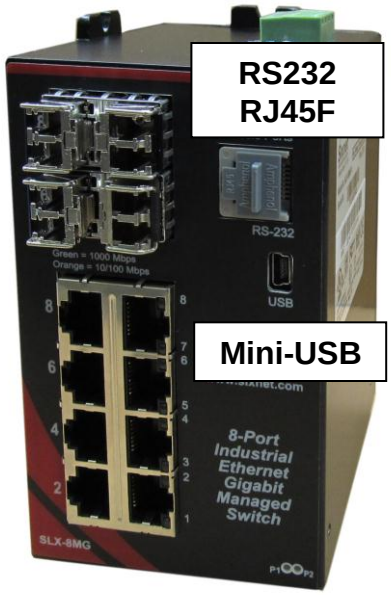
Switch		Adapter	
RJ45F Pin #	**Signal Name**	**Signal Name**	**DB9F Pin #**
1	RI/DSR in	DTR out	4
2	DCD in	N/C	n/c
3	DTR out	DSR in	6
4	GND	GND	5
5	RXD in	TXD out	3
6	TXD out	RXD in	2
7	CTS in	RTS out	7
8	RTS out	CTS in	8

USB Console Port Wiring

Newer models of these switches may also have an USB port instead of or in addition to the RS232 port. Use a standard USB cable with a mini-USB plug on one end and an A-type-USB plug on the other end. The A-type plug goes into a standard USB port on a computer. The mini-USB plug goes into the USB port on the switch.

Refer to the software user manual for how to use this USB port.





The RS232 and/or USB ports may located on the bottom edge or front face of the switch

Section 6 Technical Specifications

Technical Specs

Here are the hardware technical specifications for the industrial Ethernet switches covered by this manual. For the managed models, refer to the software user manual or datasheet for complete software specifications.

Note: These specifications are subject to change. Contact Sixnet for the latest details.

General Specifications:		
Ethernet switch type	Unmanaged or managed with up to 9 ports	
Operating mode	Store and forward, wire-speed switching, non-blocking	
Devices supported	All IEEE 802.3 compliant devices are supported	
Protocols (managed models only)	SNMPv1/v2/v3, RMON, DHCP, SNTP, TFTP, STP, RSTP, QoS/CoS/ToS/DS, IGMPv1/v2, VLAN (tag and port based), HTTP, HTTPS (SSL & TSL), Telnet, SSH and more	
Industrial protocols supported	Modbus/TCP, EtherNet/IP, PROFInet, Foundation Fieldbus HSE and others	
Standards (depends on model)	IEEE 802.3, 802.3u, 802.3ab/z, 802.3x, 802.1D/w, 802.1p, 802.1Q and others	
Management interfaces (managed models only)	Web (see online demo), text (Telnet & SSH), CLI (command line interface) and SNMP (see software manual for supported MIBs)	
Open source linux (managed models only)	The Linux Advantage – Contact Sixnet for more information	
MAC addresses	1024 on unmanaged (ES) models; 2048 on managed (MS)models; 8192 on Gigabit (MG) models	
Memory bandwidth	3.2 Gbps on ES & MS models; 32 Gbps on MG models	
Latency for 10 Mbps	16 us + frame time (typical)	Varies on load and settings
Latency for 100/1000 Mbps	<5 us + frame time (typical)	
Ethernet isolation	1500 VRMS 1 minute	
Management serial port (managed models only)	RS232 (TXD, RXD and GND), 9600, 8, N, 1 fixed and/or mini-USB	

Copper RJ45 Ports: (10/100 Mbps or 10/100/1000 Mbps)	
Copper ports	Shielded RJ45
Speed	10/100 Mbps or 10/100/1000 Mbps (depending on model)
Protocols supported	All standard IEEE 802.3
Auto-crossover	Yes, allows you to use straight or cross wired cables
Auto-sensing operation	Yes, Full and half duplex
Auto-negotiating	Yes, 10BaseT and 100BaseT
Auto-polarity	Yes, on the TD and RD pair
Flow control	Automatic
Ethernet isolation	1500 VRMS 1 minute
Plug and play	Yes
Cable requirements	Twisted pair (Cat. 5 or better) (shielded recommended)
Max. cable distance	100 meters
PoE models	
Power input with reverse polarity protection	10-44 VDC with no PoE output 45-56 VDC for PoE output
Switch power consumption (typical all ports active at 1000 Mbps)	4.3 W (SLX-5EG-1) + PoE 6.2 W (SLX-5EG-2SFP) + PoE
PoE power consumption	Up to 15.4 W per port
RJ45 pin assignments for	TX/V- (3, 6); RX/V+ (1, 2)

PoE	
Power input transient protection	15,000 watts peak
Power input spike Protection	5,000 watts (10 times for 10 uS)
PoE operation	Auto power management
PoE disconnect mode	DC disconnect
PoE auto-detection	Per IEEE 802.2af
PoE protection	Over-temperature, over-current, over/under-voltage and transient

SC or ST Fiber Ports: (100BaseF multimode or singlemode)	
100BaseF ports	Up to 4
Fiber port mode	Multimode (mm) or Singlemode (sm)
Fiber port connector	Duplex SC or ST
Optimal fiber cable	50/125 or 62.5/125 µm for mm; 9/125 µm for sm
Center wavelength	1300 nm (other wavelengths available)
Multimode	Links up to 4 km typ.; 1310 nm; use with 50 or 62.5/125 um fiber > Transmitter power (dB): -21 min, -17 typ, -14 max > Receiver sensitivity (dB): -34 typ, -31 max
Singlemode	Links up to 20 km typical; 1310 nm; use with 9/125 um fiber > Transmitter power (dB): -15 min, -11 typ, -8 max > Receiver sensitivity (dB): -36 typ, -31 max
Singlemode long haul	Links up to 40 km typical; 1310 nm; use with 9/125 um fiber > Transmitter power (dB): -5 min, -3 typ, -0 max > Receiver sensitivity (dB): -36 typ, -34 max
Nominal max. distance (full duplex) (see web for details)	4 km with multimode; 20 km with singlemode; up to 120 km with long haul singlemode
Half and full duplex	Full duplex on unmanaged models; Software configurable on managed models
Ethernet compliance	100BaseF
Eye safety	IEC 60825-1, Class 1; FDA 21 CFR 1040.10 and 1040.11

SFP Mini-Gbic SFP (pluggable) Ports: (many types available)	
Note: On the Gigabit (MG) models these ports are pluggable and accept many different types of pluggable SFP (Mini-Gbic) transceiver modules for Gigabit fiber connections.	
Gigabit SFP ports	Up to 4
Port types supported	Gigabit fiber multimode, fiber singlemode, fiber long-haul singlemode, fiber single-strand and more
Note: 100 Mbps fiber transceiver modules are also supported on these ports.	
Fiber port connector	LC typically for fiber (depends on module)
Optimal fiber cable	Typical 50 or 62.5/125 µm for multimode (mm); Typical 8 or 9/125 µm for singlemode (sm)
Fiber wavelength (typical)	850 nm for mm; 1310 nm for sm; 1550 for long haul sm
TX output power	**See fiber transceiver datasheet for details.**
RX input sensitivity	
Max. distance (full duplex)	Up to 80+ km with long haul singlemode modules
Half and full duplex	Software Configurable(managed models only)
Ethernet compliance	1000BaseT and 1000BaseF (SX/LX/LH)
Eye safety	IEC 60825-1, Class 1; FDA 21 CFR 1040.10 and 1040.11

Note: See SFP fiber optic transceiver datasheet for complete specifications. Also, other fiber transceivers may be available for special requirements such as longer distances, single strand (BiDi) or other special applications. Contact Sixnet for details.

Industrial Telephone Modem (SL-5MS-MDM Only)	
Maximum data rates	56 Kbps
Compatibility	V.90, V.34, V.32, V.32 bis, V.22, V.22 bis, V.21
Data compression	V.42 bis
Error correction	V.42 MNP or LAP
Ringer	0.3
Jacks	2 RJ11 (phone and line)
Command sets	Standard AT and S register
Country compatibility	World-wide (100+ countries)
Telecom ratings	FCC Part 68; Industry Canada CS03-8; CTR21 (98/482/EC); ACA TS 001 and ACA TS 002

"PLC" Input and Output (SL-5MS-MDM Only)	
PLC / Alarm output voltage	Same as switch input power voltage
Maximum current output	0.5 Amp
PLC / Trigger input voltage	10-30 VDC
Typically current input	6.5 mA @ 24 VDC

"OK" Alarm Output (managed models only)	
"OK" Output	ON if P1 and P2 have power and switch software is running
Voltage	Same as switch input voltage
Maximum current output	0.5 Amp

Power Input:		
Power input	Redundant Input Terminals	
Input power (typical with all ports active at 100 Mbps)	2.0 W (2-port converter with 1 fiber), 2.0 W (5-port unmanaged w/ 0 fiber), 3.0 W (5-port unmanaged w/ 1 fiber), 5.0 W (6-port unmanaged w/ 2 fiber), 4.0 W (8-port unmanaged w/ 0 fiber), 5.0 W (9-port unmanaged w/ 1 fiber), 8.0 W (8-port unmanaged w/ 3 fiber)	3.6 W (5-port managed w/o fiber), 4.8 W (5-port with phone modem), 5.6 W (5-port managed w/ 2 fiber), 4.3 W (8-port managed w/ 0 fiber), 6.3 W (8-port managed w/ 2 fiber), 9.0 W (8-port managed w/ 4 fiber), 12 W (8-port man. gigabit w/ 0 fiber) 15 W (8-port man. gigabit w/ 4 fiber), 5.0 W (10-port man. gigabit w/ 0 fiber), 7.0 W (10-port man. gigabit w/ 2 fiber), 7.0 W (16-port man. gigabit w/ 0 fiber), 8.0 W (18-port man. gigabit w/ 0 fiber), 10 W (18-port man. gigabit w/ 2 fiber)
Input voltage (all models)	12-48 VDC @ 1.3A , Amb: T4 @ 85C	
Reverse power protection	Yes	
Transient protection	15,000 watts peak	
Spike protection	5,000 watts (10x for 10 uS)	

Environmental and Compliances:	
Operating temperature range	SL-2/5/6/8/9ES models: -10 to +60°C (cold startup at -10°C) SL-5/8MS models: -10 to +60°C (cold startup at -10°C) SLX-3/5EG: -40 to +85°C (cold startup at -40°C) SL/SLX-5MS-MDM: -40 to +75°C (cold startup at -40°C) SL/SLX-8MG: -40 to +75°C (cold startup at -40°C) SLX-5/6/8/9ES-1/2/3/4/5 models: -40 to +85°C (cold startup at -40°C) SLX-8ES-6/7 models: -40 to 75° C (cold startup at -40°C) SLX-5/8MS models: -40 to +75°C (cold startup at -40°C) SLX-10/18MG-1 model -40 to +75°C (cold startup at -40°C) SLX-16MS-1 model -40 to +75°C (cold startup at -40°C) Contact Sixnet if wider ranges are needed.
Storage temperature range	-40 to +85 °C
PoE Models	
Power input with reverse polarity protection	10-44 VDC with no PoE output 45-56 VDC for PoE output
Switch power consumption (typical all ports active at 1000 Mbps)	4.3 W (5EG-1, all copper) typical 6.2 W (5EG-2SFP with 2 fiber) typical 66W (5EG-1) with 4 fully loaded PoE ports 53W (5EG-2SFP) with 3 fully loaded PoE ports
PoE power consumption	Up to 15.4 W per port
RJ45 pin assignments for PoE	TX/V- (3, 6); RX/V+ (1, 2)
Power input transient protection	15,000 watts peak
Power input spike Protection	5,000 watts (10 times for 10 uS)
PoE operation	Auto power management
PoE disconnect mode	DC disconnect
PoE auto-detection	Per IEEE 802.2af
PoE protection	Over-temperature, over-current, over/under-voltage and transient

Mechanical:	
Ingress protection	IP30 (all models)
Packaging and protection	UL94V0 Lexan plastic for all plastic cased units. Aluminum w/ protective finish for all metal cased units.
Dimensions (L x W x H)	See mechanical diagrams for details
Weights (typical)	SL-2ES-2/3 and SL-5ES-1/2/3 in Lexan case – 4 oz (0.11 kg) SLX-3EG in metal case – 6 oz (0.17 kg) SLX-5ES-1/2/3 in metal case – 6 oz (0.17 kg) SLX-5EG-1/2SFP in metal case – 15.2 oz (0.43 kg) SL/SLX-5MS-1/4/5 in metal case – 8 oz (0.23 kg) SL-5MS-MDM managed – 11 oz (0.31 kg) SL-6/8/9ES-1/2/3/4/5 in Lexan case – 6 oz (0.17 kg) SLX-6/8/9ES-1/2/3/4/5 in metal case – 8 oz (0.23 kg) SL/SLX-8MS-1/4/5 in metal case – 10 oz (0.28 kg) SL/SLX-8xS-6/7/8/9 in metal case – 11 oz (0.31 kg) SL-8MG-1 without fiber transceivers – 16 oz (0.45 kg) SL-8MG with 4 fiber transceivers – 18 oz (0.50 kg) SLX-10MG-1 in metal case – 12 oz (0.34 kg) SLX-16MS-1 in metal case – 16 oz (0.45 kg) SLX-18MG-1 in metal case – 16 oz (0.46 kg)

Section 7 Service Information

Service Information

We sincerely hope that you never experience a problem with any **Sixnet** product. If you do need service, call **Sixnet** at (518) 877-5173 and ask for Applications Engineering. A trained specialist will help you to quickly determine the source of the problem. Many problems are easily resolved with a single phone call. If it is necessary to return a unit to us, an RMA (Return Material Authorization) number will be given to you.

Sixnet tracks the flow of returned material with our RMA system to ensure speedy service. You must include this RMA number on the outside of the box so that your return can be processed immediately.

The applications engineer you are speaking with will fill out an RMA request for you. If the unit has a serial number, we will not need detailed financial information. Otherwise, be sure to have your original purchase order number and date purchased available.

We suggest that you give us a repair purchase order number in case the repair is not covered under our warranty. You will not be billed if the repair is covered under warranty.

Please supply us with as many details about the problem as you can. The information you supply will be written on the RMA form and supplied to the repair department before your unit arrives. This helps us to provide you with the best service, in the fastest manner. Normally, repairs are completed in two days. Sometimes difficult problems take a little longer to solve.

If you need a quicker turnaround, ship the unit to us by air freight. We give priority service to equipment that arrives by overnight delivery. Many repairs received by mid-morning (typical overnight delivery) can be finished the same day and returned immediately.

We apologize for any inconvenience that the need for repair may cause you. We hope that our rapid service meets your needs. If you have any suggestions to help us improve our service, please give us a call. We appreciate your ideas and will respond to them.

For Your Convenience:
Please fill in the following and keep this manual with your **Sixnet** system for future reference:

P.O. #:_____ Date Purchased: _____

Purchased From:_____

Product Support

To obtain support for Sixnet products:

Latest product info: http://www.sixnet.com

Phone: +1 (518) 877-5173

Fax: +1 (518) 877-8346

E-mail: mailto: support@sixnet.com

Mailing address:
Sixnet Technology Park, 331 Ushers Road, Ballston Lake, NY 12019