SIEMENS

# RUGGEDCOM RS910

Installation Guide




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RC1029-EN-03

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# Table of Contents

# Preface

This guide describes the RUGGEDCOM RS910. 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.

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## Alerts

The following types of alerts are used when necessary to highlight important information.

**DANGER!**
*DANGER alerts describe imminently hazardous situations that, if not avoided, will result in death or serious injury.*

**WARNING!**
*WARNING alerts describe hazardous situations that, if not avoided, may result in serious injury and/or equipment damage.*

**CAUTION!**
*CAUTION alerts describe hazardous situations that, if not avoided, may result in equipment damage.*

**IMPORTANT!**
*IMPORTANT alerts provide important information that should be known before performing a procedure or step, or using a feature.*

**NOTE**
*NOTE alerts provide additional information, such as facts, tips and details.*

## Related Documents

Other documents that may be of interest include:

- *RUGGEDCOM ROS User Guide* for the RUGGEDCOM RS910

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The latest user documentation for RUGGEDCOM RS910 v  is available online at www.siemens.com/ruggedcom. To request or inquire about a user document, contact Siemens Customer Support.

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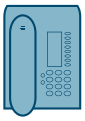

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- Submit SRs or check on the status of an existing SR
- Contact a local Siemens representative from Sales, Technical Support, Training, etc.
- Ask questions or share knowledge with fellow Siemens customers and the support community

# 1 Introduction

The RUGGEDCOM RS910 is a utility grade serial device server with an integrated, fully managed Ethernet switch, designed to operate reliably in electrically harsh and climatically demanding environments.

The RUGGEDCOM RS910 is able to interconnect multiple types of Intelligent Electronic Devices (IEDs) that have different methods of communications. Using the RUGGEDCOM RS910 extends the useful life of existing legacy IEDs, minimizing capital expenditure for new equipment.

The RUGGEDCOM RS910 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) coupled with optional conformal coating and a galvanized steel enclosure allows the RUGGEDCOM RS910 to be placed in almost any location.

The RUGGEDCOM RS910 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 RS910'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.

**CONTENTS**



Section 1.1

## Feature Highlights

**Serial Device Server**

- Baud rates up to 230 kbps
- Transmit serial data over an IP network
- RS485/RS422/RS232 Serial Ports (DB9 or RJ45 connectors)
- [Optional] Serial Fiber Interface (ST)
- Direct support for Modbus TCP, DNP 3, TIN serial protocols
- Raw socket mode allows conversion of any serial protocol
- Point-to-Point (P2P) and multi-point modes
- Converts Modbus RTU to Modbus
- Multiple Modbus masters
- Converts DNP3.0 to DNP over UDP/TCP

**Ethernet Ports**

- Multi-mode and single-mode optical transceivers

- Integrated fully managed Ethernet switch
- Industry standard fiber optical connectors: LC, SC, ST, MTRJ

**Rated for Reliability in Harsh Environments**

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

**Universal Power Supply Options**

- Fully integrated power supply
- Universal high-voltage range: 88-300 VDC or 85-264 VAC
- Dual low-voltage DC inputs: 24 VDC or 48 VDC
- Terminal blocks for reliable maintenance free connections
- CSA/UL 60950-1 safety approved to 85 °C (185 °F)

Section 1.2

# Description

The RUGGEDCOM RS910 features various ports, controls and indicator LEDs on the front panel for connecting, configuring and troubleshooting the device.

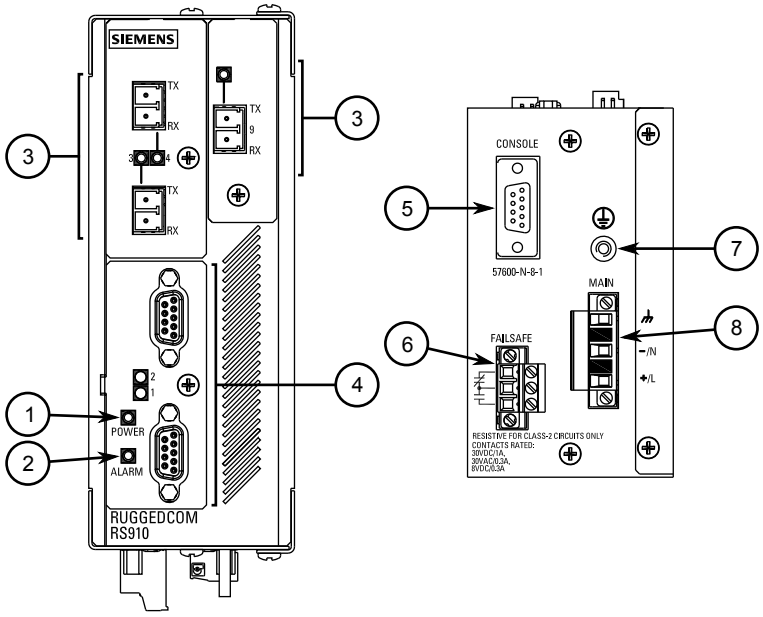


**Figure 1: RUGGEDCOM RS910**

**1.** POWER LED **2.** ALARM LED **3.** [Optional] Copper (10/100Base-TX) or Fiber Optic (100Base-FX) Ethernet Ports **4.** Serial Ports **5.** RS232 Console Port (Serial) **6.** Failsafe Alarm Relay **7.** Chassis Ground Connection **8.** Power Supply Terminal Block

| | |
|---|---|
| **POWER LED** | Illuminates when power is supplied to the device. |
| **ALARM LED** | Illuminates when an alarm condition exists. |
| **RS232 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 Section 2.5, "Connecting to the Device" . |
| **Communication Ports** | Receive and transmit data, as well as provide access to the RUGGEDCOM ROS Web interface. For more information about the various ports available for the RUGGEDCOM RS910, refer to Chapter 3, *Communication Ports* . |
| **Failsafe Alarm Relay** | Latches to default state when a power disruption or other alarm condition occurs. For more information, refer to:<br>• Section 2.4, "Connecting the Failsafe Alarm Relay"<br>• Section 4.2, "Failsafe Relay Specifications" |
| **Power Supply Terminal Block** | A pluggable terminal block. For more information, refer to Section 2.3, "Connecting Power" and Section 4.1, "Power Supply Specifications" . |

# 2 Installing the Device

The following sections describe how to install the device, including mounting the device, installing/removing modules, 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.*

**IMPORTANT!**
*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.*

**IMPORTANT!**
*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.*

The general procedure for installing the device is as follows:

1. Mount the device to a DIN rail or panel.
2. Connect power to the device and ground the device to safety Earth.
3. Connect the failsafe alarm relay.
4. Connect the device to the network.

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Section 2.1
# Required Tools and Materials

The following tools and materials are required to install the RUGGEDCOM RS910:

| Tools/Materials | Purpose |
|---|---|
| AC power cord (16 AWG) | For connecting power to the device. |
| CAT-5 Ethernet cables | For connecting the device to the network. |
| 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. |

Section 2.2
# Mounting the Device

The RUGGEDCOM RS910 is designed for maximum mounting and display flexibility. It can be equipped with adapters that allow it to be installed on a 35 mm (1.4 in) DIN rail or affixed to a panel.

**NOTE**
*For detailed dimensions of the device with either DIN rail or panel hardware installed, refer to Chapter 5, Dimension Drawings .*

**CONTENTS**



Section 2.2.1
## Mounting the Device on a DIN Rail

For DIN rail installations, the RS910 can be equipped with a DIN rail bracket pre-installed on the back of the chassis. The bracket allows the device to be slid onto a standard 35 mm (1.4 in) DIN rail.

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

1. Align the slot in the bracket with the DIN rail.

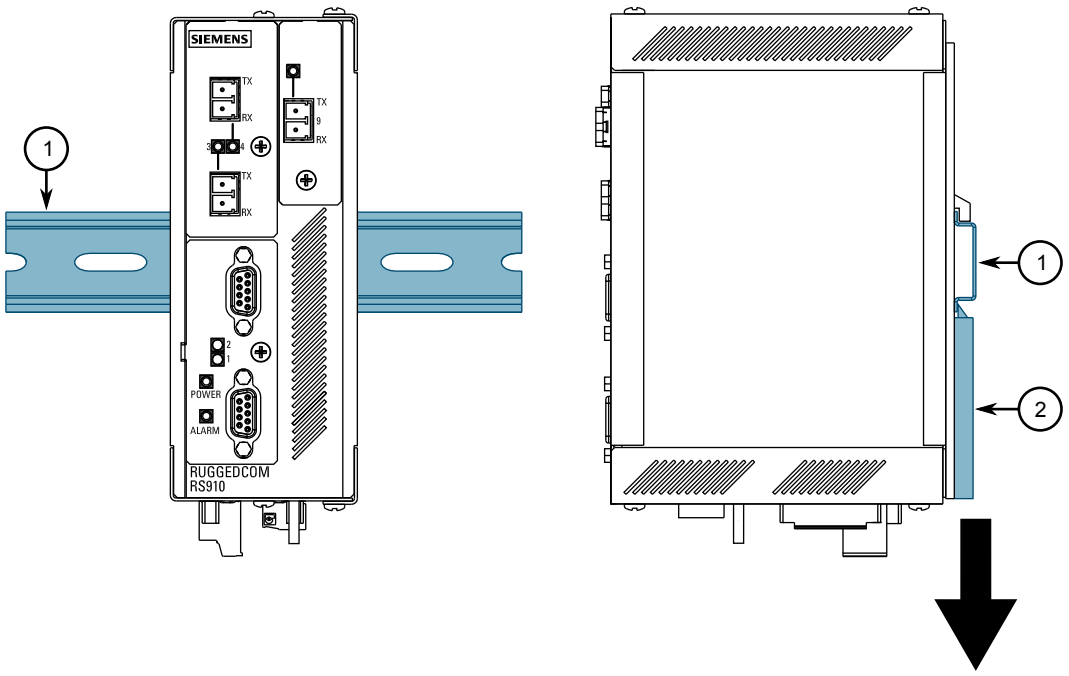


**Figure 2: DIN Rail Mounting**

**1.** DIN Rail **2.** DIN Rail Bracket

2. Pull the release on the bracket down and slide the device onto the DIN rail. Let go of the release to lock the device in position. If access to the release is limited, use a slotted screwdriver or a similar tool to reach the release.

Section 2.2.2

# Mounting the Device to a Panel

For panel installations, the RUGGEDCOM RS910 can be equipped with panel adapters pre-installed 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.

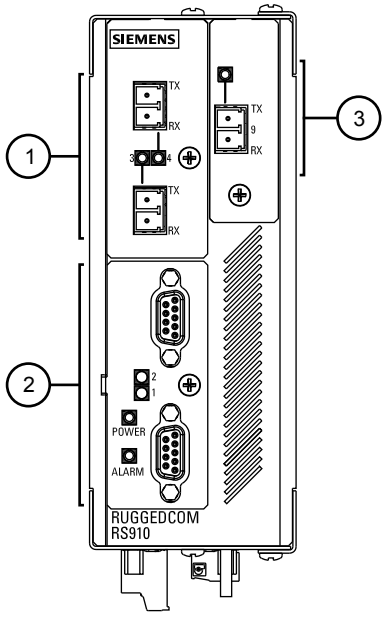


**Figure 3: Panel Mounting**

**1.** Screw **2.** Panel Mount Adapter

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

Section 2.3

# Connecting Power

The RUGGEDCOM RS910 supports power input from a single high AC/DC or low DC power supply.

**IMPORTANT!**

- *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 only #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.*

**CONTENTS**

- Section 2.3.2, “Connecting Low DC Power”

Section 2.3.1

# Connecting High AC/DC Power

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

**CAUTION!**
*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.*

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

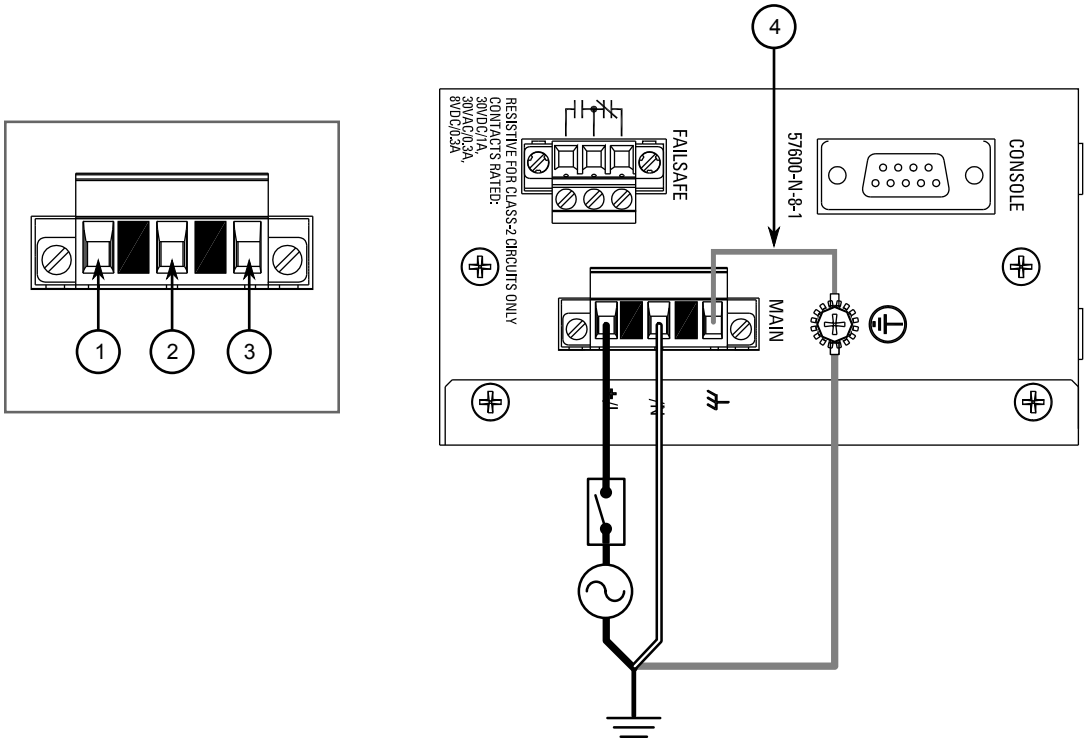


**Figure 4: Terminal Block Wiring**

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

2. Connect the negative wire from the power source to the negative/neutral (-/N) terminal on the terminal block.
3. 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.
4. Connect the ground terminal on the power source to the chassis ground terminal on the device.

Section 2.3.2
# Connecting Low DC Power

RUGGEDCOM RS910'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. Connect the positive wire from the power source to the positive terminal on the terminal block.

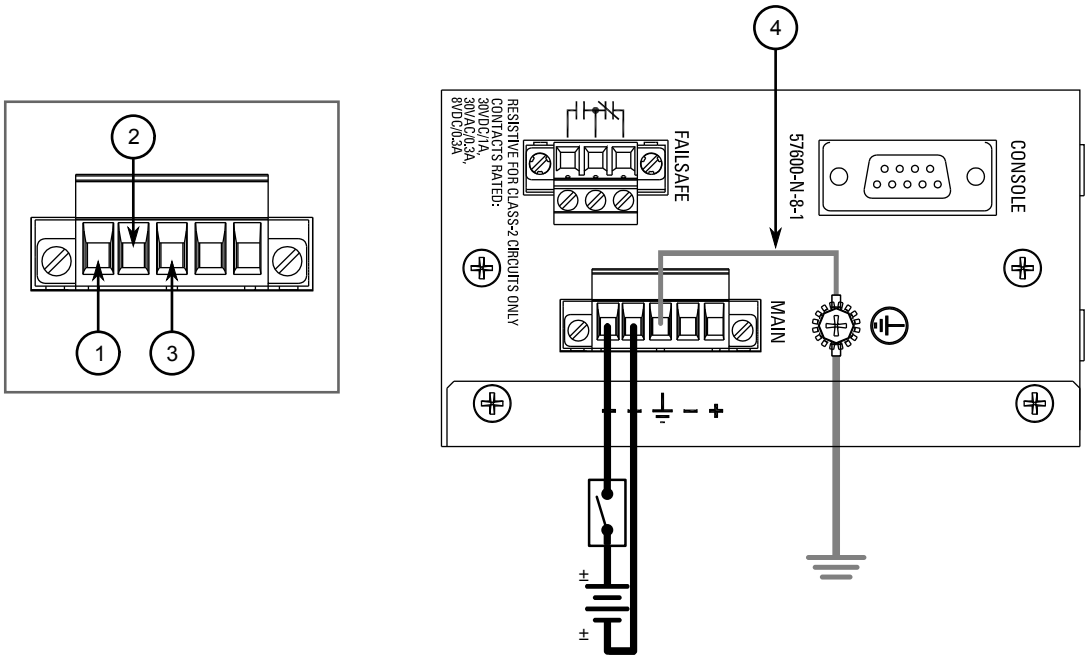


**Figure 5: Terminal Block Wiring - Single DC Power Supply Inputs**

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

2. Connect the negative wire from the power source to the negative terminal on the terminal block.
3. [Optional] If a redundant connection is required, repeat steps Step 1 and Step 2 to connect the secondary power inputs.

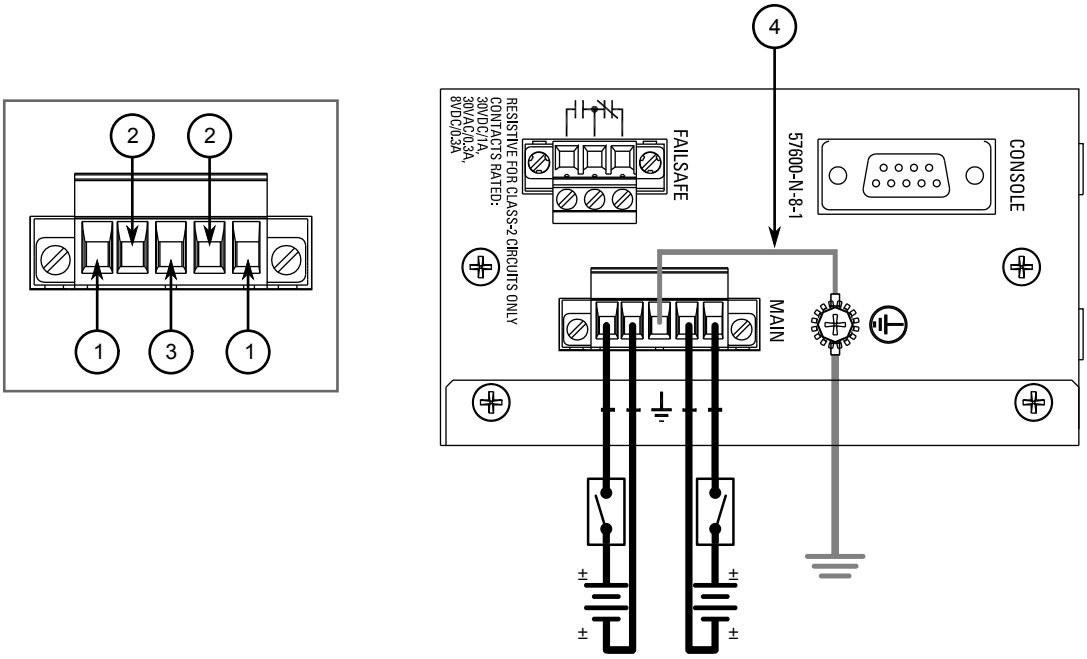


**Figure 6: Terminal Block Wiring - Dual DC Power Supply Inputs**

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

4. 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.
5. Connect the ground terminal on the power source to the chassis ground terminal on the device.

Section 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 ROS. One common application for this relay is to signal an alarm if a power failure occurs. For more information, refer to the ROS User Guide for the RUGGEDCOM RS910.*

The following shows the proper relay connections.

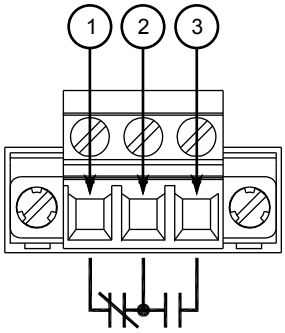


**Figure 7: Failsafe Alarm Relay Wiring**

**1.** Normally Closed **2.** Common **3.** Normally Open

Section 2.5

# Connecting to the Device

The following describes the various methods for accessing the ROS console and Web interfaces on the device. For more detailed instructions, refer to the *ROS User Guide* for the RUGGEDCOM RS910.

**IMPORTANT!**
*Ethernet cables should be only be connected/disconnected in a non-hazardous area, or when the device is not energized.*

## RS232 Console Port

Connect a workstation directly to the RS232 serial console port to access the boot-time control and ROS console interface.

**IMPORTANT!**
*The serial console port is intended to be used only as a temporary connection during initial configuration or troubleshooting.*

## Pin-Out

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

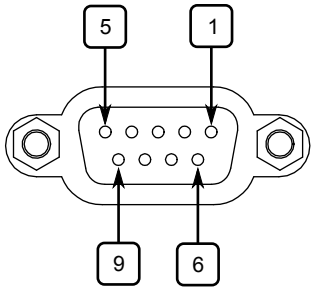


**Figure 8: Serial DB9 Console Port**

| 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.*

### Communication Ports

Connect any of the available Ethernet ports on the device to a management switch and access the RUGGEDCOM ROS console and Web interfaces via the device's IP address. The factory default IP address for the RUGGEDCOM RS910 is https://192.168.0.1 .

For more information about available ports, refer to Chapter 3, *Communication Ports* .

Section 2.6

# 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.

# 3 Communication Ports

The RUGGEDCOM RS910 can be equipped with various types of communication ports to enhance its abilities and performance.

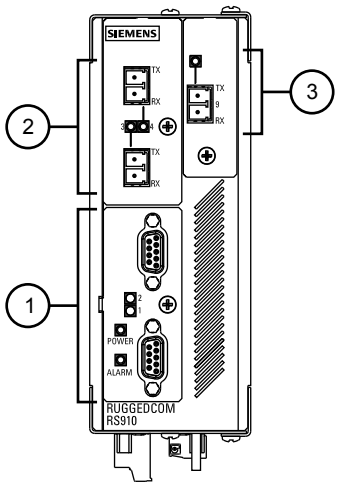


**Figure 9: Port Assignment**

**1.** Ports 1 and 2 **2.** Ports 3 and 4 **3.** Port 9

| Port | Type |
|---|---|
| 1 and 2 | Serial Ports |
| 3 and 4 | Copper (10/100Base-TX) or Fiber Optic (10/100Base-FX) Ethernet Ports |
| 9 | Fast Ethernet Port (10/100Base-TX or 10/100Base-FX) |

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Section 3.1

## Copper Ethernet Ports

The RUGGEDCOM RS910 supports multiple 10/100Base-TX Ethernet ports that allow connection to standard Category 5 (CAT-5) unshielded twisted-pair (UTP) cables with RJ-45 male connectors. The RJ-45 receptacles are directly connected to the chassis ground on the device and can accept CAT-5 shielded twisted-pair (STP) cables.

**WARNING!**
*Electric shock hazard – risk of serious personal injury and/or equipment interference. If shielded cables are used, make sure the shielded cables do not form a ground loop via the shield wire and the RJ-45 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.

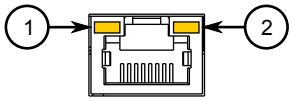


**Figure 10: RJ45 Port LEDs**

**1.** Speed LED **2.** Link/Activity LED

| 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 RJ-45 male connectors:

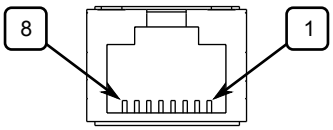


**Figure 11: RJ-45 Ethernet Port Pin Configuration**

| Pin | Name | Description |
|---|---|---|
| 1 | RX+ | Receive Data+ |
| 2 | RX- | Receive Data- |
| 3 | TX+ | Transmit Data+ |
| 4 | Reserved (Do Not Connect) | |
| 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 Section 4.3, “Copper Ethernet Port Specifications” .

Section 3.2

# Fiber Optic Ethernet Ports

Fiber optic Ethernet ports are available with either MTRJ (Mechanical Transfer Registered Jack), LC (Lucent Connector), SC (Standard or Subscriber Connector) or ST (Straight Tip) connectors. Make sure the Transmit (Tx) and Receive (Rx) connections of each port are properly connected and matched to establish a proper link.

## Port Types

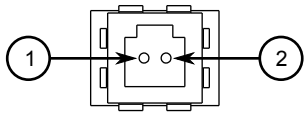


**Figure 12: MTRJ Port**

**1.** Tx Connector **2.** Rx Connector

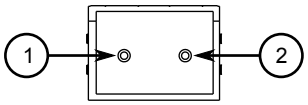


**Figure 13: LC Port**

**1.** Tx Connector **2.** Rx Connector

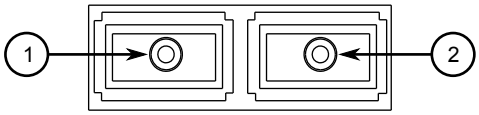


**Figure 14: SC Port**

**1.** Tx Connector **2.** Rx Connector

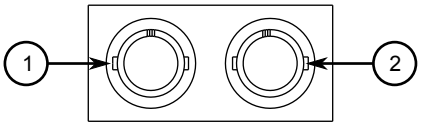


**Figure 15: ST Port**

**1.** Tx Connector **2.** Rx Connector

## LEDs

Each port features an LED that indicates the link/activity state of the port.

| State | Description |
|---|---|
| Yellow (Solid) | Link established |
| Yellow (Blinking) | Link activity |
| Off | No link detected |

## Specifications

For specifications on the available fiber optic Ethernet ports, refer to Section 4.4, “Fiber Optic Ethernet Port Specifications” .

Section 3.3
# Serial Ports

The RUGGEDCOM RS910 supports DB9, RJ-45 and ST (Straight Tip) fiber serial ports, all of which can be run in RS232, RS485 or RS422 mode.

**NOTE**
*On power-up, all serial ports default to RS485 mode. Each port can be individually set to RS232, RS485 or RS422 mode through RUGGEDCOM ROS. For more information, refer to the RUGGEDCOM ROS User Guide for the RUGGEDCOM RS910.*

## LED

All serial ports feature an LED that indicates the current state of the port.

| State | Description |
|---|---|
| Green | Link activity detected |
| Off | No link detected |

## Pin-Out

The following are the pin-outs for the DB9, RJ-45 and SC connectors:

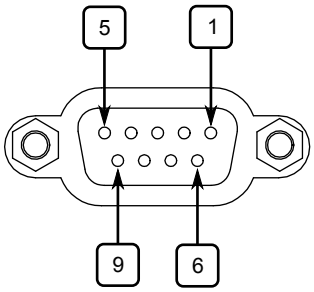


**Figure 16: Serial DB9 Port**

| Pin[a] | RS232 Mode | RS485 Mode | RS422 Mode |
|---|---|---|---|
| 1[b] | DCD | | |
| 2 | TX | TX/RX+ | TX+ |
| 3 | RX | | RX+ |
| 4[b] | DTR | | |
| 5 | Common (Isolated Ground)[c] | | |
| 6[b] | DSR | | RX- |
| 7[d] | CTS[e] | TX/RX- | TX- |
| 8[d] | RTS[e] | | |
| 9 | RI (No Connection) | | |
| Shield | Chassis Ground | | |

[a] *No internal termination is provided.*

[b] *Connected internally.*

[c] *The Common terminal is isolated. However, there is transient voltage protection circuitry between the Common terminal and chassis ground.*

[d] *Cnnected internally.*

[e] *In RS232 mode, this pin enters a high impedance state. A DTE that asserts RTS will see CTS asserted, although the device will not perform hardware flow control.*

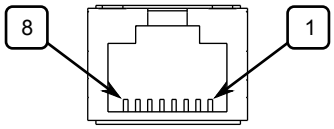


**Figure 17: Serial RJ-45 Port**

| Pin[f] | RS232 Mode | RS485 Mode | RS422 Mode |
|---|---|---|---|
| 1[g] | DSR/RI | | RX- |
| 2[g] | DCD | | |
| 3[h] | DTR | | |
| 4 | Common (Isolated) Ground | | |
| 5 | RX | | RX+ |
| 6 | TX | TX/RX+ | TX+ |
| 7[h] | CTS[i] | | |
| 8[h] | RTS[i] | TX/RX- | TX- |
| Shield | Chassis Ground | | |

[f] *No internal termination is provided.*

[g] *Connected internally.*

[h] *Connected internally.*

[i] *In RS232 mode, this pin enters a high impedance state. A DTE that asserts RTS will see CTS asserted, although the device will not perform hardware flow control.*

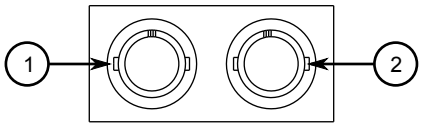


**Figure 18: Serial ST Fiber Port**

**1.** Rx Connector **2.** Tx Connector

### More Information

For specifications on serial ports, refer to Section 4.5, “Serial Port Specifications” .

For information about how to connect devices configured to run in RS485 mode, refer to Section 3.4, “Connecting Multiple RS485 Devices” .

Section 3.4

# Connecting Multiple RS485 Devices

Each RS485 port can communicate with multiple RS485 devices by wiring devices together in sequence over a single twisted pair with transmit and receive signals on the same two wires (half duplex). For reliable, continuous communication, adhere to the following guidelines:

- To minimize the effects of ambient electrical noise, use shielded cabling.
- The correct polarity must be observed throughout a single sequence or ring.
- The number of devices wired should not exceed 32, and total distance should be less than 1219 m (4000 ft) at 100 kbps.
- The Common terminals should be connected to the common wire inside the shield.

- The shield should be connected to earth ground at a single point to avoid loop currents.
- The twisted pair should be terminated at each end of the chain.

The following shows the recommended RS485 wiring.

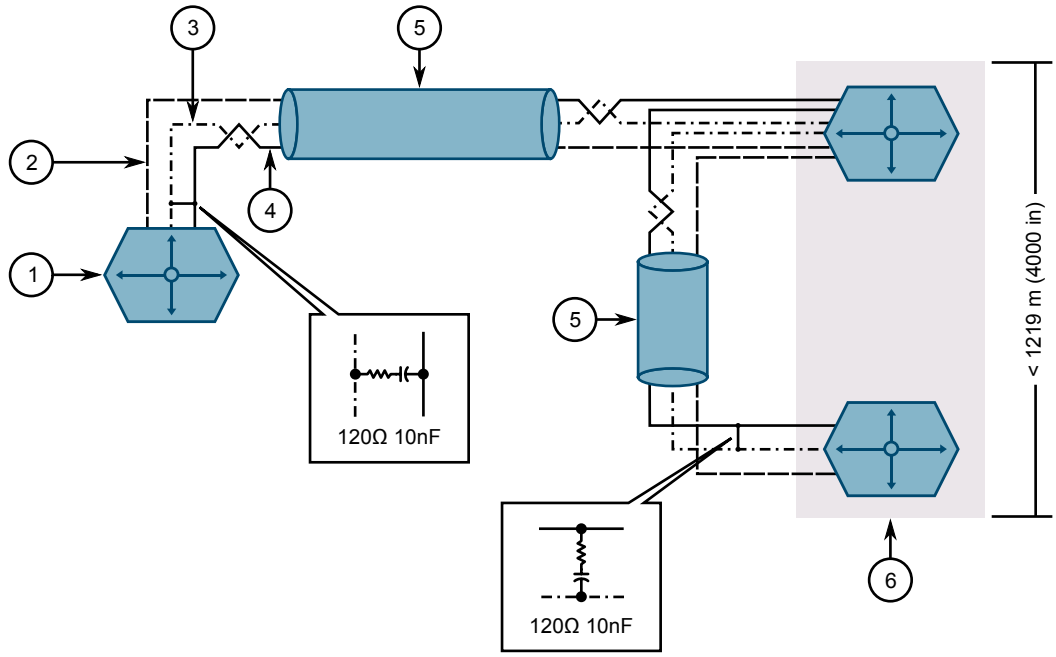


**Figure 19: Recommended RS485 Wiring**

**1.** RUGGEDCOM RS910 Device **2.** Common (Isolated Ground) **3.** Negative **4.** Positive **5.** Shield to Earth (Connected At a Single Point) **6.** RS485 Devices (32 Total)

# 4 Technical Specifications

This section provides important technical specifications related to the device.

CONTENTS



Section 4.1

## Power Supply Specifications

| Power Supply Type | Input Range | | 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 | | 5.5 kVDC | |
| 24 | 10 VDC | 36 VDC | | 1.5 kVDC | |
| 48 | 37 VDC | 72 VDC | | 1.5 kVDC | |

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

[b] *Power consumption varies based on configuration.*

Section 4.2

## Failsafe 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 | |

Section 4.3

# Copper Ethernet Port Specifications

The following details the specifications for copper Ethernet ports that can be ordered with the RUGGEDCOM RS910.

| Speed[c] | Connector | Duplex[c] | Cable Type[d] | Wiring Standard[e] | Maximum Distance[f] | Isolation[g] |
|---|---|---|---|---|---|---|
| 10/100Base-TX | DB9 | FDX/HDX | > CAT 5 | TIA/EIA T568A/B | 100 m (328 ft) | 1.5 kV |
| 10/100Base-TX | RJ-45 | FDX/HDX | > CAT 5 | TIA/EIA T568A/B | 100 m (328 ft) | 1.5 kV |

[c] *Auto-negotiating.*

[d] *Shielded or unshielded.*

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

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

[g] *RMS 1 minute.*

Section 4.4

# Fiber Optic Ethernet Port Specifications

The following details the specifications for fiber Ethernet ports that can be ordered with the RUGGEDCOM RS910.

**NOTE**

- *All optical power numbers are listed as dBm averages. To convert from average to peak add 3 dBm. To convert from peak to average, subtract 3 dBm.*
- *Maximum segment length is greatly dependent on factors such as fiber quality, and the number of patches and splices. Consult a Siemens sales associate when determining maximum segment distances.*

## 10Base-FL Fiber Optic

| Mode | Connector Type | Tx λ (nm)[h] | Cable Type (µm) | Tx min (dBm) | Tx max (dBm) | Rx Sensitivity (dBm) | Rx Saturation (dBm) | Distance (km)[h] | Power Budget (dB) |
|---|---|---|---|---|---|---|---|---|---|
| MM | ST | 62.5/125 | 850 | -16 | -9 | -34 | -11.2 | 2 | 18 |
| | | 50/125 | | -19.8 | -12.8 | | | | 14.2 |

[h] *Typical.*

## 100Base-FX Fiber Optic

| Mode | Connector Type | Tx λ (nm)[i] | Cable Type (µm) | Tx (dBm) | | Rx Sensitivity (dBm) | Rx Saturation (dBm) | Distance (km)[i] | Power Budget (dB) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Minimum | Maximum | | | | |
| MM | MTRJ | 1300 | 50/125 | -22.5 | -14 | -33.5 | -14 | 2 | 11 |

| Mode | Connector Type | Tx λ (nm)[i] | Cable Type (µm) | Tx (dBm) | | Rx Sensitivity (dBm) | Rx Saturation (dBm) | Distance (km)[i] | Power Budget (dB) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Minimum | Maximum | | | | |
| | | | 62.5/125 | -19 | -14 | -33.5 | -14 | 2 | 14.5 |
| MM | SC | 1300 | 50/125 | -22.5 | -14 | -33.9 | -14 | 2 | 11.4 |
| | | | 62.5/125 | -19 | -14 | -33.9 | -14 | 2 | 14.9 |
| MM | ST | 1300 | 50/125 | -22.5 | -14 | -33.9 | -14 | 2 | 11.4 |
| | | | 62.5/125 | -19 | -14 | -33.9 | -14 | 2 | 14.9 |
| MM | LC | 1310 | 62.5/125 | -19 | -14 | -32 | -14 | 2 | 13 |
| SM | ST | 1310 | 9/125 | -15 | -7 | -34 | -3 | 20 | 19 |
| SM | LC | 1300 | 9/125 | -15 | -8 | -38 | -3 | 20 | 23 |
| SM | LC | 1310 | 9/125 | -5 | 0 | -35 | -3 | 50 | 30 |
| SM | LC | 1310 | 9/125 | 0 | 5 | -37 | 0 | 90 | 37 |
| SM | SC | 1300 | 9/125 | -15 | -8 | -31 | -7 | 20 | 16 |
| SM | SC | 1310 | 9/125 | -5 | 0 | -34 | -3 | 50 | 29 |
| SM | SC | 1310 | 9/125 | 5 | 0 | -37 | 0 | 90 | 42 |
| MM | ST | 62.5/125 | 1300 | -19 | -14 | -31 | -14 | 2 | 12 |
| | | 50/125 | | -22.5 | | | | | 8.5 |
| MM | SC | 62.5/125 | 1300 | -19 | -14 | -31 | -14 | 2 | 12 |
| | | 50/125 | | -22.5 | | | | | 8.5 |
| MM | MTRJ | 62.5/125 | 1300 | -19 | -14 | -31 | -14 | 2 | 12 |
| SM | ST | 9/125 | 1300 | -15 | -8 | -32 | -3 | 20 | 17 |
| SM | SC | 9/125 | 1300 | -15 | -8 | -31 | -7 | 20 | 16 |
| SM | LC | 9/125 | 1300 | -15 | -8 | -34 | -7 | 20 | 19 |
| SM | SC | 9/125 | 1300 | -5 | 0 | -34 | -3 | 50 | 29 |
| SM | LC | 9/125 | 1300 | -5 | 0 | -35 | 3 | 50 | 30 |
| SM | SC | 9/125 | 1300 | 0 | 5 | -37 | 0 | 90 | 37 |
| SM | LC | 9/125 | 1300 | 0 | 5 | -37 | 0 | 90 | 37 |
| MM | LC | 50/125 | 1300 | -22.5 | -14 | -31 | -14 | 2 | 8.5 |

[i] *Typical.*

Section 4.5
# Serial Port Specifications

This section details specifications for ports that can be equipped on the RS910.

CONTENTS



Section 4.5.1
## Copper Serial Port Specifications

| Baud Rate | Connector | Isolation |
|---|---|---|
| 300 to 230 kbps | DB9 or RJ45 | 2.5 kV |

Section 4.5.2
## Fiber Serial Port Specifications

| Mode | Connector | Typical Distance (km) | Optical Wavelength (nm) | Cable Size |
|---|---|---|---|---|
| Multimode | ST | 5 | 850 | 50/125 |
| | | | | 62.5/125 |

Section 4.6
# Operating Environment

| Parameter | Range | Comments |
|---|---|---|
| Ambient Operating Temperature | -40 to 85 °C (-40 to 185 °F) | Measured from a 30 cm (12 in) radius surrounding the center of the enclosure. |
| Ambient Relative Humidity | 5% to 95% | Non-condensing |
| Ambient Storage Temperature | -40 to 85 °C (-40 to 185 °F) | |

Section 4.7

# Mechanical Specifications

| Parameter | Value |
|---|---|
| Dimensions | Refer to Chapter 5, *Dimension Drawings* |
| Weight | 1.2 kg (2.7 lbs) |
| Ingress Protection | IP40 (1 mm or 0.04 in objects) |
| Enclosure | 20 AWG Galvanized Steel |

# 5 Dimension Drawings

**NOTE**
*All dimensions are in millimeters, unless otherwise stated.*

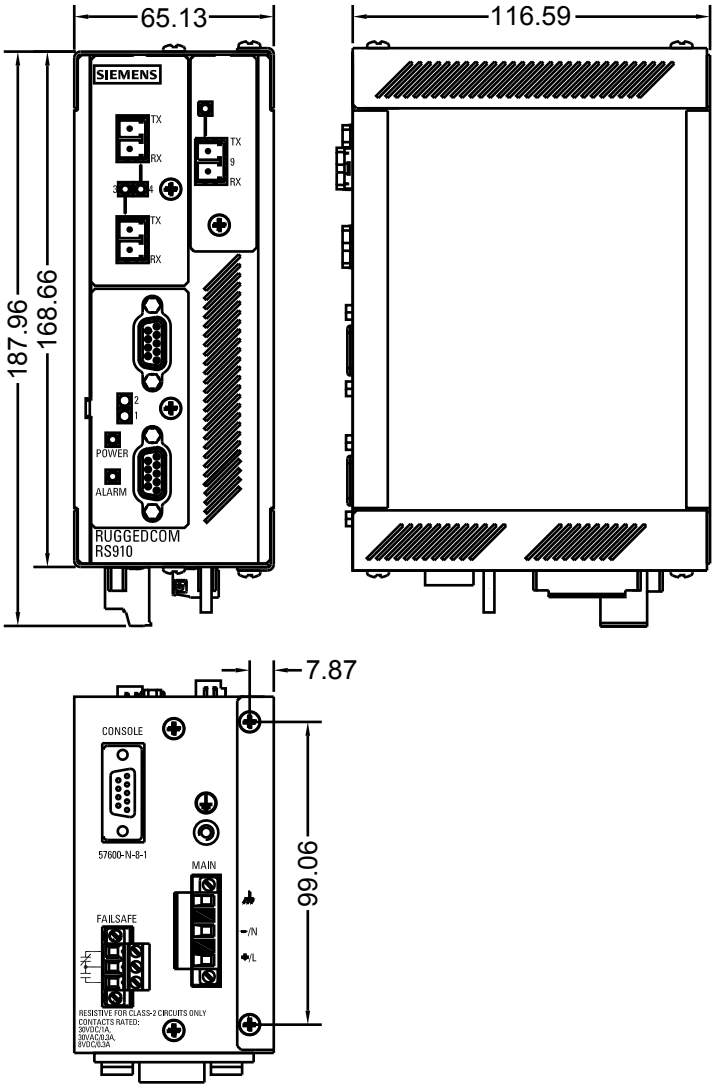


**Figure 20: Overall Dimensions**

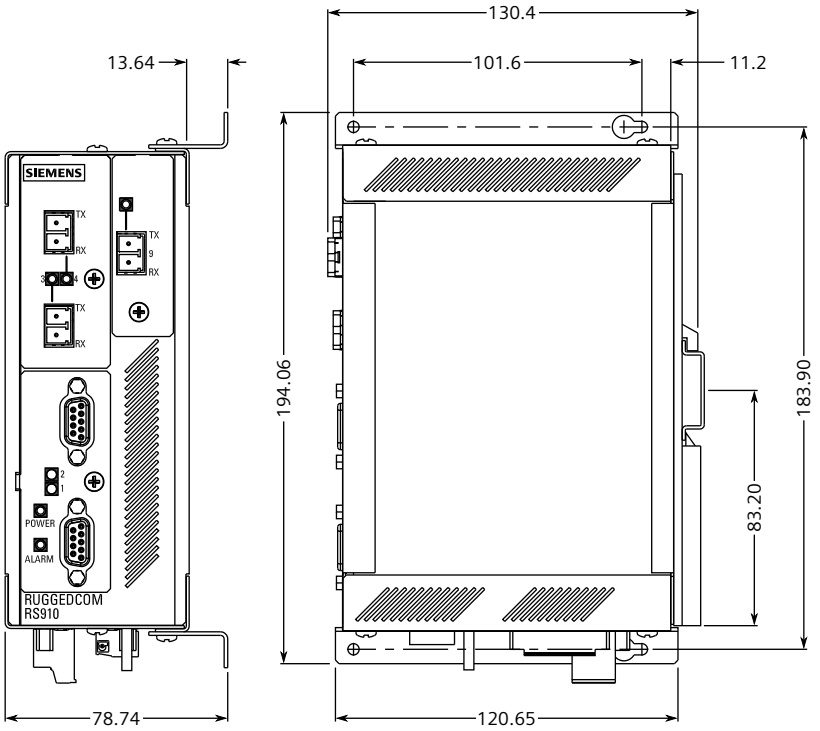


**Figure 21: Panel and DIN Rail Mount Dimensions**

# 6 Certification

The RUGGEDCOM RS910 device has been thoroughly tested to guarantee its conformance with recognized standards and has received approval from recognized regulatory agencies.

**CONTENTS**



Section 6.1

## Approvals

This section details the standards to which the RUGGEDCOM RS910 complies.

**CONTENTS**



Section 6.1.1

### CSA

This device meets the requirements of the following Canadian Standards Association (CSA) standards under certificate 16.70065161:

- **CAN/CSA-C22.2 No. 60950-1**
  Information Technology Equipment – Safety – Part 1: General Requirements (Bi-National Standard, with UL 60950-1)
- **UL 60950-1**
  Information Technology Equipment – Safety Part 1: General Requirements

Section 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 60950-1**
  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 50581**
  Technical Documentation for the Assessment of Electrical and Electronic Products with Respect to the Restriction of Hazardous Substances
- **EN 55022**
  Information Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurement

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

CE

A copy of the CE Declaration of Conformity is available from Siemens Canada Ltd. For contact information, refer to "Contacting Siemens " .

Section 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 the user will be required to correct the interference on his own expense.

Section 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

Section 6.1.5
## Industry Canada

This device is declared by Siemens Canada Ltd to meet the requirements of the following Industry Canada standard:

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

Section 6.1.6
# Other Approvals

This device meets the requirements of the following additional standards:

- **IEEE 1613**
  IEEE Standard Environmental and Testing Requirements for Communications Networking Devices in Electric Power Substations
- **IEC 61000-6-2**
  Electromagnetic Compatibility (EMC) – Part 6-2: Generic Standards – Immunity for Industrial Environments
- **IEC 61850-3**
  Communication Networks and Systems in Substations – Part 3: General Requirements

Section 6.2
# EMC and Environmental Type Tests

The RUGGEDCOM RS910 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 | x |
| 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<br>± 2 kV Line-to-Line | 4 |
| | | DC Power Ports | ± 2 kV Line-to-Ground<br>± 1 kV Line-to-Line | 3 |
| | | AC Power Ports | ± 4 kV Line-to-Ground<br>± 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 | |

| Test | Description | | Test Levels | Severity Levels |
|---|---|---|---|---|
| | | | 1000 A/m for 1 s | |
| 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 61000-4-11 | Voltage Dips and Interrupts | 100% for 5 Periods<br>100% for 50 Periods | |
| IEC 61000-4-12 | Damped Oscillatory | Signal Ports | 2.5 kV Common Mode @ 1 MHz<br>1 kV Differential Mode @ 1 MHz | 3 |
| | | DC Power Ports | 2.5 kV Common Mode @ 1 MHz<br>1 kV Differential Mode @ 1 MHz | 3 |
| | | AC Power Ports | 2.5 kV Common Mode @ 1 MHz<br>1 kV Differential Mode @ 1 MHz | 3 |
| IEC 61000-4-16 | Mains Frequency Voltage | Signal Ports | 30 V Continuous<br>300 V for 1 s | 4 |
| | | 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 | 10% | 3 |
| IEC 60255-5 | Dielectric Strength | Signal Ports | 2 kV (Failsafe Relay Output) | |
| | | DC Power Ports | 1.5 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**
*The RUGGEDCOM RS910 meets Class 2 requirements for an all-fiber configuration and Class 1 requirements for copper ports. 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 |

| Description | | Test Levels |
|---|---|---|
| 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) |
| | DC Power Ports | 1.5 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 @ 10-150 Hz | Class 2 |
| IEC 60255-21-2 | Shock | | 30 g @ 11 ms | Class 2 |