

SIEMENS

RUGGEDCOM RS940G

Installation Guide

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Preface

This guide describes the RUGGEDCOM RS940G. It describes the major features of the device, installation, commissioning and important technical specifications.

It is intended for use by network technical support personnel who are responsible for the installation, commissioning and maintenance of the device. It is also recommended for use by network and system planners, system programmers, and line technicians.

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- [“Alerts”](#)
- [“Related Documents”](#)
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Alerts

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



DANGER!

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



WARNING!

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



CAUTION!

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



IMPORTANT!

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



NOTE

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

Related Documents

Other documents that may be of interest include:

- [RUGGEDCOM ROS User Guide](https://support.industry.siemens.com/cs/ww/en/view/109737230) [https://support.industry.siemens.com/cs/ww/en/view/109737230]
- [RUGGEDCOM SFP Transceiver Catalog](https://support.industry.siemens.com/cs/ww/en/view/109482309) [https://support.industry.siemens.com/cs/ww/en/view/109482309]

Accessing Documentation

The latest user documentation for RUGGEDCOM RS940G is available online at <https://www.siemens.com/ruggedcom>. To request or inquire about a user document, contact Siemens Customer Support.

Training

Siemens offers a wide range of educational services ranging from in-house training of standard courses on networking, Ethernet switches and routers, to on-site customized courses tailored to the customer's needs, experience and application.

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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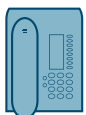
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Online

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



Telephone

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



Mobile App

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 RS940G is an industrially hardened, fully managed Ethernet switch providing six or eight ports of Gigabit Ethernet. Six 10/100/1000Base-TX triple speed copper ports are standard. An additional two gigabit fiber or copper ports can be added. The RUGGEDCOM RS940G provides a cost effective way of connecting a cluster of field devices to a Gigabit Ethernet backbone.

Designed to operate reliably in harsh industrial environments, the RUGGEDCOM RS940G provides a high level of immunity to electromagnetic interference and heavy electrical surges typical of environments found in electric utility substations, process control or in curb side traffic control cabinets. An operating temperature range of -40 to 85 °C (-40 to 185 °F) coupled with hazardous location certification (Class I Division 2), optional conformal coating and a galvanized steel enclosure allows the RUGGEDCOM RS940G to be placed in almost any location.

The embedded RUGGEDCOM ROS (Rugged Operating System) 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. The versatility and wide selection of fiber optics allows the RUGGEDCOM RS940G to be used in a variety of applications. The RUGGEDCOM RS940G provides two fiber optical Gigabit Ethernet ports for creating a fiber optical backbone with high noise immunity and long haul connectivity.

RUGGEDCOM ROS offers advanced Layer 2 and Layer 3 networking functions, and advanced cyber security features. Combined with the ruggedized hardware design, RUGGEDCOM RS940G is designed for creating mission-critical, real-time, control applications where high reliability and availability is of paramount importance.

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- [Section 1.1, "Feature Highlights"](#)
- [Section 1.2, "Description"](#)
- [Section 1.3, "Required Tools and Materials"](#)
- [Section 1.4, "Decommissioning and Disposal"](#)
- [Section 1.5, "Cabling Recommendations"](#)

Section 1.1

Feature Highlights

Ethernet Ports

- 6 x 10/100/1000Base-TX copper Ethernet ports
- Additional port options:
 - 2 x 1000Base-LX SFP transceivers
 - 2 x 10/100/1000Base-TX copper Ethernet ports
 - 2 x 10/100/1000Base-FX fiber optic Ethernet ports
- 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
- Hazardous Location Certification: Class I Division 2
- -40 to 85 °C (-40 to 185 °F) operating temperature (no fans)
- [Optional] Conformal coated printed circuit boards

Universal Power Supply Options

- Fully integrated power supply
- Universal high-voltage range: 88-300 VDC or 85-264 VAC
- Dual low-voltage DC inputs: 24 VDC (10-36 VDC) or 48VDC (36-72 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 RS940G features various ports, controls and indicator LEDs on the front panel for connecting, configuring and troubleshooting the device.

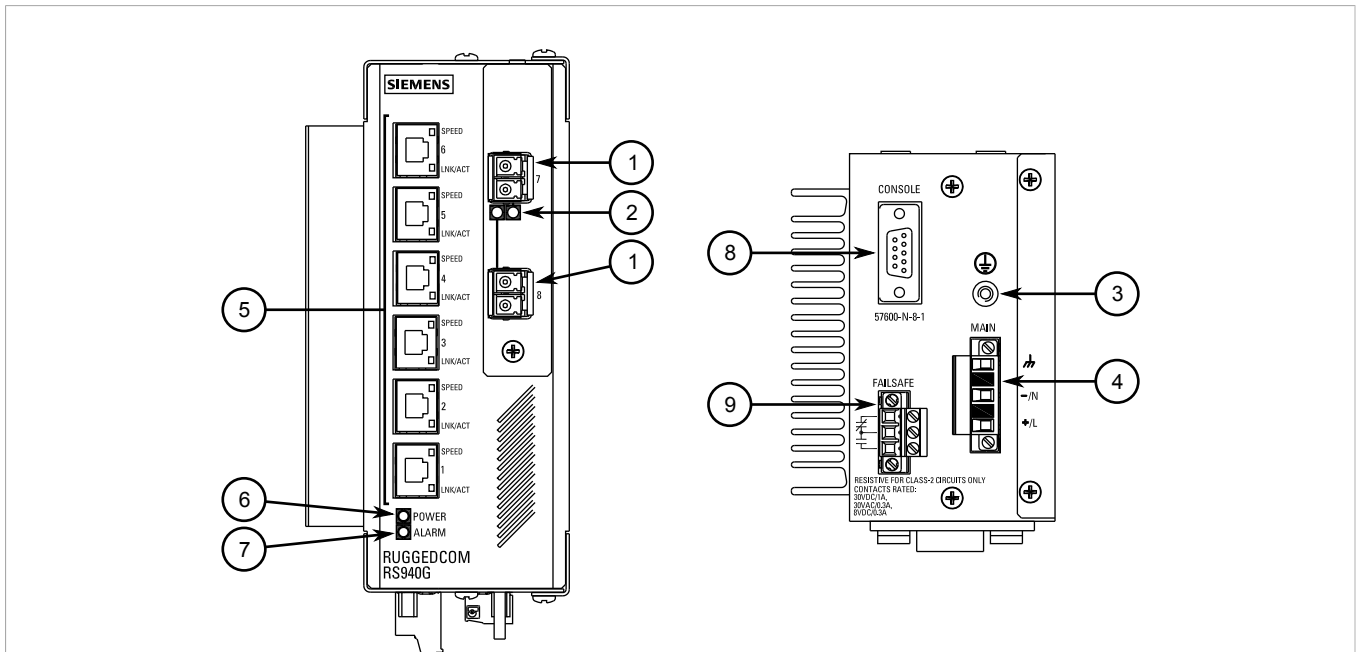


Figure 1: RUGGEDCOM RS940G

1. Optional Ethernet Ports 2. Port Status LEDs 3. Ground Connection 4. Power Supply Terminal Block 5. Standard Copper Ethernet Ports 6. POWER LED 7. ALARM LED 8. RS-232 Console Port (DB9) 9. Failsafe Alarm Relay

POWER LED Illuminates when power is being supplied to the device.

ALARM LED Illuminates when an alarm condition exists.

Port Status LEDs

Indicate the status of the optional SFP ports:

State	Description
Solid	Link
Blinking	Activity
Off	No link/activity

Status LEDs for copper Ethernet ports are incorporated into each RJ45 port. For more information, refer to [Section 4.1, "Copper Ethernet Ports"](#).

Power Supply Terminal Block

A pluggable terminal block. For more information, refer to:

- [Section 2.6, "Connecting Power"](#)
- [Section 5.1, "Power Supply Specifications"](#)

RS-232 Serial 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 3.1, "Connecting to the Device"](#).

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"](#)

Section 1.3

Required Tools and Materials

The following tools and materials are required to install the RUGGEDCOM RS940G:

Tools/Materials	Purpose
AC or DC power cord (16 AWG)	For connecting power to the device.
CAT-5 Ethernet cables	For connecting the device to the network.
Flathead screwdriver	For mounting the device to a DIN rail.
Phillips screwdriver	For mounting the device to a panel.
4 x #6-32 screws	For mounting the device to a panel.

Section 1.4

Decommissioning and Disposal

Proper decommissioning 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

Before connecting the device, be aware of the recommendations and considerations outlined in this section.

CONTENTS

- [Section 1.5.1, "Protection On Twisted-Pair Data Ports"](#)
- [Section 1.5.2, "Gigabit Ethernet 1000Base-TX Cabling Recommendations"](#)
- [Section 1.5.3, "Supported Fiber Optic Cables"](#)

Section 1.5.1

Protection On Twisted-Pair Data Ports

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.

Section 1.5.2

Gigabit Ethernet 1000Base-TX Cabling Recommendations

The IEEE 802.3ab Gigabit Ethernet standard defines 1000 Mbit/s Ethernet communications over distances of up to 100 m (328 ft) using all 4 pairs in category 5 (or higher) balanced, unshielded twisted-pair cabling. For wiring guidelines, system designers and integrators should refer to the Telecommunications Industry Association (TIA) TIA/EIA-568-A wiring standard that characterizes minimum cabling performance specifications required for proper Gigabit Ethernet operation. For reliable, error-free data communication, new and pre-existing communication paths should be verified for TIA/EIA-568-A compliance.

The following table summarizes the relevant cabling standards:

Cabling Category	1000Base-TX Compliant	Required Action
< 5	No	New wiring infrastructure required.
5	Yes	Verify TIA/EIA-568-A compliance.
5e	Yes	No action required. New installations should be designed with Category 5e or higher.

Cabling Category	1000Base-TX Compliant	Required Action
6	Yes	No action required.
> 6	Yes	Connector and wiring standards to be determined.

Follow these recommendations for copper data cabling in high electrical noise environments:

- Data cable lengths should be as short as possible, preferably 3 m (10 ft) in length. Copper data cables should not be used for inter-building communications.
- Power and data cables should not be run in parallel for long distances, and should be installed in separate conduits. Power and data cables should intersect at 90° angles when necessary to reduce inductive coupling.
- Shielded/screened cabling can be used when required. Care should be taken to avoid the creation of ground loops with shielded cabling.

Section 1.5.3

Supported Fiber Optic Cables

The following fiber optic cable types are supported under the stated conditions.

Cable Type	Wavelength (nm)	Modal Bandwidth (MHz·km)	Distance (m)		
			100Base-FX	1000Base-SX	10GBase-SR
OM1 (62.5/125)	850	200	—	275	33
	1300	500	2000	—	—
OM2 (50/125)	850	500	—	550	82
	1300	500	2000	—	—
OM3 (50/125) ^a	850	1500	—	550	300
	1300	500	2000	—	—
OM4 (50/125) ^a	850	3500	—	550	400
	1300	500	2000	—	—

^a Laser optimized.

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.



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.*



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 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.*

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- [Section 2.1, "General Procedure"](#)
- [Section 2.2, "Unpacking the Device"](#)
- [Section 2.3, "Installing the Device in Hazardous Locations"](#)
- [Section 2.4, "Mounting the Device"](#)
- [Section 2.5, "Connecting the Failsafe Alarm Relay"](#)
- [Section 2.6, "Connecting Power"](#)

Section 2.1

General Procedure

The general procedure for installing the device is as follows:

1. Review the relevant certification information for any regulatory requirements. For more information, refer to [Section 6.1, "Approvals"](#).
2. Mount the device.
3. Connect the failsafe alarm relay.
4. Connect power to the device and ground the device to safety Earth.
5. Connect the device to the network.
6. Configure the device.

Section 2.2

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 RS940G is designed to comply with the safety standards for Class I, Division 2 hazardous locations where concentrations of flammable gases, vapors or liquids may be present, as opposed to normal operating environments.



IMPORTANT!

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

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

- The device must be installed in a suitable enclosure
- Components must not be substituted for non-Siemens parts
- The device must not be disconnected unless the power has been turned off or the area is known to be non-hazardous

- The device must be appropriately connected to safety Earth upon installation



NOTE

For further details of the device's compliance with Class I, Division 2 standards, refer to [Section 6.1, "Approvals"](#).



IMPORTANT!

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

IMPORTANT !

Débrancher ou ouvrir l'équipement seulement si l'alimentation a été coupée ou si l'on sait que la zone ne pose aucun danger.



IMPORTANT!

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

IMPORTANT !

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

Section 2.4

Mounting the Device

The RUGGEDCOM RS940G 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.



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 convective 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 5.8, "Dimension Drawings"](#).

CONTENTS

- [Section 2.4.1, "Mounting the Device on a DIN Rail"](#)
- [Section 2.4.2, "Mounting the Device to a Panel"](#)

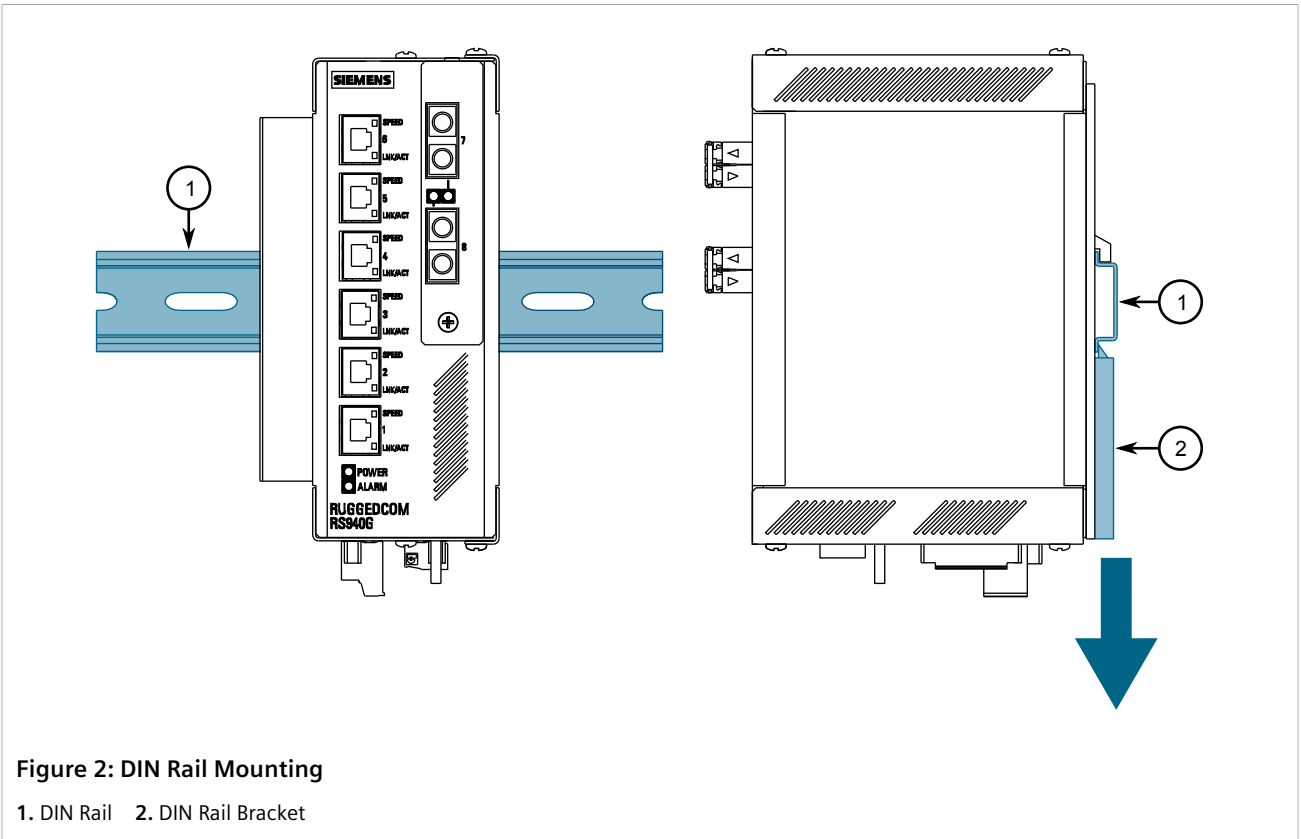
Section 2.4.1

Mounting the Device on a DIN Rail

For DIN rail installations, the RUGGEDCOM RS940G can be equipped with a DIN rail bracket pre-installed on the back of the chassis. The bracket allows the device to be slid onto a standard 35 mm (1.4 in) DIN rail.

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

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



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.

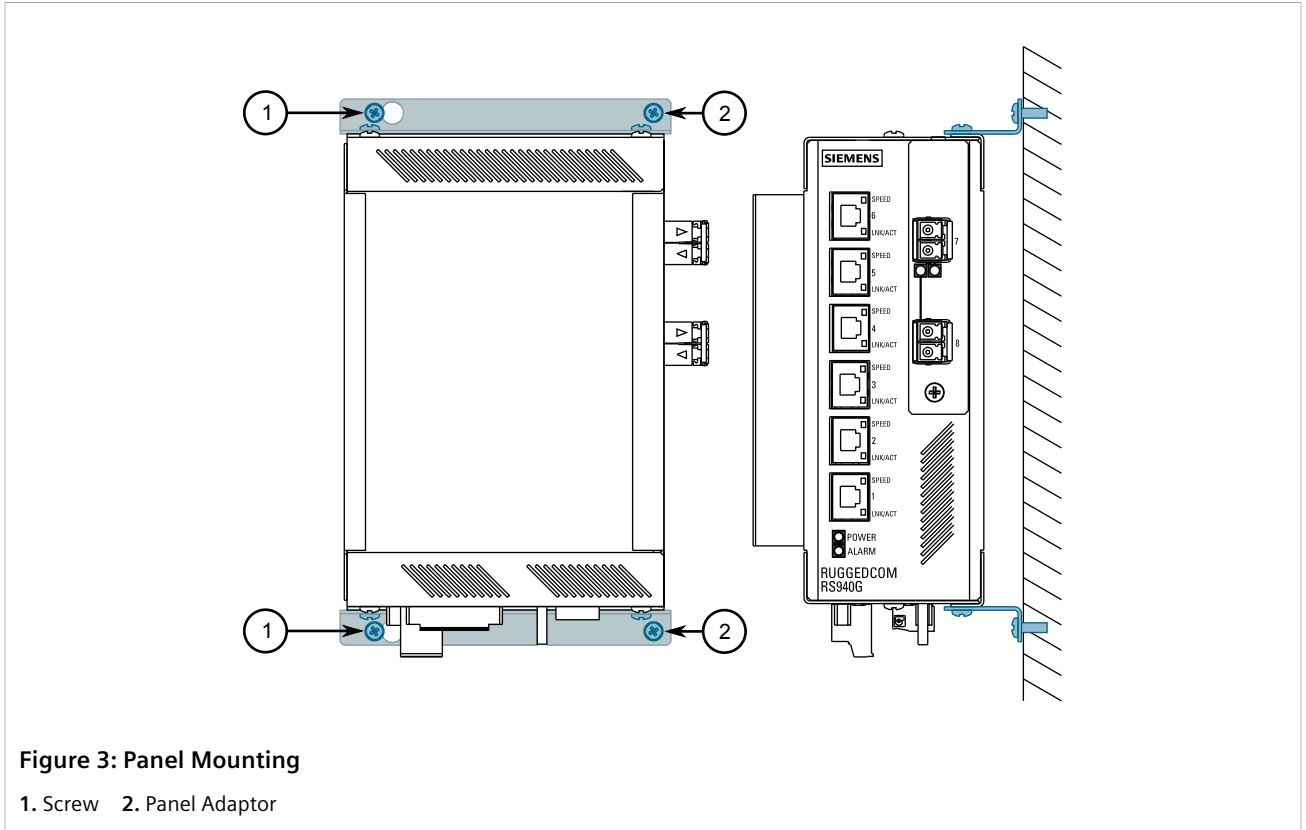
Section 2.4.2

Mounting the Device to a Panel

For panel installations, the RUGGEDCOM RS940G can be equipped with panel adapters pre-installed on the top and bottom of the chassis. The adapters allow the device to be attached to a panel using screws.

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

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



3. Secure the adaptors to the panel with #6-32 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 RUGGEDCOM 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 RS940G.

The following shows the proper relay connections.

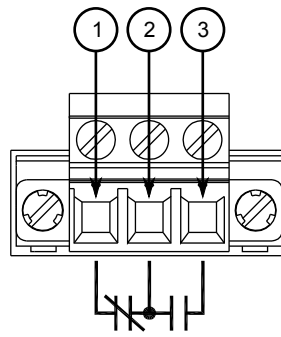


Figure 4: Failsafe Alarm Relay Wiring

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

Section 2.6

Connecting Power

The RUGGEDCOM RS940G 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.
- 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, 8x20 μ s waveform



IMPORTANT!

Use minimum #16 gage copper wiring when connecting terminal blocks.

CONTENTS

- [Section 2.6.1, "Connecting High AC/DC Power"](#)
- [Section 2.6.2, "Connecting Low DC Power"](#)

Section 2.6.1

Connecting High AC/DC Power

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



CAUTION!

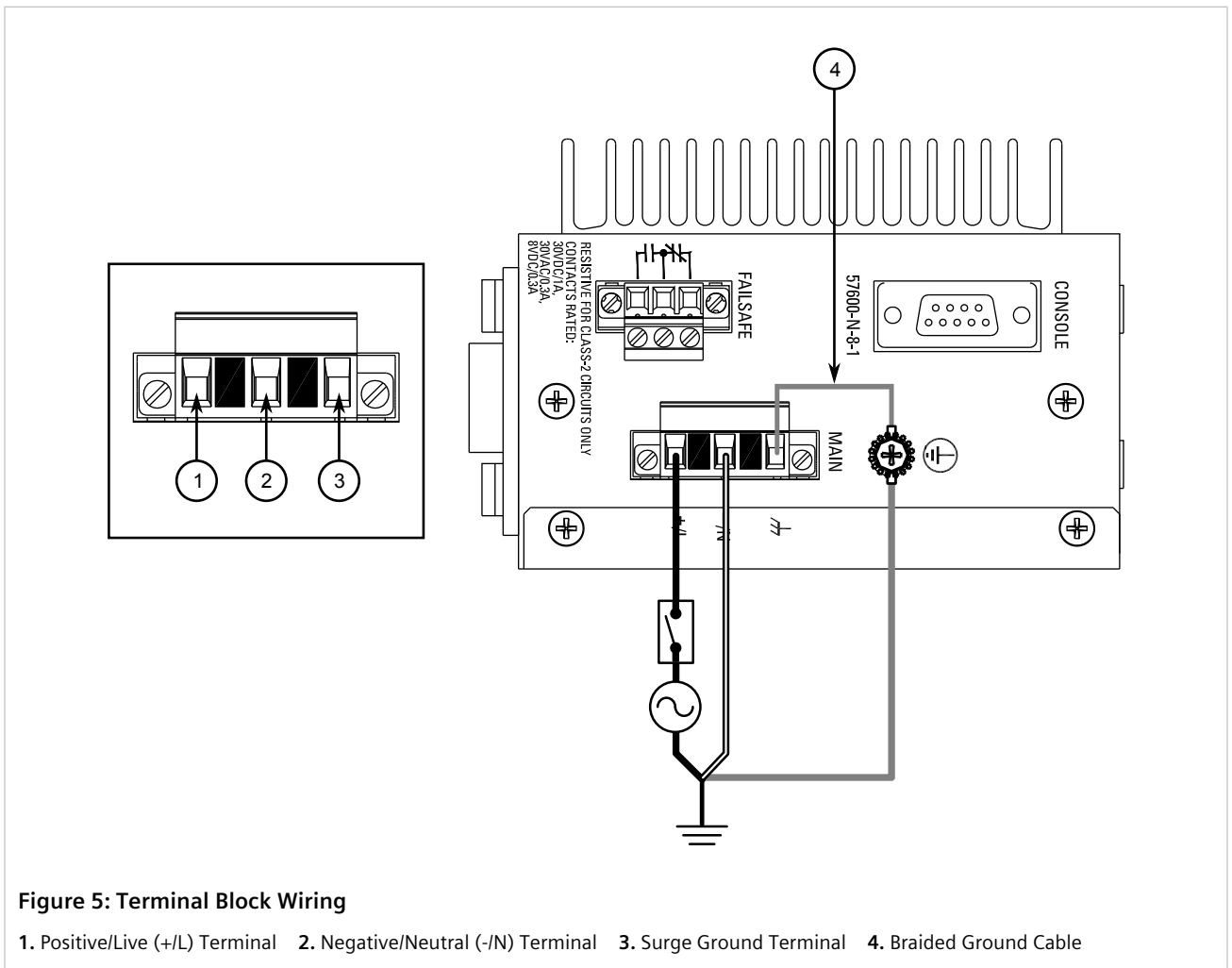
Electrical hazard – risk of damage to equipment. Do not connect AC power cables to terminals for DC power. Damage to the power supply may occur.



CAUTION!

Electrical hazard – risk of damage to equipment. Before testing the dielectric strength (HIPOT) in the field, remove the braided ground cable connected to the surge ground terminal and chassis ground. This cable connects transient suppression circuitry to chassis ground and must be removed in order to avoid damage to transient suppression circuitry during testing.

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



2. Connect the negative wire from the power source to the negative/neutral (-/N) terminal on the terminal block.

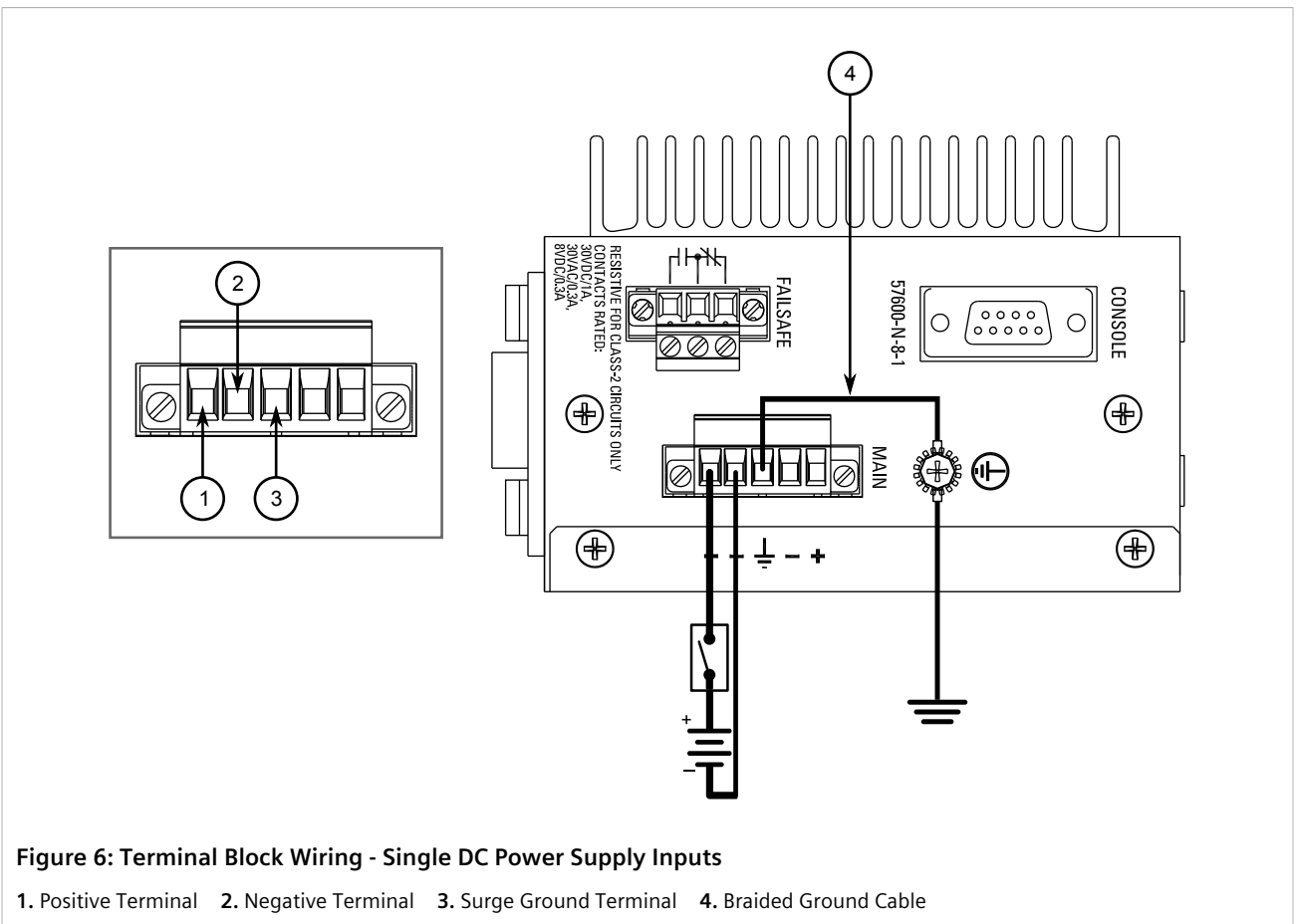
- Using a braided wire or other appropriate grounding wire, connect the surge ground terminal to the chassis ground connection. The surge ground terminal is used as the ground conductor for all surge and transient suppression circuitry internal to the unit.
- Connect the ground terminal on the power source to the chassis ground terminal on the device.

Section 2.6.2

Connecting Low DC Power

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

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



3 Device Management

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

CONTENTS

- [Section 3.1, "Connecting to the Device"](#)
- [Section 3.2, "Configuring the Device"](#)

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 RS940G.



IMPORTANT!

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

» RS232 Serial Console Port

Connect a PC or terminal directly to the serial console port to access the boot-time control and RUGGEDCOMROS console interface.



IMPORTANT!

The serial console port is intended to be used only as a temporary connection during initial configuration or troubleshooting, and should only be used in a safe area (as defined by IEC 60079-0, Edition 6.0).

The serial console port implements RS-232 DCE (Data Communication Equipment) on a DB9 connector. Use the following settings to connect to either port:

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

The following is the pin-out for the port:

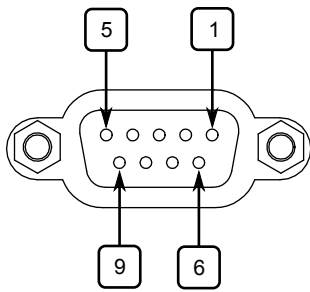


Figure 8: Serial DB9 Console Port

Pin	Name	Description
1 ^a		Reserved (Do Not Connect)
2	TX	Transmit Data
3	RX	Receive Data
4 ^a		Reserved (Do Not Connect)
5	GND	Signal Ground
6 ^a		Reserved (Do Not Connect)
7 ^b		Reserved (Do Not Connect)
8 ^b		Reserved (Do Not Connect)
9		Reserved (Do Not Connect)

^a Connected internally.

^b Connected internally.

» Communication Ports

Connect any of the available Ethernet ports on the device to a management switch and access the RUGGEDCOM ROS console and Web interfaces via the device's IP address. The factory default IP address for the RUGGEDCOM RS940G 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 RS940G 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 RUGGEDCOM ROS. For more information on how to access the factory data file, refer to the *RUGGEDCOM ROS User Guide* for the RUGGEDCOM RS940G.

Each communication port type has a specific place in the RUGGEDCOM RS940G chassis.

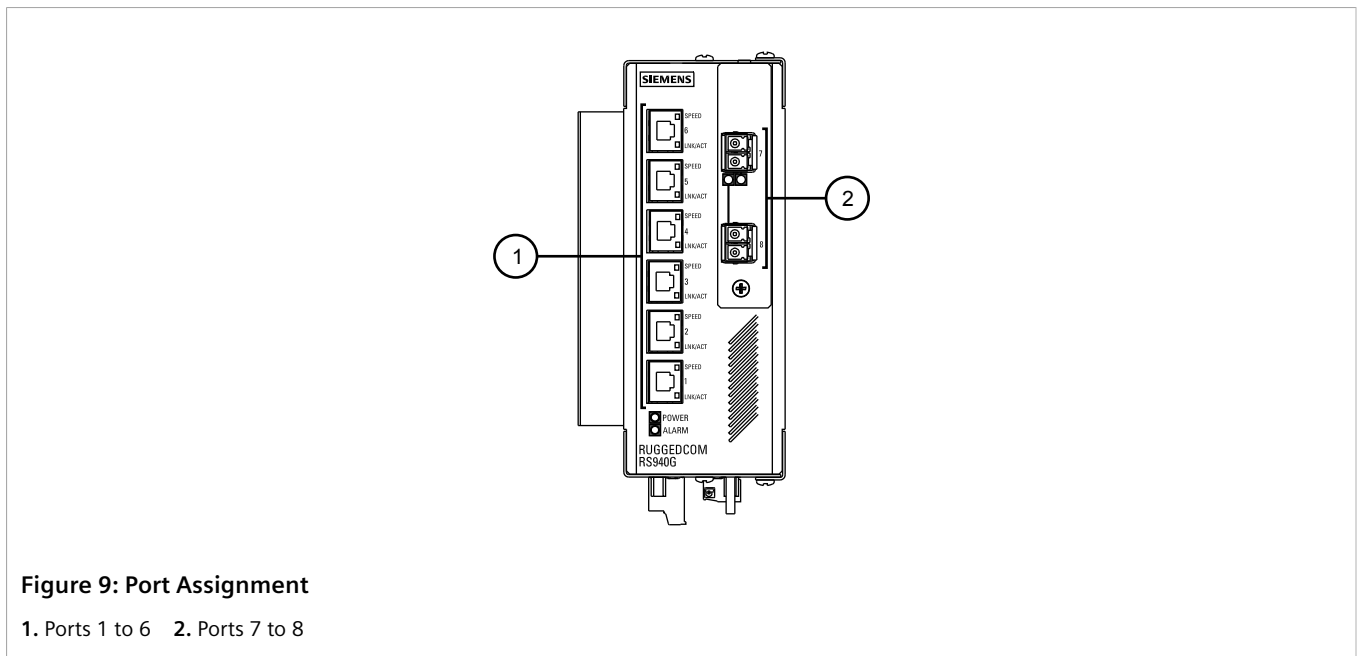


Figure 9: Port Assignment

1. Ports 1 to 6 2. Ports 7 to 8

Port	Type
1 to 6	Copper Gigabit Ethernet Ports (10/100/1000Base-TX)
7 to 8	Fixed, SFP or GBIC Gigabit Ethernet Ports (1000Base-SX or 1000Base-LX)


CONTENTS

- [Section 4.1, "Copper Ethernet Ports"](#)
- [Section 4.2, "Fiber Optic Ethernet Ports"](#)
- [Section 4.3, "SFP Transceivers"](#)

Section 4.1

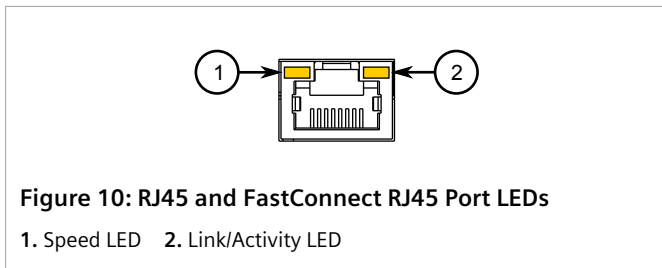
Copper Ethernet Ports

The RUGGEDCOM RS940G supports several 10/100/1000Base-TX Ethernet ports that allow connection to standard Category 5 (CAT-5) unshielded twisted-pair (UTP) cables with RJ45 male connectors. The RJ45 connectors are directly connected to the chassis ground on the device and can accept CAT-5 shielded twisted-pair (STP) cables.



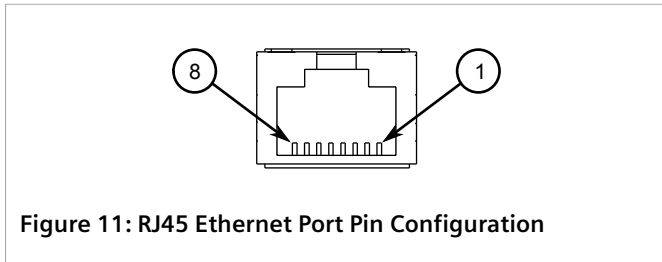
WARNING!
Electric shock hazard – risk of serious personal injury and/or equipment interference. If shielded cables are used, make sure the shielded cables do not form a ground loop via the shield wire and the RJ45 receptacles at either end. Ground loops can cause excessive noise and interference, but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

Each port features LEDs that indicate the state of the port.



LED	State	Description
Speed	Yellow	The port is operating at 1000 Mbps
	Off	The port is operating at 10 or 100 Mbps
Link/Activity	Yellow (Solid)	Link established
	Yellow (Blinking)	Link activity
	Off	No link detected

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



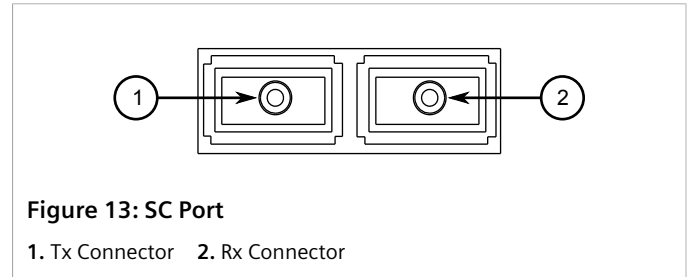
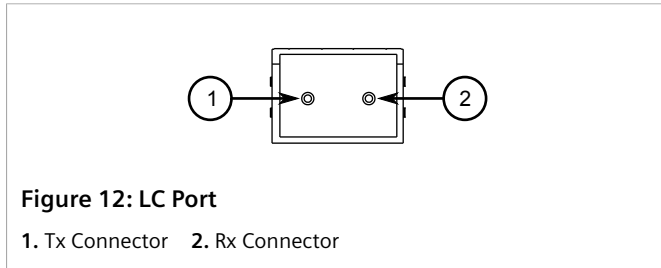
Pin	Name		Description
	10/100Base-TX	1000Base-TX	
1	RX+	BI_DB+	Receive Data+ or Bi-Directional
2	RX-	BI_DB-	Receive Data- or Bi-Directional
3	TX+	BI_DA+	Transmit Data+ or Bi-Directional
4	BI_DC+		
5	BI_DC-		
6	TX-	BI_DA-	Transmit Data- or Bi-Directional
7	BI_DD+		
8	BI_DD-		

For specifications on the available copper Ethernet ports, refer to [Section 5.4, "Copper Ethernet Port Specifications"](#).

Section 4.2

Fiber Optic Ethernet Ports

Fiber optic Ethernet ports are available with either LC (Lucent Connector) and 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.



For specifications on the available fiber optic Ethernet ports, refer to [Section 5.5, “Fiber Optic Ethernet Port Specifications”](#).

Section 4.3

SFP Transceivers

The RUGGEDCOM RS940G features four Small Form-Factor Pluggable (SFP) transceiver sockets, which are compatible with a wide array of SFP transceivers available from Siemens.

» LEDs

Each socket features an LED that indicates its link state.

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

» Compatible SFP Transceivers

The following SFP transceivers are compatible with the RUGGEDCOM RS940G. For more information, including installation/removal instructions and ordering information, refer to the [RUGGEDCOM SFP Transceiver Catalog](https://support.industry.siemens.com/cs/ca/en/view/109482309) [<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.

SFP Transceiver	Order Code	Speed (Mbit/s)	Mode ^a	Nominal Distance (km)
RUGGEDCOM SFP1122-1SX	6GK6000-8FG51-0AA0	1000	MM	0.5

SFP Transceiver	Order Code	Speed (Mbit/s)	Mode ^a	Nominal Distance (km)
RUGGEDCOM SFP1132-1LX10	6GK6000-8FG52-0AA0	1000	SM	10
RUGGEDCOM SFP1132-1LX25	6GK6000-8FG53-0AA0	1000	SM	25
RUGGEDCOM SFP1132-1LX40	6GK6000-8FG57-0AA0	1000	SM	40
RUGGEDCOM SFP1132-1LX70	6GK6000-8FG54-0AA0	1000	SM	70
RUGGEDCOM SFP1132-1LX100	6GK6000-8FG55-0AA0	1000	SM	100
RUGGEDCOM SFP1132-1LX115	6GK6000-8FE56-0AA0	1000	SM	115

^a MM = Multi-Mode, SM = Single-Mode

5 Technical Specifications

This section provides important technical specifications related to the device.

CONTENTS

- [Section 5.1, "Power Supply Specifications"](#)
- [Section 5.2, "Failsafe Alarm Relay Specifications"](#)
- [Section 5.3, "Supported Networking Standards"](#)
- [Section 5.4, "Copper Ethernet Port Specifications"](#)
- [Section 5.5, "Fiber Optic Ethernet Port Specifications"](#)
- [Section 5.6, "Operating Environment"](#)
- [Section 5.7, "Mechanical Specifications"](#)
- [Section 5.8, "Dimension Drawings"](#)

Section 5.1

Power Supply Specifications

» Hazardous Environments

Power Supply Type	Input Range		Internal Fuse Rating ^a	Isolation	Maximum Power Consumption ^b
	Minimum	Maximum			
HI	125 VDC	250 VDC	3.15 A(T)	4 kVAC	10 W
	100 VAC	240 VAC	3.15 A(T)	4 kVAC	10 W
24	12 VDC	24 VDC	3.15 A(T)	1.5 kVDC	10 W
48	37 VDC	72 VDC	3.15 A(T)	1.5 kVDC	10 W

^a (T) denotes time-delay fuse.

^b Power consumption varies based on configuration.

» Non-Hazardous Environments

Power Supply Type	Input Range		Internal Fuse Rating ^{cd}	Isolation	Maximum Power Consumption ^e
	Minimum	Maximum			
HI	88 VDC	300 VDC	3.15 A(T)	4 kVAC	18 W
	85 VAC	264 VAC	3.15 A(T)	5.5 kVDC	18 W

Power Supply Type	Input Range		Internal Fuse Rating ^{cd}	Isolation	Maximum Power Consumption ^e
	Minimum	Maximum			
24 VDC	10 VDC	36 VDC	3.15 A(T)	1.5 kVDC	18 W
48	37 VDC	72 VDC	3.15 A(T)	1.5 kVDC	18 W

^c (F) denotes fast-acting fuse

^d (T) denotes time-delay fuse.

^e Power consumption varies based on configuration.

Section 5.2

Failsafe Alarm Relay Specifications

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

Section 5.3

Supported Networking Standards

Standard	10 Mbps Ports	100 Mbps Ports	1000 Mbps Ports	Notes
IEEE 802.3x	✓	✓	✓	Full Duplex Operation
IEEE 802.3z			✓	1000Base-LX
IEEE 802.3ab			✓	1000Base-Tx
IEEE 802.1D	✓	✓	✓	MAC Bridges
IEEE 802.1Q	✓	✓	✓	VLAN (Virtual LAN)
IEEE 802.1p	✓	✓	✓	Priority Levels

Section 5.4

Copper Ethernet Port Specifications

The following details the specifications for copper Ethernet ports that can be ordered with the RUGGEDCOM RS940G.

Speed ^f	10/100/1000 Mbps
Interface	TX
Connector	RJ45

Duplex ^f	FDX/HDX
Cable Type ^g	> Category 5
Wiring Standard ^h	TIA/EIA T568A/B
Maximum Distance ⁱ	100 m (328 ft)
Isolation ^j	1.5 kV

^f Auto-negotiating.

^g Shielded or unshielded.

^h Auto-crossover and auto-polarity.

ⁱ Typical distance. Dependent on the number of connectors and splices.

^j RMS 1 minute.

Section 5.5

Fiber Optic Ethernet Port Specifications

The following details the specifications for fiber Ethernet ports that can be ordered with the RUGGEDCOM RS940G.



NOTE

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

Speed (Mbps)	Interface	Mode	Connector Type	Cable Type (µm) ^k	Wavelength (nm) ^l	Transmit Power (dBm) ^m		Receiver Sensitivity (dBm) ^m	Receiver Saturation (dBm) ^m	Maximum Distance (km) ⁿ	Power Budget (dB)
						Min	Max				
1000	SX	MM	LC	50/125	850	-9	-2.5	-20	0	0.5	11
				62.5/125							
1000	FX	SM	SC	9/125	1310	-10	-3	-20	-3	10	10
1000	FX	SM	LC	9/125	1310	-9.5	-3	-21	-3	10	11.5
1000	FX	SM	SC	9/125	1310	-5	0	-20	-3	25	15
1000	FX	SM	LC	9/125	1310	-7	-3	-24	-3	25	17

^k All cabling is duplex type unless specified otherwise.

^l Typical.

^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.

Section 5.6

Operating Environment

Parameter	Range	Comments
Ambient Operating Temperature	-40 to 85 °C (-40 to 185 °F)	Measured from a 30 cm (12 in) radius surrounding the center of the enclosure.
Ambient Relative Humidity	5% to 95%	Non-condensing
Ambient Storage Temperature	-40 to 85 °C (-40 to 185 °F)	
Maximum Altitude	2000 m (6562 ft)	

Section 5.7

Mechanical Specifications

Weight	1.2 kg (2.7 lbs)
Ingress Protection	IP30
Enclosure	20 AWG Galvanized Steel

Section 5.8

Dimension Drawings



NOTE

All dimensions are in millimeters, unless otherwise stated.

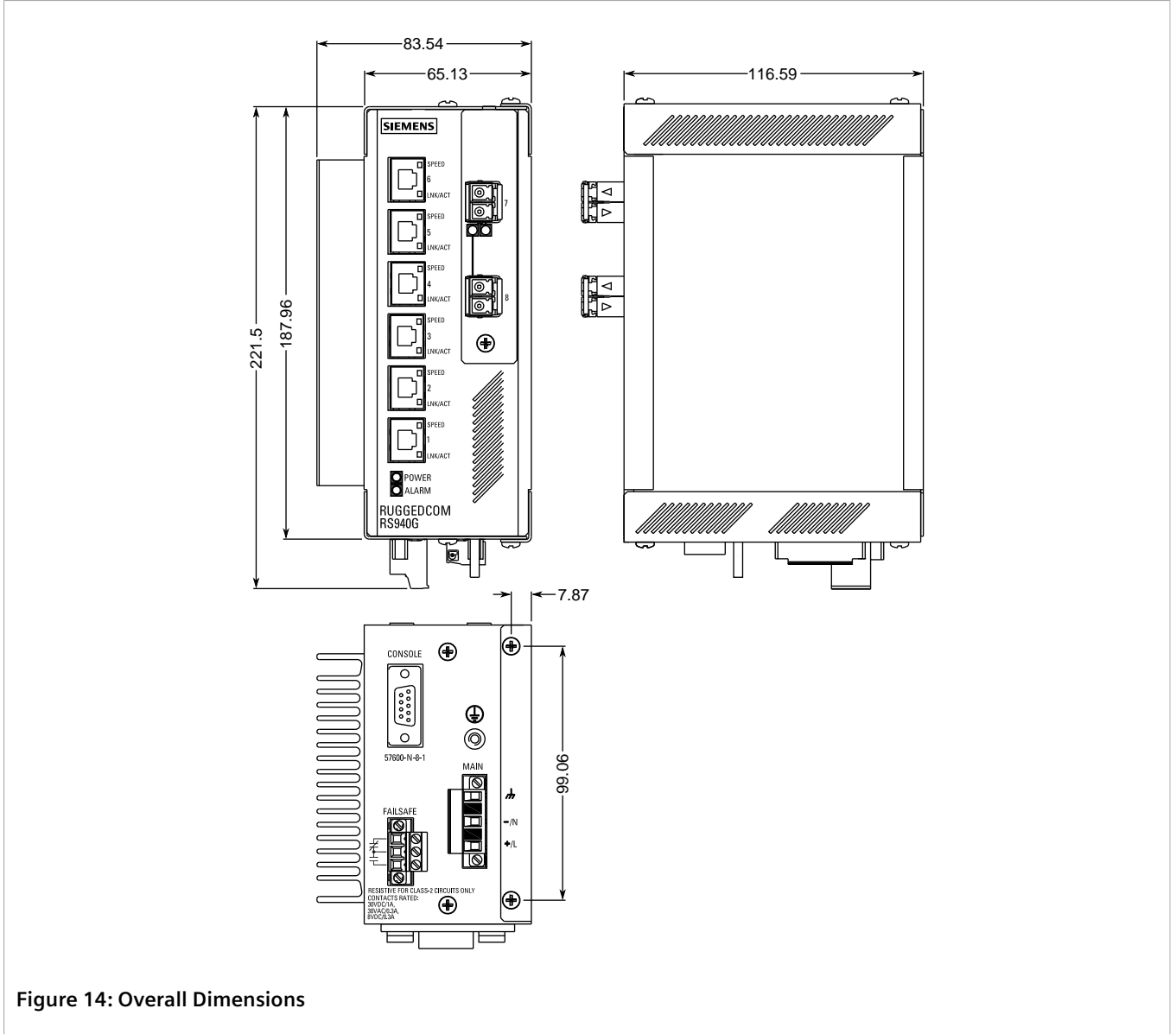


Figure 14: Overall Dimensions

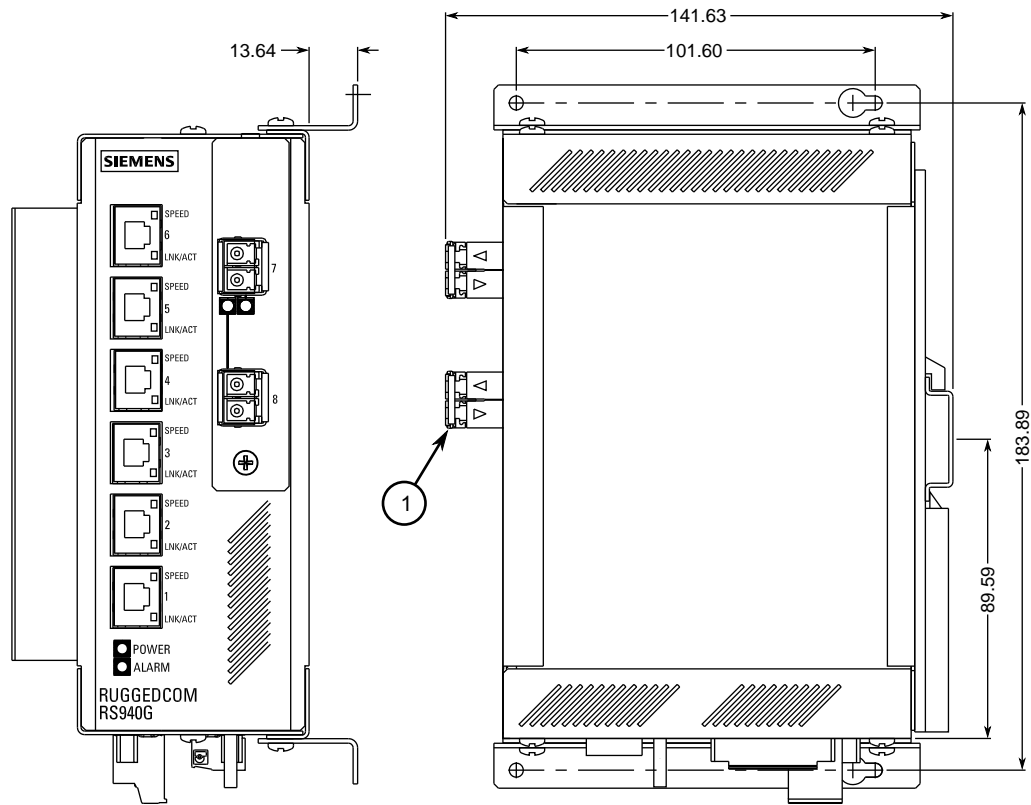


Figure 15: Panel and DIN Rail Mount Dimensions

1. SFP Port (Reference)

6 Certification

The RUGGEDCOM RS940G device has been thoroughly tested to guarantee its conformance with recognized standards and has received approval from recognized regulatory agencies.

CONTENTS

- [Section 6.1, "Approvals"](#)
- [Section 6.2, "EMC and Environmental Type Tests"](#)

Section 6.1

Approvals

This section details the standards to which the RUGGEDCOM RS940G complies.

CONTENTS

- [Section 6.1.1, "CSA"](#)
- [Section 6.1.2, "European Union \(EU\)"](#)
- [Section 6.1.3, "ISED"](#)
- [Section 6.1.4, "FCC"](#)
- [Section 6.1.5, "FDA/CDRH"](#)
- [Section 6.1.6, "ACMA"](#)
- [Section 6.1.7, "RoHS"](#)

Section 6.1.1

CSA

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

- **CAN/CSA-C22.2 No. 0-M91**
General Requirements - Canadian Electrical Code, Part II
- **CAN/CSA-C22.2 No. 142-M1987**
Process Control Equipment Industrial Products
- **CAN/CSA-C22.2 No. 213-16**
Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations (Bi-National Standard with ANSI/ISA-12.12.01-2016)

- **UL 916**
Standard for Energy Management Equipment
- **ANSI/ISA-12.12.01-2015**
Non-Incendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Division 1 and 2 Hazardous (Classified) Locations

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 hazardous locations defined as:

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

Section 6.1.2

European Union (EU)

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

- **EN 60950-1**
Information Technology Equipment – Safety – Part 1: General Requirements
- **EN 61000-6-2**
Electromagnetic Compatibility (EMC) – Part 6-2: Generic Standards – Immunity for Industrial Environments
- **EN 60825-1**
Safety of Laser Products – Equipment Classification and Requirements
- **EN 50581**
Technical Documentation for the Assessment of Electrical and Electronic Products with Respect to the Restriction of Hazardous Substances
- **EN 55022**
Information Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurement

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



A copy of the CE Declaration of Conformity is available from Siemens Canada Ltd. For contact information, refer to [“Contacting Siemens”](#).

Section 6.1.3

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 6.1.4

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

ACMA

This device meets the requirements of the following Australian Communications and Media Authority (ACMA) standards under certificate ABN 98 004 347 880:

- Radiocommunications (Compliance Labelling – Devices) Notice 2014 made under Section 182 of the Radiocommunications Act 1992
- Radiocommunications Labelling (Electromagnetic Compatibility) Notice 2008 made under Section 182 of the Radiocommunications Act 1992
- Radiocommunications (Compliance Labelling – Electromagnetic Radiation) Notice 2003 made under Section 182 of the Radiocommunications Act 1992
- Telecommunications Labelling (Customer Equipment and Customer Cabling) Notice 2001 made under Section 407 of the Telecommunication Act 1997

The device is marked with an RCM symbol to indicate compliance when sold in the Australian region.



A copy of the Declaration of Conformity is available via Siemens Industry Online Support at <https://support.industry.siemens.com/cs/ww/en/view/89855782>.

Section 6.1.7

RoHS

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

- **China RoHS 2**

Administrative Measure on the Control of Pollution Caused by Electronic Information Products

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

Section 6.2

EMC and Environmental Type Tests

The RUGGEDCOM RS940G 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	x
IEC 61000-4-4	Burst (Fast Transient)	Signal Ports	± 4 kV @ 2.5 kHz	x
		DC Power Ports	± 4 kV	4
		AC Power Ports	± 4 kV	4
		Earth ground Ports	± 4 kV	4
IEC 61000-4-5	Surge	Signal Ports	± 4 kV line-to-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
		D.C Power Ports	10 V	3
		AC Power Ports	10 V	3
		Earth ground Ports	10 V	3
IEC 61000-4-8	Magnetic Field	Enclosure Ports	40 A/m continuous, 1000 A/m for 1 s	
IEC 61000-4-29	Voltage Dips and Interrupts	DC Power Ports	30% for 0.1 s, 60% for 0.1 s, 100% for 0.05 s	
		AC Power Ports	30% for 1 period, 60% for 50 periods	

Test	Description		Test Levels	Severity Levels
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 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 61000-4-16	Mains Frequency Voltage	Signal Ports	30 V Continuous, 300 V for 1 s	4
		DC Power Ports	30 V Continuous, 300 V for 1 s	4
IEC 61000-4-17	Ripple on DC Power Supply	DC Power Ports	10%	3
IEC 60255-5	Dielectric Strength	Signal Ports	2 kVAC (Fail-Safe Relay output)	
		DC Power Ports	2 kV	
		AC Power Ports	2 kV	
	HV Impulse	Signal Ports	5 kV (Fail-Safe Relay Output)	
		DC Power Ports	5 kV	
		AC Power Ports	5 kV	

» IEEE 1613 (C37.90.x) EMC Immunity Type Tests



NOTE

The RUGGEDCOM RS940G 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.

IEEE Test	Description		Test Levels
C37.90.3	ESD	Enclosure Contact	± 8 kV
		Enclosure Air	± 15 kV
C37.90.2	Radiated RFI	Enclosure Ports	35 V/m
C37.90.1	Fast Transient	Signal Ports	± 4 kV @ 2.5 kHz
		DC Power Ports	± 4 kV
		AC Power Ports	± 4 kV
		Earth ground Ports	± 4 kV
	Oscillatory	Signal Ports	2.5 kV common mode @ 1 MHz
		DC Power Ports	2.5 kV common and differential mode @ 1 MHz
		AC Power Ports	2.5 kV common and differential mode @ 1 MHz
C37.90	HV Impulse	Signal Ports	5 kV (Failsafe Relay)

IEEE Test	Description		Test Levels
		DC Power Ports	5 kV
		AC Power Ports	5 kV
	Dielectric Strength	Signal Ports	2 kVAC (Failsafe Relay)
		DC Power Ports	1.5 kVDC
		AC Power Ports	2 kVAC

» Environmental Type Tests

Test	Description		Test Levels	Severity Levels
IEC 60068-2-1	Cold Temperature	Test Ad	-40 °C (-40 °F), 16 Hours	
IEC 60068-2-2	Dry Heat	Test Bd	85 °C (185 °F), 16 Hours	
IEC 60068-2-30	Humidity (Damp Heat, Cyclic)	Test Db	95% (non-condensing), 55 °C (131 °F), 6 cycles	
IEC 60255-21-1	Vibration		2 g @ 10-150 Hz	Class 2
IEC 60255-21-2	Shock		30 g @ 11 ms	Class 2