SIEMENS

RUGGEDCOM RSG909R

Installation Guide

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Table of Contents

Preface

This guide describes the RUGGEDCOM RSG909R. 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.

CONTENTS

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 [https://support.industry.siemens.com/cs/ww/en/view/109755339]

Accessing Documentation

The latest user documentation for RUGGEDCOM RSG909R is available online at https://www.siemens.com/ruggedcom. To request or inquire about a user document, contact Siemens Customer Support.

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Online

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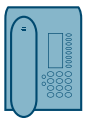

Telephone

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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 RSG909R is a utility-grade, fully managed Ethernet switch featuring an integrated HSR/PRP RedBox designed for mission-critical, time-sensitive applications (i.e IEC 61850 substations) that require zero downtime.

- **Integrated PRP/HSR Solution**
  The HSR/PRP RedBox function allows regular Ethernet end devices to participate in HSR or PRP networks. The device also allows an HSR network to connect to a PRP network over the Coupler port (port 7). QuadBox functionality is available when used in conjunction with another RUGGEDCOM RSG909R or RUGGEDCOM RSG907R.
- **Swappable SFP Transceivers**
  Ports designated for Redundant Network Access (RNA) – ports **A/B** and **7** – can be customized with a wide array of Small Form-factor Portable (SFP) transceivers offered by Siemens, making the device flexible to the needs of the redundant network application.
- **Fixed Ethernet Ports**
  In addition to removable SFP transceivers, the device also features six standard 10/100/1000Base-TX fixed copper Ethernet ports for Local Area Network (LAN) access.
- **Built for Harsh Environments**
  The device provides a high level of immunity to electromagnetic interference, heavy electrical surges, extreme temperatures and humidity for reliable operation in harsh environments.

  The device features IP40 degree protection, does not use internal fans for cooling, and supports a -40 to 85 °C (-40 to 185 °F) extended operating temperature range.
- **Compact Design**
  The small form factor of the RUGGEDCOM RSG909R allows for installation in space-limited cabinets and on DIN rails.
- **Dual Input Power**
  The device features dual power inputs to support redundant AC or DC power sources.
- **RUGGEDCOM ROS**
  RUGGEDCOM ROS provides advanced Layer 2 networking functions, and advanced cyber security features.

CONTENTS

Section 1.1
Feature Highlights

Ethernet Ports

- 6 x 10/100/1000Base-TX copper Ethernet ports
- 3 x 1000Base-SX/LX SFP transceivers

Rated for Reliability in Harsh Environments

- Immunity to EMI and heavy electrical surges
- Certified for use in explosive environments in accordance with the ATEX directive
- Hazardous Location Certification: Class I Division 2
- -40 to 85 °C (-40 to 185 °F) ambient operating temperature (no fans)
- Die Cast Aluminum
- DIN or panel mounting options provide secure mechanical reliability
- [Optional] Conformal coated printed circuit boards

Universal Power Supply Options

- Fully integrated power supply
- Dual high-voltage AC inputs: 88-300 VDC or 85-264 VAC
- Dual low-voltage DC inputs: 12, 24 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 RSG909R features various ports, controls and indicator LEDs on the front panel for connecting, configuring and troubleshooting the device.

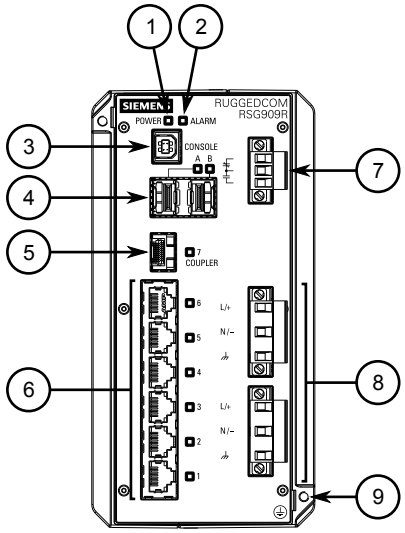

Figure 1: RUGGEDCOM RSG909R

1. POWER LED **2.** ALARM LED **3.** USB Console Port **4.** RNA Port (Port A/B) **5.** Port 7 **6.** Copper Ethernet Ports (Ports 1 to 6) **7.** Failsafe Alarm Relay **8.** Power Supply Terminal Blocks **9.** Chassis Ground Screw

POWER LED	Illuminates green when power is supplied to the device.
ALARM LED	Illuminates red when an alarm condition exists.
Console Port	The USB Type-B 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 3.1, "Connecting to the Device".
Communication Ports	Communication ports in general receive and transmit data, as well as provide access to the RUGGEDCOM ROS Web interface. For more information about the various ports available, refer to Chapter 4, *Communication Ports*.
Failsafe Alarm Relay	Latches to default state when a power disruption or other alarm condition occurs. For more information, refer to: • Section 2.5, "Connecting the Failsafe Alarm Relay" • Section 5.2, "Failsafe Alarm Relay Specifications"
Power Supply Terminal Blocks	Pluggable terminal blocks for connecting one or more power sources. For more information, refer to Section 2.6, "Connecting Power" and Section 5.1, "Power Supply Specifications".
Chassis Ground Terminal	Protects the device from power surges and accumulated static electricity. For information about grounding the device, refer to Section 2.6, "Connecting Power".

Section 1.3

Required Tools and Materials

The following tools and materials are required to install the RUGGEDCOM RSG909R:

Tools/Materials	Purpose
AC power cord (16 AWG)	For connecting power to the device.

Tools/Materials	Purpose
USB Type-B console port cable	For connecting to the RUGGEDCOM ROS console interface.
CAT-5 Ethernet cables	For connecting the device to a LAN.
Flathead screwdriver	For mounting the device to a DIN rail.
Phillips screwdriver	For mounting the device to a panel.
Torx screwdriver	For attaching mounting brackets to the device.
4 x M5 or #10-24 screws	For mounting the device to a panel.

Section 1.4

Decomissioning and Disposal

Proper decomissioning and disposal of this device is important to prevent malicious users from obtaining proprietary information and to protect the environment.

Decommissioning

This device may include sensitive, proprietary data. Before taking the device out of service, either permanently or for maintenance by a third-party, make sure it has been fully decommissioned.

For more information, refer to the associated *User Guide*.

Recycling and Disposal

For environmentally friendly recycling and disposal of this device and related accessories, contact a facility certified to dispose of waste electrical and electronic equipment. Recycling and disposal must be done in accordance with local regulations.

Section 1.5

Cabling Recommendations

All copper Ethernet ports on RUGGEDCOM products include transient suppression circuitry to protect against damage from electrical transients and conform with IEC 61850-3 and IEEE 1613 Class I standards. This means that during a transient electrical event, communications errors or interruptions may occur, but recovery is automatic.

Siemens also does not recommend using copper Ethernet ports to interface with devices in the field across distances that could produce high levels of ground potential rise (i.e. greater than 2500 V), during line-to-ground fault conditions.

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

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. **Unpack and inspect the device.**
   For more information, refer to Section 2.2, "Unpacking the Device".
3. **Mount the device.**
   For more information, refer to Section 2.4, "Mounting the Device".
4. **Connect the failsafe alarm relay.**
   For more information, refer to Section 2.5, "Connecting the Failsafe Alarm Relay".
5. **Connect power and ground the device.**
   For more information, refer to Section 2.6, "Connecting Power".
6. **Connect the device to the network.**
   For more information, refer to Section 2.7, "Connecting the Device to the Network".
7. **Configure the device.**
   For more information, refer to Section 3.2, "Configuring the Device".

Section 2.2
Unpacking the Device

When unpacking the device, do the following:

1. Inspect the package for damage before opening it.
2. Visually inspect each item in the package for any physical damage.
3. Verify all items are included.

IMPORTANT!
If any item is missing or damaged, contact Siemens for assistance.

Section 2.3
Installing the Device in Hazardous Locations

The RUGGEDCOM RSG909R is designed to comply with the safety standards for Class I, Division 2, Zone 2 hazardous locations where concentrations of flammable gases, vapors or liquids may be present, as opposed to normal operating environments.

Special Conditions for Safe Use

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

- The equipment shall 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 according to IEC 60079-0 and IEC 60079-7 or IEC 60079-15. The installer shall ensure that the maximum ambient temperature of the equipment when installed is not exceeded.
- The equipment shall be used in an area of not more than pollution degree 2 as defined in IEC 60664-1.
- Transient protection shall be provided that is set at a level not exceeding 140% of the peak rated voltage value at the supply and failsafe relay contact terminals to the equipment.
- The console ports (USB Type-B) shall be used in a non-hazardous area only.
- Pluggable communication modules shall not be connected or disconnected in hazardous locations.
- The equipment must be appropriately connected to safety Earth upon installation.

NOTE
For further details of the device's compliance with Class I, Division 2, Zone 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.

Sample Hazardous Location Label

The following is an example of the RUGGEDCOM RSG909R hazardous location label:

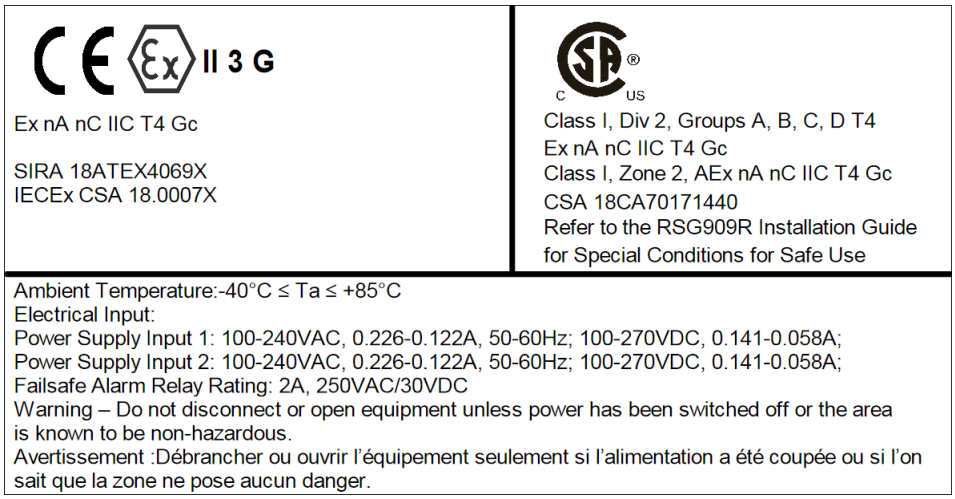

Figure 2: Compliance Label (Example)

Section 2.4

Mounting the Device

The RUGGEDCOM RSG909R 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 from the enclosure. As such, it is recommended that 2.5 cm (1 in) of space be maintained on all open sides of the device to allow for some convectional airflow.

Forced airflow is not required. However, any increase in airflow will result in a reduction of ambient temperature and improve the long-term reliability of all equipment mounted in the rack space.

NOTE

For detailed dimensions of the device with either DIN rail or panel hardware installed, refer to Section 5.7, "Dimension Drawings".

CONTENTS

Section 2.4.1

Mounting the Device on a DIN Rail

For DIN rail installations, the RSG909R is equipped with a DIN rail bracket pre-installed on the back of the chassis. The bracket allows the device to be slid or clipped onto a standard 35 mm (1.4 in) DIN rail.

Mounting the Device

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

1. Position the device in front of the DIN rail and then hook the upper part of the DIN rail bracket onto the DIN rail.

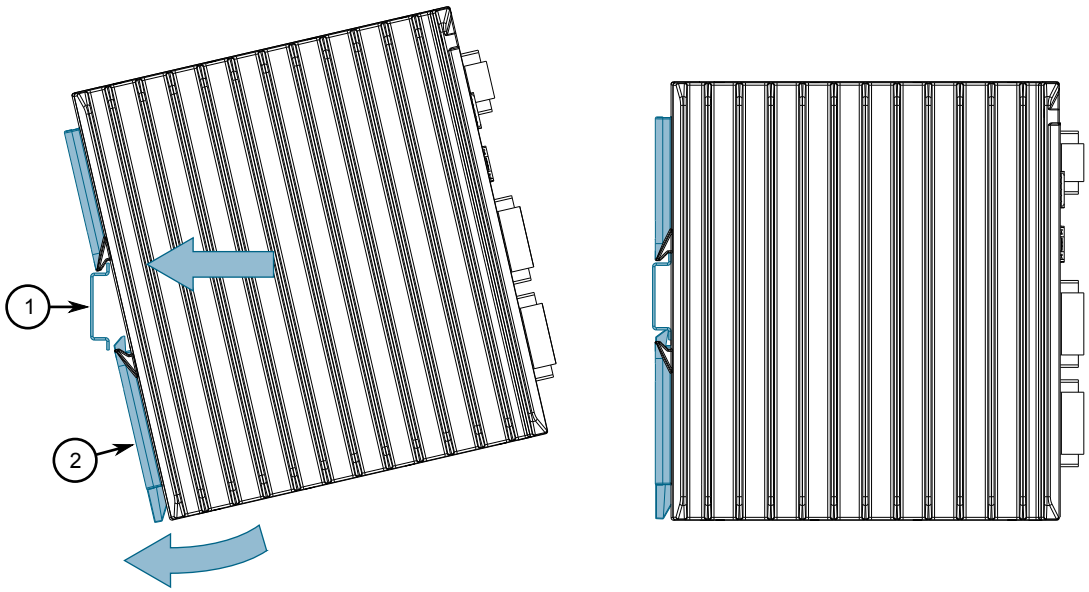

Figure 3: Mounting the Device to a DIN Rail

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

2. Push the bottom of the device towards the DIN rail until the release mechanism clicks into place.
3. Gently lift the bottom of the device to make sure the device is locked in place.

Removing the Device

To remove the device from a DIN rail, do the following:

1. Pull the release at the back of the device down and hold. If clearance is limited, insert the tip of a flathead screw driver into the slot at the bottom of the release and use leverage to pull the release down.

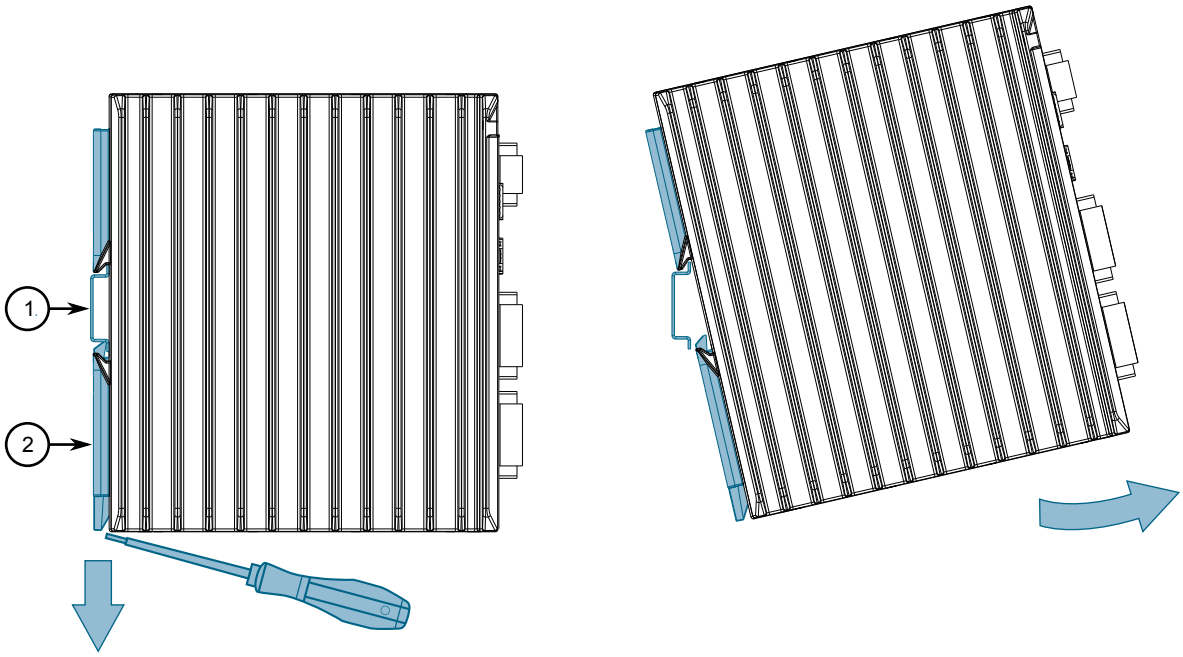

Figure 4: Removing the Device from a DIN Rail

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

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

Section 2.4.2

Mounting the Device to a Panel

For panel installations, the RUGGEDCOM RSG909R can be equipped with panel adapters on the top and bottom of the chassis. The adapters allow the device to be attached to a panel using screws.

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

1. Secure the mounting adapters to the top and bottom of the device using the four M4 screws each included with the device.

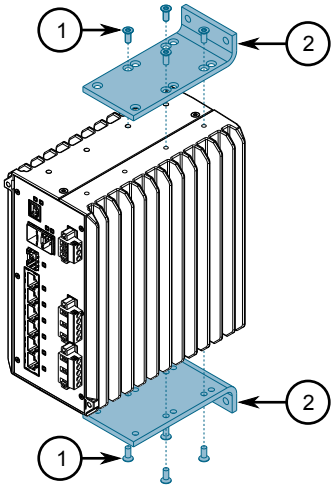

Figure 5: Panel Mount Adapter Assembly

1. Screw (M4) **2.** Panel Mount Adapter

2. Prepare mounting holes in the panel where the device is to be installed.
3. Place the device against the panel and align the adapters with the mounting holes.

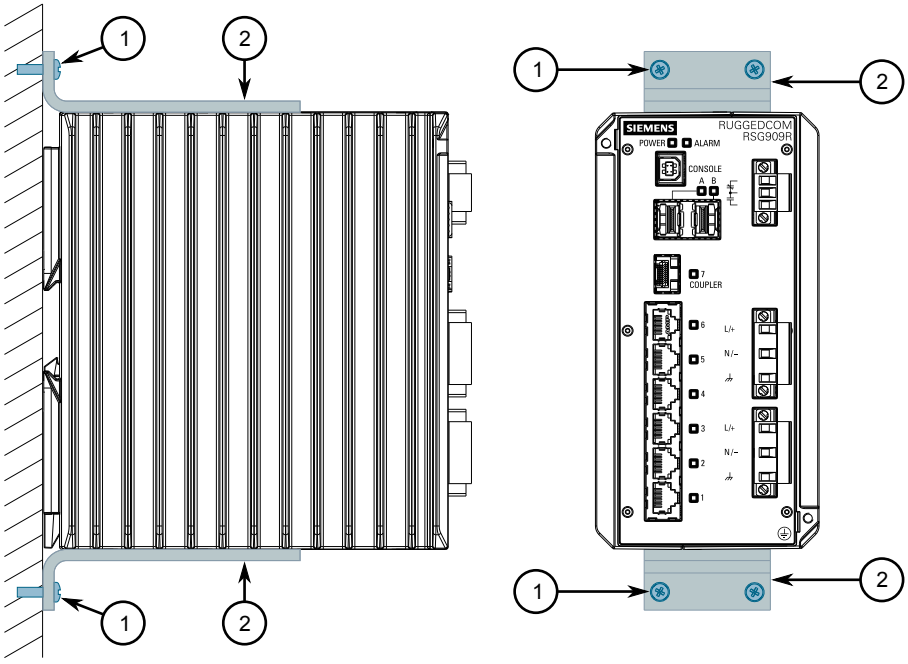

Figure 6: Panel Mounting (Rear Mount Orientation)

1. Screw (M5 or #10-24) **2.** Panel Mount Adapter

4. Secure the adapters to the panel with M5 or #10-24 screws.

Section 2.5

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 RSG909R.

To connect the failsafe alarm relay, do the following:

1. Insert the failsafe alarm relay terminal block into the device and tighten the screws.

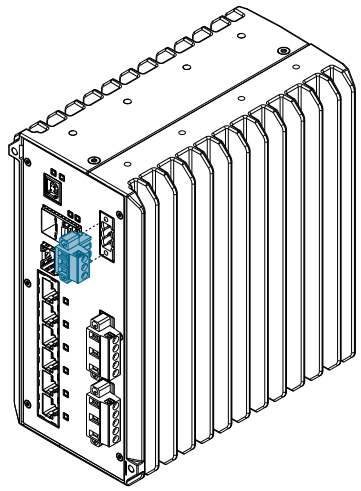

Figure 7: Assembling the Failsafe Alarm Relay Terminal Block

2. Connect a failsafe device to the terminal block.

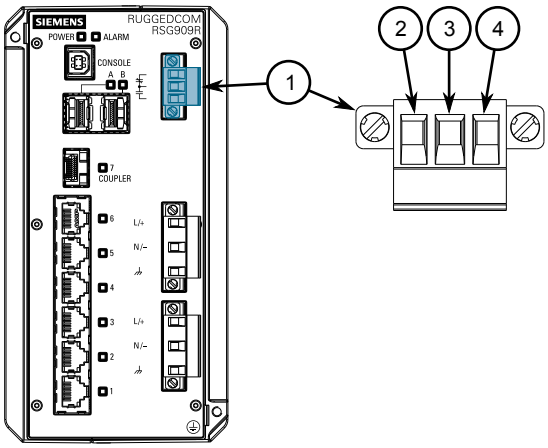

Figure 8: Failsafe Alarm Relay Wiring

1. Failsafe Alarm Relay Terminal Block **2.** Normally Open **3.** Common **4.** Normally Closed

Section 2.6

Connecting Power

The RUGGEDCOM RSG909R features two input terminals that allow the device to be powered by:

- Up to one independent AC and one independent DC power source
- Two independent DC power sources

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 minimum #16 gage copper wiring when connecting terminal blocks.*
- *Equipment must be installed according to applicable local wiring codes and standards.*

CONTENTS

Section 2.6.1

Connecting AC or DC Power

To connect a single high AC, high DC or low DC power supply to the device, do the following:

NOTE
For examples of the supported wiring configurations, refer to Section 2.6.2, "Wiring Examples".

NOTE
This device is intended to be connected to two independent power sources.

WARNING!
Electrocution hazard – risk of personal injury. When only one AC power source is connected to the device, the secondary power terminals are energized. To prevent contact with the terminals and avoid an electrical shock, do the following when one AC power source is connected to the device:

- *Make sure a terminal block is installed in the unused port and that any wires from the secondary terminal block are properly terminated*
- *Make sure the first power source is off before connecting (or disconnecting) a second power source*

1. If connecting a secondary power source, make sure the power source currrently connected to the device is disabled (e.g. the AC power cable is unplugged from the wall receptacle).
2. Insert the appropriate terminal block(s) into the device and tighten both screws.

Power Source	Terminal Block Type
HI	3 POS
LO	5 POS

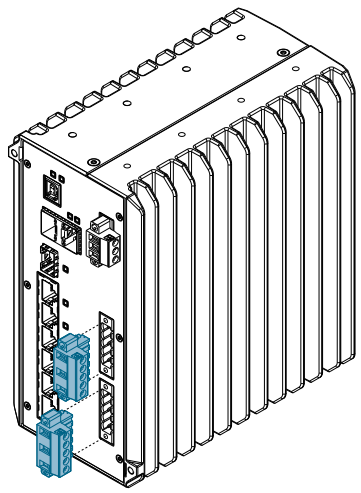

Figure 9: Assembling the Power Terminal Blocks

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

3. Connect the power cable to the device as follows:

HI Power Supply

a. Connect the Line wire (AC) or Positive wire (DC) to the positive/live (+/L) terminal on the terminal block.
b. Connect the Neutral wire (AC) or Negative wire (DC) to the negative/neutral (-/N) terminal on the terminal block.
c. Connect the ground wire to the chassis/ground terminal on the terminal block.

LO Power supply

a. Connect the Positive wire to the positive (+) terminal on the terminal block.
b. Connect the Negative wire to the negative (-) terminal on the terminal block.
c. Connect the ground wire to the chassis/ground terminal on the terminal block.

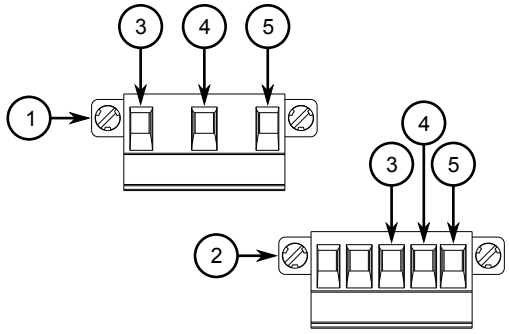

Figure 10: Terminal Block Wiring

1. 3 POS Terminal Block **2.** 5 POS Terminal Block **3.** Chassis/ Ground Terminal **4.** Negative Terminal **5.** Positive Terminal

4. Connect the chassis ground screw to ground (Potential Earth). It is recommended to terminate the ground connection with an M4 ring or spade lug, and then torque to 1.7 N·m (15 lbf-in).

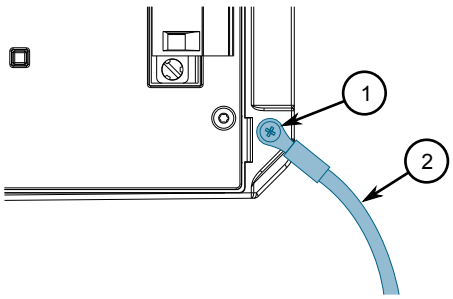

Figure 11: Chassis Ground Connection

1. M4 Screw **2.** M4 Ring Lug

5. Connect the power cable to the power source.

Section 2.6.2
Wiring Examples

The following illustrate how to connect single and dual power supplies to the device.

HI Power Supply Configurations

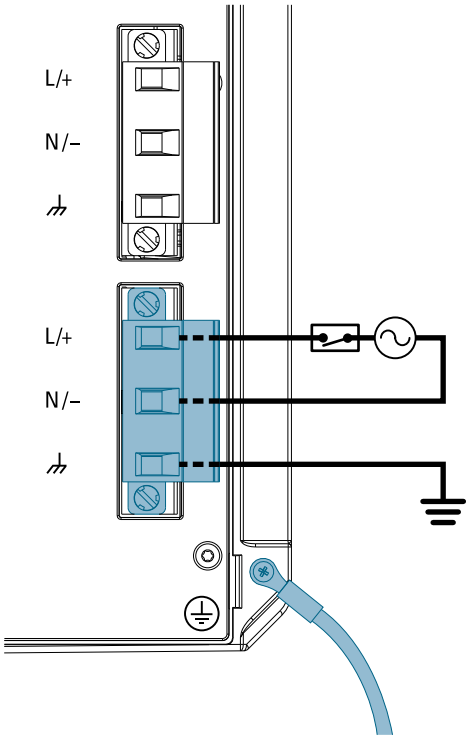

Figure 12: Single High AC Power Input Configuration

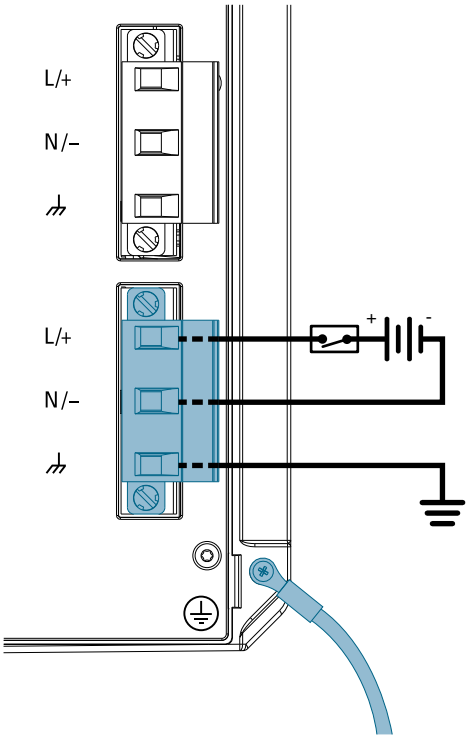

Figure 13: Single High DC Power Input Configuration

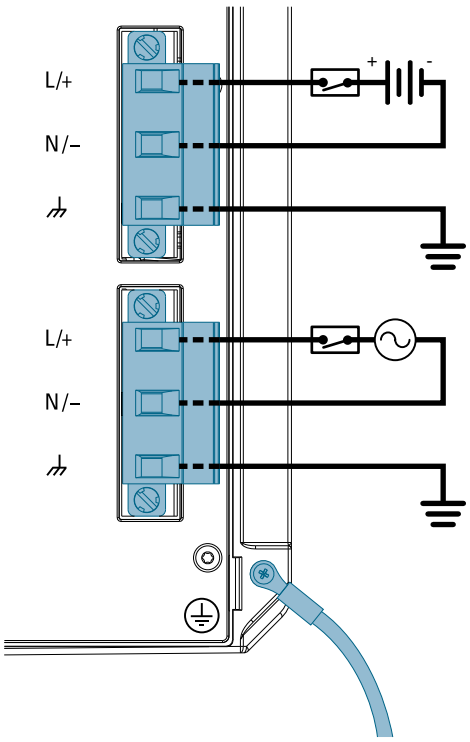

Figure 14: Dual High AC and DC Power Supplies

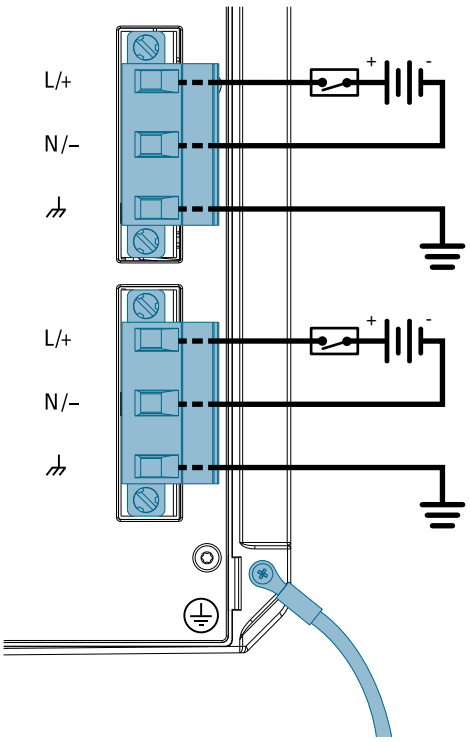

Figure 15: Dual High DC Power Supplies

LO Power Supply Configurations

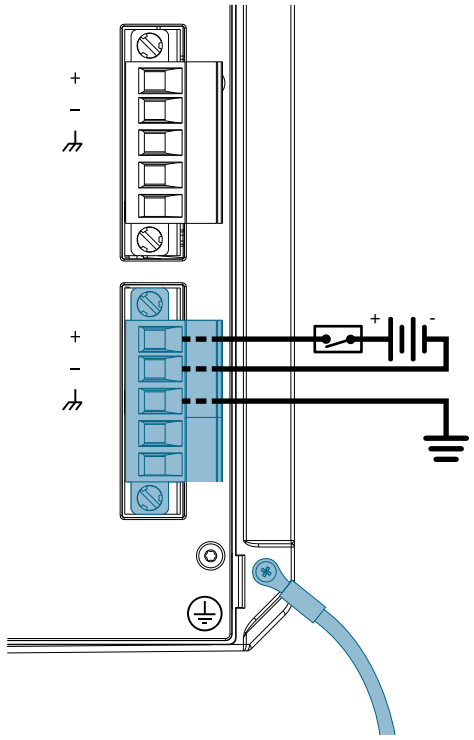

Figure 16: Single Low DC Power Input Configuration

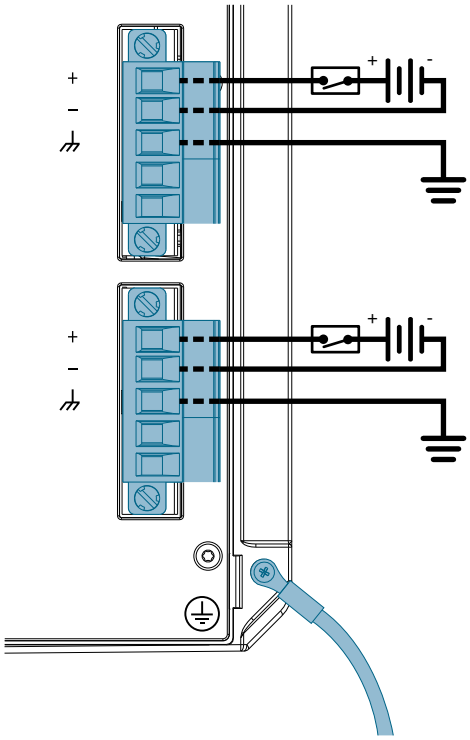

Figure 17: Dual Low DC Power Input Configuration

Section 2.7

Connecting the Device to the Network

Steps to connect the device to the network are application-specific.

Connecting to a Local Area Network

In this application, the device operates as a switch on a Local Area Network (LAN). Connect the device as follows:

Port	Connect To...
A	Not used
B	Not used
7 (Coupler)	Connect to an Ethernet-capable device if the RUGGEDCOM RSG909R is configured as an HSR or PRP RedBox
1 to 6	Connect to an Ethernet-capable device

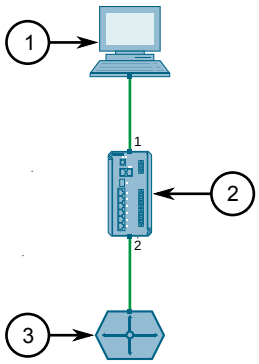

Figure 18: LAN

1. Ethernet-Capable Device **2.** Switch (RUGGEDCOM RSG909R) **3.** Router

Connecting to a PRP Network

In this application, the device operates as a PRP RedBox on a PRP network. Connect the device as follows:

Port	Connect To...
A	Connect to LAN A
B	Connect to LAN B
7 (Coupler)	Connect to one or more Singly Attached Nodes (SANs)
1 to 6	

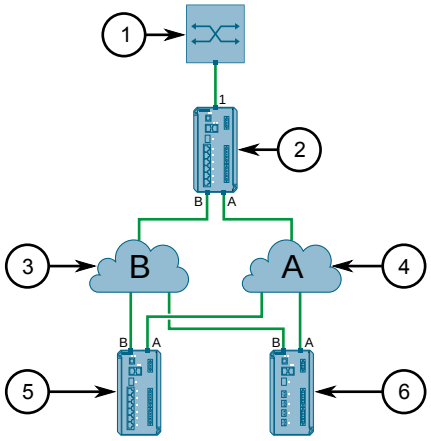

Figure 19: A PRP Network

1. VDAN **2.** PRP RedBox (RUGGEDCOM RSG909R) **3.** LAN B **4.** LAN A **5.** DAN (RUGGEDCOM RSG909R RSG909R;RSG908C;RSG910C) **6.** DAN (RUGGEDCOM RSG909R RSG907R)

Connecting to an HSR Ring

In this application, the device operates as an HSR RedBox in an HSR ring. Connect the device as follows:

Port	Connect To...
A	Connect to port **B** of the neighboring HSR device
B	Connect to port **A** of the neighboring HSR device
7 (Coupler)	[Optional] Connect to a Singly Attached Node (SAN)
1 to 6	Connect to one or more Singly Attached Nodes (SANs)

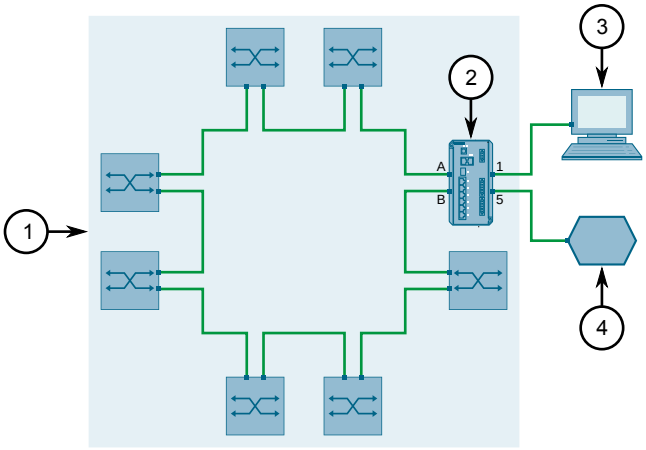

Figure 20: An HSR Ring

1. HSR Ring **2.** HSR RedBox (RUGGEDCOM RSG909R) **3.** HSR-Unaware Device **4.** SAN

Connecting an HSR Ring and PRP Network

In this application, the device operates as one of two HSR/PRP RedBoxes in an HSR ring that is connected to either LAN A or LAN B in the PRP network. Connect the device as follows:

Port	Connect To...
A	Connect to port **B** of the neighboring HSR/PRP RedBox or to the HSR ring
B	Connect to port **A** of the neighboring HSR/PRP RedBox or to the HSR ring
7 (Coupler)	Connect to LAN A or LAN B
1 to 6	Connect to one or more Singly Attached Nodes (SANs)

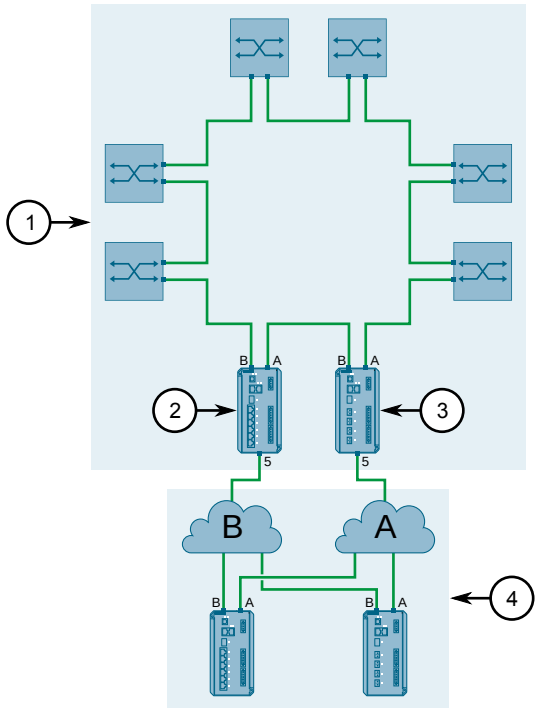

Figure 21: HSR-to-PRP Coupling

1. HSR Ring **2.** HSR/PRP RedBox (RUGGEDCOM RSG909R;RSG908C;RSG910C) **3.** HSR/PRP RedBox (RUGGEDCOM RSG907R) **4.** PRP Network

Connecting HSR Rings

In this application, the device operates as an HSR/HSR RedBox in an HSR ring that is connected to another HSR/HSR RedBox. When linked, the two HSR/HSR RedBoxes form a QuadBox or Quadruple Port device. Connect the device as follows:

NOTE
Quadbox applications typically consist of two Quadboxes between each HSR ring.

Port	Connect To...
A	Connect to port **B** of the neighboring HSR/HSR RedBox or to the HSR ring
B	Connect to port **A** of the neighboring HSR/HSR RedBox or to the HSR ring
7 (Coupler)	Connect to the coupling (or interlink) port of the companion HSR/HSR RedBox
1 to 6	Connect to one or more Singly Attached Nodes (SANs)

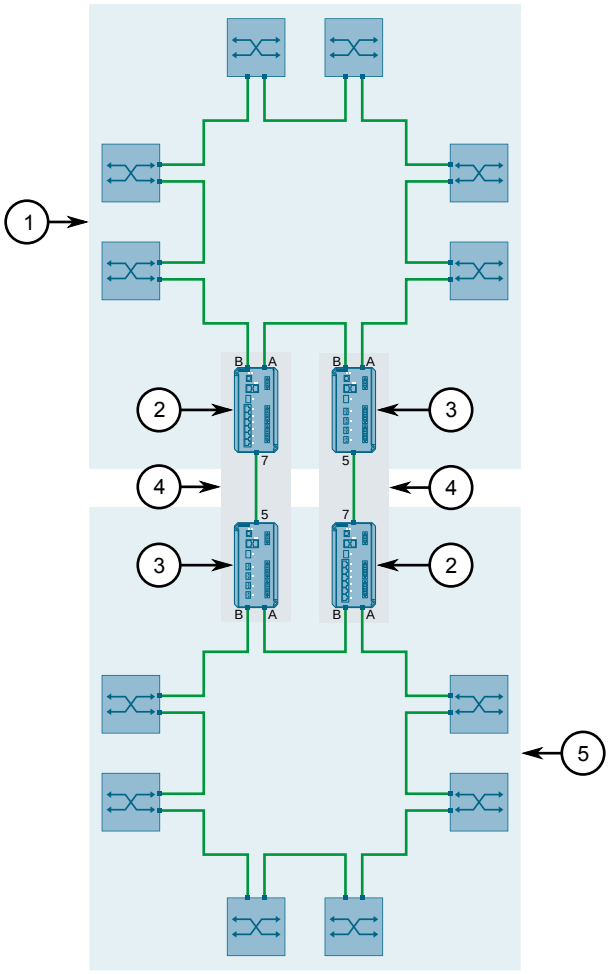

Figure 22: HSR Quadbox

1. HSR Ring **2.** HSR Quadbox **3.** HSR/HSR RedBox (RUGGEDCOM RSG909R;RSG908C;RSG910C) **4.** HSR/HSR RedBox (RUGGEDCOM RSG907R)

3 Device Management

This section describes how to connect to and manage the device.

CONTENTS

Section 3.1

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 RSG909R.

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

Console Port

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

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

NOTE
For Microsoft Windows users, the RUGGEDCOM USB Serial Console driver must be installed on the users workstation before connecting via the USB Type-B console port. For more information, refer to the RUGGEDCOM ROS User Guide for the RUGGEDCOM RSG909R.

Use the following settings to connect to the port:

Speed	57600 baud
Data Bits	8
Stop Bit	1
Parity	None
Flow Control	Off

Terminal ID	VT100

Ethernet 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 RSG909R is https://192.168.0.1.

For more information about available ports, refer to Chapter 4, *Communication Ports*.

Section 3.2

Configuring the Device

Once the device is installed and connected to the network, it must be configured. All configuration management is done via the RUGGEDCOM ROS interface. For more information about configuring the device, refer to the *RUGGEDCOM ROS User Guide* associated with the installed software release.

4 Communication Ports

The RUGGEDCOM RSG909R can be equipped with various types of communication ports to enhance its abilities and performance.

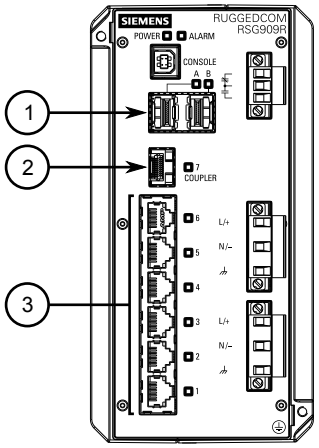

Figure 23: Port Assignment

1. Ports A and B **2.** Port 7 **3.** Ports 1 to 6

Port	Type
A/B	SFP Transceiver (1000Base-SX/LX)
7	SFP Transceiver (1000Base-SX/LX)
1 to 6	Copper (10/100/1000Base-TX) Ethernet Ports

CONTENTS

Section 4.1

Redundant Network Access (RNA) Ports

The RUGGEDCOM RSG909R features three dedicated Small Form-factor Pluggable (SFP) transceiver sockets for PRP/HSR applications:

HSR/PRP Ports

Port	Description
A	Port **A** and **B** enable the device to connect to a Parallel Redundancy Protocol (PRP) network or a High-Availability Seamless Redundancy (HSR) ring.
B	
7	The **Coupler** port serves the following purposes: • To connect two HSR devices to form a QuadBox • To connect a SAN (Singly Attached Node) to an HSR ring via an HSR device • To connect a VDAN (Virtual Dual Attached Node) to a PRP network via a PRP device • To connect an HSR ring to a PRP network and vice versa • To connect an HSR ring to an RSTP network

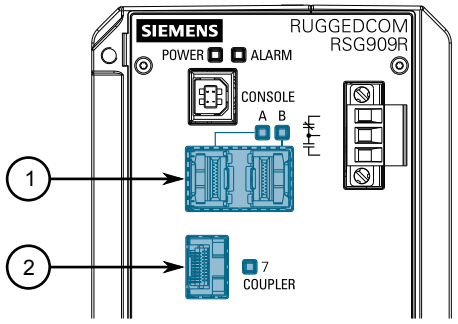

Figure 24: HSR/PRP Ports

1. Ports A and B **2.** Port 7 (Coupler)

LEDs

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

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

Compatible SFPs

For more information about which SFP transceivers are compatible with the RUGGEDCOM RSG909R, as well as instructions for ordering and installation/removal, refer to the *RUGGEDCOM SFP Transceiver Catalog [https://support.industry.siemens.com/cs/ca/en/view/109482309]*.

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

IMPORTANT!
RNA ports A and B must operate at the same speed. Inconsistent speed in these ports will generate an alarm. Make sure to use SFPs with compatible speeds on ports A and B.

Section 4.2

Copper Ethernet Ports

The RUGGEDCOM RSG909R supports multiple 10/100/1000Base-TX Ethernet ports that allow connection to standard Category 5 (CAT-5) shielded twisted-pair cables with RJ45 male connectors.

WARNING!
Electric shock hazard – risk of serious personal injury and/or equipment interference. When shielded cables are used, make sure the shielded cables do not form a ground loop via the shield wire and the RJ45 receptacles at either end. Ground loops can cause excessive noise and interference, but more importantly, create a potential shock hazard that can result in serious injury.

LEDs

Each port features an LED that indicates the state of the port.

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

Pin-Out

The following is the pin-out for the RJ45 male connectors:

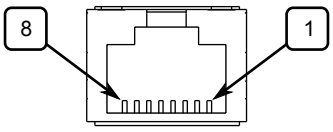

Figure 25: RJ45 Ethernet Port Pin Configuration

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)	BI_DD+	Bi-Directional
5	Reserved (Do Not Connect)	BI_DD-	Bi-Directional
6	TX-	BI_DA-	Transmit Data- or Bi-Directional
7	Reserved (Do Not Connect)	BI_DC+	Bi-Directional
8	Reserved (Do Not Connect)	BI_DC-	Bi-Directional

Specifications

For specifications on the available copper Ethernet ports, refer to Section 5.4, “Copper Ethernet Port Specifications”.

5 Technical Specifications

This section provides important technical specifications related to the device.

CONTENTS

Section 5.1

Power Supply Specifications

NOTE
When determining cable lengths, make sure the minimum input voltage for the power supply is provided at the power source.

» Hazardous Environments

Power Supply Type	Input Voltage			Internal Fuse Rating	Isolation	Maximum Power Consumption[a]
	Minimum	Maximum	Nominal			
LO	11.1 VDC	55 VDC	12 VDC, 24 VDC, 48 VDC	5 A	1.5 kVDC	13.4 W
HI	100 VDC	270 VDC	125 VDC, 250 VDC	3.15 A	5 kVDC	15.3 W
	100 VAC	240 VAC	110 VAC, 220 VAC	3.15 A	5 kVDC	15.5 W

[a] *Current consumption may vary based on configuration.*

Non Hazardous Environments

Power Supply Type	Input Voltage			Internal Fuse Rating	Isolation	Maximum Power Consumption[b]
	Minimum	Maximum	Nominal			
LO	10 VDC	60 VDC	12 VDC, 24 VDC, 48 VDC	5 A	1.5 kVDC	13.4 W
HI	88 VDC	300 VDC	125 VDC, 250 VDC	3.15 A	5 kVDC	15.3 W
	85 VAC	264 VAC	110 VAC, 220 VAC	3.15 A	5 kVDC	15.5 W

[b] *Current consumption may vary based on configuration.*

Section 5.2
Failsafe Alarm Relay Specifications

Hazardous Environments

Maximum Switching Voltage	Rated Switching Current	Isolation
30 VDC	2 A	5.0 kVAC[c] between coil and contacts 1.0 kVAC[c] between contacts
250 VAC	2 A	5.0 kVAC[c] between coil and contacts 1.0 kVAC[c] between contacts

[c] *50 to 60 Hz for 1 minute*

Non Hazardous Environments

Maximum Switching Voltage	Rated Switching Current	Isolation
300 VDC	2 A	5.0 kVAC[d] between coil and contacts 1.0 kVAC[c] between contacts
264 VAC	2 A	5.0 kVAC[c] between coil and contacts 1.0 kVAC[c] between contacts

[d] *50 to 60 Hz for 1 minute*

Section 5.3
Supported Networking Standards

Standard	10 Mbps Ports	100 Mbps Ports	1000 Mbps Ports	Description
IEEE 802.3u		✓		
IEEE 802.3x	✓	✓	✓	Flow Control

Standard	10 Mbps Ports	100 Mbps Ports	1000 Mbps Ports	Description
IEEE 802.3z			✓	1000Base-LX
IEEE 802.3ab			✓	1000Base-Tx
IEEE 802.3ad			✓	Link Aggregation
IEEE 802.1D	✓	✓	✓	MAC Bridges
IEEE 802.1D	✓	✓	✓	Spanning Tree Protocol (STP)
IEEE 802.1p	✓	✓	✓	Class of Service (CoS)
IEEE 802.1Q	✓	✓	✓	VLAN (Virtual LAN) Tagging
IEEE 802.1w	✓	✓	✓	Rapid Spanning Tree Protocol (RSTP)
IEEE 802.1x	✓	✓	✓	Port-Based Network Access Control
IEEE 802.1Q-2005	✓	✓	✓	Multiple Spanning Tree Protocol (MSTP)
IEEE 1588-2008	✓	✓	✓	Precision Time Protocol (PTP) Version 2
IEC 62439-2:2016		✓	✓	Media Redundancy Protocol (MRP)
IEC 62439-3:2016	✓	✓	✓	High-Availability Seamless Redundancy (HSR), Parallel Redundancy Protocol (PRP)

Section 5.4

Copper Ethernet Port Specifications

The following details the specifications for copper Ethernet ports that can be ordered with the RUGGEDCOM RSG909R.

Speed[e]	10/100/1000Base-TX
Connector	RJ45
Duplex[e]	FDX/HDX
Cable Type[f]	> CAT 5
Wiring Standard[g]	TIA/EIA T568A/B
Maximum Distance[h]	100 m (328 ft)
Isolation[i]	1.5 kV

[e] *Auto-negotiating.*

[f] *Shielded.*

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

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

[i] *RMS 1 minute.*

Section 5.5
Operating Environment

The RUGGEDCOM RSG909R is rated to operate under the following environmental conditions.

Ambient Operating Temperature[jk]	-40 to 85 °C (-40 to 185 °F)
Ambient Storage Temperature	-40 to 85 °C (-40 to 185 °F)
Ambient Relative Humidity[l]	5% to 95%
Maximum Altitude	3000 m

[j] *Measured from a 30 cm (12 in) radius surrounding the center of the enclosure.*

[k] *Operating temperature may vary based on the limitations of installed SFPs. Refer to the RUGGEDCOM SFP Transceiver Catalog [https://support.industry.siemens.com/cs/ca/en/view/109482309] for SFP temperature ratings.*

[l] *Non-condensing.*

Section 5.6
Mechanical Specifications

Weight	2.4 kg (5.3 lbs)
Ingress Protection	IP40
Enclosure	Die Cast Aluminum

Section 5.7
Dimension Drawings

NOTE
All dimensions are in millimeters, unless otherwise stated.

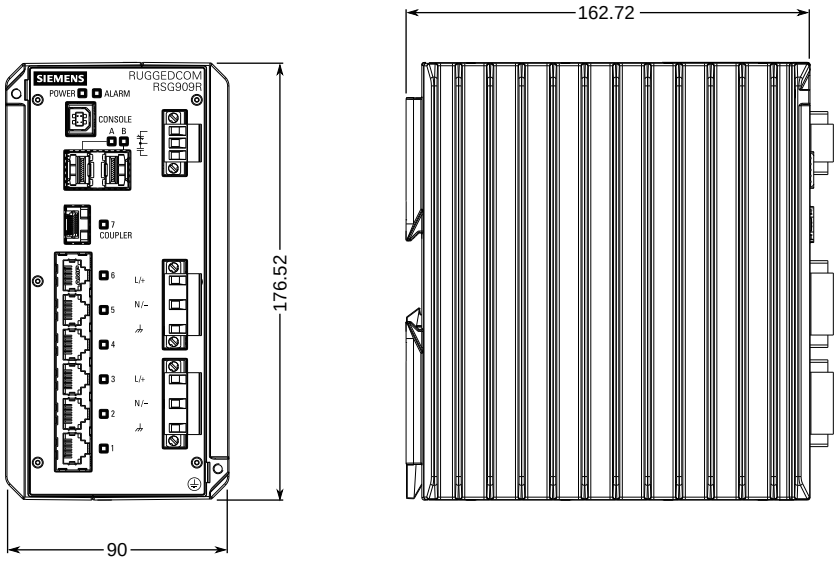

Figure 26: Overall Dimensions

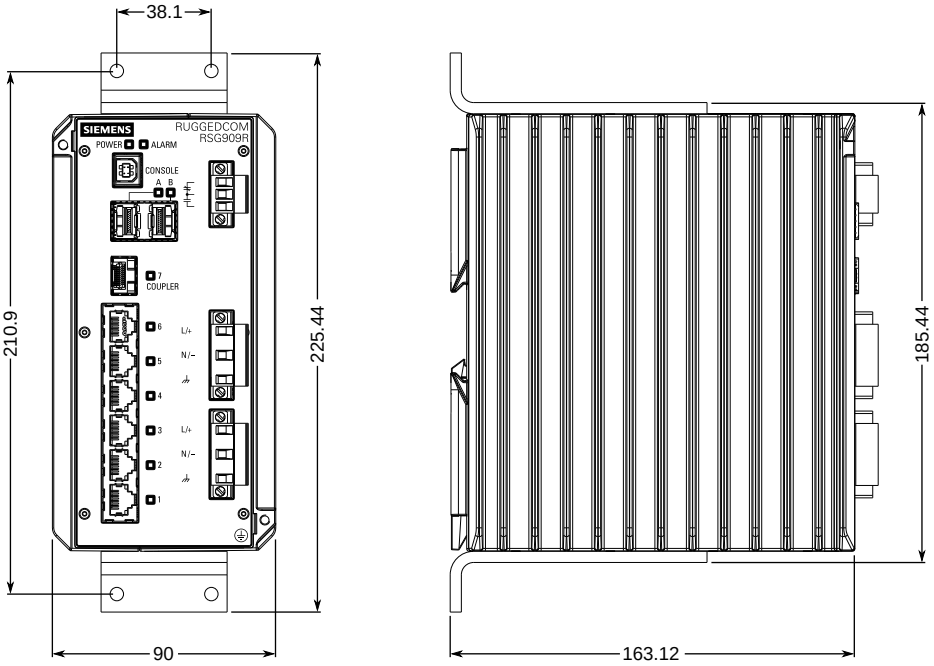

Figure 27: Panel Mount Dimensions

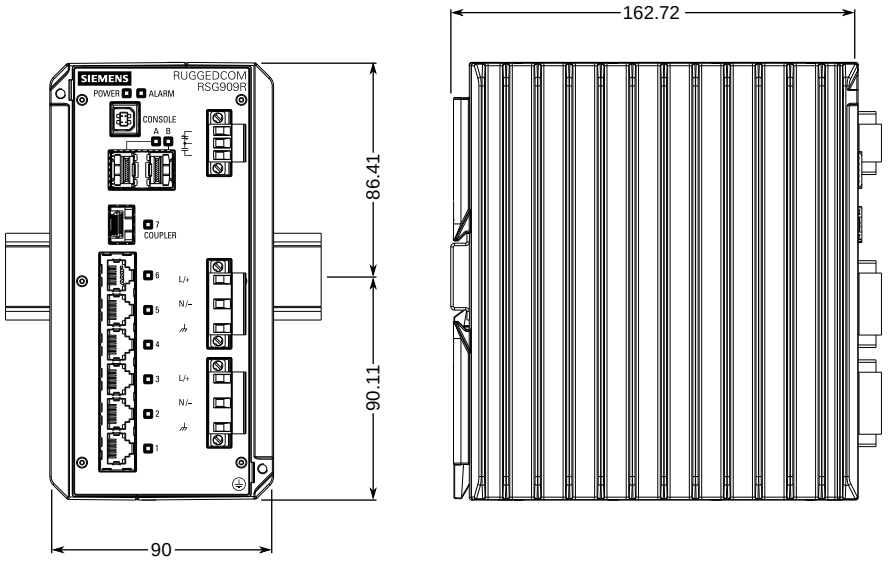

Figure 28: DIN Rail Mount Dimensions

6 Certification

The RUGGEDCOM RSG909R device has been thoroughly tested to guarantee its conformance with recognized standards and has received approval from recognized regulatory agencies.

CONTENTS

Section 6.1

Approvals

This section details the standards to which the RUGGEDCOM RSG909R complies.

CONTENTS

Section 6.1.1

CSA

This device meets the requirements of the following Canadian and U.S. standards under certificate CSA 18CA70171440:

- **CAN/CSA C22.2 No. 60950-1-07 AMD 2:2014**
  Information Technology Equipment – Safety – Part 1: General Requirements
- **CSA Std. C22.2 No. 213-16**
  Non-Incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations

- **CAN/CSA-C22.2 No. 60079-0:15**
  Explosive Atmospheres – Part 0: Equipment – General Requirements
- **CAN/CSA-C22.2 No. 60079-15:16**
  Electrical Apparatus for Explosive Gas Atmospheres – Part 15: Construction, Test and Marking of Type of Protection "n" Electrical Apparatus
- **ANSI/UL 60950-1-2014**
  Information Technology Equipment – Safety Part 1: General Requirements
- **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
- **ANSI/UL 60079-0:13**
  Electrical Apparatus for Explosive Gas Atmospheres – Part 0: General Requirements
- **ANSI/UL 60079-15:13**
  Electrical Apparatus for Explosive Gas Atmospheres – Part 15: Type of Protection "n"

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

It is specifically approved for use in Division 2 and Zone 2 hazardous locations with the following markings:

- Class I, Division 2, Groups A, B, C, D T4
- Ex nA nC IIC T4 Gc
- Class I, Zone 2, AEx nA nC IIC T4 Gc

This device meets the requirements of the following International standards under certificate IECEx CSA 18.0007X:

- **IEC 60079-0:2011**
  Explosive Atmospheres – Part 0: Equipment – General Requirements
- **IEC 60079-15:2010**
  Electrical Apparatus for Explosive Gas Atmospheres – Part 15: Construction, Test and Marking of Type of Protection "n" Electrical Apparatus.

It is specifically approved for use in Zone 2 hazardous locations with the following markings:

- Ex nA nC IIC T4 Gc

Section 6.1.2
CSA/Sira

When marked with the following ATEX marking, this device is approved for use in Zone 2 hazardous locations under certificate Sira 18ATEX4069X.

NOTE
For the maximum ambient temperature, refer to the hazardous location label affixed to the device.

The device also meets the requirements of the following European directive and standards:

- **2014/34/EU**
  Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres (recast) Text with EEA relevance
- **EN 60079-0:2012/A11:2013**
  Explosive Atmospheres – Part 0: Equipment – General Requirements
- **EN 60079-15:2010**
  Explosive Atmospheres – Part 15: Equipment Protection by Type of Protection "n"

Section 6.1.3

European Union (EU)

This device is declared by Siemens Canada Ltd to comply with essential requirements and other relevant provisions of the following EU directives:

- **EN 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
- **CISPR 32/EN 55032**
  Electromagnetic compatibility of multimedia equipment – Emission requirements

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 6.1.4

FCC

This device has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This device generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case users will be required to correct the interference at their own expense.

IMPORTANT!
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this device.

Section 6.1.5
FDA/CDRH

This device meets the requirements of the following U.S. Food and Drug Administration (FDA) standard:

- Title 21 Code of Federal Regulations (CFR) – Chapter I – Sub-chapter J – Radiological Health

Section 6.1.6
ISED

This device is declared by Siemens Canada Ltd to meet the requirements of the following ISED (Innovation Science and Economic Development Canada) standard:

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

Section 6.1.7
TÜV SÜD

This device is certified by TÜV SÜD to meet the requirements of the following standards:

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

Section 6.1.8
RRA

This device has been registered by the Korean Radio Research Agency (RRA) under Clause 3, Article 58-2 of the Radio Waves Act. As such, the device is marked with a KC symbol and can be used in the Republic of Korea (South Korea) as a Class A product in a commercial, industrial or business environment.

R-REM-S14-RSG909R

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

Notices specific to the RRA:

WARNING!
Class A Equipment (Industrial Broadcasting and Communication Equipment)

This device complies with the limits of a Class A electromagnetic wave device and is intended for use outside of a residential environment. The seller or user must be aware.

주의!
*A*급 기기 *(*업무용 방송통신기자재*)*

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Section 6.1.9
RoHS

This device is declared by Siemens Canada Ltd to meet the requirements of the following RoHS (Restriction of Hazardous Substances) directives for the restricted use of certain hazardous substances in electrical and electronic equipment:

- **China RoHS 2**
  Administrative Measure on the Control of Pollution Caused by Electronic Information Products

A copy of the Material Declaration is available online at https://support.industry.siemens.com/cs/ww/en/view/109738831.

Section 6.1.10
Other Approvals

This device meets the requirements of the following additional standards:

- **IEC 61000-6-2**
  Electromagnetic Compatibility (EMC) – Part 6-2: Generic Standards – Immunity for Industrial Environments
- **EN50121-4**
  Railway applications – Electromagnetic Compatibility – Emission and Immunity of the Signaling and Telecommunications Apparatus
- **EN50121-3-2**
  Railway applications – Electromagnetic Compatibility – Rolling Stock Apparatus
- **EN 50155**
  Railway applications – Rolling stock – Electronic equipment

Section 6.2

EMC and Environmental Type Tests

The RUGGEDCOM RSG909R 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	
IEC 61000-4-4	Burst (Fast Transient)	Signal Ports	± 4 kV @ 2.5 kHz, 5 kHz	4
		DC Power Ports	± 4 kV @ 2.5 kHz, 5 kHz	4
		AC Power Ports	± 4 kV @ 2.5 kHz, 5 kHz	4
		Earth Ground Ports	± 4 kV @ 2.5 kHz, 5 kHz	4
IEC 61000-4-5	Surge	Signal Ports	± 4 kV Line-to-Ground ± 2 kV Line-to-Line	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	100 A/m Continuous 1000 A/m for 1 s	
IEC 61000-4-9	Pulse Magnetic Field	Enclosure Ports	300 A/m	4
IEC 61000-4-11	Voltage Dips and Interrupts	AC Power Ports	30% for 0.5 Cycles 60% for 5 Cycles 100% for 250 Cycles	
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	15%	4
IEC 61000-4-18	Damped Oscillatory Wave	Slow Damped	2.5 kV Common	3

Test	Description		Test Levels	Severity Levels
			100 kHz or 1 MHz	
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 60255-27	Dielectric Strength	Signal Ports	2 kV (Failsafe Relay Output)	
		DC Power Ports	2 kV or 2.8kV DC	
		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 RSG909R 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.

Test	Description		Test Levels
IEEE 1613	ESD	Enclosure Contact	± 8 kV
		Enclosure Air	± 15 kV
IEEE 1613	Radiated RFI	Enclosure Ports	35 V/m
IEEE 1613	Fast Transient	Signal Ports	± 4 kV @ 2.5 kHz, 5 kHz
		DC Power Ports	± 4 kV @ 2.5 kHz, 5 kHz
		AC Power Ports	± 4 kV @ 2.5 kHz, 5 kHz
		Earth Ground Ports	± 4 kV
IEEE 1613	Oscillatory	Signal Ports	2.5 kV Common Mode @ 1 MHz
		DC Power Ports	2.5 kV Common Mode @ 1 MHz 1 kV Differential Mode @ 1 MHz
IEEE 1613	HV Impulse	Signal Ports	5 kV (Failsafe Relay)
		DC Power Ports	5 kV
		AC Power Ports	5 kV
IEEE 1613	Dielectric Strength	Signal Ports	2 kV (Failsafe Relay)
		DC Power Ports	2.8 kVDC or 2 kV
		AC Power Ports	2 kV
IEEE 1613.1 IEC 61000-4-10	Damped Oscillating Magnetic Field	Enclosure Ports	100 A/m for 1 s (100 kHz and 1 MHz)

Environmental Type Tests

Test	Description		Test Levels	Severity Levels
IEC 60068-2-1	Cold Temperature	Test Ad	-40 °C (-40 °F), 16 Hours	
	Cold Storage	Test Ab	-40 °C (-40 °F), 16 Hours	
IEC 60068-2-2	Dry Heat	Test Bd	85 °C (185 °F), 16 Hours	
	Dry Heat Storage	Test Bd	85 °C (185 °F), 16 Hours	
IEC 60068-2-30	Humidity (Damp Heat, Cyclic)	Test Dd	95% (Non-Condensing), 55 °C (131 °F), 6 Cycles	
IEC 60068-2-14	Change of Temperature	Test Nb	5 Cycles @ -40 to 85 °C (-40 to 185 °F)	
IEC 60068-2-78	Humidity (Damp Heat, Cyclic)	Test Cab	10 Days @ 55 °C (131 °F), 6 Cycles	
IEC 60255-21-1	Vibration		2 g @ 10 to 150 Hz	Class 2
IEC 60255-21-2	Shock		30 g @ 11 ms	Class 2
IEC 60255-21-2	Bump		10 g @ 16 ms	Class 1
IEC 60255-21-3	Seismic		Method A	Class 2
IEC 60529	Ingress Protection		IP4x	