SIEMENS

RUGGEDCOM RS910

Installation Guide

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Contacting Siemens

Address
Siemens Canada Ltd
Industry Sector
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
ruggedcom.info.i-ia@siemens.com

Web
www.siemens.com/ruggedcom

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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"
- "Related Documents"
- "Accessing Documentation"
- "Training"
- "Customer Support"

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

Accessing Documentation

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

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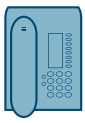
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- Access Siemens' extensive library of support documentation, including FAQs and manuals
- Submit SRs or check on the status of an existing SR
- Contact a local Siemens representative from Sales, Technical Support, Training, etc.

- Ask questions or share knowledge with fellow Siemens customers and the support community

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 communication. 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 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 hazardous location certification (Class I Division 2), 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”
- Section 1.2, “Description”

Section 1.1

Feature Highlights

Serial Device Server

- Baud rates up to 230 kbps
- Transmit serial data over an IP network
- 2 x RS485/RS422/RS232 Serial Ports (DB9 or RJ45)
- [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

- Up to 3 x 10/100Base-TX copper or 10/100Base-FX fiber optic 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
- Hazardous Location Certification: Class I Division 2
- -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:
  - 125-250 VDC or 100-240 VAC (Hazardous Environments)
  - 88-300 VDC or 85-264 VAC (Non-Hazardous Environments)
- 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.

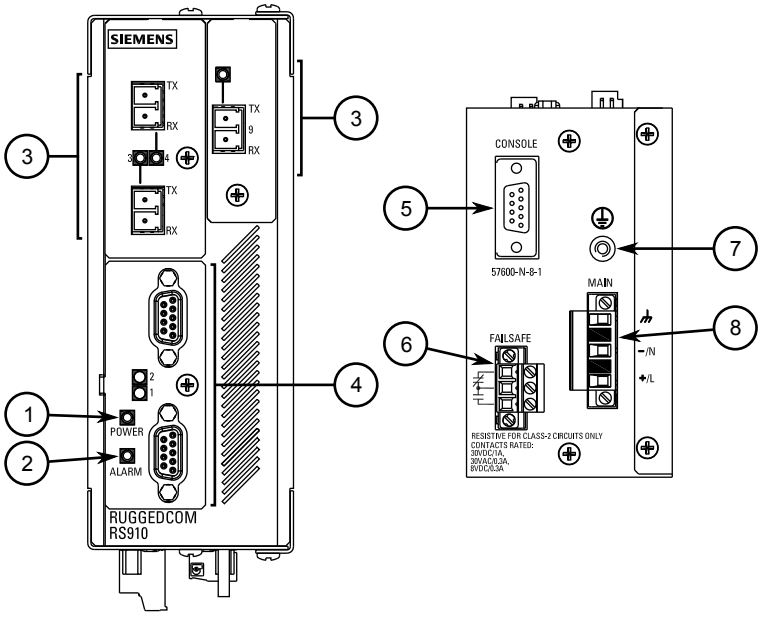


Figure 1: RUGGEDCOM RS910

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 2.8, "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: • Section 2.6, "Connecting the Failsafe Alarm Relay" • Section 4.2, "Failsafe Relay Specifications"
Power Supply Terminal Block	A pluggable terminal block. For more information, refer to Section 2.7, "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.*

CONTENTS

- Section 2.1, “General Procedure”
- Section 2.2, “Required Tools and Materials”
- Section 2.3, “Cabling Recommendations”
- Section 2.4, “Installing the Device in Hazardous Locations”
- Section 2.5, “Mounting the Device”
- Section 2.6, “Connecting the Failsafe Alarm Relay”
- Section 2.7, “Connecting Power”
- Section 2.8, “Connecting to the Device”
- Section 2.9, “Configuring the Device”

Section 2.1
General Procedure

The general procedure for installing the device is as follows:

1. Review the relevant certification information for any regulatory requirements. For more information, refer to Section 6.1, "Approvals".
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.

Section 2.2
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 2.3
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.

Section 2.4
Installing the Device in Hazardous Locations

The RUGGEDCOM RS910 is designed to comply with the safety standards for Class I, Division 2 hazardous locations where concentrations of flammable gases, vapors or liquids may be present, as opposed to normal operating environments.

IMPORTANT!
The device is certified for installation in hazardous environments as a component only. It is required to be installed in a suitable enclosure where the final combination is subject to acceptance by an authorized local inspection authority.

Installation and use of the device in a hazardous location should meet the following special conditions for safe use:

- The equipment should be installed in an enclosure that is considered to be not accessible in normal operation without the use of a tool providing a degree of protection of not less than IP54. The enclosure should have a minimum service temperature range of -40 to 100 °C (-40 to 212 °F).
- The equipment should be used in an area of not more than pollution degree 2.
- The console port should only be used in the safe area.
- The equipment should be appropriately connected to safety Earth upon installation.

NOTE
For further details of the device's compliance with Class I, Division 2 standards, refer to Section 6.1, "Approvals".

IMPORTANT!
Do not disconnect or open equipment unless power has been switched off or the area is known to be non-hazardous.

IMPORTANT !
Débrancher ou ouvrir l'équipment seulement si l'alimnetation a été coupée ou si l'on sait que la zone ne pose aucun danger.

IMPORTANT!
Substitution of the components may impair suitability for Class I, Division 2.

IMPORTANT !
Le remplacement de composants pourrait compromettre l'admissibilité à la Classe I, Division 2.

Section 2.5
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.

IMPORTANT!
Heat generated by the device is channeled outwards to 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 Chapter 5, Dimension Drawings.

CONTENTS

- Section 2.5.1, "Mounting the Device on a DIN Rail"
- Section 2.5.2, "Mounting the Device to a Panel"

Section 2.5.1

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.

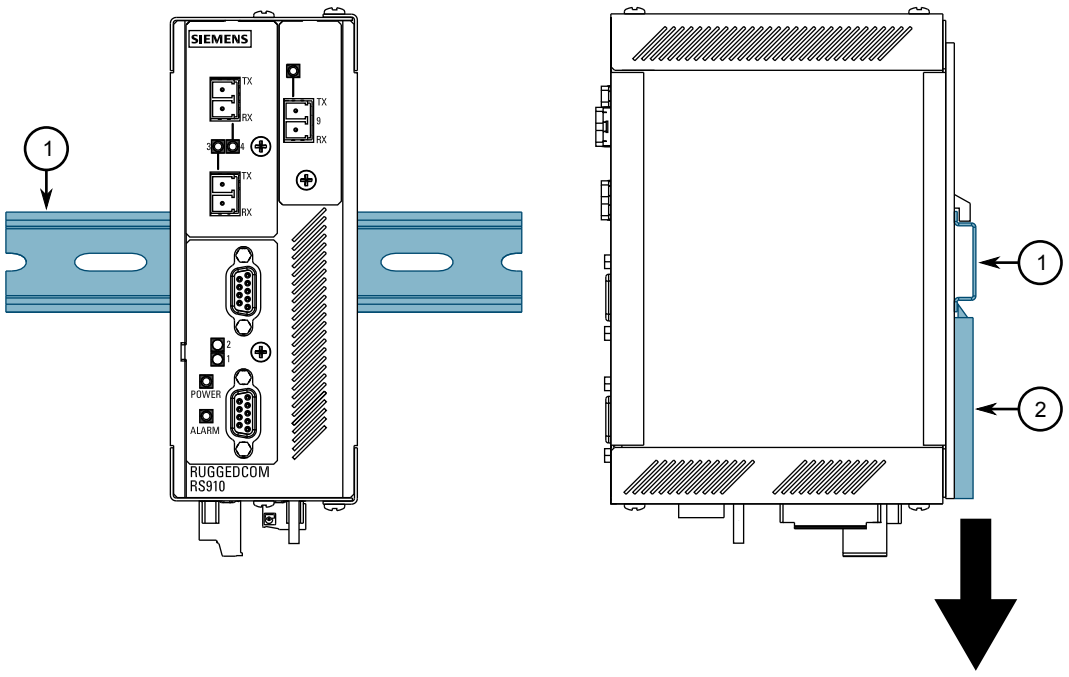


Figure 2: DIN Rail Mounting

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 2.5.2

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.

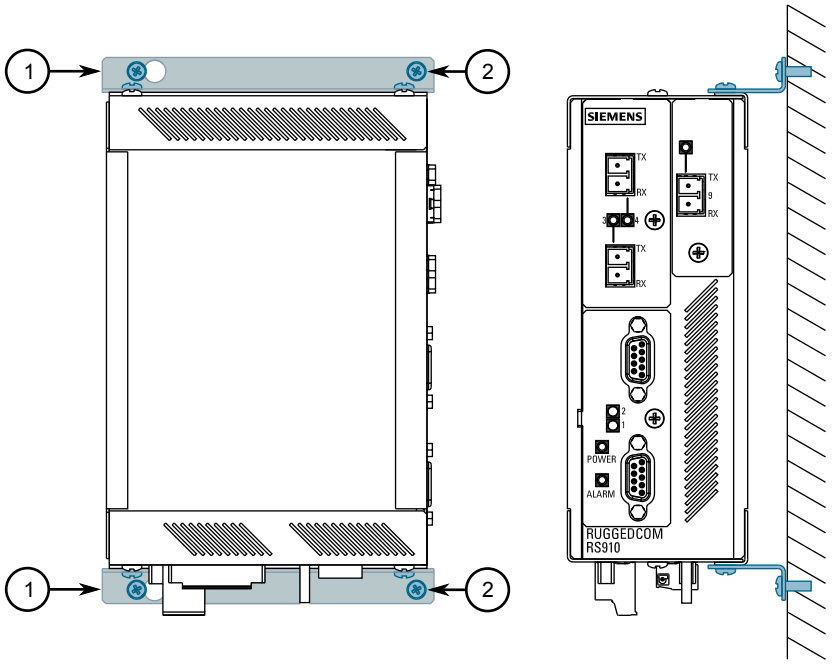


Figure 3: Panel Mounting

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

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

Section 2.6

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.

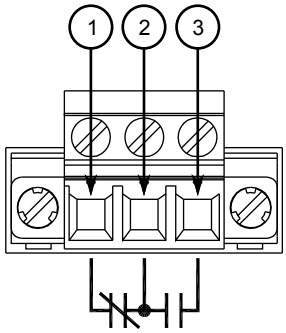


Figure 4: Failsafe Alarm Relay Wiring

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

Section 2.7

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 2.7.1, “Connecting High AC/DC Power”
- Section 2.7.2, “Connecting Low DC Power”

Section 2.7.1

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.

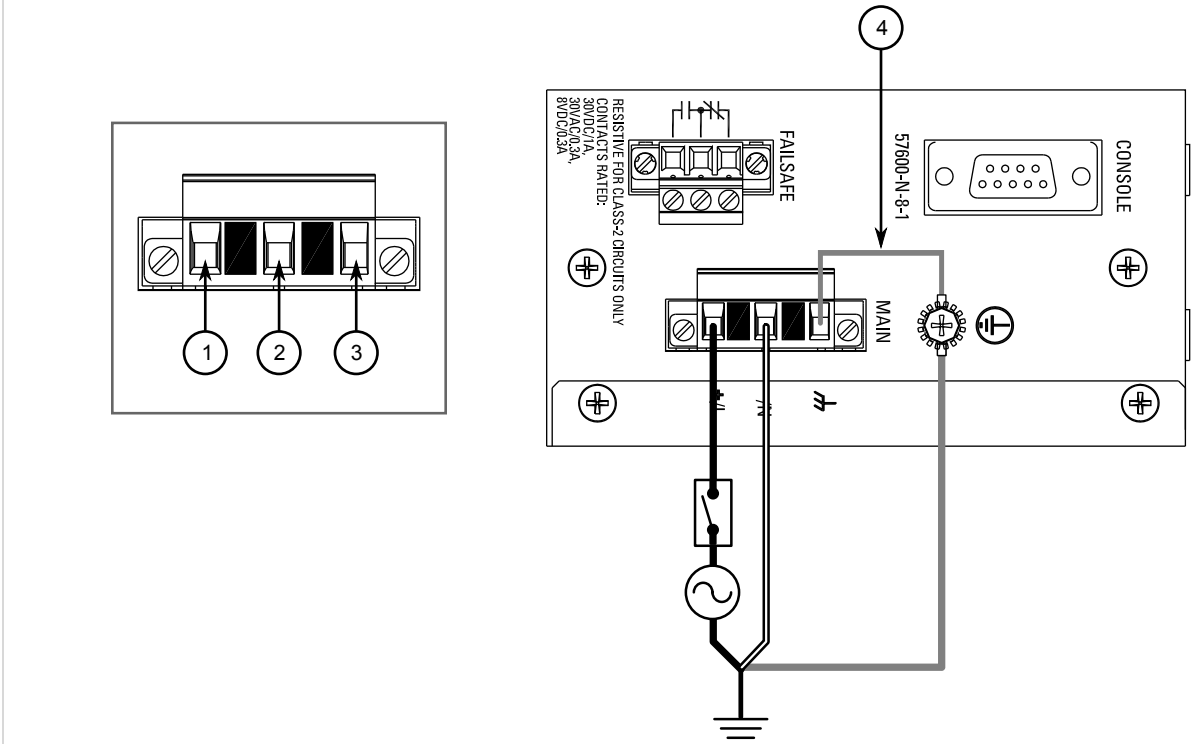


Figure 5: Terminal Block Wiring

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 2.7.2

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.

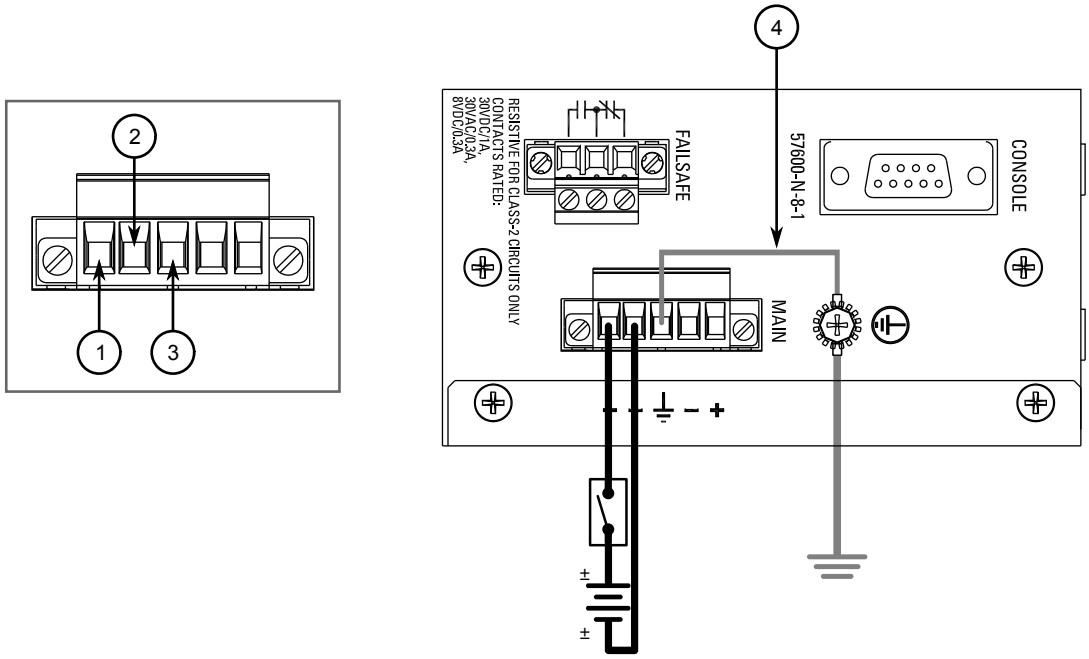


Figure 6: Terminal Block Wiring - Single DC Power Supply Inputs

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.

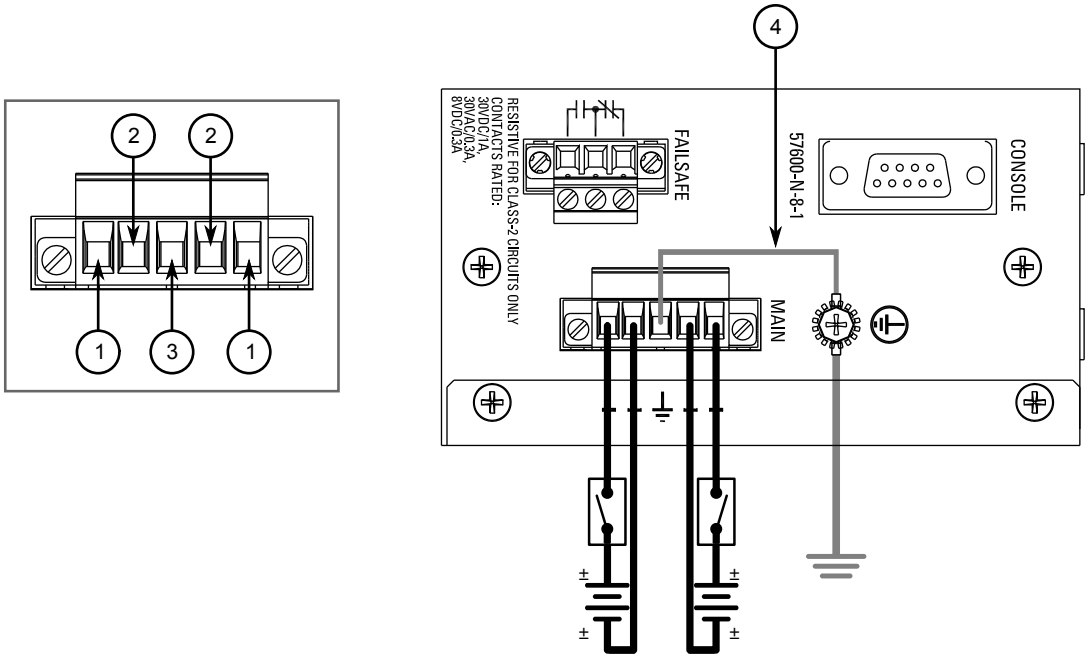


Figure 7: Terminal Block Wiring - Dual DC Power Supply Inputs

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 2.8

Connecting to the Device

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

IMPORTANT!
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 either port:

Speed	57600 Mbps
Data Bits	8
Stop Bit	1
Parity	None
Flow Control	Off
Terminal ID	VT100
Speed	57600 Mbps

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

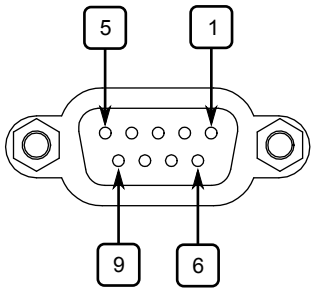


Figure 8: Serial DB9 Console Port

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 2.9

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 ROS interface. For more information about configuring the device, refer to the *RUGGEDCOM ROS User Guide* associated with the installed software release.

3 Communication Ports

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

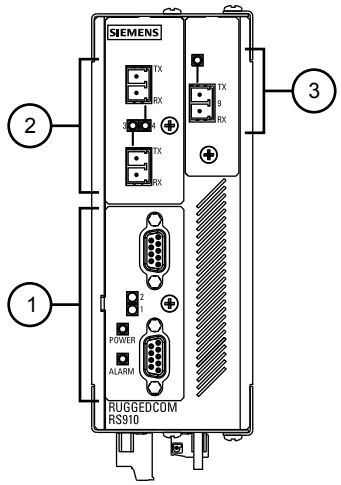


Figure 9: Port Assignment

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)

CONTENTS

- Section 3.1, “Copper Ethernet Ports”
- Section 3.2, “Fiber Optic Ethernet Ports”
- Section 3.3, “Serial Ports”

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 RJ45 male connectors. The RJ45 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 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.

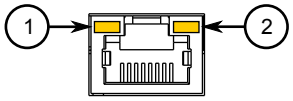


Figure 10: RJ45 Port LEDs

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 RJ45 male connectors:

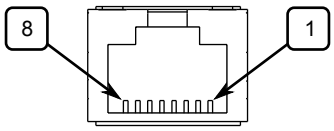


Figure 11: RJ45 Ethernet Port Pin Configuration

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

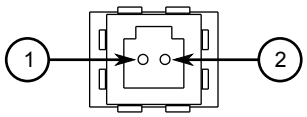


Figure 12: MTRJ Port

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

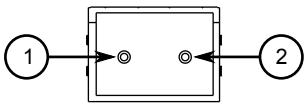


Figure 13: LC Port

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

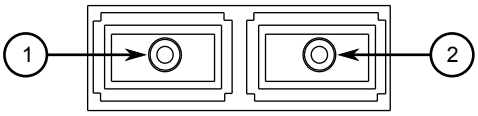


Figure 14: SC Port

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

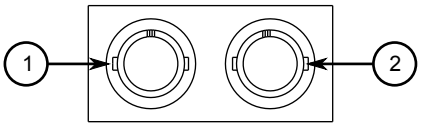


Figure 15: ST Port

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, RJ45 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.

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

State	Description
Green	Link activity detected
Off	No link detected

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

CONTENTS

- Section 3.3.1, "Serial RS232/RS485/RS422 DB9 Ports"
- Section 3.3.2, "Serial RS232/RS485/RS422 RJ45 Ports"
- Section 3.3.3, "Serial RS232/RS485/RS422 Fiber Ports"
- Section 3.3.4, "Connecting Multiple RS485 Devices"

Section 3.3.1

Serial RS232/RS485/RS422 DB9 Ports

The RS910 can be equipped with serial RS232/RS485/RS422 DB9 ports. Each port can be set individually through the RUGGEDCOM ROS operating system to operate in RS232, RS485 or RS422 mode. For more information, refer to the *RUGGEDCOM ROS User Guide* for the RS910.

The following is the pin-out description for the RS232/RS485/RS422 DB9 ports:

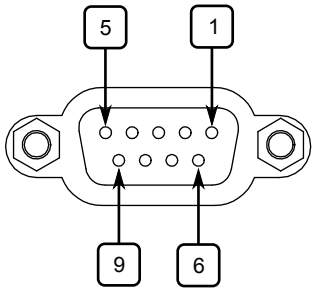


Figure 16: RS232/RS485/RS422 DB9 Serial Console Port

Pin[a]	Name		
	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.*

Section 3.3.2
Serial RS232/RS485/RS422 RJ45 Ports

The RS910 can be equipped with serial RS232/RS485/RS422 RJ45 ports. Each port can be set individually through the RUGGEDCOM ROS operating system to operate in RS232, RS485 or RS422 mode. For more information, refer to the *RUGGEDCOM ROS User Guide* for the RS910.

The following is the pin-out description for the RS232/RS485/RS422 RJ45 ports:

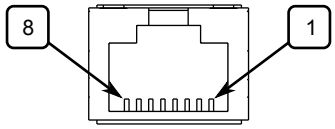


Figure 17: RS232/RS485/RS422 RJ45 Serial Console Port

Pin[f]	Name		
	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.*

Section 3.3.3
Serial RS232/RS485/RS422 Fiber Ports

The RS910 can be equipped with serial RS232/RS485/RS422 fiber ports. Each port can be set individually through the RUGGEDCOM ROS operating system to operate in RS232, RS485 or RS422 mode. For more information, refer to the *RUGGEDCOM ROS User Guide* for the RS910.

The following is the pin-out description for the RS232/RS485/RS422 fiber ports:

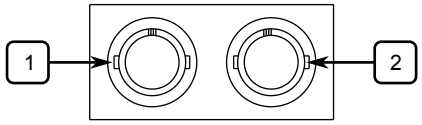


Figure 18: RS232/RS485/RS422 Fiber Serial Console Ports

Pin	Name
1	Rx
2	Tx

Section 3.3.4

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.

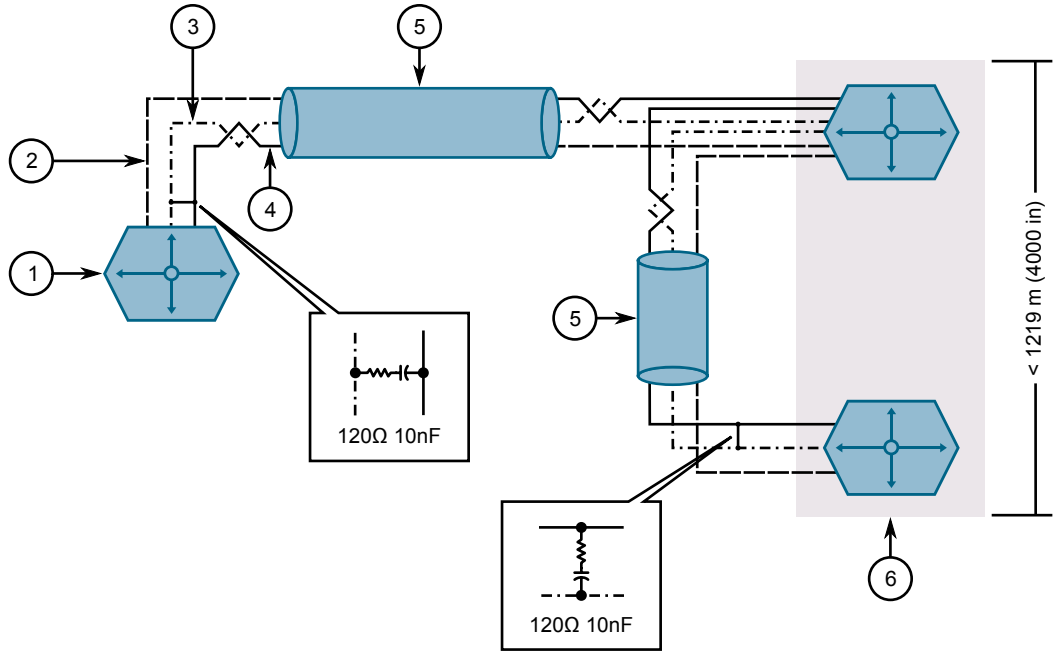


Figure 19: Recommended RS485 Wiring

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"
- Section 4.2, "Failsafe Relay Specifications"
- Section 4.3, "Copper Ethernet Port Specifications"
- Section 4.4, "Fiber Optic Ethernet Port Specifications"
- Section 4.5, "Serial Port Specifications"
- Section 4.6, "Operating Environment"
- Section 4.7, "Mechanical Specifications"

Section 4.1

Power Supply Specifications

Hazardous Environments

Power Supply Type	Input Range		Internal Fuse Rating[a]	Isolation	Maximum Power Consumption[b]
	Minimum	Maximum			
HI	125 VDC	250 VDC	3.15 A(T)	4 kVAC	10 W
	100 VAC	240 VAC	3.15 A(T)	4 kVAC	10 W
24	12 VDC	24 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 varies based on configuration.*

Non-Hazardous Environments

Power Supply Type	Input Range		Internal Fuse Rating[c]	Isolation	Maximum Power Consumption[d]
	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

Power Supply Type	Input Range		Internal Fuse Rating[c]	Isolation	Maximum Power Consumption[d]
	Minimum	Maximum			
48	37 VDC	72 VDC	3.15 A(T)	1.5 kVDC	10 W

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

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

Section 4.2
Failsafe Relay Specifications

Hazardous Environments

Maximum Switching Voltage	Rated Switching Current	Isolation
30 VDC	1 A	1500 V_{rms} for 1 minute
80 VDC	0.3 A	
30 VAC		

Non-Hazardous Environments

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[e]	Connector	Duplex[e]	Cable Type[f]	Wiring Standard[g]	Maximum Distance[h]	Isolation[i]
10/100Base-TX	DB9	FDX/HDX	> CAT 5	TIA/EIA T568A/B	100 m (328 ft)	1.5 kV
10/100Base-TX	RJ45	FDX/HDX	> CAT 5	TIA/EIA T568A/B	100 m (328 ft)	1.5 kV

[e] *Auto-negotiating.*

[f] *Shielded or unshielded.*

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

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

[i] *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)[j]	Cable Type (µm)	Tx (dBm)		Rx Sensitivity (dBm)	Rx Saturation (dBm)	Distance (km)[j]	Power Budget (dB)
				Minimum	Maximum				
MM	ST	62.5/125	850	-16	-9	-34	-11.2	2	18
		50/125	850	-19.8	-12.8				14.2

[j] *Typical.*

100Base-FX Fiber Optic

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

Mode	Connector Type	Tx λ (nm)[k]	Cable Type (µm)	Tx (dBm)		Rx Sensitivity (dBm)	Rx Saturation (dBm)	Distance (km)[k]	Power Budget (dB)
				Minimum	Maximum				
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	1300	-22.5	-14	-31	-14	2	8.5
MM	SC	62.5/125	1300	-19	-14	-31	-14	2	12
		50/125	1300	-22.5	-14	-31	-14	2	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

[k] *Typical.*

Section 4.5

Serial Port Specifications

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

Copper Serial Ports

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

Fiber Serial Ports

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

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.

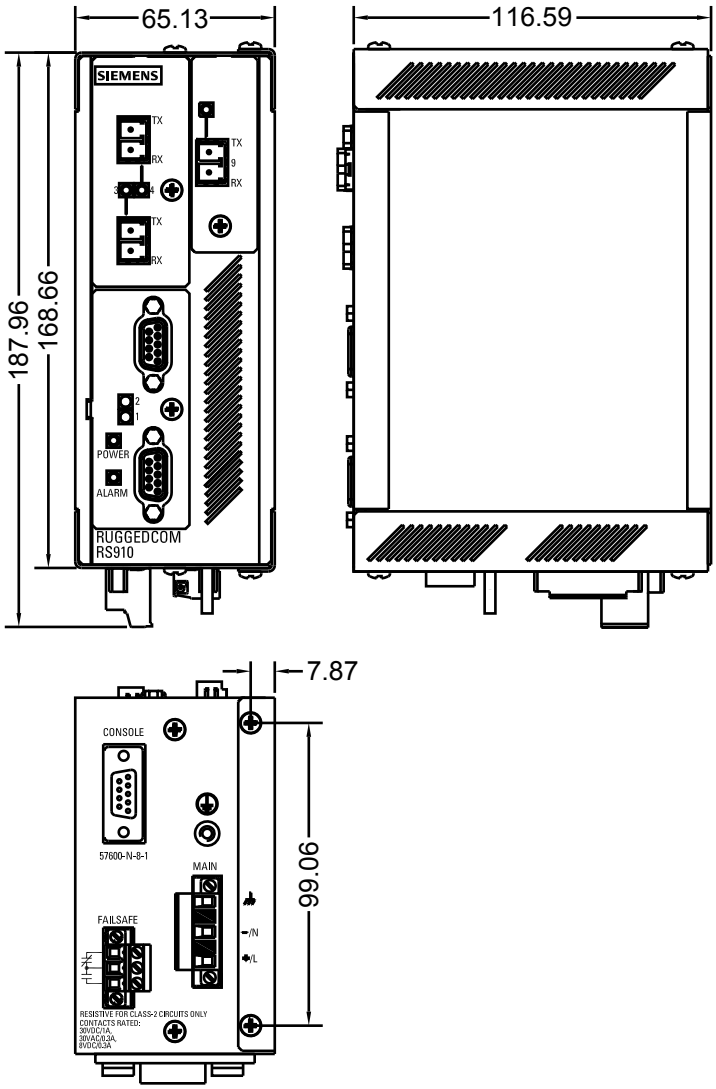


Figure 20: Overall Dimensions

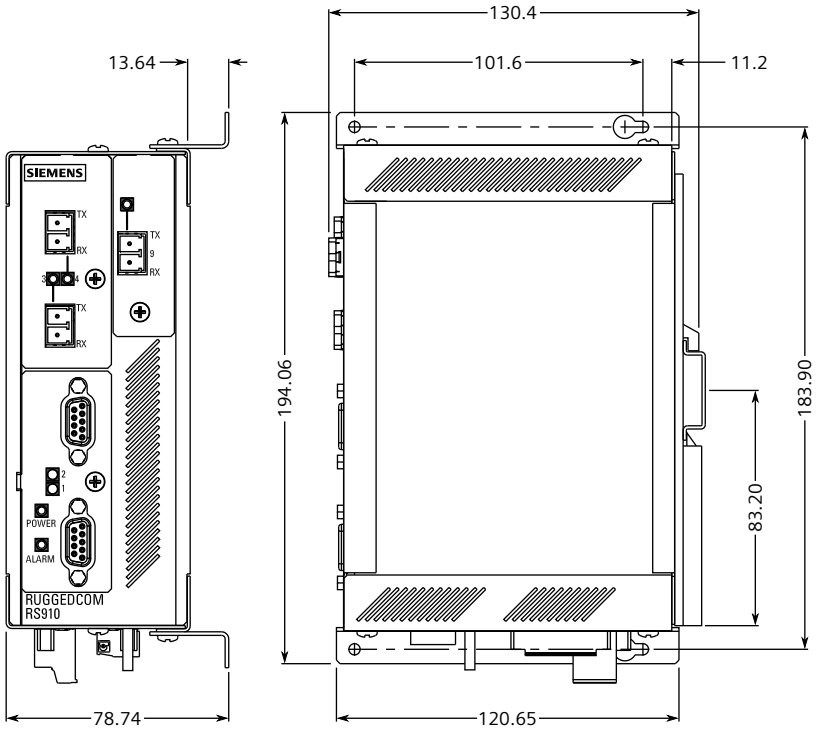


Figure 21: Panel and DIN Rail Mount Dimensions

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”
- Section 6.2, “EMC and Environmental Type Tests”

Section 6.1

Approvals

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

CONTENTS

- Section 6.1.1, “CSA”
- Section 6.1.2, “European Union (EU)”
- Section 6.1.3, “FCC”
- Section 6.1.4, “FDA/CDRH”
- Section 6.1.5, “ISED”
- Section 6.1.6, “ACMA”
- Section 6.1.7, “RoHS”
- Section 6.1.8, “Other Approvals”

Section 6.1.1

CSA

This device meets the requirements of the following Canadian Standards Association (CSA) standards under certificate 1550963:

- **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
- **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
- **CAN/CSA-C22.2 No. 213-16**
  Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations (Bi-National Standard with ANSI/ISA-12.12.01-2016)
- **UL 916**
  Standard for Energy Management Equipment
- **ANSI/ISA-12.12.01-2015**
  Non-Incendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Division 1 and 2 Hazardous (Classified) Locations

It is specifically approved for use in hazardous locations defined as:

- Class I, Division 2, Groups A, B, C, D
- Temperature rating T6 at 40 °C and T4A at 85 °C

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 users will be required to correct the interference at their 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
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)

Section 6.1.6
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.

Section 6.1.7
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.

Section 6.1.8
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

Test	Description		Test Levels	Severity Levels
		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 61000-4-29	Voltage Dips and Interrupts	DC Power Ports	30% for 0.1 s 60% for 0.1 s 100% for 0.05 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
		DC Power Ports	30 V Continuous 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
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