SIEMENS

RUGGEDCOM RS900G

Installation Guide

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RC1025-EN-03

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Table of Contents

Preface

This guide describes the RUGGEDCOM RS900G. 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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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 RS900G

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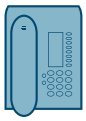

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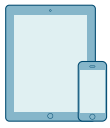

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- Access Siemens' extensive library of support documentation, including FAQs and manuals
- Submit SRs or check on the status of an existing SR
- Contact a local Siemens representative from Sales, Technical Support, Training, etc.
- Ask questions or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

1 Introduction

The RUGGEDCOM RS900G is an industrially hardened, fully managed Ethernet switch providing dual fiber optical Gigabit Ethernet ports and eight Fast Ethernet copper ports. Designed to operate reliably in harsh industrial environments, the RUGGEDCOM RS900G provides a high level of immunity to electromagnetic interference and heavy electrical surges typical of environments found in electric utility substations, factory floors or in curb side traffic control cabinets. An operating temperature range of -40 to 85 °C (-40 to 185 °F) coupled with a powder coated aluminum enclosure and optional conformal coating allows the RUGGEDCOM RS900G to be placed in almost any location.

The embedded RUGGEDCOM Rugged Operating System (ROS) provides advanced networking features such as Enhanced Rapid Spanning Tree (eRSTP), Port Rate Limiting and a full array of intelligent functionality for high network availability and manageability.

Section 1.1

Feature Highlights

Ethernet Ports

- 2 x 1000Base-X fiber optic ports
- 8 x 10/100Base-TX RJ-45 ports
- Industry standard fiber optic connectors: LC, SC and SFP pluggable optics
- Bi-directional simplex fiber support
- Long haul optics allow Gigabit distances up to 70 km (43.5 mi)

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)
- Conformal coated printed circuit boards (optional)

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 (10-36 VDC) or 48 VDC (36-72 VDC)
- Terminal blocks for reliable, maintenance-free connections
- CSA/UL 60950-1 safety approved to 85 °C (185 °F)

Cyber Security

- Multi-level user passwords
- SSH/SSL (128-bit encryption version)
- Enable/disable ports, MAC-based port security
- Port-based network access control (IEEE 802.1x)

- VLAN (IEEE 802.1Q) to segregate and secure network traffic
- RADIUS centralized password management
- SNMPv3 authentication and 56-bit encryption

Section 1.2

Description

The RUGGEDCOM RS900G features various ports, controls and indicator LEDs on the front panel for connecting, configuring and troubleshooting the device.

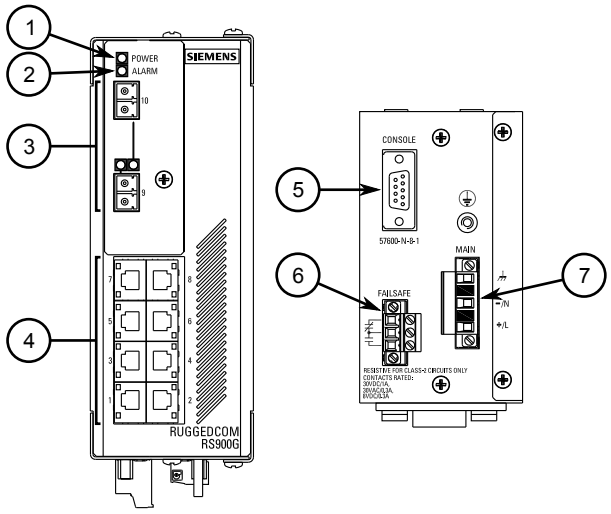

Figure 1: RUGGEDCOM RS900G

1. ALARM LED **2.** POWER LED **3.** Fiber Optic or SFP (Small Form-Factor Pluggable) Ethernet Ports **4.** Copper Ethernet Ports **5.** RS-232 Console Port (DB9) **6.** Failsafe Alarm Relay **7.** Power Supply Terminal Block

- **Fiber Optic, SFP 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 3.2, “Copper Ethernet Ports”
  - Section 3.3, “Fiber Optic Ethernet Ports”
  - Section 3.4, “SFP Optic Ethernet Ports”
- **RS-232 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 2.4, “Connecting to the Device”.
- **POWER LED** – Illuminates when power is being supplied to the device.

Color	Description
Green	Device is receiving power
Off	No power

- **ALARM LED** – Illuminates when an alarm condition exists.
- **Failsafe Alarm Relay** – 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 Alarm Relay Specifications”
- **Power Supply Terminal Block** – A pluggable terminal block. For more information, refer to:
  - Section 2.2, “Connecting Power”
  - 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.

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 RuggedCom Inc. 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 RUGGEDCOM RS900G 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

For DIN rail installations, the RUGGEDCOM RS900G can be equipped with a DIN rail bracket that 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.

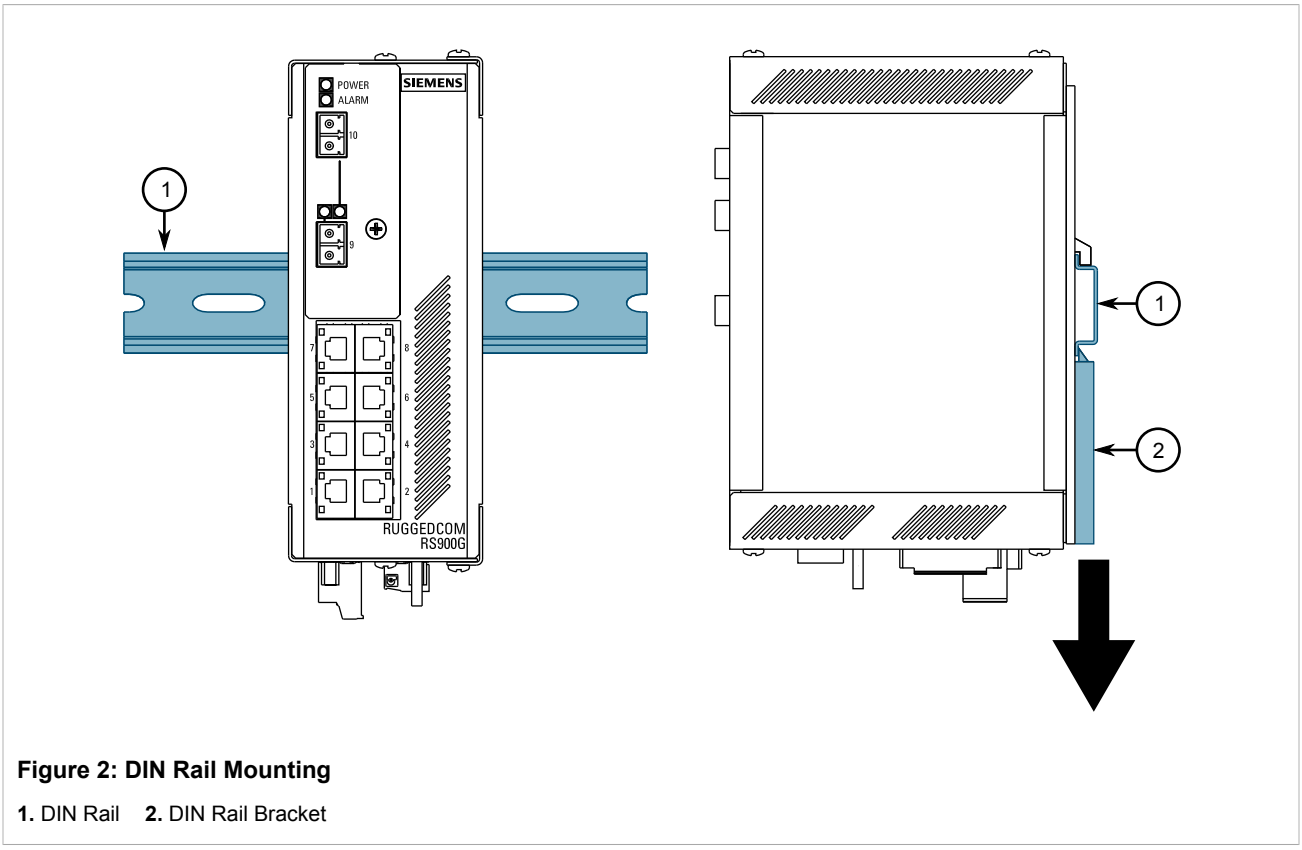

Figure 2: DIN Rail Mounting

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.

Section 2.1.2

Mounting the Device to a Panel

For panel installations, the RUGGEDCOM RS900G can be equipped with panel adapters that allow the device to be attached to a panel using screws.

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

1. Loosen the screws for the panel adapters located at the top and bottom of the device.

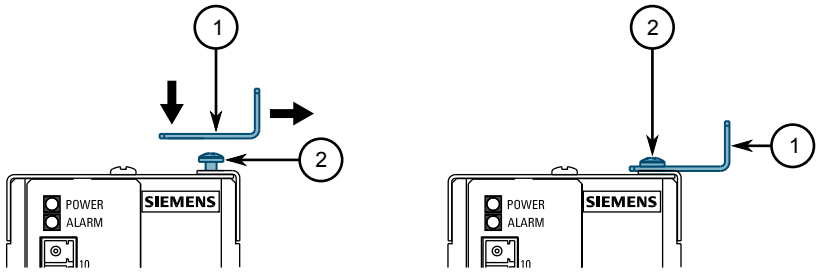

Figure 3: Installing the Panel Adapters

1. Panel Adapter **2.** Screw

2. For both adapters, align the slots with the screws and then slide the adapters onto the device.
3. Tighten the screws to secure the adapters.
4. Place the device against the panel and align the adapters with the mounting holes.

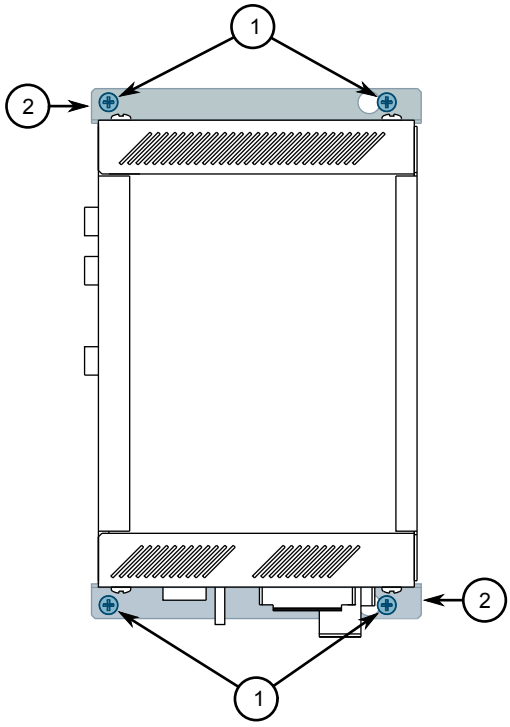

Figure 4: Panel Mounting

1. Screw **2.** Panel Adapter

5. Using two #6-32 screws for each adapter, secure the device to the panel.

Section 2.2

Connecting Power

The RUGGEDCOM RS900G features a single, integrated high AC/DC or low DC power supply, which accept dual power supply inputs for redundancy.

NOTE
Power sources can be connected to either power supply terminal block on the device.

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.*

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

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 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.

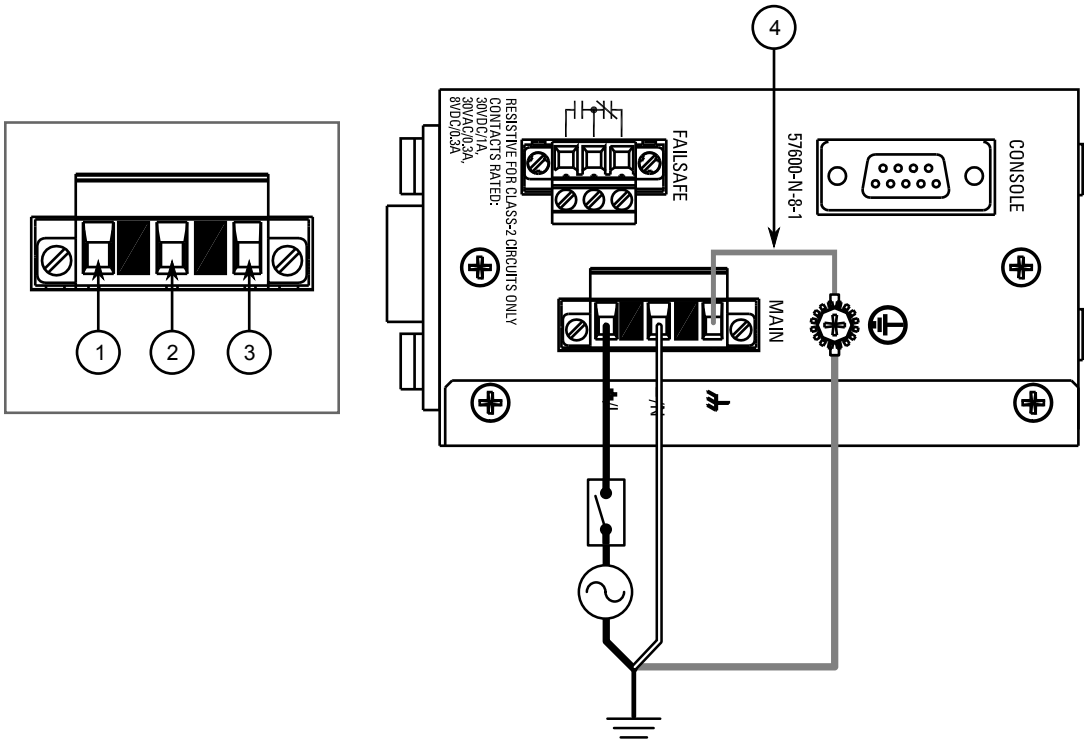

Figure 5: Terminal Block Wiring

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 2.2.2

Connecting Low DC Power

The RUGGEDCOM RS900G features a single low DC power supply, which accepts input one or more DC power sources. The use of both power supply inputs is recommended to provide redundancy.

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 to avoid damage to transient suppression circuitry during testing.

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

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

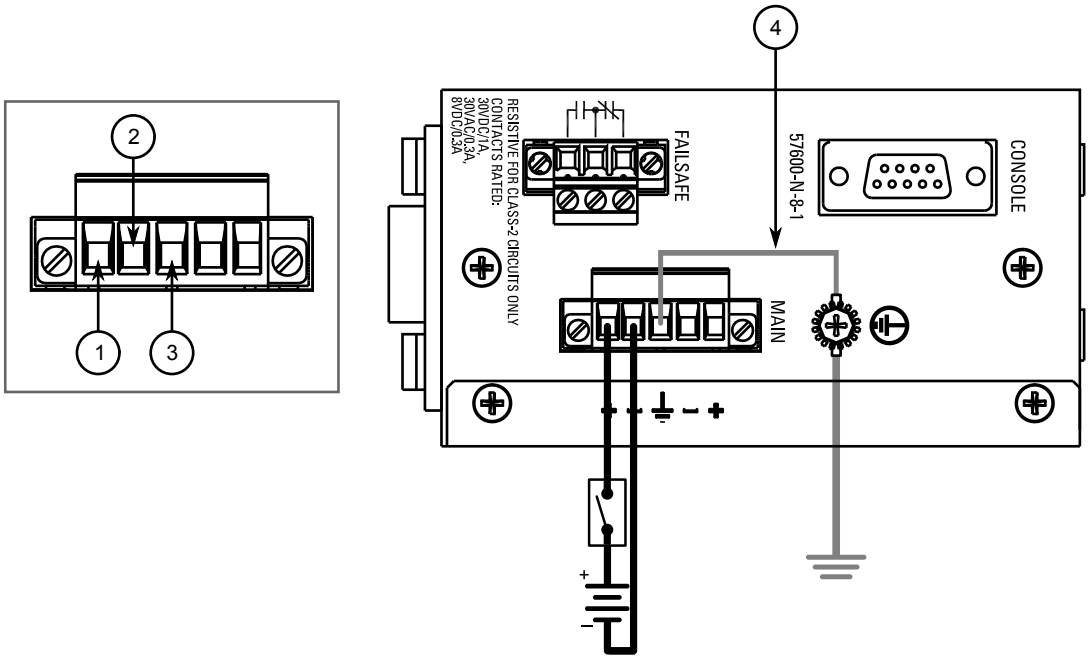

Figure 6: Terminal Block Wiring - Single DC Power Supply Inputs

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

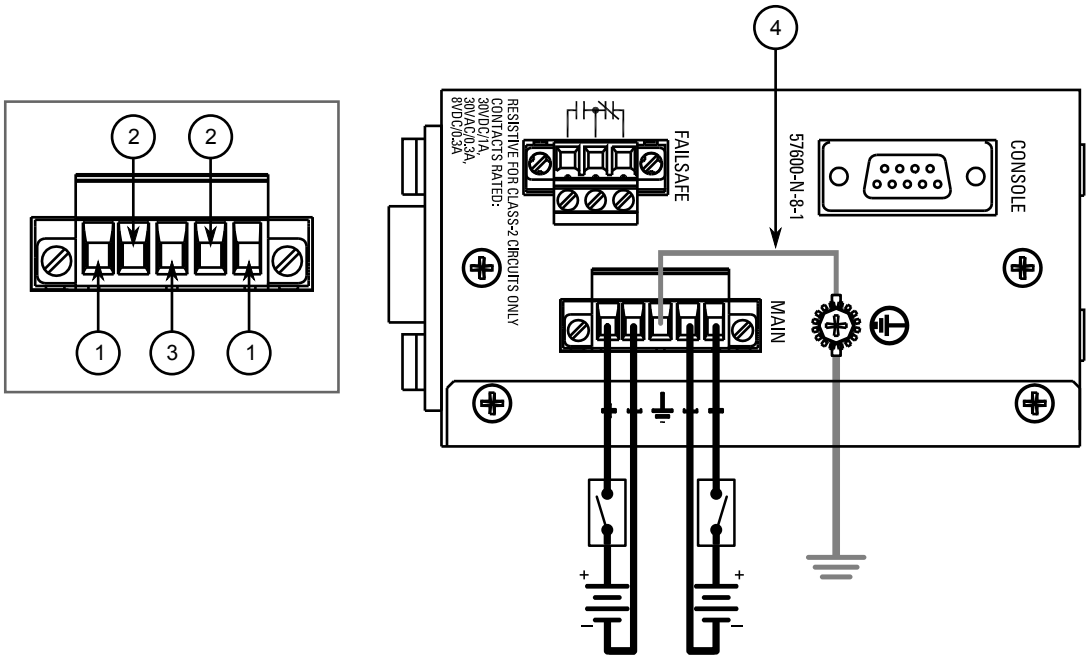

Figure 7: Terminal Block Wiring - Dual DC Power Supply Inputs

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 RUGGEDCOM ROS User Guide for the RUGGEDCOM RS900G.

The following shows the proper relay connections.

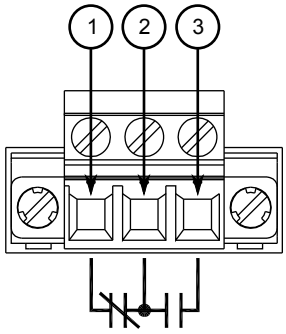

Figure 8: Failsafe Alarm Relay Wiring

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

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 RUGGEDCOM RS900G.

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

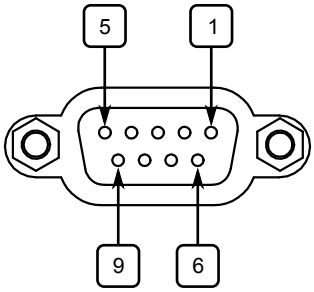

Figure 9: Serial DB9 Console Port

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 ROS console and Web interfaces via the device's IP address. For more information about available ports, refer to Chapter 3, *Communication Ports*.

Section 2.5

Cabling Recommendations

Siemens does not recommend the use of copper cabling of any length for critical, real-time substation automation applications. 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 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 RS900G features eight standard 10/100Base-TX or 100/1000Base-TX copper RJ-45 Ethernet ports. It can also be equipped with two additional Gigabit Ethernet capable ports, for which many fiber transceiver and copper options are available.

Each communication port type has a specific place in the RUGGEDCOM RS900G chassis.

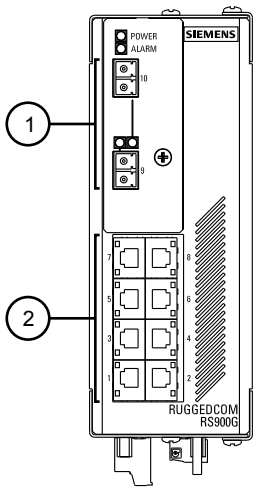

Figure 10: Port Assignment

1. SFP or Fiber Optic Ethernet Ports (Ports 9 and 10) **2.** Standard Copper Ethernet Ports (Ports 1 to 8)

The following sections describe the available ports:

- Section 3.1, “Port LEDs”
- Section 3.2, “Copper Ethernet Ports”
- Section 3.3, “Fiber Optic Ethernet Ports”
- Section 3.4, “SFP Optic Ethernet Ports”

Section 3.1

Port LEDs

Each communication port features a dedicated LED to indicate the port's link/activity status. The LED is either built into the port (ports 1 to 8) or adjacent to the port (ports 9 and 10).

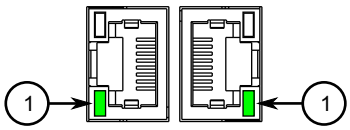

Figure 11: LED for Standard Copper RJ-45 Ports (1 to 8)

1. Link/Activity LED

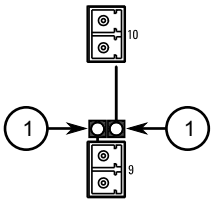

Figure 12: LED for Optional Ports (9 to 10)

1. Link/Activity LED

LED	State	Description
Link/Activity	Green (Solid)	Link established
	Green (Blinking)	Link activity
	Off	No link detected

Section 3.2

Copper Ethernet Ports

The RUGGEDCOM RS900G features eight 10/100Base-TX or 100/1000Base-TX copper RJ-45 Ethernet ports in ports 1 to 8.

Each copper port is directly connected to chassis ground and accepts a standard Category 5 (CAT-5) Unshielded Twisted-Pair (UTP) or Shielded Twisted-Pair (STP) cable.

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.

Pin-Out

The following are the pin-out descriptions for the RJ-45 and micro-D connectors:

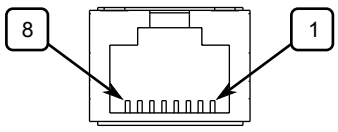

Figure 13: RJ-45 Port Pin Configuration

Pin	Name		Description
	10/100Base-TX	1000Base-TX	
1	RX+	BI_DB+	Receive Data+ or Bi-Directional
2	RX-	BI_DB-	Receive Data- or Bi-Directional
3	TX+	BI_DA+	Transmit Data+ or Bi-Directional
4	Reserved (Do Not Connect)		
5	Reserved (Do Not Connect)		

Pin	Name		Description
	10/100Base-TX	1000Base-TX	
6	TX-	BI_DA-	Transmit Data- or Bi-Directional
7	Reserved (Do Not Connect)		
8	Reserved (Do Not Connect)		

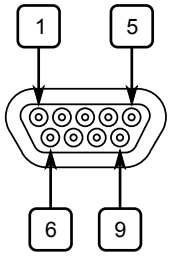

Figure 14: Micro-D Port Pin Configuration

Pin	10/100Base-TX	1000Base-TX
1	RX+	A+
2	Reserved (Do Not Connect)	C+
3	Reserved (Do Not Connect)	
4	Reserved (Do Not Connect)	D+
5	TX+	B+
6	RX-	A-
7	Reserved (Do Not Connect)	C-
8	Reserved (Do Not Connect)	D-
9	TX-	B-

Specifications

For further specifications, refer to Section 4.3, “Copper Ethernet Port Specifications”.

Section 3.3

Fiber Optic Ethernet Ports

Optional 100Base-FX, 1000Base-SX and 1000Base-LX fiber optic Ethernet ports are available for ports 9 and 10 with either LC (Lucent Connector), SC (Standard or Subscriber Connector) connectors. Make sure the Transmit (Tx) and Receive (Rx) connections of each port are properly connected and matched to establish a proper link.

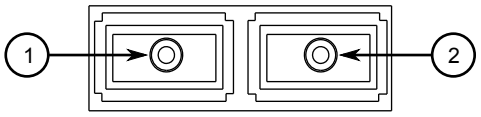

Figure 15: SC Connector

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

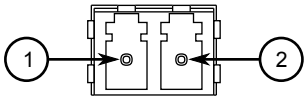

Figure 16: LC Connector

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

For further specifications, refer to Section 4.4, “Fiber Optic Ethernet Port Specifications”.

Section 3.4
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.

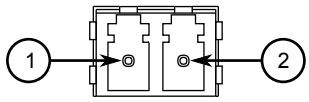

Figure 17: LC Connector

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

Specifications

For specifications on the available SFP optic Ethernet ports, refer to Section 4.5, “SFP Optic Ethernet Port Specifications”.

Installation/Removal

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

NOTE
SFP optical ports can be safely inserted and removed while the chassis is powered and operating.

- Section 3.4.1, “Installing an SFP Optical Port”
- Section 3.4.2, “Removing an SFP Optical Port”

Section 3.4.1
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.

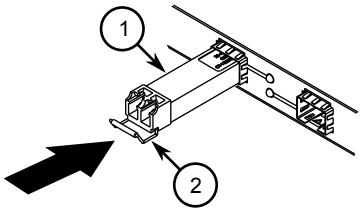

Figure 18: Installing an SFP Optical Port (Typical)

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 3.4.2
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.

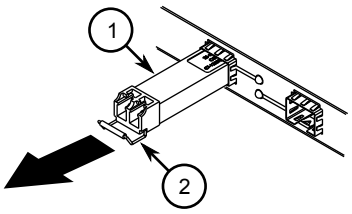

Figure 19: Removing an SFP Optical Port (Typical)

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	Fuse Rating	Isolation	Maximum Power Consumption
12-24 VDC	10 VDC	36 VDC	3.15A (T) [a]	1.5 kVDC	10 W
24 VDC	18 VDC	36 VDC	3.15A (T) [a]	1.5 kVDC	
48 VDC	36 VDC	72VDC	3.15A (T) [a]	1.5 kVDC	
HI (125/250 VDC)[b] HI (110/230 VAC)[b]	88 VDC 85 VAC	300 VDC 265 VAC	3.15A (T) [a]	4 kVAC 5.5 kVDC	

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

[b] *This is the same power supply for both AC and DC.*

Section 4.2

Failsafe Alarm Relay Specifications

NOTE
The following specifications are for Class-2 circuits only.

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 specifications for all standard and optional fixed copper Ethernet ports that can be ordered with the RUGGEDCOM RS900G. For more information about the SFP ports, refer to Section 3.2, "Copper Ethernet Ports".

NOTE

For specifications on optional copper Small Form-Factor Pluggable (SFP) ports, refer to Section 4.5, "SFP Optic Ethernet Port Specifications".

NOTE

- *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.*
- *All optical power numbers are listed as dBm averages.*
- *F51 transceivers are rated for -40 to 85 °C (-40 to 185 °F).*

Connector	Duplex[c]	Cable Type[d]	Wiring Standard[e]	Maximum Distance[f]	Isolation
RJ-45	FDX/HDX	> CAT-5	TIA/EIA T568A/B	100 m (328 ft)	1.5 kV
micro-D	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.*

Section 4.4

Fiber Optic Ethernet Port Specifications

The following details specifications for all optional fixed fiber optic Ethernet ports that can be ordered with the RUGGEDCOM RS900G. For more information about the SFP ports, refer to Section 3.3, "Fiber Optic Ethernet Ports".

NOTE

For specifications on optional fiber optic Small Form-Factor Pluggable (SFP) ports, refer to Section 4.5, "SFP Optic Ethernet Port Specifications".

NOTE

- *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.*
- *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.*
- *All cabling is duplex type unless otherwise specified.*

Mode	Connector Type	Cable Type (µm)	Tx λ (nm)[g]	Tx min (dBm)	Tx max (dBm)	Rx Sensitivity (dBm)	Rx Saturation (dBm)	Distance (km)[g]
MM	LC	50µ/125	850	-9.5	-4	-20	0	0.5
SM	LC	9µ/125	1310	-9.5	-3	-22	-3	10
SM	LC	9µ/125	1310	-5	0	-22	-3	25
SM	SC	9µ/125	1310	-10	-3	-22	-3	10
SM	SC	9µ/125	1310	-7	-3	-24	-3	25
MM	LC	50µ/125	850	-8.5	-4	-22	-3	0.5
SM	LC	9µ/125	1310	-9	-3	-24	0	10
SM	LC	9µ/125	1310	-7	-3	-26	-3	25
SM[h]	LC	9µ/125	1550	-5	0	-26	0	50
SM[h]	LC	9µ/125	1550	0	5	-26	0	80
SM	SC Simplex	9µ/125	1310	-9	-3	-22	-3	10
SM[h]	SC Simplex	9µ/125	1490	-9	-3	-22	-3	10

[g] *Typical.*

[h] *Utilizes a distributed feedback (DFB) type laser. Rated for -20 to 85 °C (-4 to 185 °F) operation only.*

Section 4.5

SFP Optic Ethernet Port Specifications

The RUGGEDCOM RS900G supports two optional 1 Gps Small Form-Factor Pluggable (SFP) optic Ethernet ports. For more information about the SFP ports, refer to Section 3.4, “SFP Optic Ethernet Ports”.

NOTE

- *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.*
- *All optical power numbers are listed as dBm averages.*
- *F51 transceivers are rated for -40 to 85 °C (-40 to 185 °F).*

Copper SFP

Connector	Duplex[i]	Cable Type[j]	Wiring Standard[k]	Maximum Distance	Isolation[l]
RJ-45	FDX/HDX	> CAT-5	TIA/EIA T568A/B	100 m (328 ft)	1.5 kV

[i] *Auto-Negotiating.*

[j] *Shielded or unshielded.*

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

[l] *RMS 1 minute.*

Fiber Optic SFP

Mode	Connector Type	Cable Type (µm)	Tx λ (nm)[m]	Tx min (dBm)	Tx max (dBm)	Rx Sensitivity (dBm)	Rx Saturation (dBm)	Distance (km)[m]	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	LC	9/125	1550	0	5	-23	-3	70	23

[m] *Typical.*

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 RUGGEDCOM RS900G enclosure.
Ambient Relative Humidity	5% to 95%	Non-condensing
Ambient Storage Temperature	-40 to 85 °C (-40 to 185 °F)	
Operating Altitude	0 to 15240 m (0 to 50000 ft)	Over temperature range of -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)
Enclosure	20 AWG Galvanized Steel

5 Dimension Drawings

NOTE
All dimensions are in millimeters, unless otherwise stated.

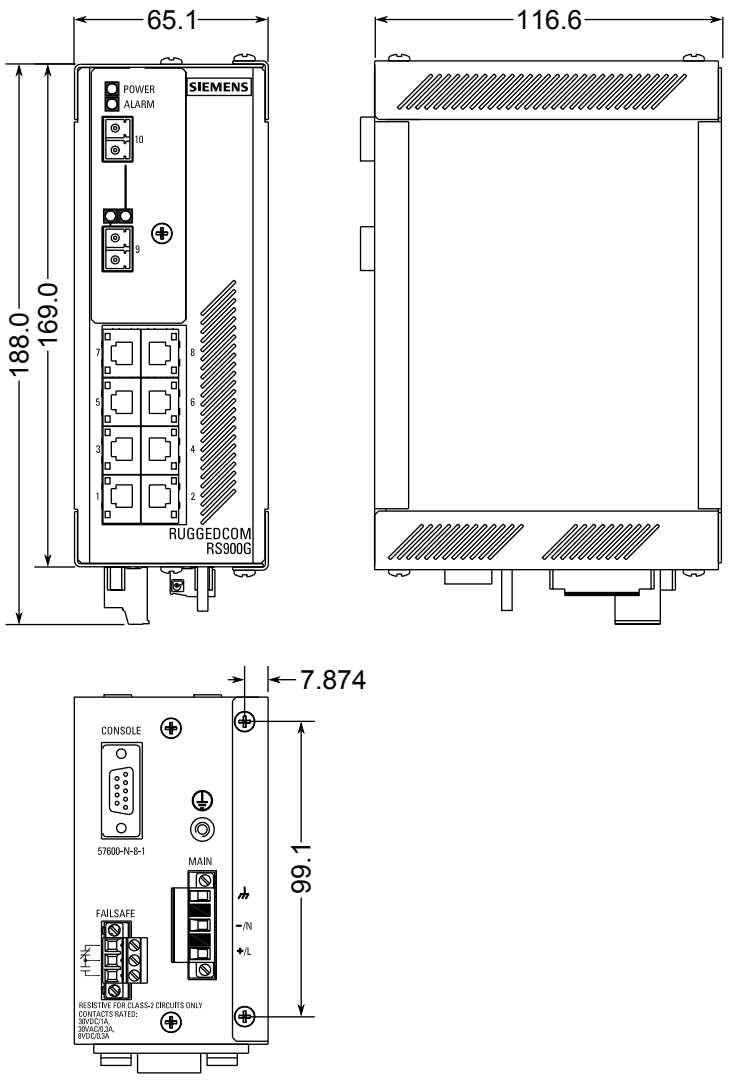

Figure 20: Overall Dimensions

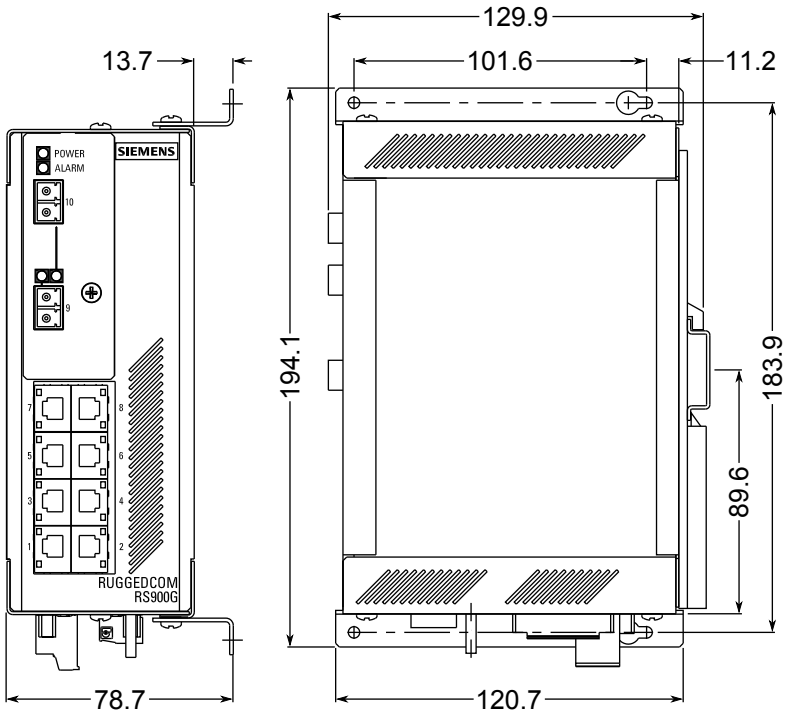

Figure 21: Panel and DIN Rail Mount Dimensions

6 Certification

The RUGGEDCOM RS900G 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 RS900G 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**

  EN 50121-4 (Wayside Rail EMI)

Section 6.2

Agency Approvals

Agency	Standards	Comments
CSA	CSA C22.2 No. 60950-1, UL 60950-1	Approved
	CSA C22.2 No. 142-M1987, CSA C22.2 No. 213-M1987, UL Std No. 916, UL Std No. 1604	Approved Hazardous Locations Class 1, Division 2, Groups A, B, C, and D T6 rating at 40 °C (104 °F), T4A rating at 85 °C (185 °F)
CE	EN 60950-1, EN 61000-6-2, EN 55022 Class A, EN 60825-1, EN 50581	CE Compliance is claimed via Declaration of Self Conformity Route
FCC	FCC Part 15, Class A	Approved

Agency	Standards	Comments
FDA/CDRH	21 CFR Chapter I, Sub-chapter J	Approved

Section 6.3

EMI and Environmental Type Tests

The RUGGEDCOM RS900G has passed the following EMI 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	10 V/m	3
IEC 61000-4-4	Burst (Fast Transient)	Signal ports	± 2 kV	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-earth, ± 2 kV line-to-line	4
		DC Power Ports	± 2 kV line-to-earth, ± 1 kV line-to-line	3
		AC Power Ports	± 4 kV line-to-earth, ± 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, 100% for 0.02 s, 100% for 0.05 s	
		AC Power Ports	30% for 1 period, 60% for 50 periods	
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, 1 kV differential mode @ 1 MHz	3
		DC Power Ports	2.5 kV common, 1 kV differential mode @ 1 MHz	3
		AC Power Ports	2.5 kV common, 1 kV differential mode @ 1 MHz	3
IEC 60255-5	Dielectric Strength	Signal ports	0.5 kV (Fail-Safe Relay output)	

Test	Description		Test Levels	Severity Levels
		DC Power Ports	2 kV	
		AC Power Ports	2 kV	
IEC 60255-5	HV Impulse	Signal ports	5 kV (Fail-Safe Relay output)	
		DC Power Ports	5 kV	
		AC Power Ports	5 kV	

IEEE 1613 Type Tests

NOTE
The RUGGEDCOM RS900G meets Class 2 requirements for an all-fiber configuration and Class 1 requirements for copper ports.

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	2.2 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	0.5 kV (Failsafe Relay)
	DC Power Ports	2 kV
	AC Power Ports	2 kV

Environmental Type Tests

Test	Description	Test Levels	Severity Levels
IEC 60255-21-1	Vibration	2g @ 10-150 Hz	Class 2
IEC 60255-21-2	Shock	30g @ 11 ms	Class 2