# SIEMENS

**Installation Manual**

# SIMATIC NET

**Rugged Ethernet Switches**

RUGGEDCOM RS930L

**https://www.siemens.com/ruggedcom**

# SIEMENS

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## Rugged Ethernet Switches
## RUGGEDCOM RS930L

**Installation Manual**

## Legal Information

### Warning Notice System

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

> ⚠ **DANGER**
>
> indicates that death or severe personal injury **will** result if proper precautions are not taken.

> ⚠ **WARNING**
>
> indicates that death or severe personal injury **may** result if proper precautions are not taken.

> ⚠ **CAUTION**
>
> indicates that minor personal injury can result if proper precautions are not taken.

> ⚠ **NOTICE**
>
> indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

### Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

### Proper Use of Siemens Products

Note the following:

> ⚠ **WARNING**
>
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All names identified by ® are registered trademarks of Siemens Canada Ltd.. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

### Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

# Table of Contents

# Preface

This guide describes the RUGGEDCOM RS930L. It describes the major features of the device, installation, commissioning and important technical specifications.

It is intended for use by network technical support personnel who are responsible for the installation, commissioning and maintenance of the device. It is also recommended for use by network and system planners, system programmers, and line technicians.

## Related Documents

Other documents that may be of interest include:

| Document Title | Link |
| --- | --- |
| RUGGEDCOM ROS Configuration Manual | https://support.industry.siemens.com/cs/ww/en/view/109737228 |

## SIMATIC NET Glossary

The SIMATIC NET Glossary describes special terms that may be used in this document.

The glossary is available online via Siemens Industry Online Support (SIOS) at:

https://support.industry.siemens.com/cs/ww/en/view/50305045

## Accessing Documentation

The latest user documentation for RUGGEDCOM RS930L is available online at https://support.industry.siemens.com. To request or inquire about a user document, contact Siemens Customer Support.

## Registered Trademarks

RUGGEDCOM®, ROS®, RCDP®, and RUGGEDCOM Discovery Protocol® are registered trademarks of Siemens Canada Ltd.

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# Warranty

Siemens warrants this product for a period of five (5) years from the date of purchase, conditional upon the return to factory for maintenance during the warranty term. This product contains no user-serviceable parts. Attempted service by unauthorized personnel shall render all warranties null and void. The warranties set forth in this article are exclusive and are in lieu of all other warranties, performance guarantees and conditions whether written or oral, statutory, express or implied (including all warranties and conditions of merchantability and fitness for a particular purpose, and all warranties and conditions arising from course of dealing or usage or trade). Correction of nonconformities in the manner and for the period of time provided above shall constitute the Seller's sole liability and the Customer's exclusive remedy for defective or nonconforming goods or services whether claims of the Customer are based in contract (including fundamental breach), in tort (including negligence and strict liability) or otherwise.

For warranty details, visit https://www.siemens.com or contact a Siemens customer service representative.

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Siemens offers a wide range of educational services ranging from in-house training of standard courses on networking, Ethernet switches and routers, to on-site customized courses tailored to the customer's needs, experience and application.

Siemens' Educational Services team thrives on providing our customers with the essential practical skills to make sure users have the right knowledge and expertise to understand the various technologies associated with critical communications network infrastructure technologies.

Siemens' unique mix of IT/Telecommunications expertise combined with domain knowledge in the utility, transportation and industrial markets, allows Siemens to provide training specific to the customer's application.

For more information about training services and course availability, visit https://www.siemens.com or contact a Siemens Sales representative.
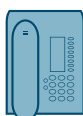
# Customer Support

Customer support is available 24 hours, 7 days a week for all Siemens customers. For technical support or general information, contact Siemens Customer Support through any of the following methods:

**Online**

Visit http://www.siemens.com/automation/support-request to submit a Support Request (SR) or check on the status of an existing SR.

**Telephone**

Call a local hotline center to submit a Support Request (SR). To locate a local hotline center, visit https://w3.siemens.com/aspa_app/?lang=en.

**Mobile App**

Install the Industry Online Support app by Siemens AG on any Android, Apple iOS or Windows mobile device and be able to:

- Access Siemens' extensive library of support documentation, including FAQs and manuals
- Submit SRs or check on the status of an existing SR
- Contact a local Siemens representative from Sales, Technical Support, Training, etc.
- Ask questions or share knowledge with fellow Siemens customers and the support community

# Contacting Siemens

| Address | Siemens Canada Ltd. |
|---|---|
| | Digital Industries |
| | Process Automation |
| | 300 Applewood Crescent |
| | Concord, Ontario |
| | Canada, L4K 5C7 |
| Telephone | Toll-free: 1 888 264 0006 |
| | Tel: +1 905 856 5288 |
| | Fax: +1 905 856 1995 |
| E-Mail | info.ruggedcom@siemens.com |
| Web | https://www.siemens.com |

# Introduction

<div style="text-align: right; font-size: 2em;">1</div>

The RUGGEDCOM RS930L is an 6-port utility-grade, fully managed Ethernet switch with Ethernet over VDSL (EoVDSL) capabilitiies, designed to operate reliably in electrically harsh and climatically demanding environments.

EoVDSL supports LAN segments of up to 5 km (3.1 mi) over telephone grade cable (or other legacy serial cabling) at up to 35 Mbps (upstream and downstream). It allows an Ethernet-enabled device to communicate with a central control room using existing cabling. The RUGGEDCOM RS930L can be equipped with dual EoVDSL interfaces, making it ideal for right or loop network architecture. It is the perfect solution for bringing Ethernet networking to applications where existing wiring is already present, thus saving the considerable cost of upgrading existing legacy devices or installing new network cabling.

The RUGGEDCOM RS930L provides a high level of immunity to electromagnetic interference and heavy electrical surges typical of environments found on plant floors and curb-side traffic control cabinets. An operating temperature range of -40 to 85 °C (-40 to 185 °F), optional conformal coating, and a galvanized steel enclosure allows the RUGGEDCOM RS930L to be placed in almost any location.

The RUGGEDCOM RS930L can be mounted on a DIN rail or panel for efficient use of cabinet space.

The integrated power supply supports a wide range of voltages (88-300 VDC or 85-264 VAC) for worldwide operability.

The RUGGEDCOM RS930L's superior ruggedized design and embedded RUGGEDCOM Rugged Operating System (ROS) provides superior system reliability and advanced networking features making it ideally suited for creating Ethernet networks for mission-critical, real-time, control applications.

## 1.1    Feature Highlights

**Ethernet Ports**

- 6 x 10/100Base-TX copper Ethernet ports

**Ethernet Over VDSL (EoVDSL)**

- Up to 2 x Ethernet over VDSL (EoVDSL) ports
- Up to 5 km (3.1 mi) LAN segments
- Symmetric data rates up to 35 Mbps

- Asymmetric data rates up to 40 Mbps
- Automatically selects fastest data rate based on distance and quality of cable
- Software selectable to be master or slave
- Frequency Division Multiplexing (FDM)

**Rated for Reliability in Harsh Environments**

- Immunity to EMI and heavy electrical surges
- -40 to 85 °C (-40 to 185 °F) ambient operating temperature (no fans)
- 20 AWG Galvanized Steel
- DIN or panel mounting options provide secure mechanical reliability
- [Optional] Conformal coated printed circuit boards

**Power Supply**

- Fully integrated power supply
- Universal high-voltage range: 88-300 VDC or 85-264 VAC
- Terminal blocks for reliable maintenance free connections
- CSA/UL 62368-1 safety approved to 85 °C (185 °F)

## 1.2 Description

The RUGGEDCOM RS930L features various ports, controls and indicator LEDs on the front panel for connecting, configuring and troubleshooting the device.
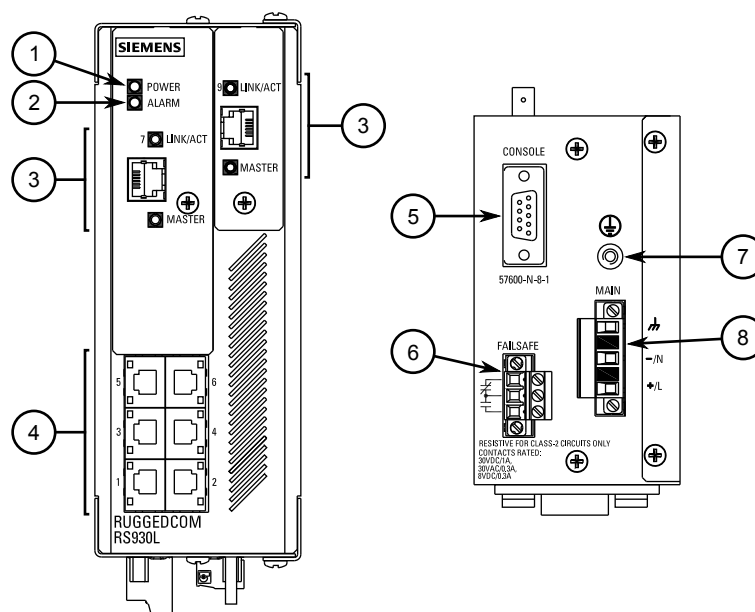
① POWER LED
② ALARM LED
③ EoVDSL Ports
④ Copper (10/100Base-TX) Ethernet Ports
⑤ RS232 Console Port (Serial)
⑥ Failsafe Alarm Relay
⑦ Chassis Ground Connection
⑧ Power Supply Terminal Block

Figure 1.1          RUGGEDCOM RS930L

| **POWER LED** | Illuminates green during boot up and when power is supplied to the device. |
|---|---|
| **ALARM LED** | Illuminates red when an alarm condition exists. |
| **Console Port** | The serial console port is for interfacing directly with the device and accessing initial management functions. For information about connecting to the device via the serial console port, refer to "Connecting to the Device" (Page 15). |
| **Communication Ports** | Communication ports in general receive and transmit data, as well as provide access to the RUGGEDCOM ROS Web interface. For more information about the various ports available, refer to "Communication Ports" (Page 17). |
| **Failsafe Alarm Relay** | Latches to default state when a power disruption or other alarm condition occurs. For more information, refer to: <br>• "Connecting the Failsafe Alarm Relay" (Page 9) <br>• "Failsafe Alarm Relay Specifications" (Page 25) |
| **Power Supply Terminal Blocks** | Pluggable terminal blocks for connecting one or more power sources. For more information, refer to "Connecting Power" (Page 10) and "Power Supply Specifications" (Page 25). |

## 1.3 Required Tools and Materials

The following tools and materials are required to install the RUGGEDCOM RS930L:

| Tools/Materials | Purpose |
|---|---|
| AC power cord (16 AWG) | For connecting power to the device. |
| CAT-5 Ethernet cables | For connecting the device to a LAN. |
| Flathead screwdriver | For mounting the device to a DIN rail. |
| Phillips screwdriver | For mounting the device to a panel. |
| 4 x #6-32 screws | For mounting the device to a panel. |

## 1.4 Decommissioning and Disposal

Proper decommissioning and disposal of this device is important to prevent malicious users from obtaining proprietary information and to protect the environment.

### Decommissioning

This device may include sensitive, proprietary data. Before taking the device out of service, either permanently or for maintenance by a third-party, make sure it has been fully decommissioned.

For more information, refer to the associated "Configuration Manual".

### Recycling and Disposal

For environmentally friendly recycling and disposal of this device and related accessories, contact a facility certified to dispose of waste electrical and electronic equipment. Recycling and disposal must be done in accordance with local regulations.

## 1.5 Cabling Recommendations

All copper Ethernet ports on RUGGEDCOM products include transient suppression circuitry to protect against damage from electrical transients and conform with IEC 61850-3 and IEEE 1613 Class I standards. This means that during a transient electrical event, communications errors or interruptions may occur, but recovery is automatic.

Siemens also does not recommend using copper Ethernet ports to interface with devices in the field across distances that could produce high levels of ground potential rise (i.e. greater than 2500 V), during line-to-ground fault conditions.

# Installing the Device

<div style="text-align: right; font-size: 2em;">**2**</div>

This chapter describes how to install the device, including mounting the device, connecting power, and connecting the device to the network.

| ⚠ DANGER |
|---|
| **Electrocution hazard – risk of serious personal injury and/or damage to equipment** |
| Before performing any maintenance tasks, make sure all power to the device has been disconnected and wait approximately two minutes for any remaining energy to dissipate. |

| ⚠ WARNING |
|---|
| **Radiation hazard – risk of serious personal injury** |
| This product contains a laser system and is classified as a *Class I LASER PRODUCT*. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure. |

| ⚠ CAUTION |
|---|
| **Burn hazard – risk of personal injury** |
| The surface of the device may be hot during operation, or as a result of the ambient air temperature. |
| Wear appropriate personal protective equipment and use caution when working with or around the device. |

| ⚠ NOTICE |
|---|
| This product contains no user-serviceable parts. Attempted service by unauthorized personnel shall render all warranties null and void. |
| Changes or modifications not expressly approved by Siemens Canada Ltd. could invalidate specifications, test results, and agency approvals, and void the user's authority to operate the equipment. |

| ⚠ NOTICE |
|---|
| This product should be installed in a *restricted access location* where access can only be gained by authorized personnel who have been informed of the restrictions and any precautions that must be taken. Access must only be possible through the use of a tool, lock and key, or other means of security, and controlled by the authority responsible for the location. |

## 2.1 General Procedure

The general procedure for installing the device is as follows:

**Note**

The user is responsible for the operating environment of the device, including maintaining the integrity of all protective conductor connections and checking equipment ratings. Make sure to review all operating and installation instructions before commissioning or performing maintenance on the device.

1. Review the relevant certification information for any regulatory requirements. For more information, refer to "Approvals" (Page 29).
2. Mount the device.
3. Connect the failsafe alarm relay.
4. Connect power to the device and ground the device to safety Earth.
5. Connect the device to the network.
6. Configure the device.

## 2.2 Unpacking the Device

When unpacking the device, do the following:

1. Inspect the package for damage before opening it.
2. Visually inspect each item in the package for any physical damage.
3. Verify all items are included.

**Note**

If any item is missing or damaged, contact Siemens for assistance.

## 2.3 Mounting the Device

The RUGGEDCOM RS930L is designed for maximum mounting and display flexibility. It can be equipped with adapters that allow it to be attached to a DIN rail or panel.

**Note**

Heat generated by the device is channeled outwards from the enclosure. As such, it is recommended that 2.5 cm (1 in) of space be maintained on all open sides of the device to allow for some convectional airflow.

Forced airflow is not required. However, any increase in airflow will result in a reduction of ambient temperature and improve the long-term reliability of all equipment mounted in the rack space.

> **Note**
>
> For detailed dimensions of the device with either DIN rail or panel hardware installed, refer to "Dimension Drawings" (Page 27).

## 2.3.1 Mounting the Device on a DIN Rail

The RUGGEDCOM RS930L can be ordered with a DIN rail adapter preinstalled on the back of the chassis. Use the adapter to mount the device to a standard 35 mm (1.4 in) IEC/EN 60715 or TS35 DIN rail.

### Mounting the Device

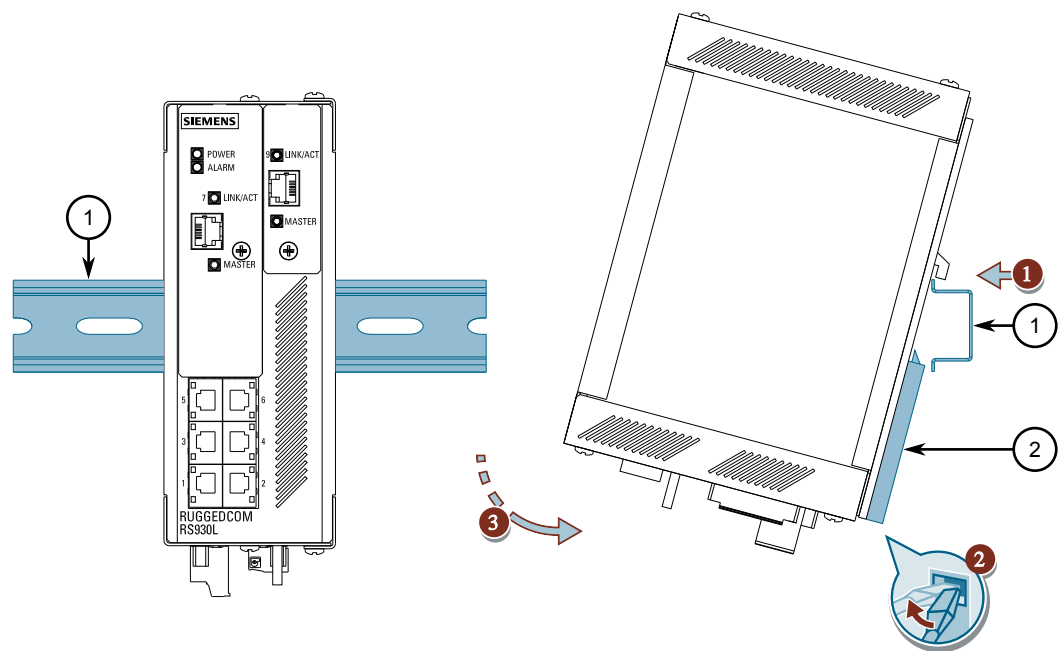To mount the device to a DIN rail, do the following:

1. Hook the top teeth of the adapter onto the DIN rail.

   > **Note**
   >
   > The adapter features a sliding release with a slot at the bottom for a flathead screwdriver.



① DIN Rail
② DIN Rail Adapter

Figure 2.1          Mounting the Device to a DIN Rail

2. Insert a flathead screwdriver into the slot of the sliding release and move it down.

3.   Push the device against the bottom of the DIN rail, then let go of the sliding release to latch the device.

**Removing the Device**

To remove the device from a DIN rail, do the following:

1.   Insert a flathead screwdriver into the slot of the sliding release and move it down.
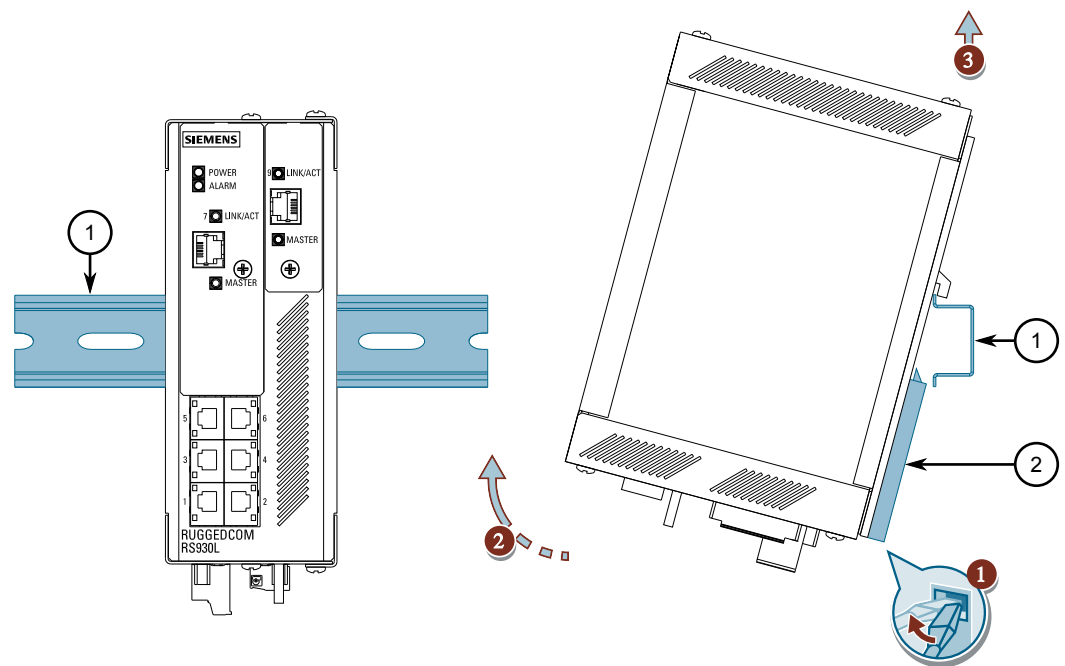


①   DIN Rail
②   DIN Rail Adapter

Figure 2.2          Removing the Device from a DIN Rail

2.   Swing the bottom of the device away from the DIN rail.

3.   Lift the device off the DIN rail.

### 2.3.2          Mounting the Device to a Panel

For panel installations, the RUGGEDCOM RS930L can be equipped with panel adapters on the top and bottom of the chassis. The adapters allow the device to be attached to a panel using screws.

To mount the device to a panel, do the following:

1.   Prepare mounting holes in the panel where the device is to be installed.

2.   Place the device against the panel and align the adapters with the mounting holes.
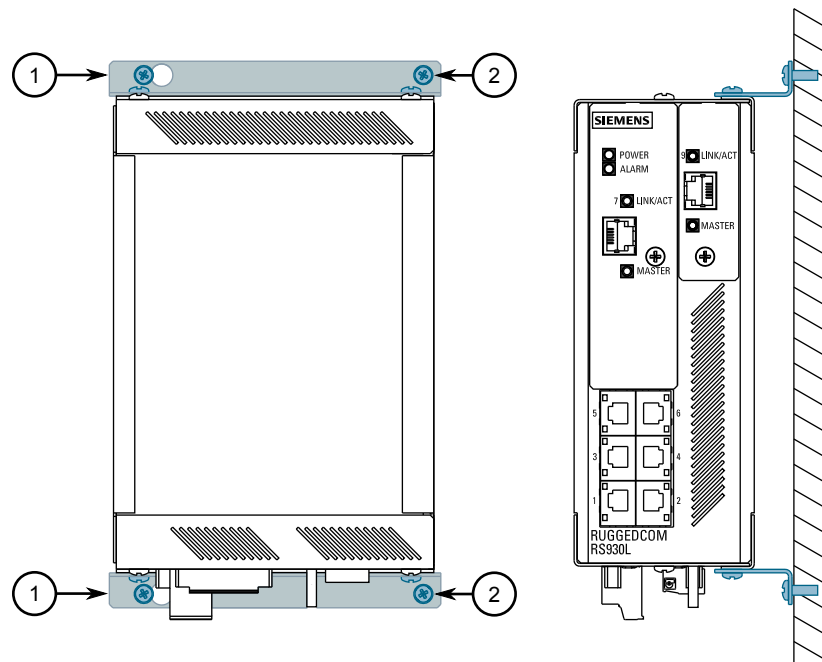
① Screw (M3.5 or #6-32)
② Panel Mount Adapter

Figure 2.3          Panel Mounting

3.  Secure the adapters to the panel with M3.5 or #6-32 screws.

## 2.4      Connecting the Failsafe Alarm Relay

The failsafe relay can be configured to latch based on alarm conditions. The NO (Normally Open) contact is closed when the unit is powered and there are no active alarms. If the device is not powered or if an active alarm is configured, the relay opens the NO contact and closes the NC (Normally Closed) contact.

**Note**

Control of the failsafe relay output is configurable through RUGGEDCOM RS930L. One common application for this relay is to signal an alarm if a power failure occurs. For more information, refer to the "RUGGEDCOM ROS Configuration Manual" for the RUGGEDCOM RS930L.

To connect the failsafe alarm relay, do the following:

1.  Insert the failsafe alarm relay terminal block into the device and tighten the screws.

2.  Connect a failsafe device to the terminal block.
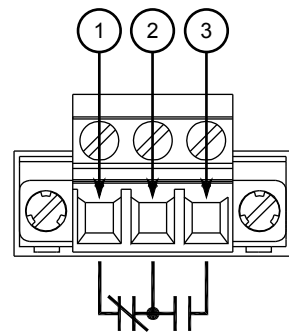
| ① | Normally Closed |
| ② | Common |
| ③ | Normally Open |

Figure 2.4          Failsafe Alarm Relay Wiring

## 2.5          Connecting Power

The RUGGEDCOM RS930L supports power input from a single high AC/DC or low DC power supply.

**Note**

- For 110/230 VAC rated equipment, an appropriately rated AC circuit breaker must be installed.

- For 125/250 VDC rated equipment, an appropriately rated DC circuit breaker must be installed.

- Use minimum #16 gage copper wiring when connecting terminal blocks.

- Equipment must be installed according to applicable local wiring codes and standards.

- All line-to-ground transient energy is shunted to the Surge Ground terminal. In cases where users require the inputs to be isolated from ground, remove the ground braid between Surge and Chassis Ground. Note that all line-to-ground transient protection circuitry will be disabled.

## 2.5.1 Connecting High AC/DC Power

To connect a high AC/DC power supply to the device, do the following:

---
⚠ **NOTICE**

**Electrical hazard – risk of damage to equipment**

Do not connect AC power cables to terminals for DC power. Damage to the power supply may occur.

---

---
⚠ **NOTICE**

**Electrical hazard – risk of damage to equipment**

Before testing the dielectric strength (HIPOT) in the field, remove the braided ground cable connected to the surge ground terminal and chassis ground. This cable connects transient suppression circuitry to chassis ground and must be removed in order to avoid damage to transient suppression circuitry during testing.

---

**Note**

Torque all terminal connections to 0.6 N·m (5 lbf-in).

1. Secure the power terminal block to the device.

2. Connect the positive wire from the power source to the positive/live (+/L) terminal on the terminal block.
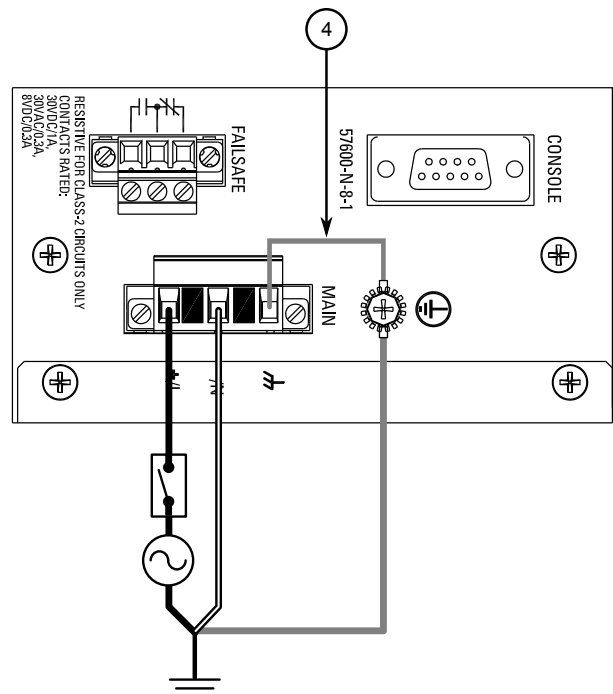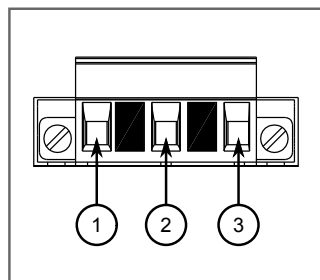


① Positive/Live (+/L) Terminal
② Negative/Neutral (-/N) Terminal
③ Surge Ground Terminal

④    Braided Ground Cable

Figure 2.5            Terminal Block Wiring
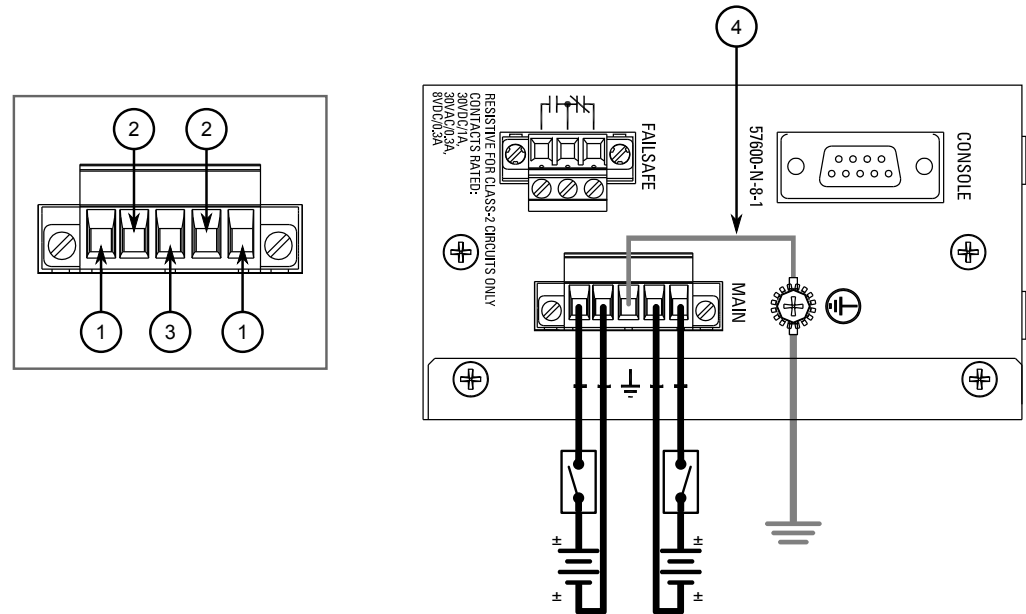


①    Positive Terminal
②    Negative Terminal
③    Surge Ground Terminal
④    Braided Ground Cable

Figure 2.6           Terminal Block Wiring – Dual DC Power Supply Inputs

3.    Connect the negative wire from the power source to the negative/neutral (-/N) terminal on the terminal block.

4.    Connect the ground wire from the power source to the chassis groun terminal on the terminal block.

### 2.5.2    Connecting Low DC Power

RUGGEDCOM RS930L's equipped with 24 or 48 V power supply inputs feature reverse polarity protection and dual power supply inputs allowing the device to accept redundant connections to a single DC power supply.

To connect a low DC power supply to the device, do the following:

**Note**

Torque all terminal connections to 0.6 N·m (5 lbf-in).

1.    Secure the power terminal block to the device.

2.  Connect the positive wire from the power source to the positive terminal on the terminal block.
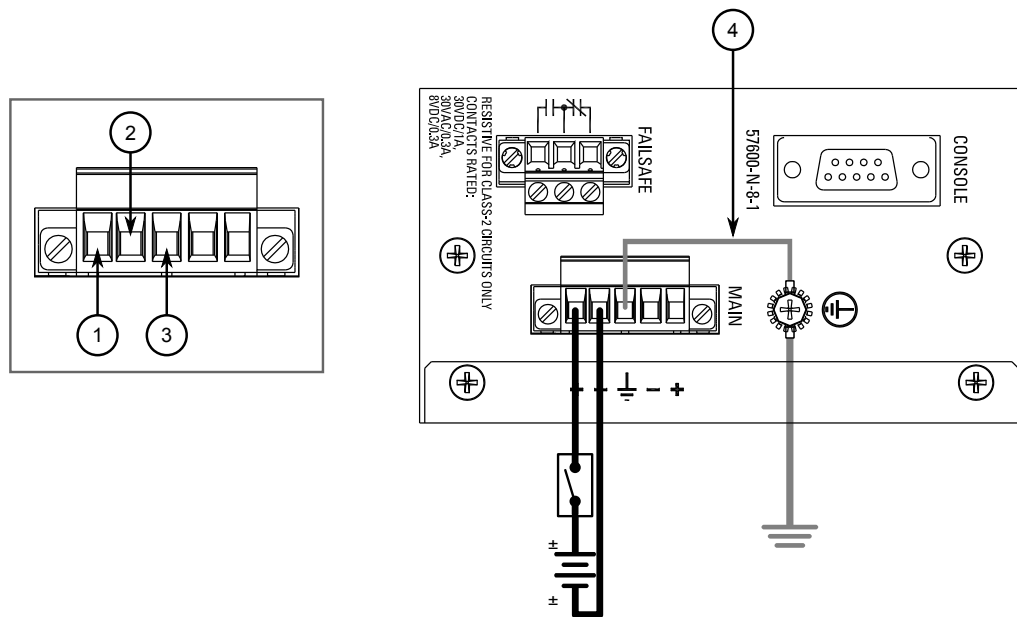


①   Positive Terminal
②   Negative Terminal
③   Surge Ground Terminal
④   Braided Ground Cable

Figure 2.7          Terminal Block Wiring – Single DC Power Supply Inputs

3.  Connect the negative wire from the power source to the negative terminal on the terminal block.

4.  [Optional] If a redundant connection is required, repeat step 2 (Page 13) and step 3 (Page 13) to connect the secondary power inputs.
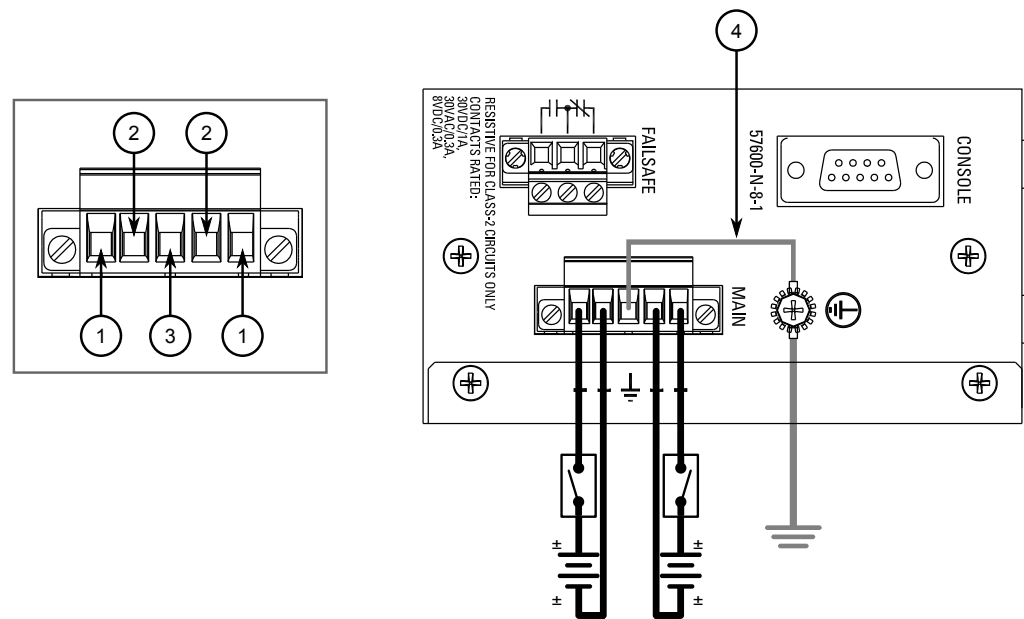
① Positive Terminal
② Negative Terminal
③ Surge Ground Terminal
④ Braided Ground Cable

Figure 2.8          Terminal Block Wiring – Dual DC Power Supply Inputs

5.  Using a braided wire or other appropriate grounding wire, connect the surge ground terminal to the chassis ground connection. The surge ground terminal is used as the ground conductor for all surge and transient suppression circuitry internal to the unit.

6.  Connect the ground wire from the power source to the chassis groun terminal on the terminal block.

# Device Management

This section describes how to connect to and manage the device.

## 3.1      Connecting to the Device

The following describes the various methods for accessing the RUGGEDCOM RS930L console and Web interfaces on the device. For more detailed instructions, refer to the "RUGGEDCOM ROS Configuration Manual" for the RUGGEDCOM RS930L.

**Console Port**

Connect a workstation directly to the RS232 serial console port to access the boot-time control and RUGGEDCOM ROS console interface. The console port provides access to RUGGEDCOM RS930L's console interface.

**Note**

The serial console port is intended to be used only as a temporary connection during initial configuration or troubleshooting, and should only be used in a safe area (as defined by IEC 60079-0, Edition 6.0).

Use the following settings to connect to the port:

| | |
|---|---|
| **Speed** | 57600 baud |
| **Data Bits** | 8 |
| **Stop Bit** | 1 |
| **Parity** | None |
| **Flow Control** | Off |
| **Terminal ID** | VT100 |

The serial console port implements RS232 DCE (Data Communication Equipment) on a DB9 connector. The following is the pin-out for the port:



| Pin | Name | Description |
|---|---|---|
| 1[a] | Reserved (Do Not Connect) | |
| 2 | TX | Transmit Data |
| 3 | RX | Receive Data |
| 4[a] | Reserved (Do Not Connect) | |
| 5 | GND | Signal Ground |
| 6[a] | Reserved (Do Not Connect) | |
| 7[b] | Reserved (Do Not Connect) | |
| 8[b] | Reserved (Do Not Connect) | |
| 9 | Reserved (Do Not Connect) | |
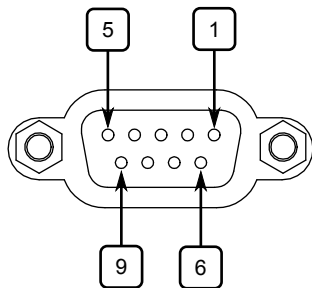
Figure 3.1          Serial DB9 Console Port

[a] *Connected internally.*

[b] *Connected internally.*

**Ethernet Ports**

Connect any of the available Ethernet ports on the device to a management switch and access the RUGGEDCOM RS930L console and Web interfaces via the device's IP address. The factory default IP address for the RUGGEDCOM RS930L is https://192.168.0.1.

For more information about available ports, refer to "Communication Ports" (Page 17).

## 3.2          Configuring the Device

Once the device is installed and connected to the network, it must be configured. All configuration management is done via the RUGGEDCOM RS930L interface. For more information about configuring the device, refer to the "RUGGEDCOM ROS Configuration Manual" associated with the installed software release.

# Communication Ports

The RUGGEDCOM RS930L can be equipped with various types of communication ports to enhance its abilities and performance.
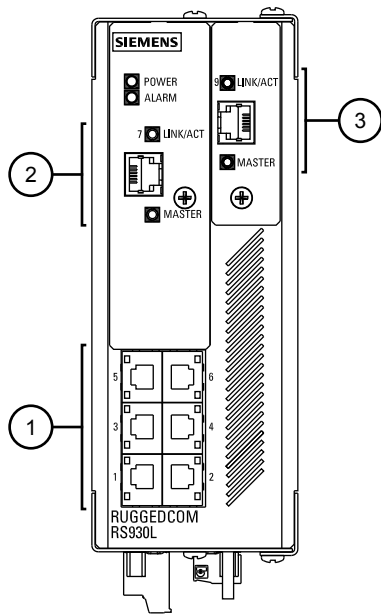


① Ports 1 to 6
② Port 7
③ Port 9

Figure 4.1　　　　　Port Assignment

| Port | Type |
|---|---|
| 1 to 6 | Copper Ethernet Ports (10/100Base-TX) |
| 7 and 9 | EoVDSL Ports |

## 4.1　　Copper Ethernet Ports

The RUGGEDCOM RS930L supports multiple 10/100Base-TX Ethernet ports that allow connection to standard Category 5 (CAT-5) shielded or unshielded twisted-pair cables with RJ45 male connectors.

> **⚠ WARNING**
>
> **Electric shock hazard – risk of serious personal injury and/or equipment interference**
>
> When shielded cables are used, make sure the shielded cables do not form a ground loop via the shield wire and the RJ45 receptacles at either end. Ground loops can cause excessive noise and interference, but more importantly, create a potential shock hazard that can result in serious injury.

**LEDs**

Each port features a **Speed** and **Link/Activity** LED that indicates the state of the port.
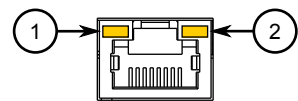


① Speed LED
② Link/Activity LED

Figure 4.2          RJ45 Port LEDs

| LED | State | Description |
|---|---|---|
| Speed | Yellow | The port is operating at 100 Mbps |
| | Off | The port is operating at 10 Mbps |
| Link/Activity | Yellow (Solid) | Link established |
| | Yellow (Blinking) | Link activity |
| | Off | No link detected |

**Pin-Out**

The following is the pin-out for the RJ45 male connectors:
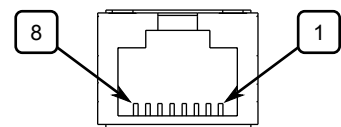


Figure 4.3          RJ45 Ethernet Port Pin Configuration

| Pin | Name | Description |
|---|---|---|
| 1 | RX+ | Receive Data+ |
| 2 | RX- | Receive Data- |
| 3 | TX+ | Transmit Data+ |
| 4 | Reserved (Do Not Connect) | |

| Pin | Name | Description |
|---|---|---|
| 5 | | Reserved (Do Not Connect) |
| 6 | TX- | Transmit Data- |
| 7 | | Reserved (Do Not Connect) |
| 8 | | Reserved (Do Not Connect) |

**Specifications**

For specifications on the available copper Ethernet ports, refer to "Copper Ethernet Port Specifications" (Page 26).

## 4.2 EoVDSL Ports

Ethernet over VDSL (EoVDSL) connections operate in pairs with one device configured as the Master and the other as the Slave. In VDSL (Very-high-bit-rate Digital Subscriber Line), the terms Central Office (CO) or Line Termination (LT) are used interchangeably for the Master, and the terms Customer Premise Equipment (CPE) or Network Termination (NT) are used interchangeably for the Slave. All EoVDSL line configuration settings are modified on the Master and pushed to the Slave. Data flowing from the Master to the Slave is designated *downstream*, while data flowing from the Slave to the Master is designated *upstream*.

Siemens supports two types of EoVDSL:

• **Universal EoVDSL**
Universal EoVDSL ports are Master/Slave selectable and offer symmetric data rates (upstream and downstream) up to 35 Mbps. They are best suited for higher throughput connections spanning distances up to 2.5 km (1.6 mi).

• **Long-Reach EoVDSL**
Long-Reach EoVDSL ports are fixed as either Master or Slave, but offer asymmetric data rates (upstream and downstream) up to 40 Mbps. They are best suited for lower throughput connections spanning distances up to 5 km (3.1 mi).

Universal and Long-Reach EoVDSL ports are physically indistinguishable from each other. However, the port type can be determined either from the order code or through the RUGGEDCOM RS930L user interface.

EoVDSL ports can be connected using RJ11 male connectors.

---

⚠ **NOTICE**

Universal and Long-Reach EoVDSL ports (master or slave) must be connected to EoVDSL ports (slave or master) of the same type. Connection between Universal EoVDSL ports and Long-Reach EoVDSL ports is not supported. While master/slave mode can be modified on Universal EoVDSL ports, the operating mode of all Long-Reach EoVDSL ports is predetermined by hardware. As a result, master/slave mode cannot be modified on Long-Reach EoVDSL ports.

---

**LEDs**

Each EoVDSL port has a **Link/Act** LED and a **Master** LED. On devices with Universal EoVDSL ports, the **Master** LED can be toggled on or off depending on whether the port is set to be a Master or Slave. On devices with Long-Reach EoVDSL ports, the **Master** LED will be on all the time if the device is set to be the Master, or off if the device is set to be the Slave.

| LED | State | Description |
|---|---|---|
| Master | Green (Solid) | The device is in Master mode. |
| | Off | The device is in Slave mode. |
| Link/Act | Green (Solid) | Link established |
| | Green (Blinking) | Link activity |
| | Off | No link detected |

**Pin-Out**

The following is the pin-out for the RJ11 connectors:

**Note**

All RJ11 connectors conform to the standard telephony pin configuration.
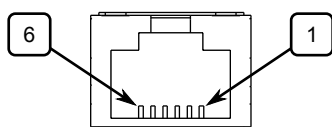


Figure 4.4          EoVDSL RJ11 Modem Port

| Pin | Description |
|---|---|
| 1 | Reserved (Do Not Connect) |
| 2 | Reserved (Do Not Connect) |
| 3 | Ring |
| 4 | Tip |
| 5 | Reserved (Do Not Connect) |
| 6 | Reserved (Do Not Connect) |

## 4.2.1          EoVDSL Wiring

VDSL operates over 2-wire Category 3 (CAT-3) or higher twisted-pair wiring. Other twisted-pair wiring with similar characteristics may work, although the performance will vary depending on the cable characteristics and distance.

When wiring EoVDSL ports, note the following:

- EoVDSL ports are designed to be used on private communications lines for point-to-point connections and are not to be connected to the Public Switched Telephone Network (PSTN).

- To reduce the risk of fire, use only #26 AWG or larger telecommunication line cord.

- Twisted-pairs are an effective way of reducing both magnetic and capacitive interference, as they reduce the magnetic loop area to nearly zero and maintain a consistent distribution of capacitances to both ground and other sources. Therefore, make sure twisting is consistent throughout the cable length.

- Open leads (also known as bridged taps or drop-lines) along the length of the cable will cause an impedance mismatch and result in VDSL signal degradation.

- Make sure the cable impedance is consistent throughout the cable run. Avoid mixing different wiring (e.g. wiring with different gages) in cable runs, as this will cause an impedance mismatch and result in VDSL signal degradation.

- Make sure wiring is adequately separated between power and control circuits. Switching spikes and surges in power and control circuits can couple noise onto the VDSL line, causing interruptions in communications.

- Lower speeds are less susceptible to interference and will transmit greater distances over the same wiring than higher speeds. Use the minimum speed that will provide adequate data transfer speed.

## 4.2.2 Configuration and Setup

If the RUGGEDCOM RS930L and another device both have Universal EoVDSL ports, configure one device to be the Master and the other the Slave. If both devices have a Long-Reach EoVDSL port, no Master/Slave configuration is necessary, since the ports will already be fixed as Master or Slave.

Once configured and connected together, each device will attempt to achieve the maximum speed based on the line length and conditions. The RUGGEDCOM RS930L's **Link/Act** LED may flash on and off several times before setting on a final link speed and declaring the port up.

For more information about configuring the RUGGEDCOM RS930L, refer to the "RUGGEDCOM ROS Configuration Manual" for the RS930L.

## 4.2.3 EoVDSL Performance

The following describes the behavior and performance characteristics of EoVDSL.

### EoVDSL Modes

The EoVDSL ports can be configured to operate in one of two modes:

- **Auto Mode (default)**
  In Auto Mode, the device will step through the different speeds and automatically select the best bit-rate based on the current line conditions.

- **Manual Mode**
  In Manual Mode, the user can select one of the speed settings and the device will only attempt to attain the set speed.

*4.2.3 EoVDSL Performance*

If the line conditions degrade (reducing the SNR or Signal to Noise Ratio), but the device is able to maintain the link, an alarm will be triggered to notify the user of the reduced SNR. By configuring the **Rescan Mode** parameter in RUGGEDCOM RS930L, the user can control at which point the scan process will be restarted when the line conditions degrade. If **Link only** is selected, the device will restart the scan process if the line conditions degrade, such that the device is unable to maintain the current link. If **Link or SNR** is selected, the device will restart the scan process if either the SNR has dropped below a pre-defined acceptable level or when the device is unable to maintain the current link, or whichever comes first.

### Note

If the **Mode** parameter is set to **Manual Mode**, the restart of the scan process will only attempt to attain the set speed in manual mode.

For information about configuring EoVDSL, refer to the "RUGGEDCOM ROS Configuration Manual" for the RUGGEDCOM RS930L.

### Note

Assuming the distance can support the speed setting, the time to establish a link is typically 15 to 30 seconds.

**Universal EoVDSL Performance Characteristics**

On No. 24 AWG Polyethylene Insulated Cable (PIC) twisted-pair wiring, the following performance is typical with Universal EoVDSL:

| Distance | Downstream/Upstream (Mbps) |
|---|---|
| 0.5 km (1640 ft) | 35 |
| 0.6 km (1969 ft) | 30 |
| 0.7 km (2297 ft) | 25 |
| 0.9 km (2953 ft) | 20 |
| 1.0 km (3280 ft) | 15 |
| 1.3 km (4265 ft) | 10 |
| 1.7 km (5577 ft) | 5 |
| 2.0 km (6562 ft) | 2.5 |
| 2.5 km (8202 ft) | 1.2 |

**Long-Reach EoVDSL Performance Characteristics**

On No. 24 AWG Polyethylene Insulated Cable (PIC) twisted-pair wiring, the following performance is typical with Long-Reach EoVDSL:

| Distance (km) | Distance (ft) | Downstream (Master to Slave) (Mbps) | Upstream (Slave to Master) (Mbps) |
|---|---|---|---|
| 0.50 | 1600 | 40 | 20 |
| 1.00 | 3300 | 25 | 5 |
| 1.50 | 4900 | 20 | 0.54 |

| Distance (km) | Distance (ft) | Downstream (Master to Slave) (Mbps) | Upstream (Slave to Master) (Mbps) |
|---|---|---|---|
| 2.00 | 6600 | 15 | 0.54 |
| 2.50 | 8200 | 10 | 0.54 |
| 3.20 | 10500 | 5 | 0.54 |
| 4.00 | 13100 | 2.1 | 0.54 |
| 4.60 | 15100 | 1.2 | 0.54 |
| 5.00 | 16400 | 0.48 | 0.18 |

## 4.2.3 EoVDSL Performance

# Technical Specifications

<div style="text-align: right;">**5**</div>

This section provides important technical specifications related to the device.

## 5.1 Power Supply Specifications

**Note**

When determining cable lengths, make sure the nominal input voltage for the power supply is provided at the power source.

| Power Supply Type | Input Voltage | | Internal Fuse Rating[a] | Isolation | Maximum Power Consumption[b] |
|---|---|---|---|---|---|
| | Minimum | Maximum | | | |
| HI | 88 VDC | 300 VDC | 3.15 A(T) | 4 kVAC | 10 W |
| | 85 VAC | 264 VAC | 3.15 A(T) | 5.5 kVDC | 10 W |
| 24 | 10 VDC | 36 VDC | 3.15 A(T) | 1.5 kVDC | 10 W |
| 48 | 37 VDC | 72 VDC | 3.15 A(T) | 1.5 kVDC | 10 W |

[a] *(T) denotes time-delay fuse.*

[b] *Power consumption may vary based on configuration.*

## 5.2 Failsafe Alarm Relay Specifications

| Maximum Switching Voltage | Rated Switching Current | Isolation |
|---|---|---|
| 30 VDC | 2 A, 60 W | 1500 $V_{rms}$ for 1 minute |
| 125 VDC | 0.24 A, 30 W | |
| 125 VAC | 0.5 A, 62.5 W | |
| 220 VDC | 0.24 A, 60 W | |
| 250 VAC | 0.25 A, 62.5 W | |

## 5.3 Supported Networking Standards

The following networking standards are supported by RUGGEDCOM RS930L:

| Standard | 10 Mbps Ports | 100 Mbps Ports | 1000 Mbps Ports | Notes |
|---|---|---|---|---|
| IEEE 802.3x | • | • | • | Full Duplex Operation |

| Standard | 10 Mbps Ports | 100 Mbps Ports | 1000 Mbps Ports | Notes |
|---|---|---|---|---|
| IEEE 802.3z | | | • | 1000Base-LX |
| IEEE 802.3ab | | | • | 1000Base-Tx |
| IEEE 802.1D | • | • | • | MAC Bridges |
| IEEE 802.1Q | • | • | • | VLAN (Virtual LAN) |
| IEEE 802.1p | • | • | • | Priority Levels |

## 5.4　Copper Ethernet Port Specifications

The following details the specifications for copper Ethernet ports that can be ordered with the RUGGEDCOM RS930L.

| | |
|---|---|
| **Speed**[a] | 10/100Base-TX |
| **Connector** | RJ45 |
| **Duplex**[a] | FDX/HDX |
| **Cable Type**[b] | > CAT 5 |
| **Wiring Standard**[c] | TIA/EIA T568A/B |
| **Maximum Distance**[d] | 100 m (328 ft) |
| **Isolation**[e] | 2.5 kV |

[a]  *Auto-negotiating.*

[b]  *Shielded or unshielded.*

[c]  *Auto-crossover and auto-polarity.*

[d]  *Typical distance. Dependent on the number of connectors and splices.*

[e]  *RMS 1 minute.*

## 5.5　Operating Environment

The RUGGEDCOM RS930L is rated to operate under the following environmental conditions.

| | |
|---|---|
| **Ambient Operating Temperature**[a] | -40 to 85 °C (-40 to 185 °F) |
| **Ambient Storage Temperature** | -40 to 85 °C (-40 to 185 °F) |
| **Ambient Relative Humidity**[b] | 5% to 95% |
| **Maximum Altitude** | 2000 m (6562 ft) |

[a]  *Measured from a 30 cm (12 in) radius surrounding the center of the enclosure.*

[b]  *Non-condensing.*

## 5.6　Mechanical Specifications

| | |
|---|---|
| **Weight** | 1.2 kg (2.7 lbs) |

| Enclosure | 20 AWG Galvanized Steel |
|-----------|-------------------------|

## 5.7 Dimension Drawings

**Note**

All dimensions are in millimeters, unless otherwise stated.
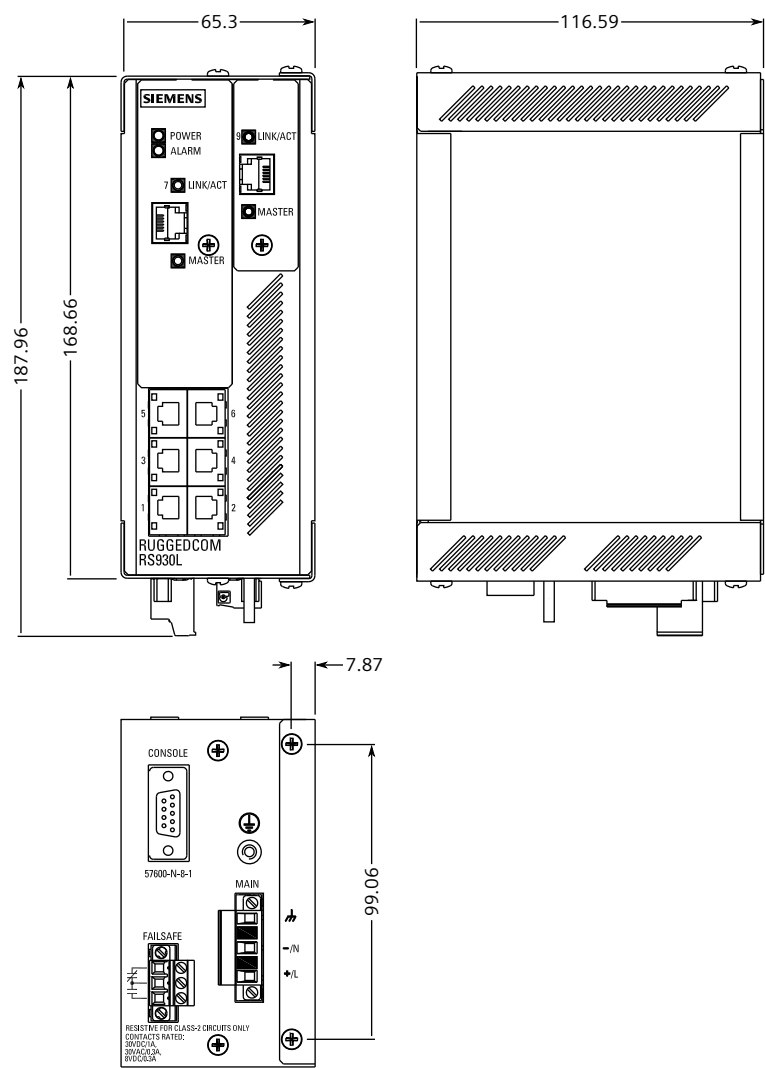
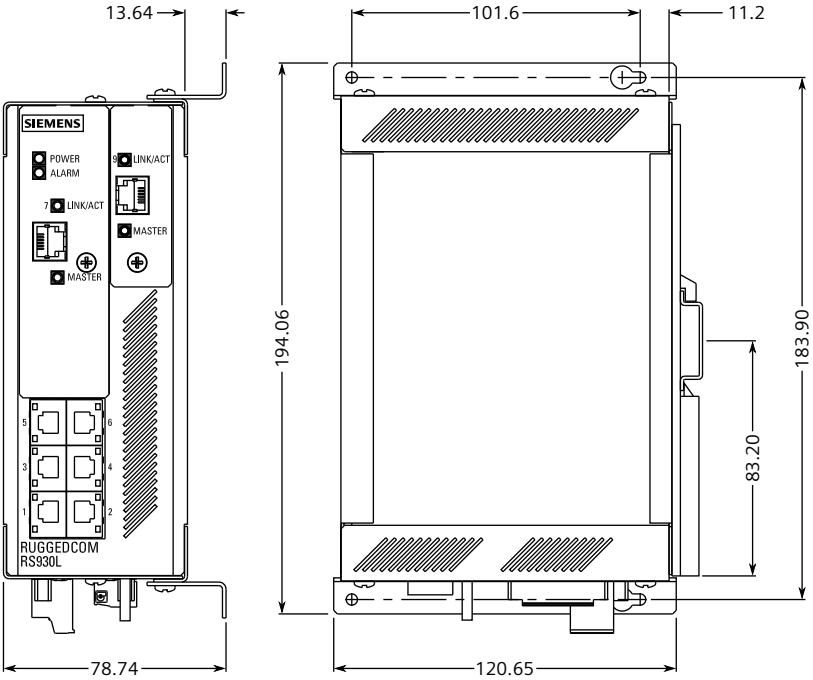

Figure 5.1          Overall Dimensions

Figure 5.2          Panel and DIN Rail Mount Dimensions

# Certification

# 6

The RUGGEDCOM RS930L device has been thoroughly tested to guarantee its conformance with recognized standards and has received approval from recognized regulatory agencies.

## 6.1 Approvals

This section details the standards to which the RUGGEDCOM RS930L complies.

**Note**

All relevant certificates and test reports are available on Siemens Industry Online Support [https://support.industry.siemens.com].

### 6.1.1 CSA

This device meets the requirements of the following Canadian and U.S. standards under certificate 1550963:

- **CAN/CSA-C22.2 No. 62368-1**
  Information Technology Equipment – Safety – Part 1: General Requirements (Bi-National Standard, with UL 62368-1)

- **UL 62368-1**
  Information Technology Equipment – Safety Part 1: General Requirements

- **CAN/CSA-C22.2 No. 0-M91**
  General Requirements - Canadian Electrical Code, Part II

- **CAN/CSA-C22.2 No. 142-M1987**
  Process Control Equipment Industrial Products

The device is marked with a CSA symbol that indicates compliance with both Canadian and U.S. requirements.

## 6.1.2 European Union (EU)

This device is declared by Siemens Canada Ltd. to comply with essential requirements and other relevant provisions of the following EU directives:

- **EN 62368-1**
  Information Technology Equipment – Safety – Part 1: General Requirements

- **EN 61000-6-2**
  Electromagnetic Compatibility (EMC) – Part 6-2: Generic Standards – Immunity for Industrial Environments

- **EN 60825-1**
  Safety of Laser Products – Equipment Classification and Requirements

- **EN 63000**
  Technical Documentation for the Assessment of Electrical and Electronic Products with Respect to the Restriction of Hazardous Substances

- **CISPR 32/EN 55032**
  Electromagnetic compatibility of multimedia equipment – Emission requirements

The device is marked with a CE symbol and can be used throughout the European community.

$\epsilon$

## 6.1.3 FCC

This device has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This device generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case users will be required to correct the interference at their own expense.

**Note**

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this device.

**6.1.4        FDA/CDRH**

This device meets the requirements of the following U.S. Food and Drug Administration (FDA) standard:

- Title 21 Code of Federal Regulations (CFR) – Chapter I – Sub-chapter J – Radiological Health

**6.1.5        ISED**

This device is declared by Siemens Canada Ltd. to meet the requirements of the following ISED (Innovation Science and Economic Development Canada) standard:

- CAN ICES-3 (A)/NMB-3 (A)

**6.1.6        TÜV SÜD**

This device is certified by TÜV SÜD to meet the requirements of the following standards:

- **CAN/CSA-C22.2 NO. 62368-1**
  Information Technology Equipment – Safety – Part 1: General Requirements (Bi-National standard, with UL 62368-1)

- **UL 62368-1**
  Information Technology Equipment – Safety – Part 1: General Requirements

**6.1.7        ISO**

This device was designed and manufactured using a certified ISO (International Organization for Standardization) quality program that adheres to the following standard:

- **ISO 9001:2015**
  Quality management systems – Requirements

**6.1.8        ACMA**

This device meets the requirements of the following Australian Communications and Media Authority (ACMA) standards under certificate ABN 98 004 347 880:

- Radiocommunications (Compliance Labelling – Devices) Notice 2014 made under Section 182 of the Radiocommunications Act 1992

- Radiocommunications Labelling (Electromagnetic Compatibility) Notice 2008 made under Section 182 of the Radiocommunications Act 1992

- Radiocommunications (Compliance Labelling – Electromagnetic Radiation) Notice 2003 made under Section 182 of the Radiocommunications Act 1992

- Telecommunications Labelling (Customer Equipment and Customer Cabling) Notice 2001 made under Section 407 of the Telecommunication Act 1997

The device is marked with an RCM symbol to indicate compliance when sold in the Australian region.



A copy of the Declaration of Conformity is available via Siemens Industry Online Support at https://support.industry.siemens.com/cs/ww/en/view/89855782.

## 6.1.9 RoHS

This device is declared by Siemens Canada Ltd. to meet the requirements of the following RoHS (Restriction of Hazardous Substances) directives for the restricted use of certain hazardous substances in electrical and electronic equipment:

- **China RoHS 2**

  Administrative Measure on the Control of Pollution Caused by Electronic Information Products

A copy of the Material Declaration is available online at https://support.industry.siemens.com/cs/ww/en/view/109738831.

## 6.1.10 Other Approvals

This device meets the requirements of the following additional standards:

- **IEC 61000-6-2**
  Electromagnetic Compatibility (EMC) – Part 6-2: Generic Standards – Immunity for Industrial Environments

- **EN 50121-4**
  Railway applications – Electromagnetic Compatibility – Emission and Immunity of the Signaling and Telecommunications Apparatus

## 6.2 EMC and Environmental Type Tests

The RUGGEDCOM RS930L has passed the following Electromagnetic Compatibility (EMC) and environmental tests.

**EMC Type Tests**

| Test | Description | | Test Levels | Severity Levels |
|---|---|---|---|---|
| IEC 61000-4-2 | ESD | Enclosure Contact | ± 8 kV | 4 |
| | | Enclosure Air | ± 15 kV | 4 |
| IEC 61000-4-3 | Radiated RFI | Enclosure Ports | 20 V/m | |
| IEC 61000-4-4 | Burst (Fast Transient) | Signal Ports | ± 4 kV @ 2.5 kHz | x |
| | | DC Power Ports | ± 4 kV | 4 |
| | | AC Power Ports | ± 4 kV | 4 |
| | | Earth Ground Ports | ± 4 kV | 4 |
| IEC 61000-4-5 | Surge | Signal Ports | ± 4 kV Line-to-Ground ± 2 kV | 4 |
| | | DC Power Ports | ± 2 kV Line-to-Ground ± 1 kV Line-to-Line | 3 |
| | | AC Power Ports | ± 4 kV Line-to-Ground ± 2 kV Line-to-Line | 4 |
| IEC 61000-4-6 | Induced (Conducted) RFI | Signal Ports | 10 V | 3 |
| | | DC Power Ports | 10 V | 3 |
| | | AC Power Ports | 10 V | 3 |
| | | Earth Ground Ports | 10 V | 3 |
| IEC 61000-4-8 | Magnetic Field | Enclosure Ports | 40 A/m Continuous 1000 A/m for 1 s | |
| IEC 61000-4-11 | Voltage Dips and Interrupts | AC Power Ports | 100% for 5 Periods 100% for 50 Periods | |
| IEC 61000-4-12 | Damped Oscillatory | Signal Ports | 2.5 kV Common Mode @ 1 MHz 1 kV Differential Mode @ 1 MHz | 3 |
| | | DC Power Ports | 2.5 kV Common Mode @ 1 MHz 1 kV Differential Mode @ 1 MHz | 3 |
| | | AC Power Ports | 2.5 kV Common Mode @ 1 MHz 1 kV Differential Mode @ 1 MHz | 3 |
| IEC 61000-4-16 | Mains Frequency Voltage | Signal Ports | 30 V Continuous 300 V for 1 s | 4 |

| Test | Description | | Test Levels | Severity Levels |
|---|---|---|---|---|
| | | DC Power Ports | 30 V Continuous<br>300 V for 1 s | 4 |
| IEC 61000-4-17 | Ripple on DC Power Supply | DC Power Ports | 15% | 3 |
| IEC 61000-4-29 | Voltage Dips and Interrupts | DC Power Ports | 30% for 0.1 s<br>60% for 0.1 s<br>100% for 0.05 s | |
| IEC 60255-27 | Dielectric Strength | Signal Ports | 2 kV (Failsafe Relay Output) | |
| | | DC Power Ports | 2 kV | |
| | | AC Power Ports | 2 kV | |
| | HV Impulse | Signal Ports | 5 kV (Failsafe Relay Output) | |
| | | DC Power Ports | 5 kV | |
| | | AC Power Ports | 5 kV | |

**EMC Immunity Type Tests per IEEE 1613**

**Note**

RUGGEDCOM products meet Class 1 requirements for copper Ethernet configurations and Class 2 for fiber Ethernet configurations. Class 1 allows for temporary communication loss, while Class 2 requires error-free and interrupted communications.

| Description | | Test Levels |
|---|---|---|
| ESD | Enclosure Contact | ± 8 kV |
| | Enclosure Air | ± 15 kV |
| Radiated RFI | Enclosure Ports | 35 V/m |
| Fast Transient | Signal Ports | ± 4 kV @ 2.5 kHz |
| | DC Power Ports | ± 4 kV |
| | AC Power Ports | ± 4 kV |
| | Earth Ground Ports | ± 4 kV |
| Oscillatory | Signal Ports | 2.5 kV Common Mode @ 1 MHz |
| | DC Power Ports | 2.5 kV Common and Differential Mode @ 1 MHz |
| | AC Power Ports | 2.5 kV Common and Differential Mode @ 1 MHz |
| HV Impulse | Signal Ports | 5 kV (Failsafe Relay) |
| | DC Power Ports | 5 kV |
| | AC Power Ports | 5 kV |
| Dielectric Strength | Signal Ports | 2 kV (Failsafe Relay) |

| Description | | Test Levels |
|---|---|---|
| | DC Power Ports | 2 kV |
| | AC Power Ports | 2 kV |

## Environmental Type Tests

| Test | Description | | Test Levels | Severity Levels |
|---|---|---|---|---|
| IEC 60068-2-1 | Cold Temperature | Test Ad | -40 °C (-40 °F), 16 Hours | |
| IEC 60068-2-2 | Dry Heat | Test Bd | 85 °C (185 °F), 16 Hours | |
| IEC 60068-2-30 | Humidity (Damp Heat, Cyclic) | Test Db | 95% (Non-Condensing), 55 °C (131 °F), 6 Cycles | |
| IEC 60255-21-1 | Vibration | | 2 g @ 10 to 150 Hz | Class 2 |
| IEC 60255-21-2 | Shock | | 30 g @ 11 ms | Class 2 |

## For more information

Siemens RUGGEDCOM
**https://www.siemens.com/ruggedcom**

Industry Online Support (service and support)
**https://support.industry.siemens.com**

Industry Mall
**https://mall.industry.siemens.com**