SIEMENS

RUGGEDCOM RS950G

Installation Guide

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Table of Contents

Preface

This guide describes the RUGGEDCOM RS950G. 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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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 RS950G*

Accessing Documentation

The latest user documentation for RUGGEDCOM RS950G 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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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.

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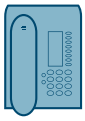
Online
Visit http://www.siemens.com/automation/support-request to submit a Support Request (SR) or check on the status of an existing SR.



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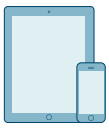
Call a local hotline center to submit a Support Request (SR). To locate a local hotline center, visit http://www.automation.siemens.com/mcms/aspa-db/en/automation-technology/Pages/default.aspx.



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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

1 Introduction

The RUGGEDCOM RS950G is an IEC 62439-3 PRP (Parallel Redundancy Protocol) and HSR (High-Availability Seamless Redundancy) redundancy box, or RedBox. The RS950G provides the ultimate in network reliability with Zero-Packet-Loss™ and zero fail-over time from any network fault.

IMPORTANT!
Comité International Spécial des Perturbations Radioélectriques Statement - CISPR22 Class A

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

IMPORTANT!
This class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

The following sections provide more information about the RS950G:

Section 1.1

Feature Highlights

Network Resilience

- IEC 62439 PRP
- IEC 62439 HSR

Industrial Design

- Panel or DIN mounting
- Dual DC inputs:
  - 10 to 36 VDC
  - 37 to 72 VDC
- Universal AC input:
  - 85-264 VAC or 88-300 VDC
- 20 AWG steel enclosure

Substation Rated

- -40 to 85 °C (-40 to 185 °F) operating (no fans)

Management

- SSH/SSL encryption
- Web-based, Telnet
- Alarms, Critical Relay

Section 1.2
Description

The RUGGEDCOM RS950G features various ports, controls and indicator LEDs for connecting, configuring and troubleshooting the device. The final device configuration is determined during the ordering process. The following describes the major options available.

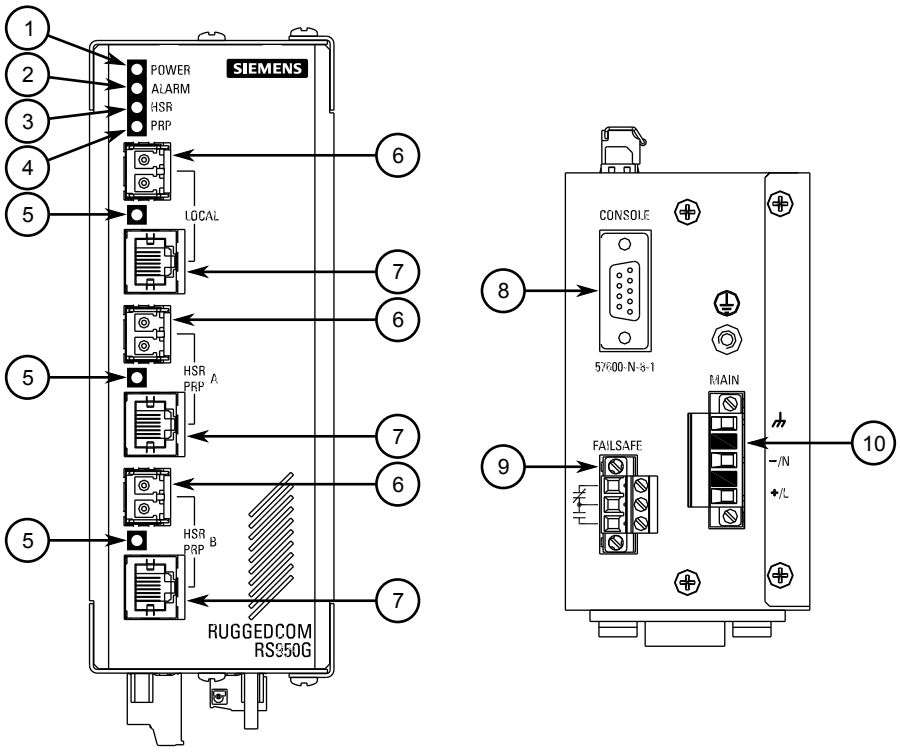

Figure 1: RUGGEDCOM RS950G

1. POWER LED **2.** ALARM LED **3.** HSR LED **4.** PRP LED **5.** Port Status LED **6.** SFP Pluggable Fiber Transceiver **7.** Copper Ethernet Port **8.** RS-232 Console Port **9.** Failsafe Alarm Relay Terminal **10.** Power Supply Terminal

- **LEDs** – LEDs indicate the operational status of the device.
  - **POWER LED** – Illuminates when power is being supplied to the device.

State	Description
Green	Device is ready
Red	Device is booting up
Off	No power

  - **ALARM LED** – Illuminates when an alarm condition exists.
  - **HSR LED** – Illuminates when the device is in HSR Redbox mode.
  - **PRP LED** – Illuminates when the device is in PRP Redbox mode.
  - **Port Status LEDs** – Indicate the status of each port:
    - Solid = Link

    - Blinking = Activity
    - Off = No link/activity
- **SFP Pluggable Transceivers and Copper Ethernet Ports** – Receive and transmit network traffic, as well as provide remote Web access to the RUGGEDCOM ROS operating system. For more information, refer to:
    - Section 2.4, “Connecting to the Device”
    - Section 3.1, “Copper Ethernet Ports”
    - Section 4.3, “Copper Ethernet Port Specifications”
    - Section 3.2, “SFP Optic Ethernet Ports”
    - Section 4.4, “SFP Optic Ethernet Port Specifications”
- **RS232 Serial Console Port** – 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 2.4, “Connecting to the Device”.
- **Failsafe Alarm Relay Terminal** – Latches to default state when a power disruption or other alarm condition occurs. For more information, refer to:
    - Section 2.3, “Connecting the Failsafe Alarm Relay”
    - Section 4.2, “Failsafe Relay Specifications”
- **Power Supply Terminal** – A pluggable terminal. For more information, refer to:
    - Section 2.2, “Connecting Power”
    - Section 4.1, “Power Supply Specifications”

Section 1.3

High Availability Seamless Ring Operation

Parallel Redundancy Protocol (PRP) and High-availability Seamless Redundancy (HSR) are two mechanisms defined by the IEC 62439-3 standard to provide hitless network recovery. Unlike Spanning Tree Protocol (STP), which requires reconfiguration of the active network topology over redundant physical links, HSR and PRP provide hitless network recovery through the use of information replication.

The following sections describe each mechanism in more detail:

- Section 1.3.1, “Parallel Redundancy Protocol”
- Section 1.3.2, “High Availability Seamless Redundancy”

Section 1.3.1

Parallel Redundancy Protocol

Parallel Redundancy Protocol (PRP) provides hitless network recovery by replicating information over two physically independent Ethernet networks. The following illustrates a typical PRP network:

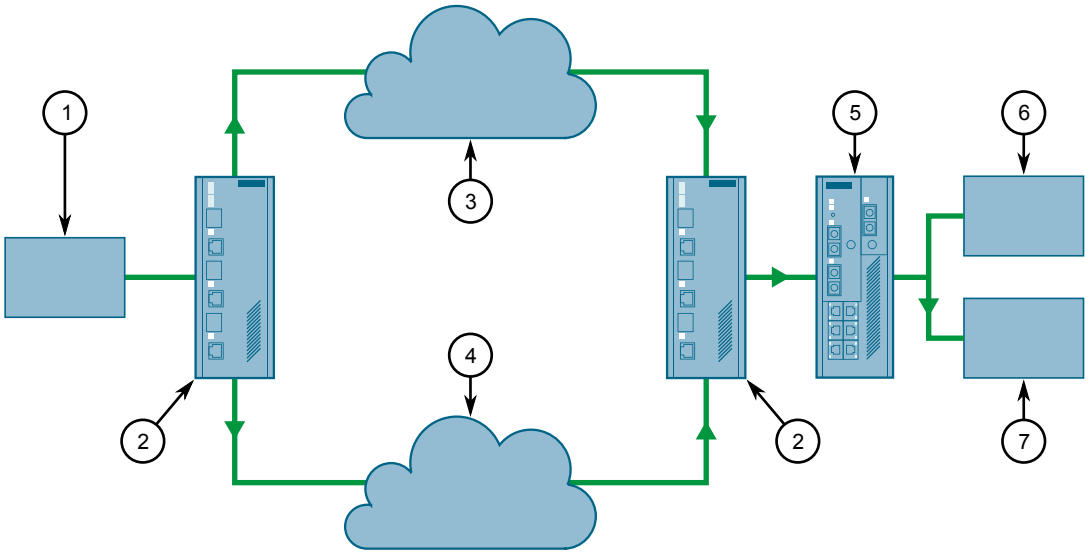

Figure 2: PRP Network Design

1. Sending IED **2.** RS950G **3.** Network A **4.** Network B **5.** RS900 **6.** IED **7.** Receiving IED

NOTE

PRP expands the Ethernet frame by 6 octets due to RCT (Redundancy Check Trailer). Generation of PRP supervision frames also consumes bandwidth. As a result, the network designer should keep in mind the overhead introduced by the PRP network when calculating the network capacity.

Section 1.3.2

High Availability Seamless Redundancy

The basic principle behind High-availability Seamless Redundancy (HSR) is the replication of frames over both sides of the HRS ring. The following illustrates a typical HSR network:

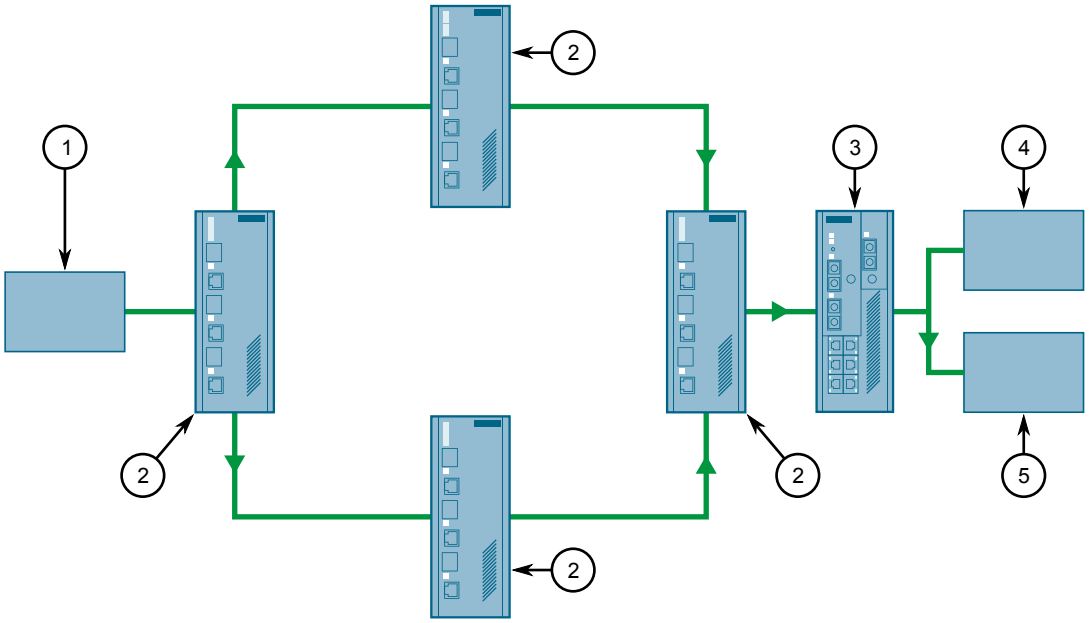

Figure 3: HSR Network Design

1. Sending IED **2.** RS950G **3.** RS900 **4.** IED **5.** Receiving IED

All of the network nodes inside an HSR ring must be HSR-capable. HSR-unaware nodes can be attached to the HSR ring through the use of a RedBox (Redundancy Box). Compared to PRP, HSR only demands approximately half of the network infrastructure. However, network bandwidth on an HSR ring is approximately halved compared with a network ring based on RSTP technology.

NOTE
Current HSR implementation limits link utilization to 74% when using multicast traffic.

2 Installing the Device

The following sections describe 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 1 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.

Section 2.1

Mounting the Device

The RS950G is designed for maximum mounting and display flexibility. It can be equipped with connectors that allow it to be installed in a 35 mm (1.4 in) DIN rail or directly on a panel.

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

The following sections describe the various methods of mounting the device:

- Section 2.1.1, “Mounting the Device on a DIN Rail”
- Section 2.1.2, “Mounting the Device to a Panel”

Section 2.1.1
Mounting the Device on a DIN Rail

For DIN rail installations, the RS950G can be ordered with a DIN rail mounting bracket pre-installed on the rear of the chassis. The bracket allow the device to be slid onto a standard 35 mm (1.4 in) DIN rail.

IMPORTANT!
DIN rail mounting is not recommended for constant vibration environments.

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

1. Pull the DIN rail adapter down and clip the device on to the DIN rail. Release the adapter to secure the device.

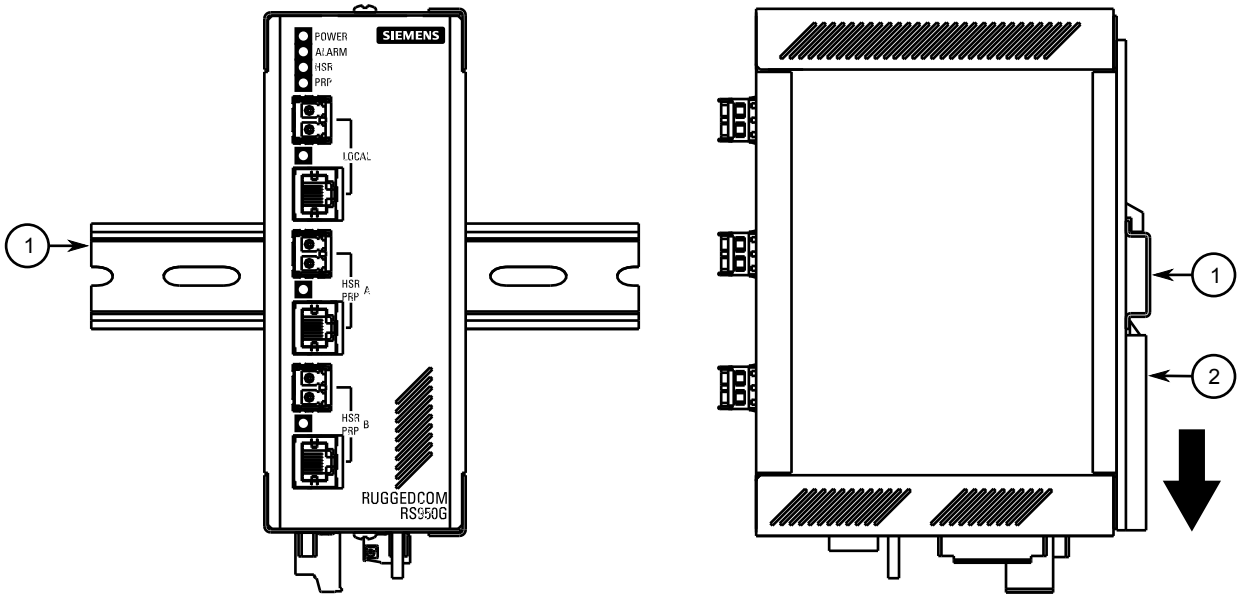

Figure 4: DIN Rail Mounting

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

2. Slide the device into position.

Section 2.1.2
Mounting the Device to a Panel

For panel installations, the RS950G can be ordered with mounting brackets that mount to the top and bottom of the chassis.

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

1. Remove the bracket mounting screws from the top and bottom of the chassis.
2. Install the mounting brackets to the top and bottom of the chassis using the bracket mounting screws. Make sure the screws are hand-tightened.
3. Place the device against the panel and align the mounting brackets with the mounting holes.

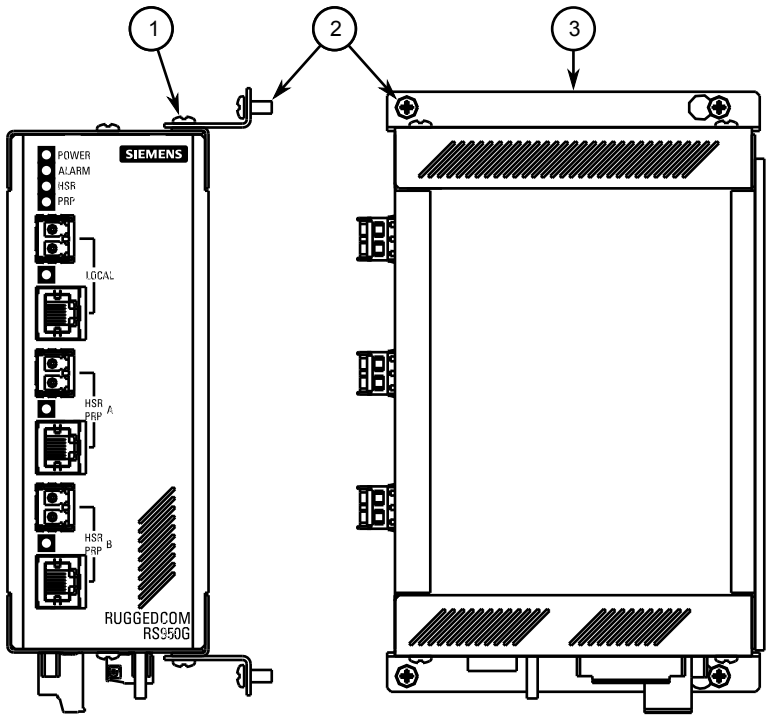

Figure 5: Panel Mounting

1. Bracket Mounting Screw **2.** #6 Screw **3.** Mounting Bracket

4. Using #6 screws of sufficient length (not provided), secure the mounting brackets to the panel. Use wall anchors (not provided) where required.

Section 2.2

Connecting Power

The RS950G supports a single integrated 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 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.*

IMPORTANT!
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, 8x20µs waveform*

The following sections describe how to connect power to the device:

- Section 2.2.1, “Connecting High AC/DC Power”
- Section 2.2.2, “Connecting Low DC Power”

Section 2.2.1
Connecting High AC/DC Power

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.

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

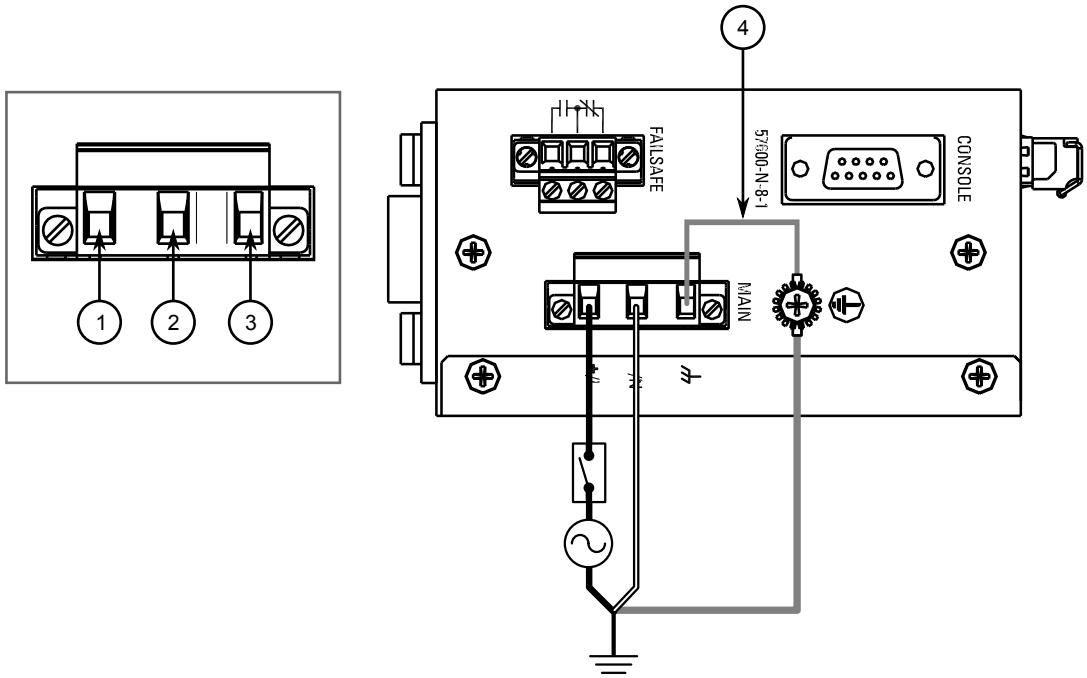

Figure 6: Terminal Block Wiring

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 2.2.2

Connecting Low DC Power

The device supports a single low DC power supply with dual power supply inputs. The use of both power supply inputs is recommended to provide redundancy and load balancing.

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

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

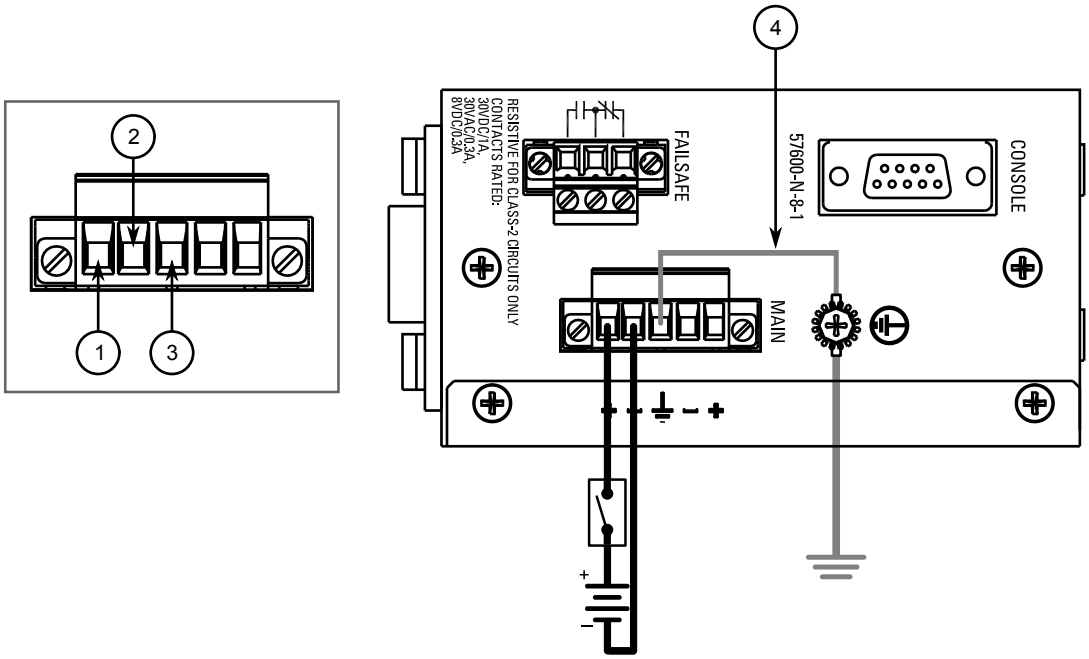

Figure 7: Terminal Block Wiring - Single DC Power Supply Inputs

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

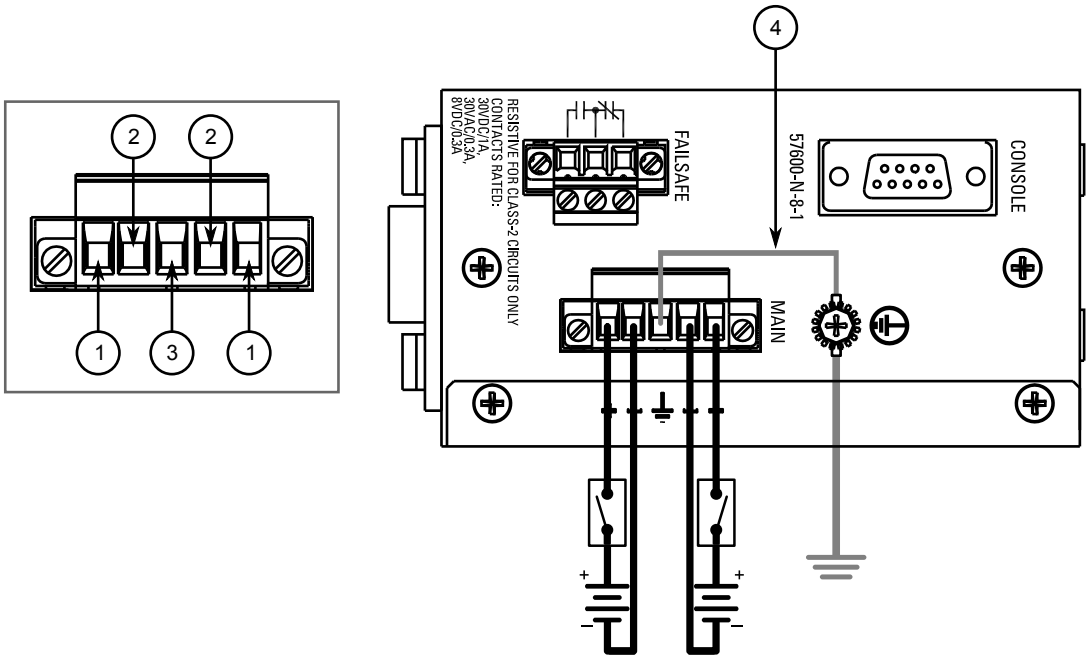

Figure 8: Terminal Block Wiring - Dual DC Power Supply Inputs

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. 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
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 RS950G.

The following shows the proper relay connections.

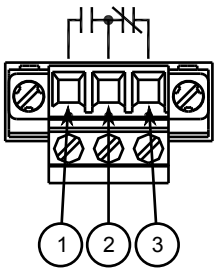

Figure 9: Failsafe Alarm Relay Wiring

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

Section 2.4
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 RS950G.

Serial Console Port

Connect a PC or terminal directly to the 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 temporary connections during initial configuration or troubleshooting.

The serial console port implements RS-232 DCE (Data Communication Equipment) on a DB9 connector. The following is the pin-out for the port:

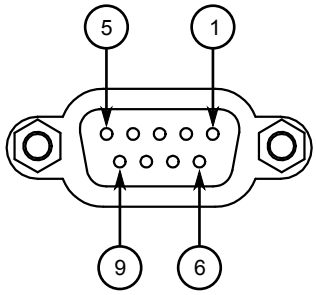

Figure 10: Serial DB9 Console Port

Pin	Name	Description
1	DCD	Data Carrier Detect
2	RX	Receive Data
3	TX	Transmit Data
4	DTR	Data Terminal Ready
5	GND	Signal Ground
6	DSR	Data Set Ready
7	RTS	Request to Send
8	CTS	Clear To Send
9	Reserved (Do Not Connect)	

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 RS950G is https://192.168.0.1.

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

Section 2.5

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 1 standards. This means that during a transient electrical event, communications errors or interruptions may occur, but recovery is automatic.

Siemens 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 RS950G can be equipped with various types of communication ports to enhance its abilities and performance. To determine which ports are equipped on the device, refer to the factory data file available through ROS. For more information on how to access the factory data file, refer to the *ROS User Guide* for the RS950G.

Each communication port type has a specific place in the RS950G chassis.

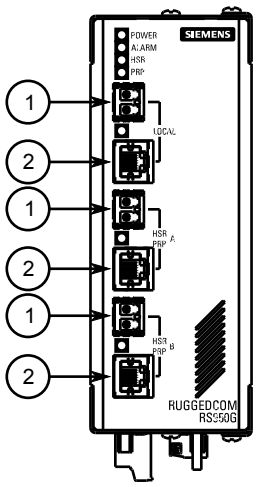

Figure 11: Port Assignment

1. 100Base-FX or 1000Base-FX SFP Pluggable Fiber Transceiver **2.** 100Base-TX or 1000Base-TX Copper Ethernet Port

NOTE
Copper ports are automatically disabled when SFP ports are present.

The following sections describe the available ports:

- Section 3.1, “Copper Ethernet Ports”
- Section 3.2, “SFP Optic Ethernet Ports”

Section 3.1

Copper Ethernet Ports

The RS950G supports several 100Base-TX or 1000Base-TX Ethernet ports with RJ-45 connectors. The RJ-45 connectors are directly connected to the chassis ground on the device and can accept CAT-5 shielded twisted-pair (STP) cables.

The following is the pin-out description for the RJ-45 connectors:

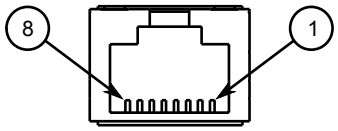

Figure 12: RJ-45 Ethernet Port Pin Configuration

Pin	Name		Description
	100Base-TX	1000Base-TX	
1	RX+	BI_DA+	Receive Data+ or Bi-Directional Pair A+
2	RX-	BI_DA-	Receive Data- or Bi-Directional Pair A-
3	TX+	BI_DB+	Transmit Data+ or Bi-Directional Pair B+
4	Reserved (Do Not Connect)	BI_DC+	Transmit Data+ or Bi-Directional Pair C+
5	Reserved (Do Not Connect)	BI_DC-	Receive Data- or Bi-Directional Pair C-
6	TX-	BI_DB-	Transmit Data- or Bi-Directional Pair B-
7	Reserved (Do Not Connect)	BI_DD+	Receive Data- or Bi-Directional Pair D+
8	Reserved (Do Not Connect)	BI_DD-	Receive Data- or Bi-Directional Pair D-

For specifications on the available copper Ethernet ports, refer to Section 4.3, “Copper Ethernet Port Specifications”.

Section 3.2

SFP Optic Ethernet Ports

SFP (Small Form-Factor Pluggable) optic Ethernet ports are available with LC (Lucent Connector) connectors. Make sure the Transmit (Tx) and Receive (Rx) connections of each port are properly connected and matched to establish a proper link.

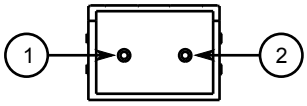

Figure 13: LC Port

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

NOTE

SFP modules, as well as their optical ports, can be safely inserted and removed while the chassis is powered and operating.

The following sections describe how to install and remove SFP optical ports:

- Section 3.2.1, “Installing an SFP Optical Port”
- Section 3.2.2, “Removing an SFP Optical Port”

Section 3.2.1

Installing an SFP Optical Port

To install an SFP optical port, do the following:

CAUTION!
Electrical hazard – risk of damage to equipment. Use only components certified by Siemens with RUGGEDCOM products. Damage to the module and device may occur if compatibility and reliability have not been properly assessed.

CAUTION!
Electrical hazard – risk of damage to equipment. Make sure all electrostatic energy is dissipated before installing or removing components from the device. An electrostatic discharge (ESD) can cause serious damage to the component once it is outside the chassis.

1. Make sure all potential electrostatic build-up has been properly discharged to prevent electrostatic discharges (ESD). This can be accomplished by wearing an ESD wrist strap or by touching Earth or the chassis ground.
2. Remove the dust cover from the port opening in the module.

   CAUTION!
   Mechanical hazard – risk of component damage. SFP optical ports are designed to insert in only one orientation. Do not force the port into the module.

3. Remove the port from its packaging.
4. Insert the port into the module and swing the bail-latch up to lock it in place.

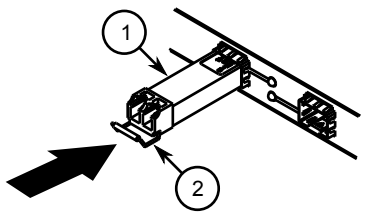

Figure 14: Installing an SFP Optical Port (Typical)

1. SFP Optical Port **2.** Metal Bail-Latch

5. Remove the dust cover from the port.
6. Connect a cable to the port and test the connection.

Section 3.2.2

Removing an SFP Optical Port

To remove an SFP optical port, do the following:

CAUTION!
Electrical hazard – risk of damage to equipment. Make sure all electrostatic energy is dissipated before performing installing or removing components from the device. An electrostatic discharge (ESD) can cause serious damage to the component once it is outside the chassis.

1. Make sure all potential electrostatic build-up has been properly discharged to prevent electrostatic discharges (ESD). This can be accomplished by wearing an ESD wrist strap or by touching Earth or the chassis ground.
2. Disconnect the cable from the port.
3. Swing the metal bail-latch down and pull the port from the module.

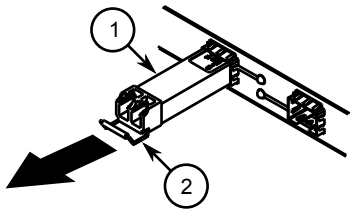

Figure 15: Removing an SFP Optical Port (Typical)

1. SFP Optical Port **2.** Metal Bail-Latch

4. Store the port in an ESD-safe bag or other suitable ESD-safe environment, free from moisture and stored at the proper temperature (-40 to 85 °C or -40 to 185 °F).
5. Insert a plug in the empty port opening to prevent the ingress of dust and dirt.

4 Technical Specifications

The following sections provide important technical specifications related to the device and available modules:

Section 4.1

Power Supply Specifications

Power Supply Type	Minimum Input	Maximum Input	Internal Fuse Rating[a]	Isolation	Maximum Power Consumption[b]
24 VDC	10 VDC	36 VDC	3.15 (T)	1.5 kVDC	10 W
48 VDC	36 VDC	72 VDC	3.15 (T)		
HI (125/250 VDC) [c]	88 VDC	300 VDC	3.15 (T)	5.5 kVDC	
HI (110/230 VAC) [c]	85 VAC	265 VAC		4 kVAC	

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

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

[c] *Same power supply for both AC and DC.*

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 RS950G.

Speed	Connector	Duplex[d]	Cable Type[e]	Wiring Standard[f]	Maximum Distance[g]	Isolation[h]
100Base-TX	RJ-45	FDX/HDX	> CAT 5	TIA/EIA T568A/B	100 m (328 ft)	1.5 kV
100/1000Base-TX	RJ-45	FDX/HDX	> CAT 5	TIA/EIA T568A/B	100 m (328 ft)	1.5 kV

[d] *Auto-Negotiating*

[e] *Shielded or unshielded.*

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

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

[h] *RMS 1 minute.*

Section 4.4

SFP Optic Ethernet Port Specifications

The following details fiber optic specifications for SFP ports that can be equipped on the RS950G.

NOTE
SFP transceivers have a temperature range of -40 to 85 °C (-40 to 185 °F), unless specified otherwise.

Fast Ethernet (100 Mbps)

Mode	Connector Type	Cable Type (µm)	Tx λ (nm)[i]	Tx Minimum (dBm)[j]	Tx Maximum (dBm)[k]	Rx Sensitivity (dBm)[l]	Rx Saturation (dBm)[m]	Maximum Distance (km)[n]	Power Budget (dB)
MM	LC	62.5/125	1310	-20	-14	-31	-14	2	11
		50/125		-23.5					7.5
SM	LC	9/125	1310	-15	-8	-31	-8	15	16

[i] *Typical.*

[j] *All optical power numbers are listed as dBm averages.*

[k] *All optical power numbers are listed as dBm averages.*

[l] *All optical power numbers are listed as dBm averages.*

[m] *All optical power numbers are listed as dBm averages.*

[n] *Typical distance. The maximum segment length is greatly dependent on factors such as fiber quality, and the number of patches and splices. Consult a Siemens sales associates when determining maximum segment distances.*

Gigabit Ethernet (1000 Mbps)

Mode	Connector Type	Cable Type (µm)	Tx λ (nm)[o]	Tx Minimum (dBm)[p]	Tx Maximum (dBm)[q]	Rx Sensitivity (dBm)[r]	Rx Saturation (dBm)[s]	Maximum Distance (km)[t]	Power Budget (dB)
MM	LC	50/125	850	-9	-2.5	-20	0	0.5	11
		62.5/125						0.3	
SM	LC	9/125	1310	-9.5	-3	-19	-3	10	9.5
SM	LC	9/125	1310	-7	-3	-23	-3	25	16
SM[u]	LC	9/125	1550	0	5	-23	-3	70	23

[o] *Typical.*

[p] *All optical power numbers are listed as dBm averages.*

[q] *All optical power numbers are listed as dBm averages.*

[r] *All optical power numbers are listed as dBm averages.*

[s] *All optical power numbers are listed as dBm averages.*

[t] *Typical distance. The maximum segment length is greatly dependent on factors such as fiber quality, and the number of patches and splices. Consult a Siemens sales associates when determining maximum segment distances.*

[u] *Operating temperature range of -20 to 85 °C (-4 to 185 °F).*

Section 4.5

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 4.6

Mechanical Specifications

Parameter	Value
Dimensions	Refer to Chapter 5, *Dimension Drawings*
Weight	1.22 kg (2.7 lb)
Enclosure	20 AWG Galvanized Steel

5 Dimension Drawings

NOTE
All dimensions are in millimeters, unless otherwise stated.

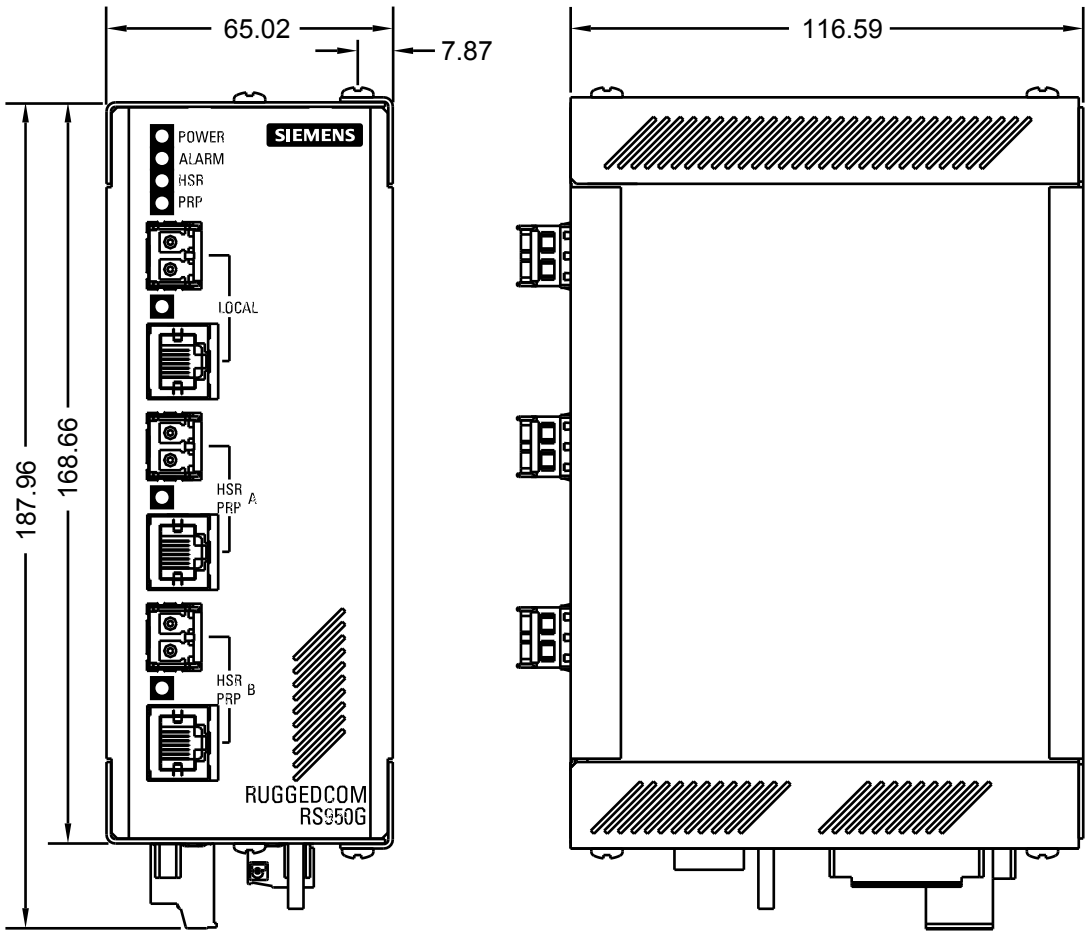

Figure 16: Overall Dimensions

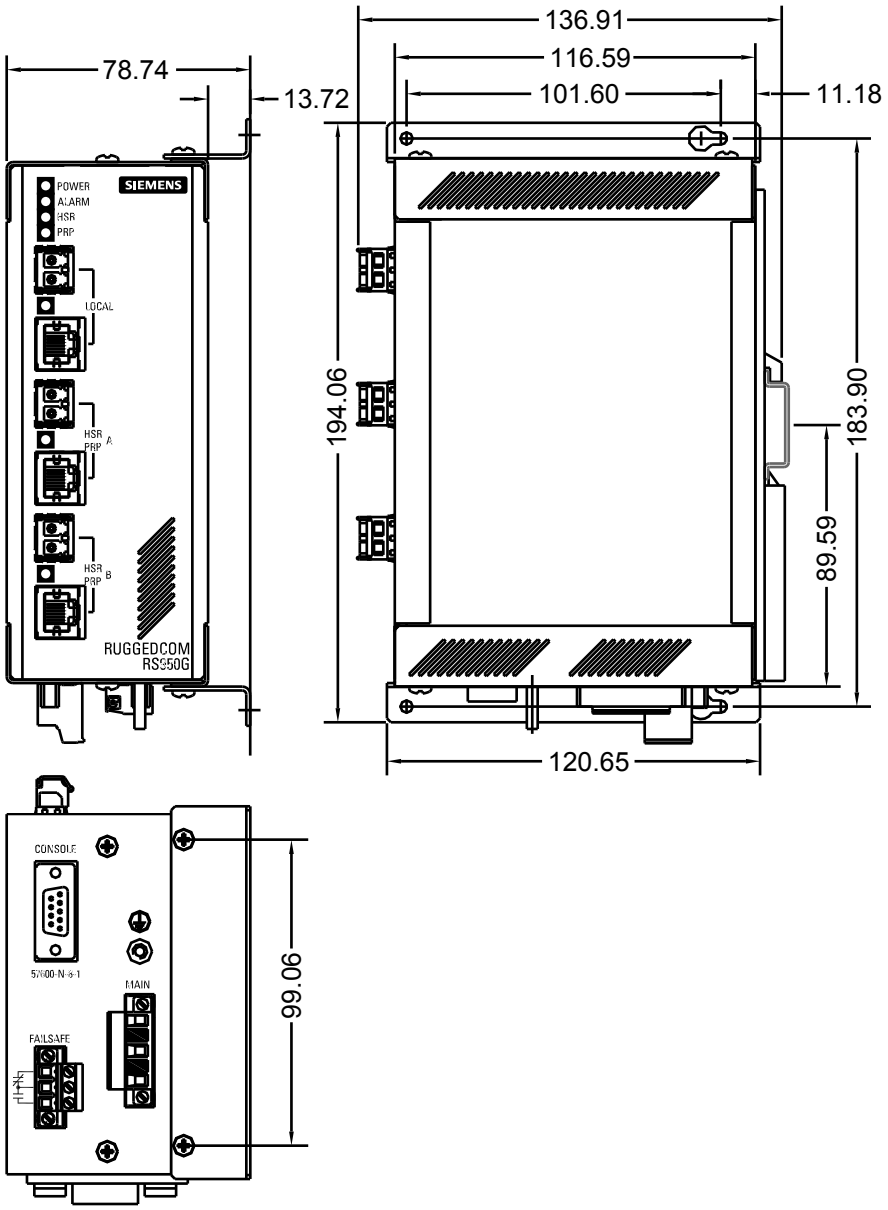

Figure 17: Panel and Din Rail Mount Dimensions

6 Certification

The RUGGEDCOM RS950G device has been thoroughly tested to guarantee its conformance with recognized standards and has received approval from recognized regulatory agencies.

Section 6.1

Standards Compliance

The RUGGEDCOM RS950G complies with the following standards:

- **FCC Compliance**
  This equipment 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 equipment 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.
- **Industry Canada Compliance**
  CAN ICES-3 (A) / NMB-3 (A)
- **Other**
  - IEEE 1613 (Electric Utility Substations)
  - IEC 61850-3 (Electric Utility Substations)

Section 6.2

Agency Approvals

Agency	Standards	Comments
TÜV	IEC/UL/CSA 60950-1	Compliant
CE	EN 55022, EN 60950-1, EN61000-6-2, EN 60825-1, and EN 50581	CE Declaration of Conformity
FCC	FCC Part 15, Class A	Compliant
FDA/CDRH	21 CFR Chapter I, Sub-chapter J	Compliant

Section 6.3

EMC and Environmental Type Tests

The RS950G has passed the following EMC and environmental tests.

IEC 61850-3 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	RUGGEDCOM-specified severity levels.
IEC 61000-4-4	Burst (Fast Transient)	Signal Ports	± 4 kV @ 2.5 kHz	Note[a]
		DC Line-to-Line	± 4 kV	4
		AC Line-to-Line	± 4 kV	4
		Earth Ground Ports	± 4 kV	4
IEC 61000-4-5	Surge	Signal Ports	± 4 kV Line-to-Ground, ± 2 kV Line-to-Line	4
		DC Line-to-Line	± 2 kV Line-to-Ground, ± 1 kV Line-to-Line	3
		AC Line-to-Line	± 4 kV Line-to-Ground, ± 2 kV Line-to-Line	4
IEC 61000-4-6	Induced (Conducted) RFI	Signal Ports	10 V	3
		D.C Line-to-Line	10 V	3
		AC Line-to-Line	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	RUGGEDCOM-specified severity levels.
			1000 A/m for 1 s	5
IEC 61000-4-29	Voltage Dips and Interrupts	DC Line-to-Line	30% for 0.1 s, 60% for 0.1 s, 100% for 0.05 s	
		AC Line-to-Line	30% for 1 period, 60% for 50 periods	
IEC 61000-4-11			100% for 5 periods, 100% for 50 periods	
IEC 61000-4-12	Damped Oscillatory	Signal Ports	2.5 kV common, 1 kV differential mode @ 1 MHz	3
		DC Line-to-Line	2.5 kV common, 1 kV differential mode @ 1 MHz	3
		AC Line-to-Line	2.5 kV common, 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 Line-to-Line	30 V Continuous, 300 V for 1 s	4

Test	Description		Test Levels	Severity Levels
IEC 61000-4-17	Ripple on DC Power Supply	DC Line-to-Line	15%	3
IEC 60255-5	Dielectric Strength	Signal Ports	2 kV (Fail-Safe Relay output)	
		DC Line-to-Line	1.5 kV	
		AC Line-to-Line	2 kV	
	HV Impulse	Signal Ports	5 kV (Fail-Safe Relay output)	
		DC Line-to-Line	5 kV	
		AC Line-to-Line	5 kV	

[a] *Siemens-specified severity levels*

IEEE 1613 EMC Immunity Type Tests

NOTE
The RUGGEDCOM RS950G meets Class 2 requirements for an all-fiber configuration and Class 1 requirements for copper ports.

Description		Test Levels
ESD	Enclosure Contact	± 2 kV, ± 4 kV, ± 8 kV
	Enclosure Air	± 4 kV, ± 8 kV, ± 15 kV
Radiated RFI	Enclosure Ports	35 V/m
Fast Transient	Signal Ports	± 4 kV @ 2.5 kHz
	DC Line-to-Line	± 4 kV
	AC Line-to-Line	± 4 kV
	Earth Ground Ports	± 4 kV
Oscillatory	Signal Ports	2.5 kV common mode @ 1 MHz
	DC Line-to-Line	2.5kV common, 1 kV differential mode @ 1 MHz
	AC Line-to-Line	2.5 kV common, 1 kV differential mode @ 1 MHz
HV Impulse	Signal Ports	5 kV (Failsafe Relay)
	DC Line-to-Line	5 kV
	AC Line-to-Line	5 kV
Dielectric Strength	Signal Ports	2 kV
	DC Line-to-Line	1.5 kV
	AC Line-to-Line	2 kV

Environmental Type Tests

Test	Description		Test 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
IEC 60255-21-2	Shock		30 g @ 11 ms