

Edition

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Installation Manual

SIMATIC NET

Rugged Ethernet Switches

RUGGEDCOM RSL910

<https://www.siemens.com/ruggedcom>

SIEMENS

SIMATIC NET

Rugged Ethernet Switches RUGGEDCOM RSL910

Installation Manual

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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

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

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.

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Preface

This guide describes the RUGGEDCOM RSL910. 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/109755338
RUGGEDCOM SFP Transceivers Catalog	https://support.industry.siemens.com/cs/ww/en/view/109482309

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 RSL910 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.

Other designations in this manual might be trademarks whose use by third parties for their own purposes would infringe the rights of the owner.

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.

Training

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.

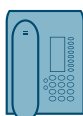
Customer Support

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

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E-Mail	info.ruggedcom@siemens.com
Web	https://www.siemens.com

Introduction

The RUGGEDCOM RSL910 is a utility-grade, fully managed Ethernet switch with Ethernet over VDSL2 (EoVDSL) capabilities, designed to operate reliably in electrically harsh and climatically demanding environments.

EoVDSL supports LAN segments of up to 3 km (1.8 mi) over telephone grade cable (or other legacy serial cabling) at up to 140 Mbps (upstream and downstream). It allows an Ethernet-enabled device to communicate with a central control room using existing cabling. 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 RSL910 provides a high level of immunity to electromagnetic interference and heavy electrical surges typical of environments found in electric utility substations, factory floors and curb-side traffic control cabinets. An operating temperature range of -40 to 85 °C (-40 to 185 °F) coupled with optional conformal coating and a galvanized steel enclosure allows the RUGGEDCOM RSL910 to be placed in almost any location.

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The RUGGEDCOM RSL910 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, as well as dual-redundant, reversible polarity, 24 VDC and 48 VDC power supply inputs for high availability applications requiring dual or backup power inputs.

The RUGGEDCOM RSL910'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
- 2 x 100/1000Base-TX/BX/FX/SX/LX SFP transceivers

Ethernet Over VDSL (EoVDSL)

- 2 x Ethernet over VDSL2 (EoVDSL) ports
- Up to 3 km (1.8 mi) LAN segments
- Symmetric data rates up to 140 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

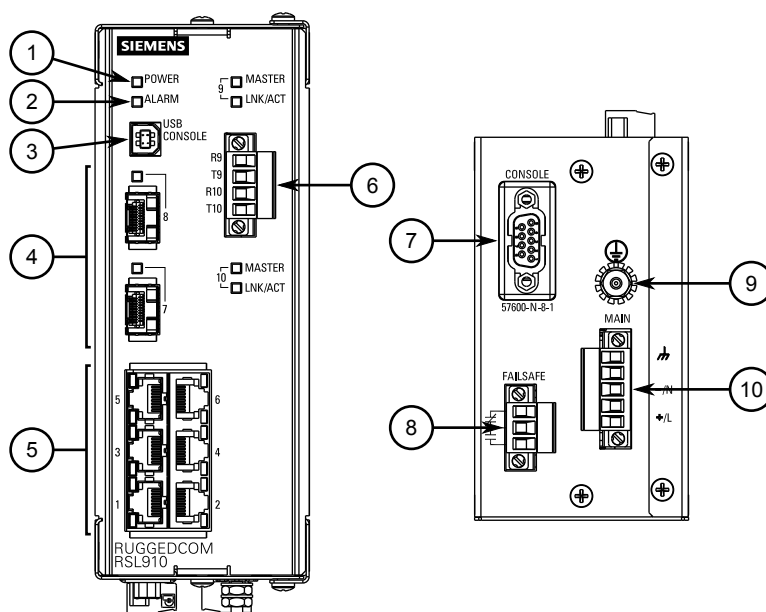
- Immunity to EMI and heavy electrical surges
- -40 to 85 °C (-40 to 185 °F) ambient operating temperature (no fans)
- 20 AWG Galvanized Steel
- DIN or panel mounting options provide secure mechanical reliability
- [Optional] Conformal coated printed circuit boards

Power Supply

- Fully integrated power supply
- Universal high-voltage range: 88-300 VDC or 85-264 VAC
- Dual LO DC inputs: 24 or 48 VDC
- Terminal blocks for reliable maintenance free connections
- CSA/UL 62368-1 safety approved to 85 °C (185 °F)

1.2 Description

The RUGGEDCOM RSL910 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 USB Console Port
- ④ [Optional] SFP (100/1000Base-TX/FX/SX/LX) Ethernet Ports
- ⑤ Copper (10/100Base-TX) Ethernet Ports
- ⑥ Universal EoVDSL Terminal
- ⑦ RS232 Console Port (Serial)
- ⑧ Failsafe Alarm Relay
- ⑨ Chassis Ground Connection
- ⑩ Power Supply Terminal Block

Figure 1.1 RUGGEDCOM RSL910

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 Ports	The console ports (serial and USB Type-B) are 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 17) .
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 21) .
Failsafe Alarm Relay	Latches to default state when a power disruption or other alarm condition occurs. For more information, refer to: • "Connecting the Failsafe Alarm Relay" (Page 12) • "Failsafe Alarm Relay Specifications" (Page 29)
Power Supply Terminal Blocks	Pluggable terminal blocks for connecting one or more power sources. For more information, refer to "Connecting Power" (Page 12) and "Power Supply Specifications" (Page 29) .

1.3 Required Tools and Materials

The following tools and materials are required to install the RUGGEDCOM RSL910:

Tools/Materials	Purpose
AC power cord (16 AWG)	For connecting power to the device.
Multi-mode and/or single-mode fiber optic cables	For connecting the device to a LAN.
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.

1.5.1 Supported Fiber Optic Cables

The following fiber optic cable types are supported under the stated conditions.

Cable Type	Wavelength (nm)	Modal Bandwidth (MHz·km)	Distance (m)		
			100Base-FX	1000Base-SX	10GBase-SR
OM1 (62.5/125)	850	200	—	275	33
	1300	500	2000	—	—
OM2 (50/125)	850	500	—	550	82
	1300	500	2000	—	—
OM3 (50/125) ^a	850	1500	—	550	300
	1300	500	2000	—	—
OM4 (50/125) ^a	850	3500	—	550	400
	1300	500	2000	—	—

^a Laser optimized.

Installing the Device

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" \(Page 35\)](#).
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 RSL910 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" \(Page 31\)](#).

2.3.1 Mounting the Device on a DIN Rail

The RUGGEDCOM RSL910 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.

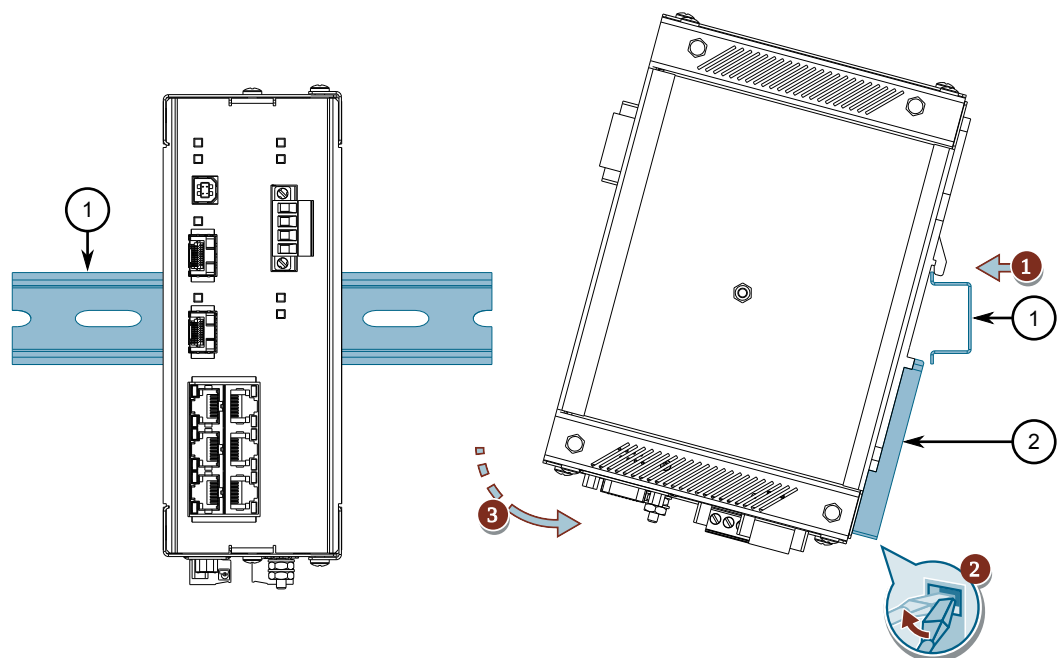
Mounting the Device

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

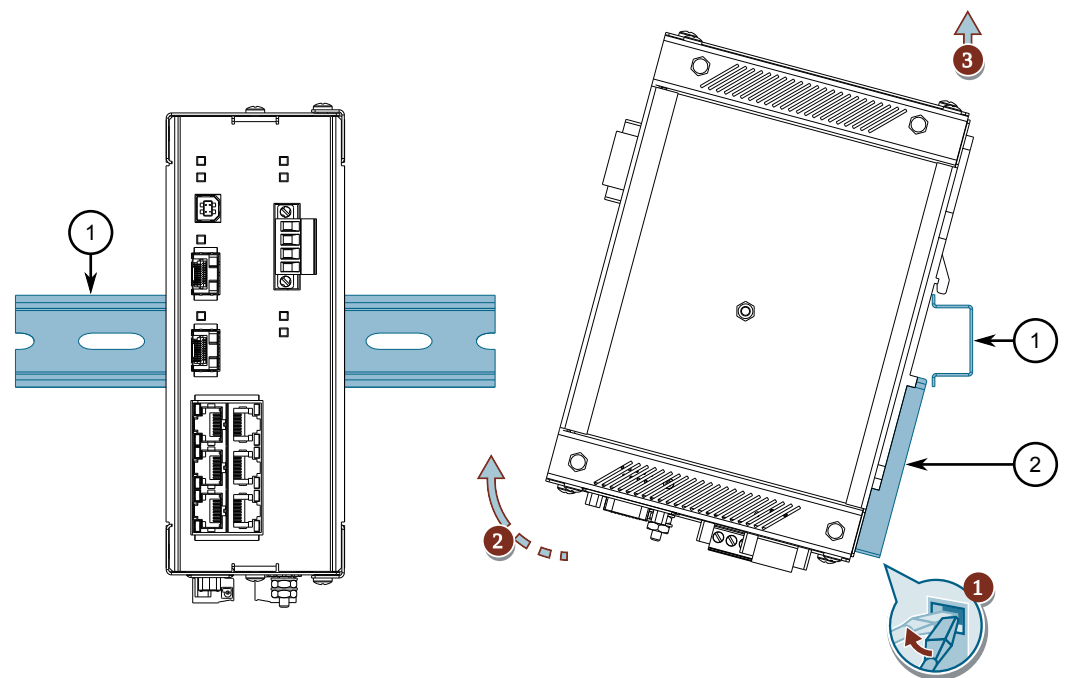
2. Insert a flathead screwdriver into the slot of the sliding release and move it down.

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

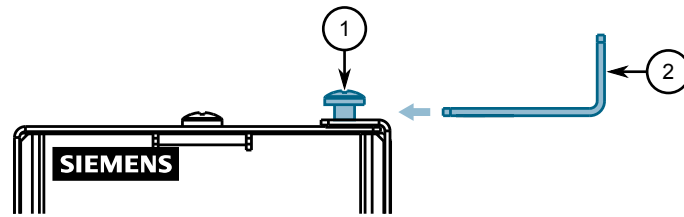
2. Swing the bottom of the device away from the DIN rail.
3. Lift the device off the DIN rail.

2.3.2 Mounting the Device to a Panel

For panel installations, the RUGGEDCOM RSL910 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:

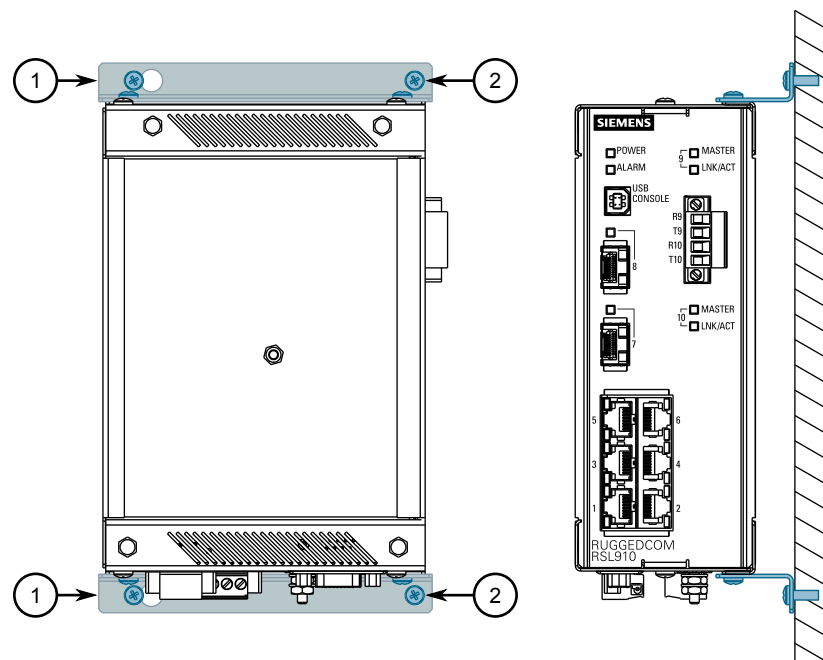
1. Loosen the top and bottom screws at the outer edge of the device.



- ① Screw (M4)
- ② Panel Mount Adapter

Figure 2.3 Panel Mount Adapter Assembly

2. Slide the supplied adapters under the screw heads and then tighten the screws.
3. Prepare mounting holes in the panel where the device is to be installed.
4. 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 2.4 Panel Mounting

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

2.4 Connecting the Failsafe Alarm Relay

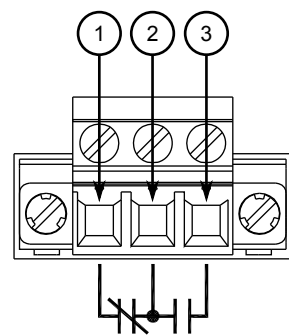
The failsafe relay can be configured to latch based on alarm conditions. The NO (Normally Open) contact is closed when the unit is powered and there are no active alarms. If the device is not powered or if an active alarm is configured, the relay opens the NO contact and closes the NC (Normally Closed)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

Note

Control of the failsafe relay output is configurable through RUGGEDCOM RSL910. 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 RSL910.

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 2.5 Failsafe Alarm Relay Wiring

2.5 Connecting Power

The RUGGEDCOM RSL910 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.

Note

Siemens requires the use of external surge protection in VDSL applications where the line may be subject to surges greater than that for which the device is rated. Use the following specifications as a guide for VDSL external surge protection:

- Clamping Voltage: 50 V to 200 V
 - Insertion Loss: < 0.1 dB at 10 MHz
 - Peak Surge Current: 10 kA, 8x20 μ s waveform
-

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
--

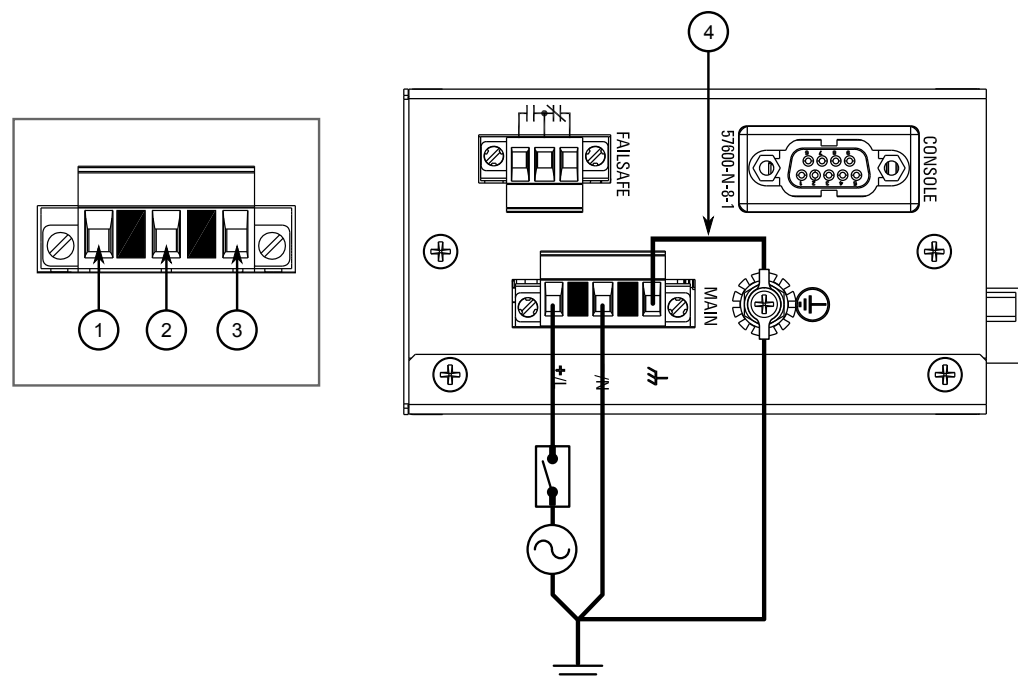
Before testing the dielectric strength (HIPOT) in the field, remove the braided ground cable connected to the surge ground terminal and chassis ground. This cable connects transient suppression circuitry to chassis ground and must be removed in order to avoid damage to transient suppression circuitry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

Note

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

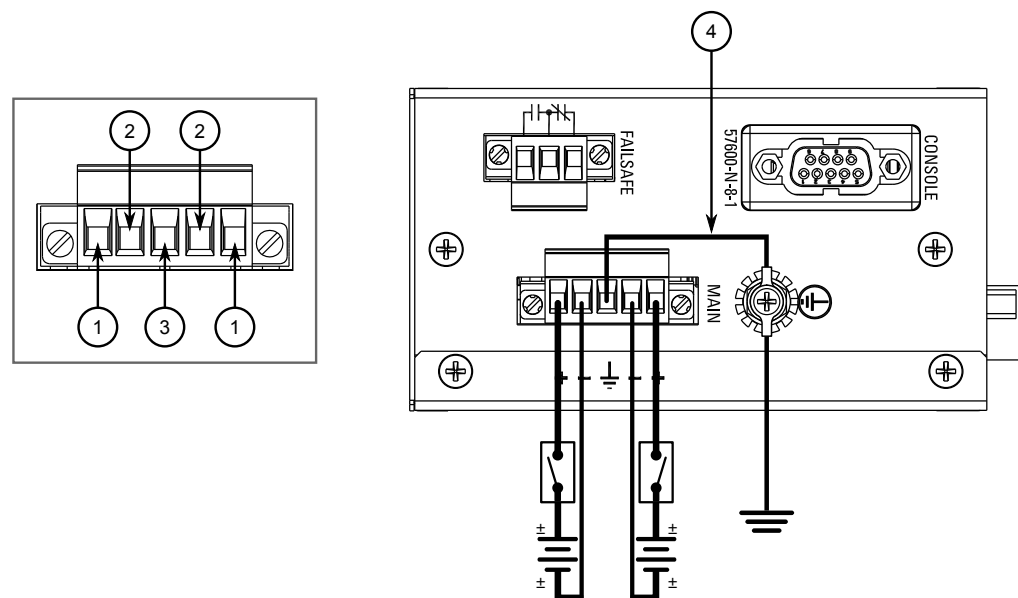
1. Secure the power terminal block to the device.
2. Connect the positive wire from the power source to the positive/live (+/L) terminal on the terminal block.

2.5.1 Connecting High AC/DC Power



- ① Positive/Live (+/L) Terminal
- ② Negative/Neutral (-/N) Terminal
- ③ Surge Ground Terminal
- ④ Braided Ground Cable

Figure 2.6 Terminal Block Wiring



- ① Positive Terminal
- ② Negative Terminal
- ③ Surge Ground Terminal

- ④ Braided Ground Cable

Figure 2.7 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 ground terminal on the terminal block.

2.5.2 Connecting Low DC Power

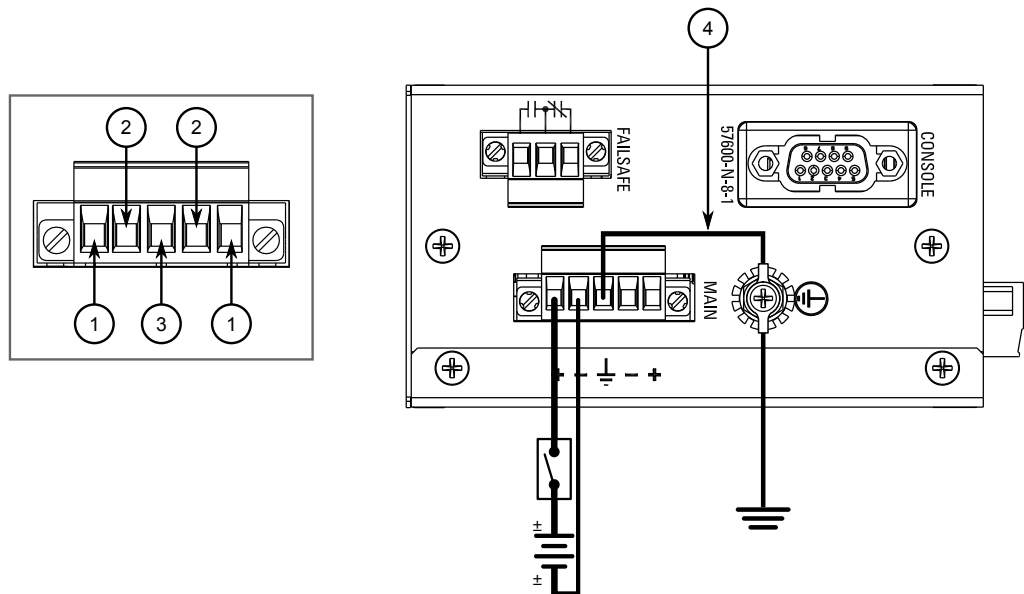
RUGGEDCOM RSL910's equipped with 24 or 48 V power supply inputs feature reverse polarity protection and dual power supply inputs allowing the device to accept redundant connections to a single DC power supply.

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).

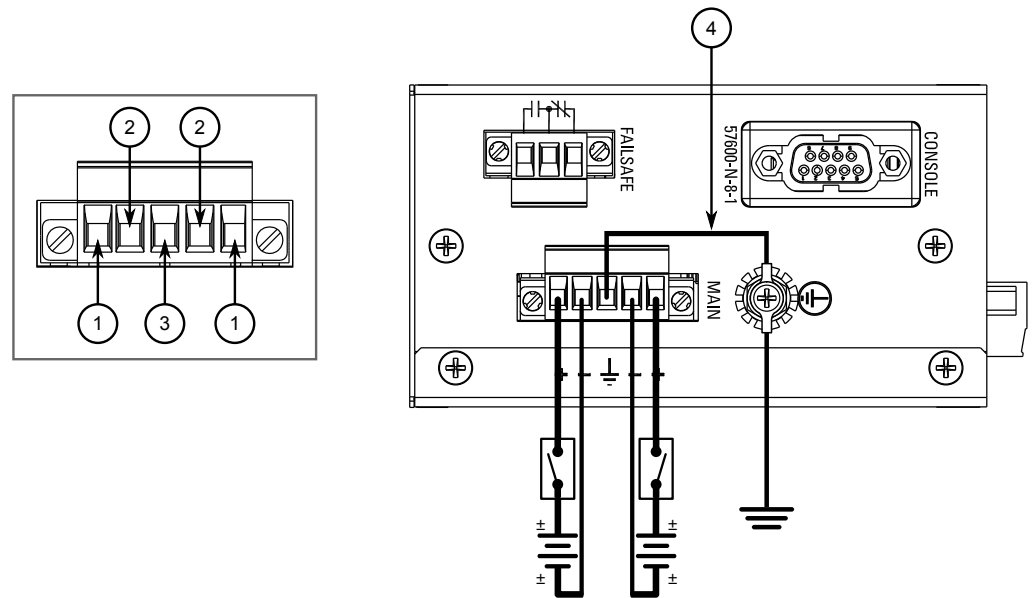
1. Secure the power terminal block to the device.
2. Connect the positive wire from the power source to the positive terminal on the terminal block.



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

Figure 2.8 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 \(Page 15\)](#) and [step 3 \(Page 16\)](#) to connect the secondary power inputs.



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

Figure 2.9 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 ground 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 RSL910 console and Web interfaces on the device. For more detailed instructions, refer to the "RUGGEDCOM ROS Configuration Manual" for the RUGGEDCOM RSL910.

Console Port

Connect a workstation directly to either the serial or USB Type-B console port to access the boot-time control and RUGGEDCOM RSL910 interfaces. The console port provides access to RUGGEDCOM RSL910's console interface.

Note

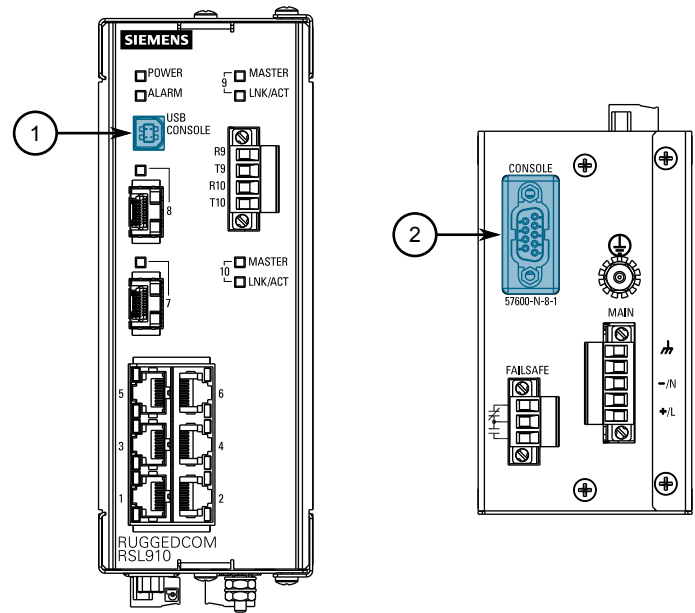
Console ports are intended to be used only as a temporary connection during initial configuration or troubleshooting.

Note

When the USB Type-B console port is in use, the serial console port will echo the console output but not accept any user input.

Note

For Microsoft Windows users, the RUGGEDCOM USB Serial Console driver must be installed on the users workstation before connecting via the USB Type-B console port. For more information, refer to the "RUGGEDCOM ROS Configuration Manual" for the RUGGEDCOM RSL910.



- ① USB Type-B Console Port
- ② Serial DB9 Console Port

Figure 3.1 Console Ports

Use the following settings to connect to either 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:

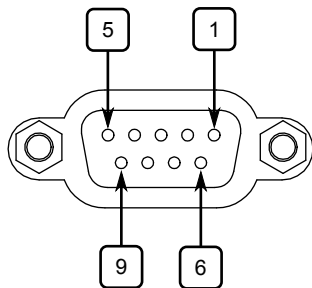


Figure 3.2 Serial DB9 Console Port

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)	

^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 RSL910 console and Web interfaces via the device's IP address. The factory default IP address for the RUGGEDCOM RSL910 is <https://192.168.0.1>.

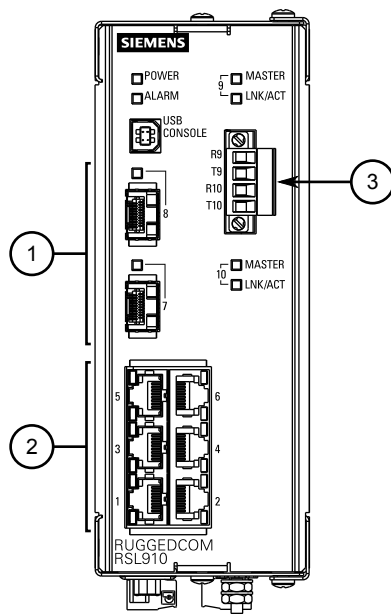
For more information about available ports, refer to "[Communication Ports](#)" (Page 21).

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 RSL910 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 RSL910 can be equipped with various types of communication ports to enhance its abilities and performance.



- ① Ports 7 and 8
- ② Ports 1 to 6
- ③ Port 9 and 10

Figure 4.1 Port Assignment

Port	Type
1 to 6	Copper Ethernet Ports (10/100Base-TX)
7 and 8	SFP Transceivers (1000Base-TX/BX/FX/SX/LX)
9 and 10	Universal EoVDSL Ports

4.1 Copper Ethernet Ports

The RUGGEDCOM RSL910 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.

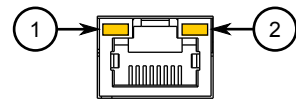
⚠ WARNING

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:

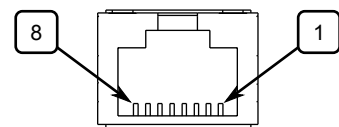


Figure 4.3 RJ45 Ethernet Port Pin Configuration

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" \(Page 30\)](#).

4.2 EoVDSL Ports

The RUGGEDCOM RSL910 features a pluggable terminal block that supports up to two Universal EoVDSL connections. Universal EoVDSL connections are Master/Slave selectable and offer symmetric data rates up to 140 Mbps (with a VDSL link data rate up to 100 Mbps) or distances up to 3 km (1.8 mi).

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*.

NOTICE

Universal EoVDSL ports (master or slave) must be connected to other Universal EoVDSL ports (slave or master). Connections between Universal EoVDSL and Long-Reach EoVDSL ports is not supported.

LEDs

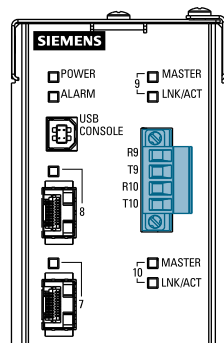
Each set of EoVDSL terminals is associated with a set of **Link/Act** and **Master** LEDs. The **Link/Act** LED indicates the state of the port, as well as the Signal-to-Noise Ratio (SNR). The **Master** LED indicates whether the device is a Master or Slave.

LED	State	Description
Link/Act	Green (Solid)	Link established and the SNR is 6 to 30 dB
	Green (Slow Blinking)	No link established
	Green (Fast Blinking)	Link activity
	Orange (Solid)	Link established and the SNR is less than 6 dB
	Off	VDSL port is disabled

LED	State	Description
Master	Green (Solid)	The device is in Master mode.
	Off	The device is in Slave mode.

Pin-Out

The following is the pin-out for the EoVDSL terminal block:



Terminal	Description
R9	Receive on Port 9
T9	Transmit from Port 9
R10	Receive on Port 10
T10	Transmit from Port 10

Figure 4.4 EoVDSL Terminal Block

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 terminals, note the following:

- EoVDSL terminals 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 RSL910 and another device both have Universal EoVDSL ports, configure one device to be the Master and the other the Slave.

Once configured and connected together, each device will attempt to achieve the maximum speed based on the line length and conditions. The RUGGEDCOM RSL910'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 RSL910, refer to the "RUGGEDCOM ROS Configuration Manual" for the RSL910.

4.2.3 EoVDSL Performance

The following describes the behavior and performance characteristics of EoVDSL.

Bit Rates

The EoVDSL terminals can be configured to use a specific bit rate for downstream and upstream communications (e.g. 140/140 Mbps, 85/85 Mbps, etc.), or to determine the optimal bit rate automatically based on the current line conditions.

When a specific bit rate is selected, the device will only attempt to attain the selected speed.

Signal Degradation

An EoVDSL terminal in Master mode can be configured to automatically scan the available VDSL profiles for a more optimal link. The terminal can be configured to initiate the scan when the link goes down to alert users to the lost connection.

Note

If the EoVDSL terminal is set to achieve a specific bit rate, the device will only select links that can achieve the selected bit rate.

Note

Assuming the distance can support the speed setting, the time to establish a link is typically 120 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)	SNR (dB)
0.9 m (3 ft)	140/140	10
305 m (1000 ft)	85/85	10
610 m (2000 ft)	35/35	10
1219 m (4000 ft)	11/11	10
2438 m (8000 ft)	2.4/2.4	10
3048 m (10000 ft)	1.2/1.2	10
3353 m (11000 ft)	0.5/0.5	10

Data Rates vs. SNR Margin

The following typical data rates are achievable with the corresponding Signal-to-Noise ratio, at a fixed cable length of 0.9m (3ft).

Distance	Downstream/Upstream (Mbps)	SNR (dB)
0.9 m (3 ft)	140/140	10
0.9 m (3 ft)	120/120	15.3
0.9 m (3 ft)	100/100	19.8
0.9 m (3 ft)	85/85	23.6
0.9 m (3 ft)	55/55	29.8
0.9 m (3 ft)	35/35	34.6
0.9 m (3 ft)	25/25	37.3
0.9 m (3 ft)	11/11	38.3
0.9 m (3 ft)	4.7/4.7	41.7
0.9 m (3 ft)	2.4/2.4	42.8
0.9 m (3 ft)	1.2/1.2	43.4
0.9 m (3 ft)	0.5/0.5	43.8
0.9 m (3 ft)	0.2/0.2	44

4.3 SFP Transceivers

The RUGGEDCOM RSL910 supports up to two Small Form-Factor Pluggable (SFP) transceiver sockets, which are compatible with a wide array of SFP transceivers available from Siemens.

LEDs

Each socket features an LED that indicates its link state.

State	Description
Yellow (Solid)	Link established

State	Description
Yellow (Blinking)	Activity
Off	No link detected

Compatible SFP Transceivers

For more information about which SFP transceivers are compatible with the RUGGEDCOM RSL910, as well as instructions for ordering and installation/removal, refer to the "[RUGGEDCOM SFP Transceiver Catalog \[https://support.industry.siemens.com/cs/ca/en/view/109482309\]](https://support.industry.siemens.com/cs/ca/en/view/109482309)".

Note

Only use SFP transceivers approved by Siemens for RUGGEDCOM products. Siemens accepts no liability as a result of performance issues related in whole or in part to third-party components.

Technical Specifications

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	12 W
	85 VAC	264 VAC	3.15 A(T)	5.5 kVDC	12 W
24	10 VDC	36 VDC	3.15 A(T)	1.5 kVDC	12 W
48	37 VDC	72 VDC	3.15 A(T)	1.5 kVDC	12 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 RSL910:

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

5.4 Copper Ethernet Port Specifications

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 RSL910.

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	1.5 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 RSL910 is rated to operate under the following environmental conditions.

Ambient Operating Temperature^{ab}	-40 to 85 °C (-40 to 185 °F)
Ambient Storage Temperature	-40 to 85 °C (-40 to 185 °F)
Ambient Relative Humidity^c	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 Operating temperature may vary based on the limitations of installed SFPs. Refer to the "RUGGEDCOM SFP Transceivers Catalog" for SFP temperature ratings.

^c Non-condensing.

5.6 Mechanical Specifications

Weight	1.2 kg (2.7 lbs)
Ingress Protection	IP30
Enclosure	20 AWG Galvanized Steel

5.7 Dimension Drawings

Note

All dimensions are in millimeters, unless otherwise stated.

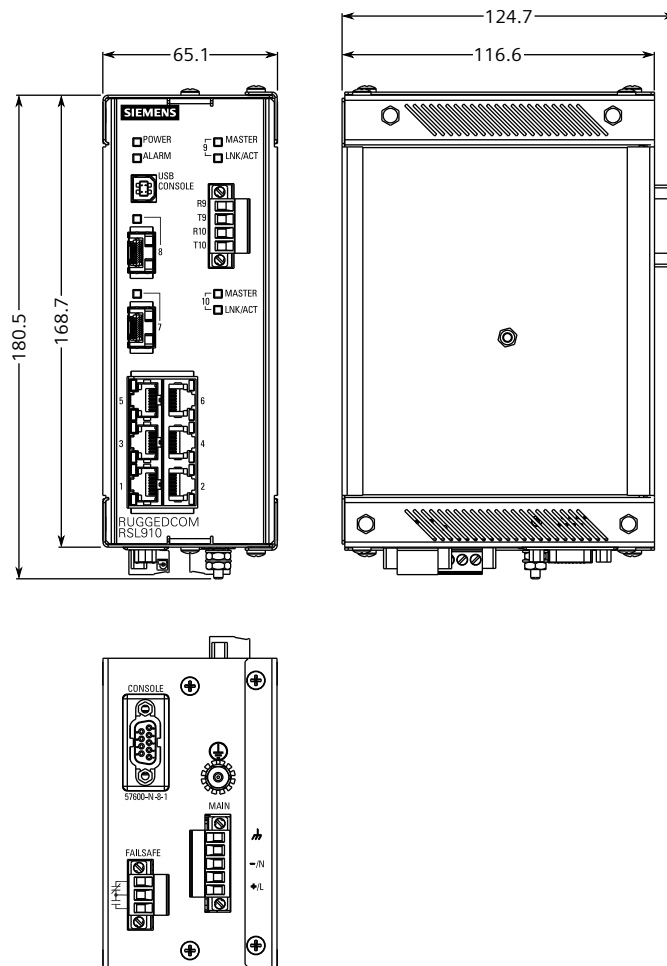


Figure 5.1 Overall Dimensions

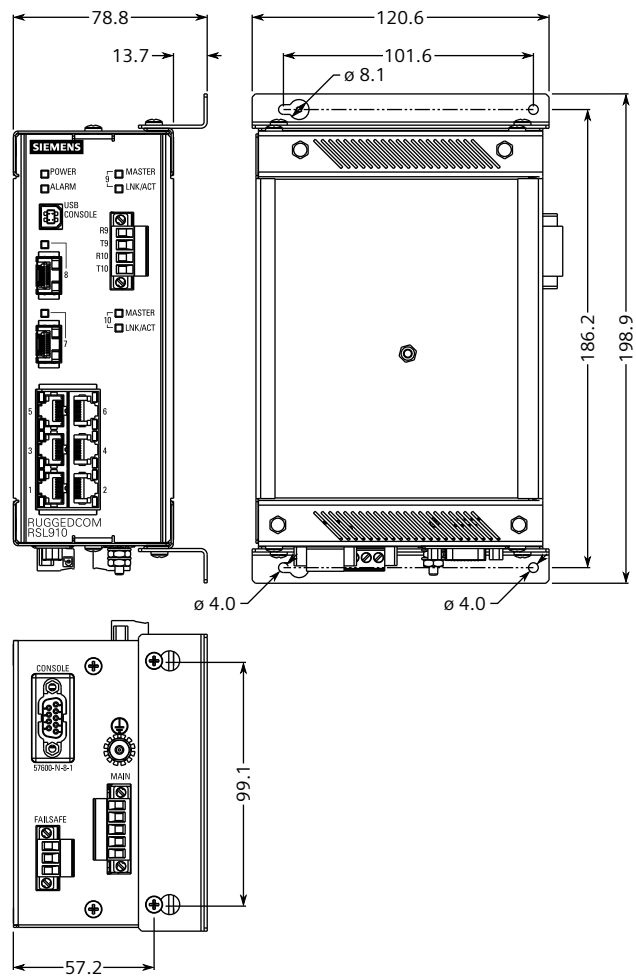


Figure 5.2 Panel Mount Dimensions

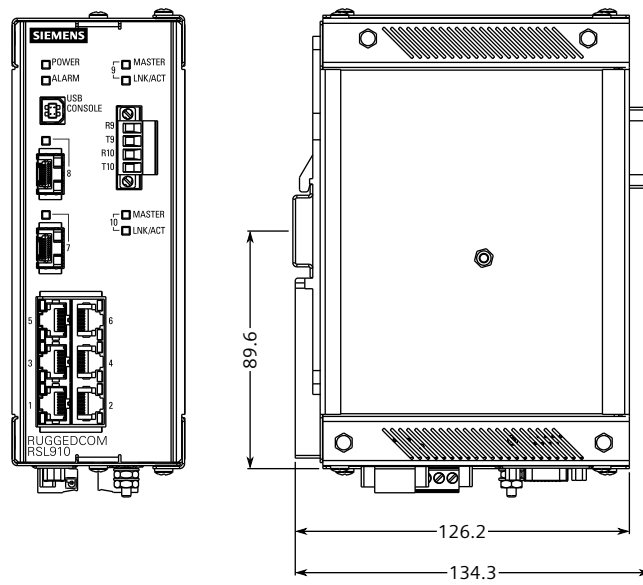


Figure 5.3 DIN Rail Mount Dimensions

Certification

The RUGGEDCOM RSL910 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 RSL910 complies.

Note

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

6.1.1 UKCA

This device is certified for use in Great Britain and bears the United Kingdom Certified Assessed (UKCA) marking. The marking is printed on the body of the device, along with the identification number of the notified body.



6.1.2 CSA

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

This device meets the requirements of the following Canadian Standards Association (CSA) 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

6.1.3 European Union (EU)

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



6.1.3 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.



6.1.4 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.

6.1.5 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

6.1.6 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)

6.1.7 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

6.1.8 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

6.1.9 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

- **EN 50121-3-2**

Railway applications – Electromagnetic Compatibility – Rolling Stock Apparatus

- **NEMA TS-2**

Traffic Controller Assemblies with NTCIP Requirements

6.2 EMC and Environmental Type Tests

The RUGGEDCOM RSL910 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	± 6 kV	3
		Enclosure Air	± 8 kV	3
IEC 61000-4-3	Radiated RFI	Enclosure Ports	10 and 20 V/m	3
IEC 61000-4-4	Burst (Fast Transient)	Signal Ports	± 2 kV	4
		DC Power Ports	± 2 kV	3

6.2 EMC and Environmental Type Tests

Test	Description		Test Levels	Severity Levels
IEC 61000-4-5	Surge	AC Power Ports	± 2 kV	3
		Earth Ground Ports	± 1 kV	2
		Signal Ports	± 2 kV	2
		DC Power Ports	± 2 kV Line-to-Ground ± 1 kV Line-to-Line	1
		AC Power Ports	± 2 kV Line-to-Ground ± 1 kV Line-to-Line	2
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	30 A/m	
IEC 61000-4-11	Voltage Dips and Interrupts	AC Power Ports	30% for 25 Periods 60% for 10 Periods 100% for 1 Period	

Environmental Type Tests

Test	Description		Test Levels	Severity Levels
IEC 60068-2-1	Cold Temperature	Test Ae	-40 °C (-40 °F), 16 Hours	
IEC 60068-2-2	Dry Heat	Test Be	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>

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