

SIEMENS

RUGGEDCOM RST2228

Installation Guide

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Preface

This guide describes the RUGGEDCOM RST2228. 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”](#)
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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 RST2228 User Guide](https://support.industry.siemens.com/cs/ww/en/view/109755340) [https://support.industry.siemens.com/cs/ww/en/view/109755340]
- [RUGGEDCOM Modules Catalog for RST2228, RST2228P](https://support.industry.siemens.com/cs/ww/en/view/109752858) [https://support.industry.siemens.com/cs/ww/en/view/109752858]

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.

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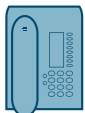
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Telephone

Call a local hotline center to submit a Support Request (SR). To locate a local hotline center, visit <http://www.automation.siemens.com/mcms/aspa-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 RST2228 is a utility grade, fully managed, industrial Ethernet switch designed to operate reliably in harsh environments. With a rugged metal enclosure and an optional conformal coating, the RUGGEDCOM RST2228 provides a high level of immunity to electromagnetic interference and heavy electrical surges, and can withstand temperatures between -40 and 85 °C (-40 and 185 °F).

Highly modular, the RUGGEDCOM RST2228 switch supports up to 28 electrical and/or optical interfaces with data transfer rates of 10/100/1000 Mbit/s. This makes it the ideal industry-standard switch for constructing electrical and/or optical line, ring and star topologies.

The RUGGEDCOM RST2228 switch is supported by RUGGEDCOM ROS, which provides advanced Layer 2 networking functions, and advanced cyber security features.

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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

Extreme Flexibility

- Support for up to a total of 28 non-blocking ports (six 4-port modules and four fixed ports)
- Mixture of fiber optic or copper Gigabit ports with up to 28 Gig Ethernet ports, including 4 ports capable of 10 Gigabits.
- Galvanized steel and aluminum construction

Compact 1U Form Factor

- Space-saving design

Front Loading Modular Design

- Allows for simple, cost effective in-field servicing and upgrading

Dual Redundant Smart Power Supplies

- HI voltage AC/DC: 88-300 VDC or 85-264 VAC
- LO voltage DC: 10.5-15 VDC, 13-36 VDC or 36-72 VDC
- Smart power supplies able to detect loss of input voltage

Reliability in Harsh Environments

- Immunity to EMI and heavy electrical surges
- Zero-Packet-Loss Technology
- Supports Siemens FastConnect RJ45 Cabling System
- -40 to 85 °C (-40 to 185 °F) operating temperature (fan-less)
- Conformal coated printed circuit boards (optional)

Section 1.2

Description

The RUGGEDCOM RST2228 features various ports, controls and indicator LEDs for connecting, configuring and troubleshooting the device.

» Orientation Options

The RUGGEDCOM RST2228 is available in one of two options:

- **Option 1**

Status panel, alarm LED, ACO Button, CLP port and USB console port are located on the front panel.

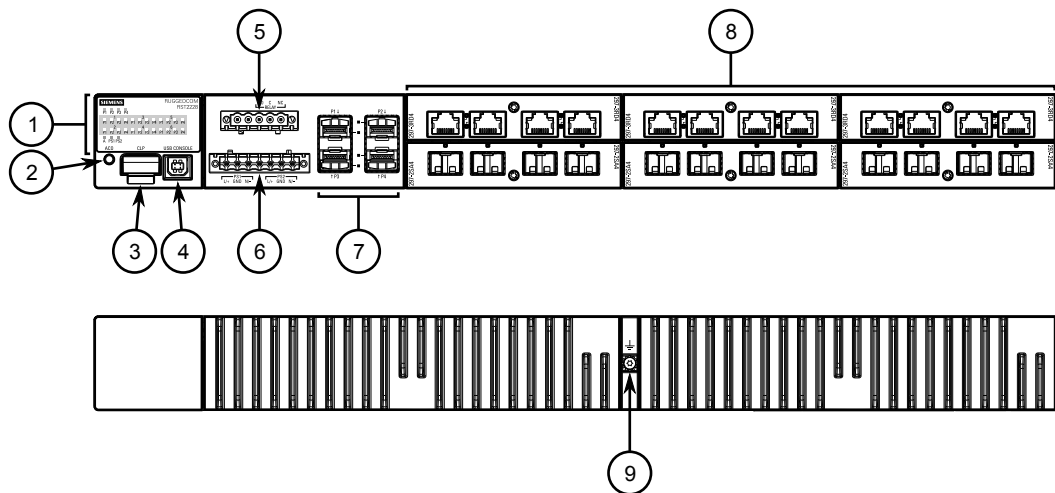


Figure 1: RUGGEDCOM RST2228 (Front Panel Orientation)

- 1. Status Panel
- 2. ACO Button
- 3. CLP Port
- 4. USB Console Port
- 5. Failsafe Alarm Relay Terminal Block
- 6. Power Terminal Block
- 7. SFP/SFP+ Transceiver Sockets
- 8. Media Modules
- 9. Chassis Ground Terminal

- **Option 2**

Status panel, alarm LED, ACO Button, CLP port and USB console port are located on the rear panel.

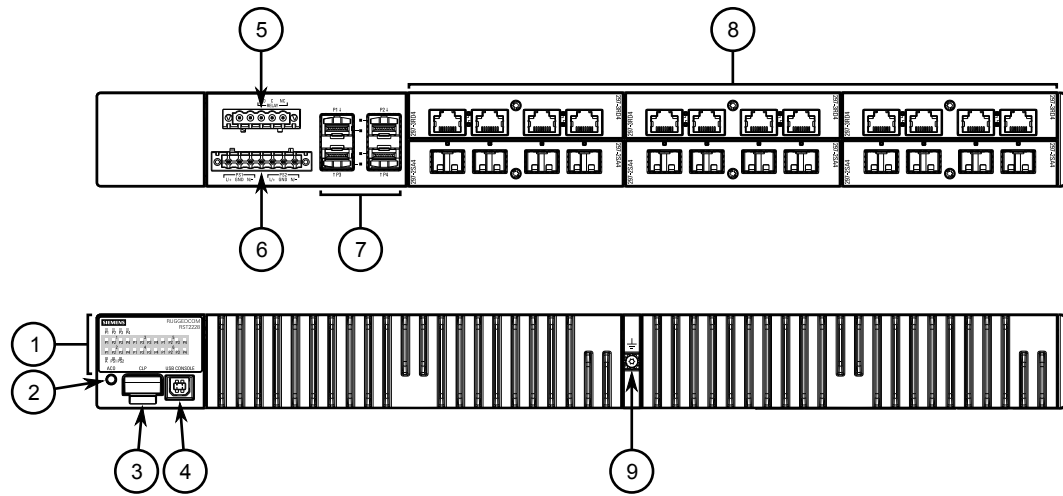


Figure 2: RUGGEDCOM RST2228 (Rear Panel Orientation)

1. Status Panel 2. ACO Button 3. CLP Port 4. USB Console Port 5. Failsafe Alarm Relay Terminal Block 6. Power Terminal Block 7. SFP/SFP+ Transceiver Sockets 8. Media Modules 9. Chassis Ground Terminal

» Key Features

Status Panel

The status panel displays the real-time status of the device.

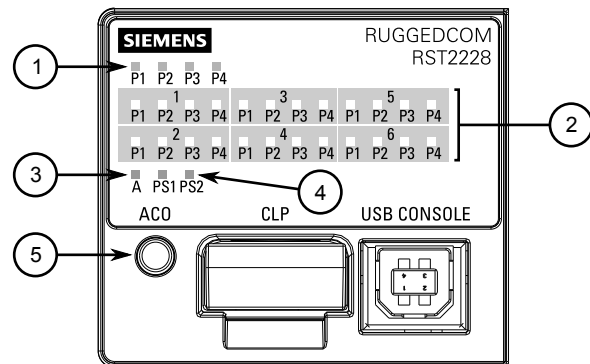


Figure 3: Status Panel

1. LEDs for 10GBase SFP+ Transceivers (Slot 0) 2. LEDs for Module ports 3. Alarm Status LED 4. Power Supply Status LEDs 5. ACO Button

LED	State	Description
P{number}	Solid	Link detected
	Blinking	Link activity
	Off	No link detected
A	Solid	An alarm condition exists

LED	State	Description
	Off	No active alarm conditions exist
PS1/PS2	Solid	The power source is supplying power to the device
	Off	The power source is not supplying power to the device

USB 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" .
Alarm Indicator LED	The alarm indicator LED illuminates when an alarm condition exists. Pressing the Alarm Cut-Off (ACO) button clears the alarm(s).
Removable Media	The device features sockets for up to four SFP/SFP+ transceivers and slots for up to six removable media modules. For more information, 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: <ul style="list-style-type: none"> • Section 2.4, "Connecting the Failsafe Alarm Relay" • Section 5.2, "Failsafe Alarm Relay Specifications"
Power Supply Terminal Block	A pluggable terminal block. For more information, refer to: <ul style="list-style-type: none"> • Section 2.5, "Connecting Power" • 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 2.5, "Connecting Power" .

Section 1.3

Required Tools and Materials

The following tools and materials are required to install the RUGGEDCOM RST2228:

Tools/Materials	Purpose
AC/DC power cord	For connecting power to the device. For the required. To determine the proper wire gage, refer to Section 5.1, "Power Supply Specifications" .
Lightning protector	For protecting the device from harmful electrical strikes.
Flathead screwdriver	For removing or installing modules and terminal blocks.
Torx T10 screwdriver	For removing or installing modules.
Phillips screwdriver	For removing or installing terminal blocks.
8 x M6 or #10-32 screws	For mounting the device to a panel.
8 x M6 or #10-32 screws	For mounting the device to a rack.
Braided or equivalent ground wire	For grounding the device to safety Earth.

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

Siemens recommends using SIMATIC NET industrial Ethernet shielded cables for all Ethernet ports.

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.
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

This chapter describes how to install the device, including mounting the device, connecting power, and connecting the device to the network.



DANGER!

Electrocution hazard – risk of serious personal injury and/or damage to equipment. Before performing any maintenance tasks, make sure all power to the device has been disconnected and wait approximately two minutes for any remaining energy to dissipate.



WARNING!

*Radiation hazard – risk of serious personal injury. This product may contain a laser system and is classified as a **CLASS 1 LASER PRODUCT**. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.*



IMPORTANT!

This product contains no user-serviceable parts. Attempted service by unauthorized personnel shall render all warranties null and void.

Changes or modifications not expressly approved by Siemens Canada Ltd could invalidate specifications, test results, and agency approvals, and void the user's authority to operate the equipment.



IMPORTANT!

*This product should be installed in a **restricted access location** where access can only be gained by authorized personnel who have been informed of the restrictions and any precautions that must be taken. Access must only be possible through the use of a tool, lock and key, or other means of security, and controlled by the authority responsible for the location.*

CONTENTS

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

Section 2.1

General Procedure

The general procedure for installing the device is as follows:



IMPORTANT!

The user is responsible for the operating environment of the device, including maintaining the integrity of all protective conductor connections and checking equipment ratings. Make sure to review all operating and installation instructions before commissioning or performing maintenance on the device.

1. **Review the relevant certification information for any regulatory requirements.**
For more information, refer to [Section 6.1, "Approvals"](#).
2. **Review the *RUGGEDCOM RST2228 Modules Catalog* for special installation or regulatory requirements related to the modules installed in the device.**
For more information, refer to ["Related Documents"](#).
3. **Unpack and inspect the device.**
For more information, refer to [Section 2.2, "Unpacking the Device"](#).
4. **Mount the device.**
For more information, refer to [Section 2.3, "Mounting the Device"](#).
5. **Connect the failsafe alarm relay.**
For more information, refer to [Section 2.4, "Connecting the Failsafe Alarm Relay"](#).
6. **Connect power to the device and ground the device to safety Earth.**
For more information, refer to [Section 2.5, "Connecting Power"](#).
7. **Connect the device to the network.**
For more information, refer to [Chapter 4, *Communication Ports*](#).
8. **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

Mounting the Device

The RUGGEDCOM RST2228 is designed for maximum mounting and display flexibility. It can be ordered with adapters that allow it to be installed in a 48 cm (19 in) rack 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 convectonal 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 rack or panel hardware installed, refer to [Section 5.6, "Dimension Drawings"](#).

CONTENTS

- [Section 2.3.1, "Mounting the Device to a Rack"](#)
- [Section 2.3.2, "Mounting the Device to a Panel"](#)

Section 2.3.1

Mounting the Device to a Rack

The RUGGEDCOM RST2228 can be secured to a standard 48 cm (19 in) rack using separately purchased rack mount adapters. The adapters can be installed at the front or rear of the chassis.

Each adapter kit includes four adapters.

To secure the device to a rack, do the following:

1. Secure the mounting adapters to both sides of the chassis.



NOTE

The chassis features multiple mounting holes, allowing the rack mount adapters to be installed up to 25 mm (1 in) from the face of the device.

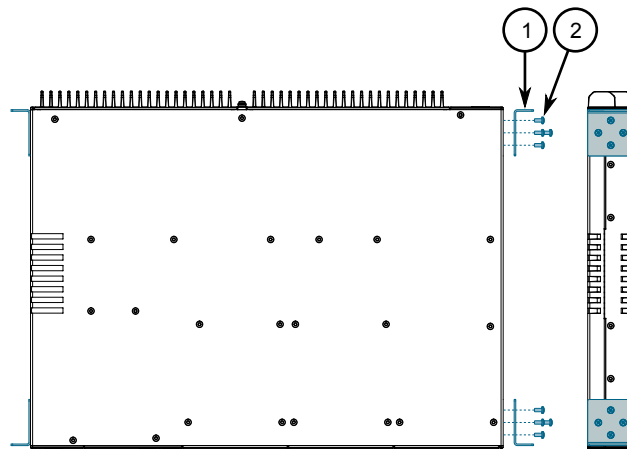


Figure 4: Installing the Mounting Adapters

1. Mounting Adapter 2. Screw

2. Insert the device into the rack. To make the modules and ports accessible from the front, insert the power supply side of the device first. Reverse the orientation to have the power supplies, management ports and LEDs accessible from the front.



NOTE

Since heat within the device is channeled to the enclosure, it is recommended that 1 rack-unit of space, or 44 mm (1.75 in), be kept empty above the device. This allows a small amount of convectonal 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.

3. Secure the adapters to the rack using M6 or #10-32 screws.

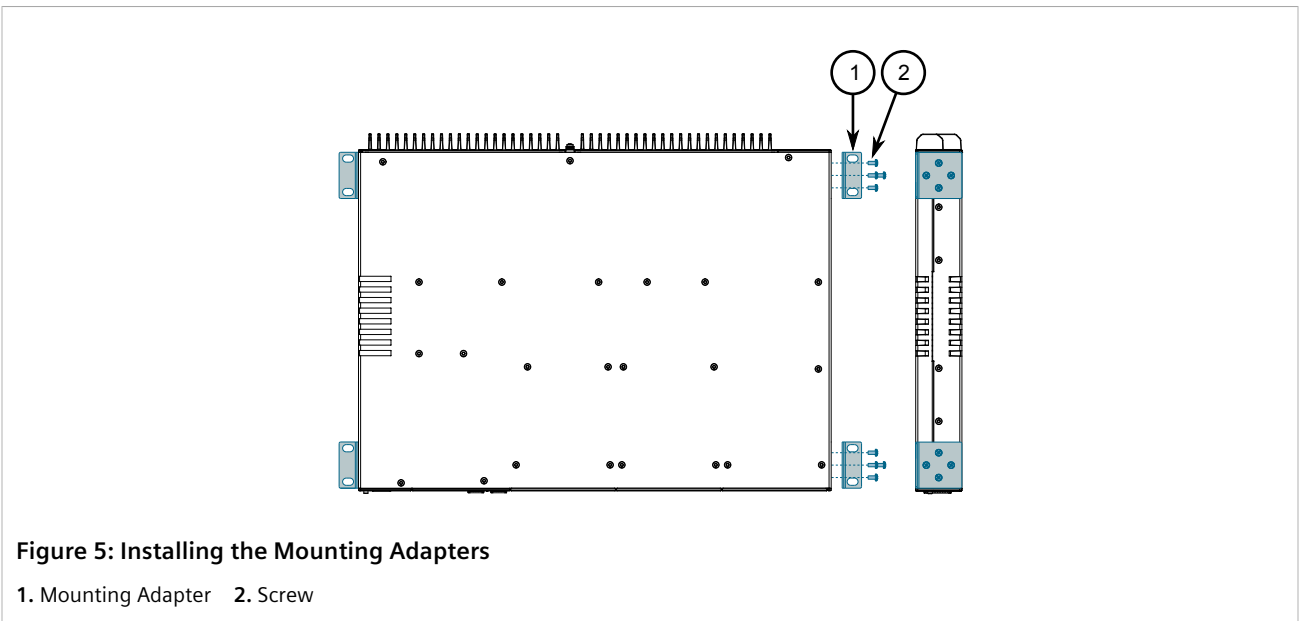
Section 2.3.2

Mounting the Device to a Panel

For panel installations, the RUGGEDCOM RST2228 can be ordered with panel adapters for each side 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 both sides of the chassis.



2. Place the device against the panel and align the adapters with the mounting holes.

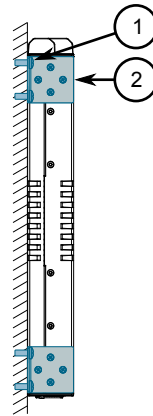


Figure 6: Panel Mounting

1. Screw 2. Panel Adapter

3. Secure the adapters to the panel with M6 or #10-32 screws.

Section 2.4

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 RST2228.

To connect the failsafe alarm relay, do the following:

1. Connect the failsafe alarm relay terminal block to the device. The terminal block is available as either a screw-type terminal block or a pluggable terminal block.
 - For a screw-type terminal block, insert the terminal block into the device. The terminal block will be secured to the device when the safety cover is installed later in the installation process.
 - For a pluggable terminal block, insert the terminal block into the device and tighten the screws.

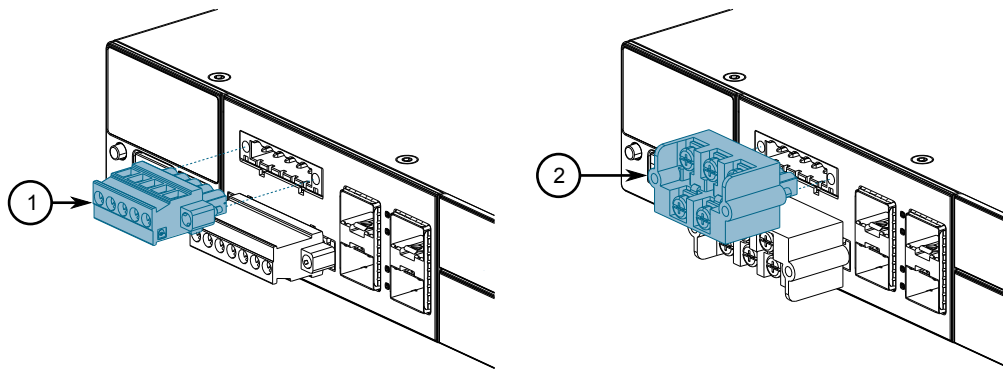


Figure 7: Assembling the Failsafe Alarm Relay Terminal Block

1. Pluggable Terminal Block 2. Screw-Type Terminal Block

2. Connect a failsafe device to the terminal block.

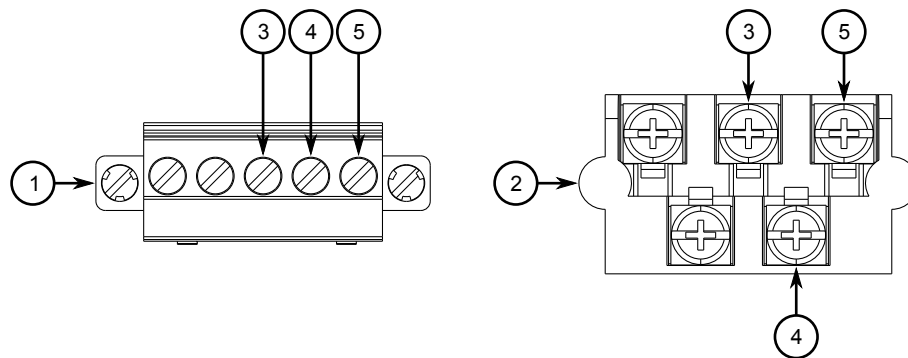


Figure 8: Failsafe Alarm Relay Wiring

1. Pluggable Terminal Block 2. Screw-Type Terminal Block 3. Normally Open Terminal 4. Common Terminal 5. Normally Closed Terminal

Section 2.5

Connecting Power

The RUGGEDCOM RST2228 supports dual redundant AC and/or DC power supplies that can be installed in any combination.

The RUGGEDCOM RST2228 can be equipped with either a screw-type or pluggable terminal block, which provides power to both power supplies. The screw-type terminal block is installed using Phillips screws and compression plates, allowing either bare wire connections or crimped terminal lugs. Use #6 size ring lugs for secure, reliable connections under severe shock or vibration.



DANGER!

Electrocution hazard – risk of serious personal injury or death. The device may have two power supplies equipped, which may be connected to separate power sources. Make sure all power sources are off before servicing the power supply terminals.



CAUTION!

Electrical hazard – risk of damage to equipment. Do not exceed the power supply voltage ratings for each power supply input. For example, if PS1 is a low DC power supply, do not connect the PS1 terminals to a high AC/DC power source.



IMPORTANT!

- *A circuit breaker rated no higher than 20 A must be installed between the device and the supply mains.*
- *Whenever possible, use a separate circuit breaker for each power supply.*
- *For maximum redundancy in a dual power supply configuration, use two independent power sources.*
- *A socket outlet/disconnect device must be installed near the device and be easily accessible.*
- *Equipment must be installed according to applicable local wiring codes and standards.*

CONTENTS

- [Section 2.5.1, “Connecting High AC/DC Power”](#)
- [Section 2.5.2, “Connecting Low DC Power”](#)
- [Section 2.5.3, “Wiring Examples”](#)

Section 2.5.1

Connecting High AC/DC Power

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



DANGER!

Electrocution hazard – risk of death, serious personal injury and/or damage to the device. Make sure the supplied cover is always installed over high voltage screw-type terminal blocks.



CAUTION!

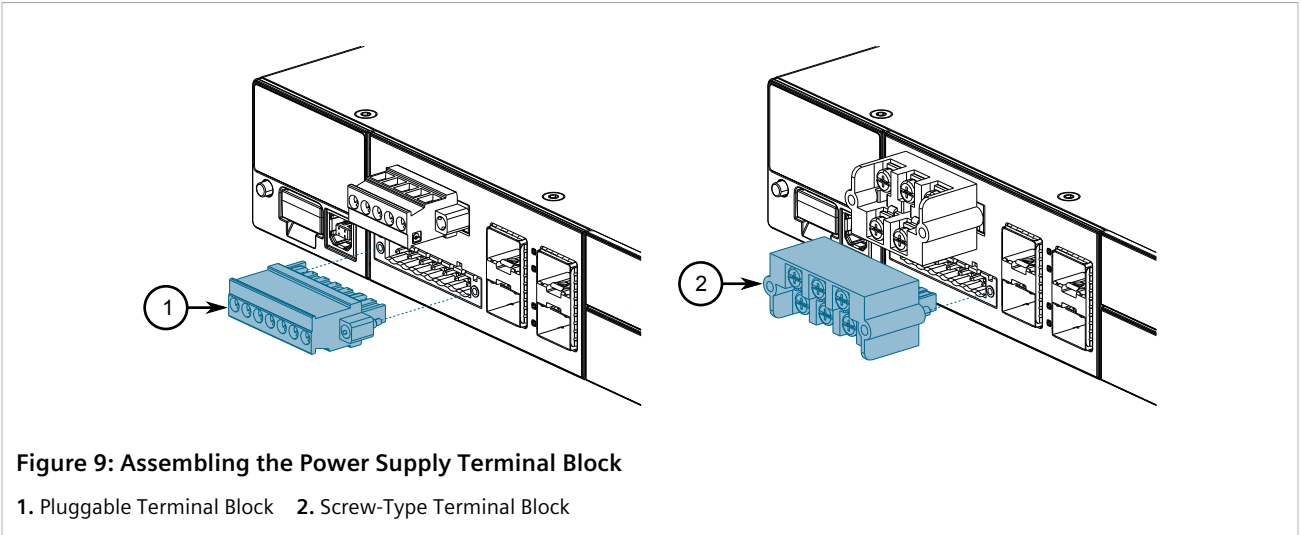
Electrical hazard – risk of damage to equipment. Do not connect AC power cables to a DC power supply terminal block. Damage to the power supply may occur.



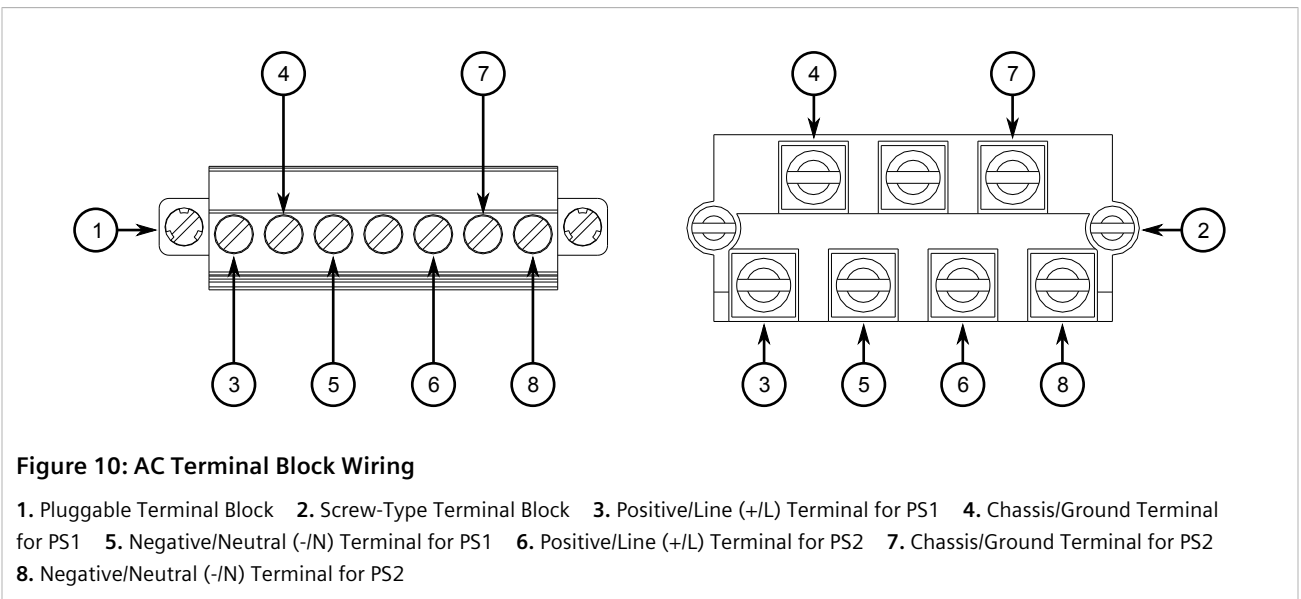
NOTE

The screw-type terminal block is installed using Phillips screws and compression plates, allowing either bare wire connections or crimped terminal lugs. Use #6 size ring lugs for secure, reliable screws, which must be removed to make connections.

1. Connect the power supply terminal block to the device.



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



3. Connect the ground wire to the chassis/ground terminal on the terminal block.
4. Connect the Neutral wire from the power source to the negative/neutral (-/N) terminal on the terminal block.
5. For screw-type terminal blocks, install the safety cover.

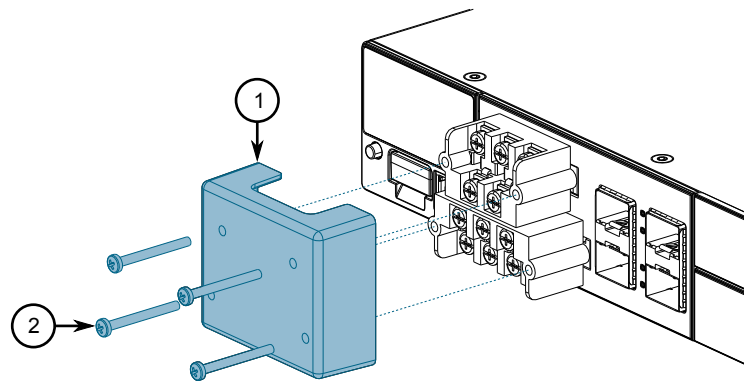


Figure 11: Assembling the Safety Cover

6. Connect the chassis ground screw to ground (Potential Earth). It is recommended to terminate the ground connection with an M3 ring or spade lug, and then torque to 1.7 N·m (15 lbf-in).

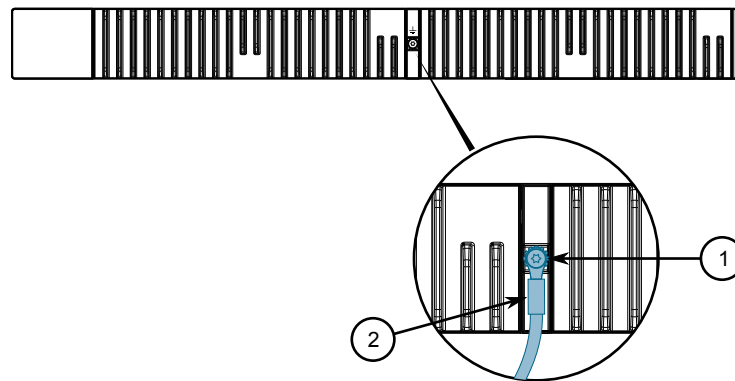


Figure 12: Chassis Ground Connection

1. M3 Screw 2. M3 Ring Lug

Section 2.5.2

Connecting Low DC Power

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



NOTE

The screw-type terminal block is installed using Phillips screws and compression plates, allowing either bare wire connections or crimped terminal lugs. Use #6 size ring lugs for secure, reliable screws, which must be removed to make connections.



CAUTION!

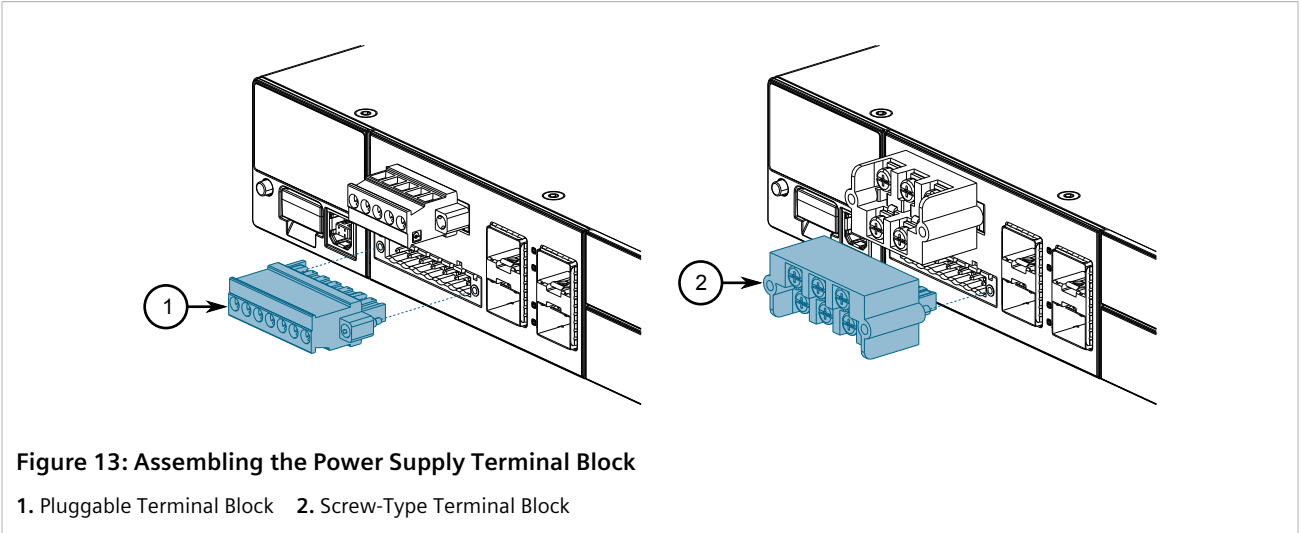
Electrical hazard – risk of damage to equipment. Do not connect AC power cables to a 12, 24 or 48 VDC power supply terminal block. Damage to the power supply may occur.



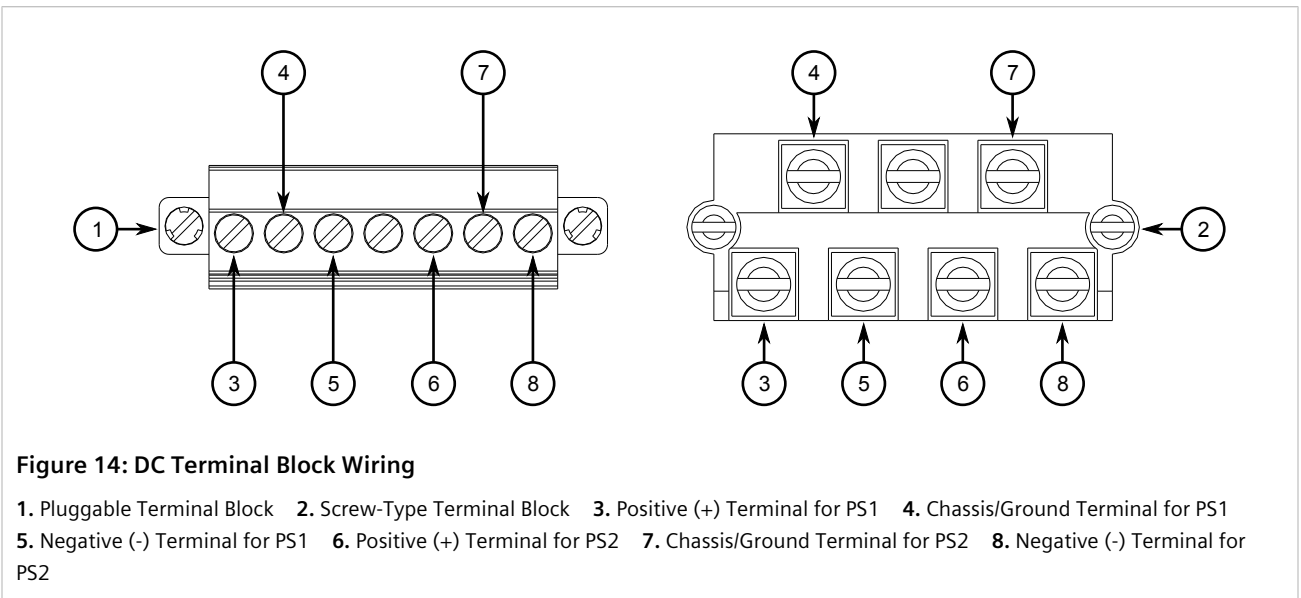
IMPORTANT!

When connecting the device to a DC power source, make sure the source provides only positive voltage.

1. Connect the power supply terminal block to the device.



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



3. Connect the negative wire from the power source to the negative terminal on the terminal block.
4. For pluggable terminal blocks, install the safety cover.

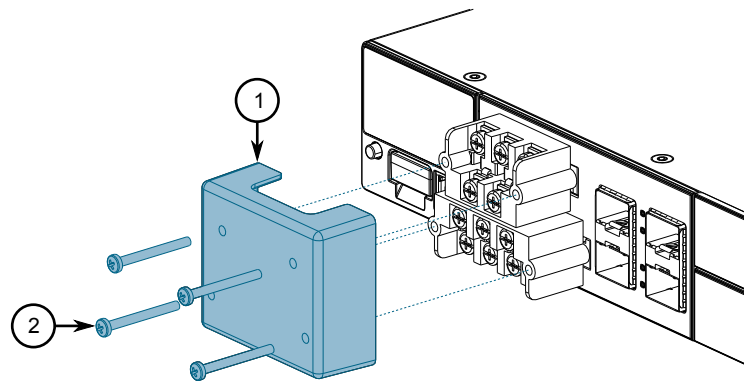


Figure 15: Assembling the Safety Cover

5. Connect the ground terminal on the power source to the ground terminal on the device.

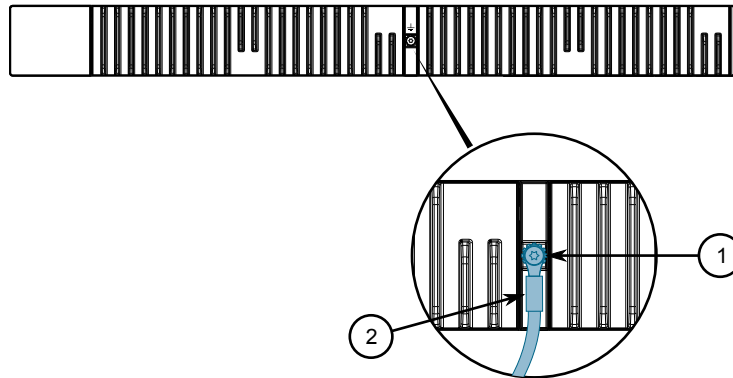


Figure 16: Chassis Ground Connection

1. M3 Screw 2. M3 Ring Lug

Section 2.5.3

Wiring Examples

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

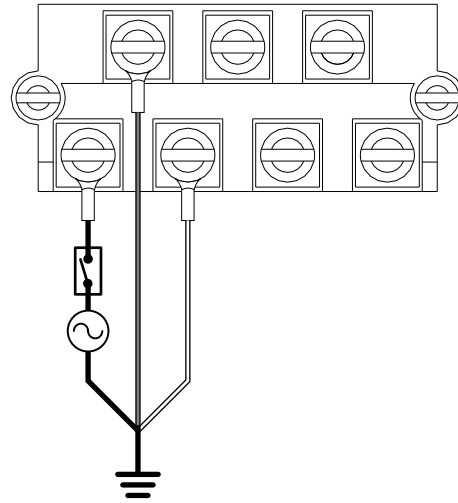
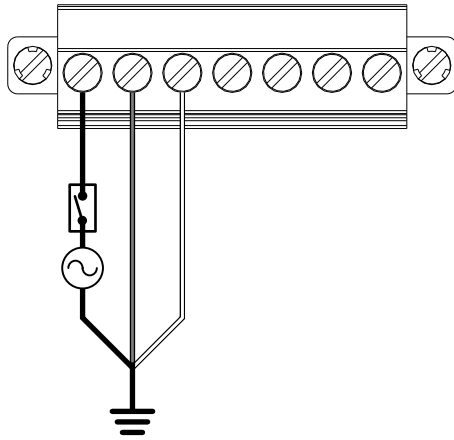


Figure 17: Single High AC/DC Power Supply

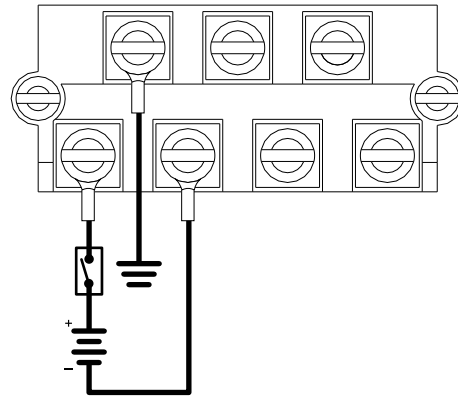
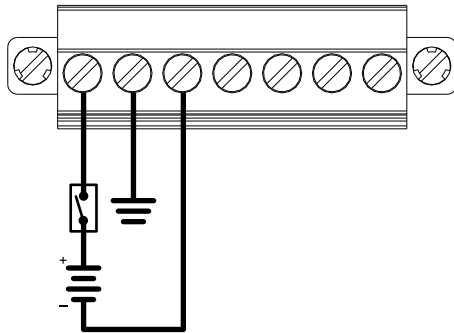


Figure 18: Single Low DC Power Supply

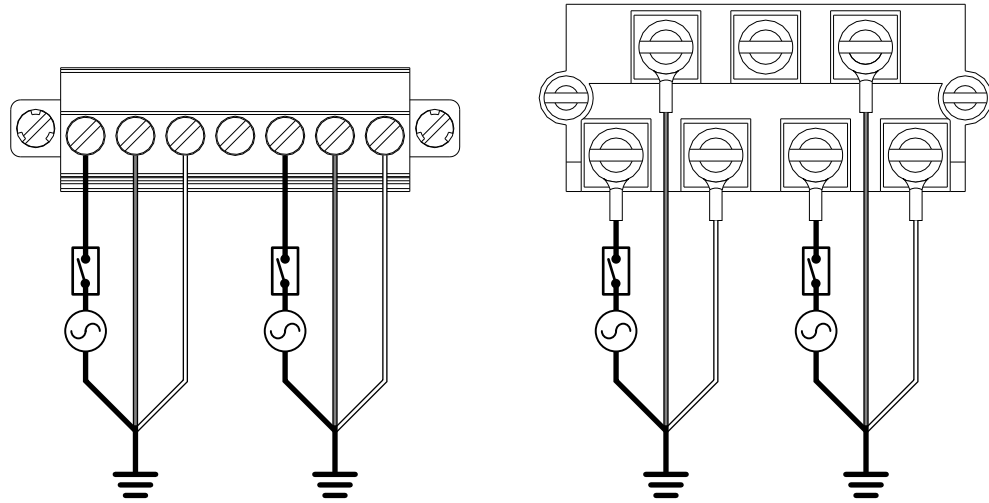


Figure 19: Dual High AC/DC Power Supply

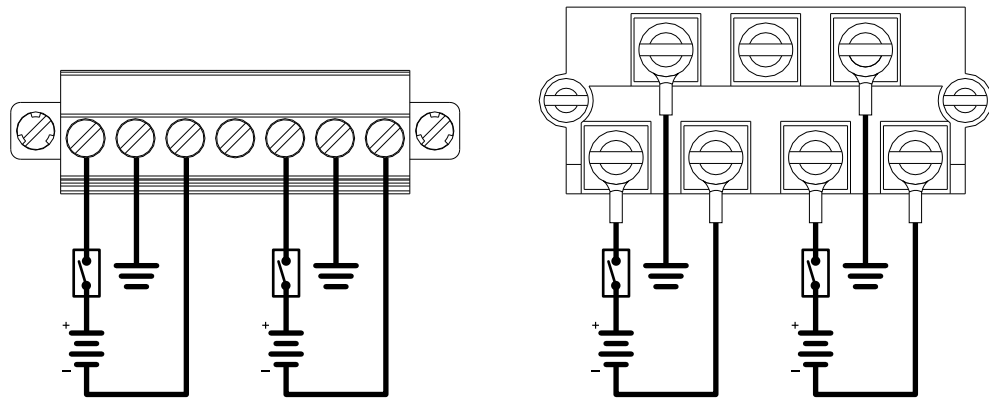


Figure 20: Dual Low DC Power Supply

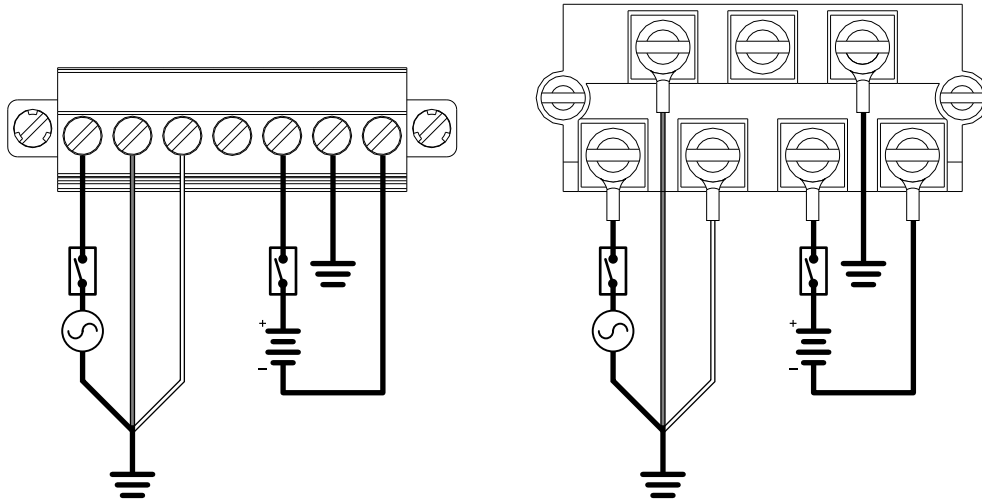


Figure 21: High AC/DC Power Supply and Low DC Power Supply

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 3.3, "Inserting/Removing the CLP"](#)

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 RST2228.

» USB 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 and Web interfaces.



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 RST2228.

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 RST2228 is <https://192.168.0.2>.

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.

Section 3.3

Inserting/Removing the CLP

The RUGGEDCOM RST2228 accepts a CLP for storing configuration files and/or software updates. A protective cover is provided to prevent the ingress of dust and dirt when the CLP is not in use.



CAUTION!

Mechanical/electrical hazard – risk of damage to the CLP.

- Do not expose the CLP to extreme temperatures or humidity
- Do not expose the CLP to large magnetic or static electric fields
- Do not bend or drop the CLP



CAUTION!

Security hazard – risk of unauthorized access and/or exploitation. Make sure to remove the CLP before decommissioning the device or sending the device to a third-party.



CAUTION!

Contamination hazard – risk of dust and dirt entering the CLP slot. When the CLP is not installed, make sure the protective cover is installed in its place.

» Removing the CLP

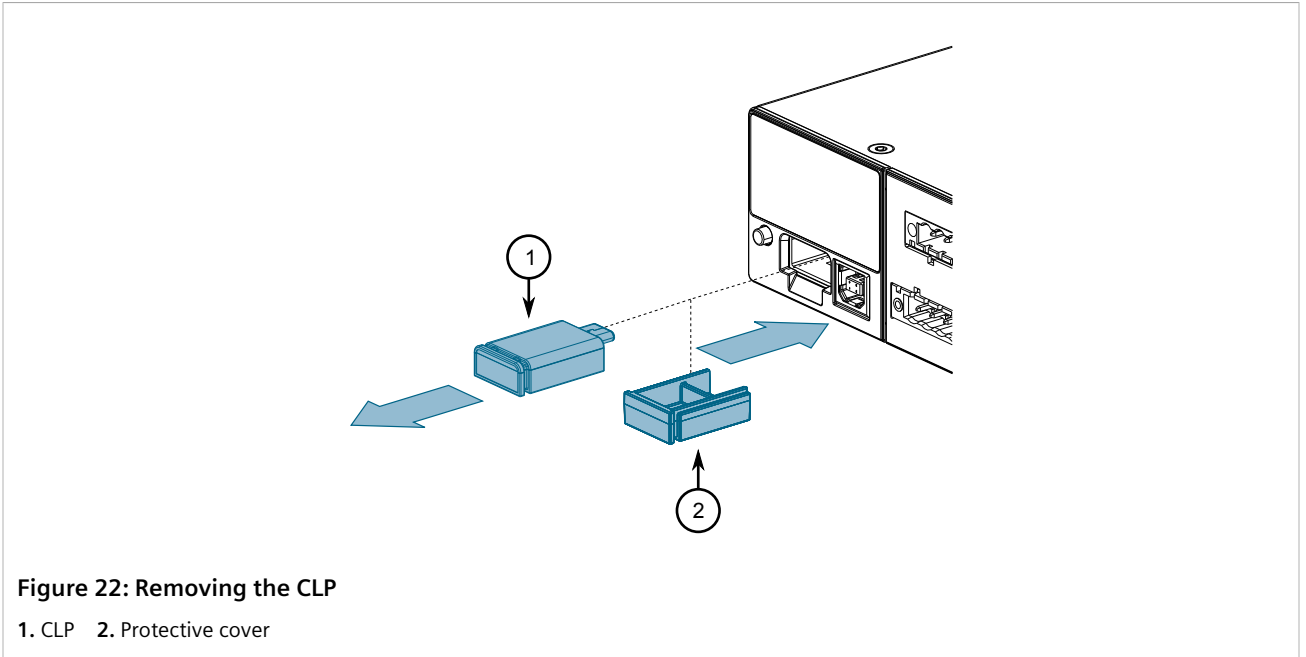


CAUTION!

Configuration hazard – risk of data loss. After uploading or downloading a file, allow at least twenty seconds before removing the CLP to ensure the data has been fully transferred.

To remove the CLP, do the following:

1. Insert a flat head screwdriver into the bottom portion of the CLP port, and gently pry the CLP out.

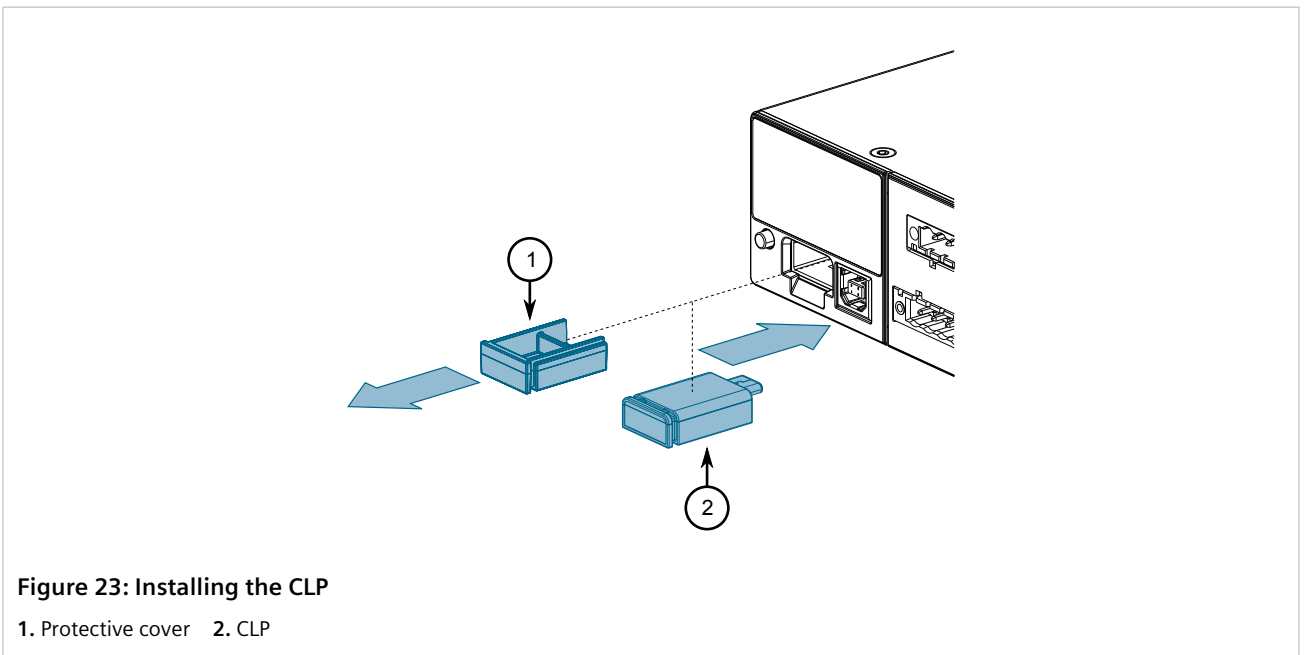


2. Insert the protective cover or a new CLP to prevent the ingress of dust and dirt.

» Installing the CLP

To install the CLP, do the following:

1. Remove the protective cover from the CLP port.



2. Insert the CLP into the CLP port.

4 Communication Ports

The RUGGEDCOM RST2228 features four Small Form-factor Pluggable (SFP+) transceiver sockets for uplink communications, as well as six slots for field-replaceable media modules. Modules can be used to expand and customize the capabilities of the device to suit specific applications. A variety of modules are available, each featuring a specific type of communication port: copper Ethernet, fiber optic Ethernet and SFP.

RUGGEDCOM ROS has the ability to analyze SFP types and port hardware capabilities at runtime. Different types of SFP modules using different integrated MAC and PHY hardware are supported.

Modules can be installed in any one of the available slots in the device chassis.

Use RUGGEDCOM ROS to determine which ports are equipped on the device. For more information, refer to the *RUGGEDCOM ROS User Guide* for the device.

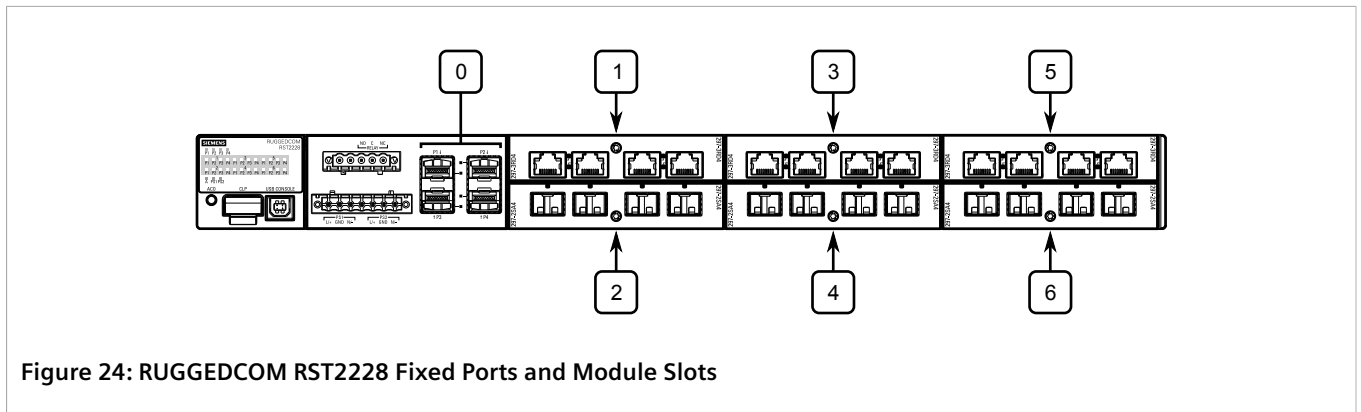


Figure 24: RUGGEDCOM RST2228 Fixed Ports and Module Slots

Slot	Media Type
0	4 x SFP/SFP+ Transceivers
1 to 6	Field-replaceable modules

CONTENTS

- [Section 4.1, “SFP Transceivers”](#)
- [Section 4.2, “Available Modules”](#)
- [Section 4.3, “Installing/Removing Modules”](#)

Section 4.1

SFP Transceivers

The RUGGEDCOM RST2228 supports up to four Small Form-factor Pluggable (SFP) transceiver sockets, which are compatible with the wide array of SFP/SFP+ transceivers available from Siemens.



NOTE

When more than two 40km or 80km SFP+ transceivers are installed, the maximum temperature at which the device can operate will be reduced to 75 °C (165°F).

» **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 RST2228. 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 SFP1112-1	6GK6000-8CG01-0AA0	10/100/1000	—	0.1
RUGGEDCOM SFP1121-1FX2A ^b	6GK6000-8FE50-0AA0	100	MM	2
RUGGEDCOM SFP1121-1FX2 ^c	6GK6000-8FE51-0AA0	100	MM	2
RUGGEDCOM SFP1131-1FX20 ^c	6GK6000-8FE52-0AA0	100	SM	20
RUGGEDCOM SFP1131-1FX50 ^c	6GK6000-8FE53-0AA0	100	SM	50
RUGGEDCOM SFP1131-1FX90 ^c	6GK6000-8FE54-0AA0	100	SM	90
RUGGEDCOM SFP1122-1SX	6GK6000-8FG51-0AA0	1000	MM	0.5
RUGGEDCOM SFP1122-1SX2	6GK6000-8FE58-0AA0	1000	MM	2
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
RUGGEDCOM SFP2133-1LR10 ^b	6GK6000-8FT51-0AA0	10000	SM	10
RUGGEDCOM SFP2133-1ER40 ^b	6GK6000-8FT53-0AA0	10000	SM	40

SFP Transceiver	Order Code	Speed (Mbit/s)	Mode ^a	Nominal Distance (km)
RUGGEDCOM SFP2133-1ZR80 ^b	6GK6000-8FT52-0AA0	10000	SM	80

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

^b Only compatible with SFP/SFP+ Transceiver Sockets.

^c Not compatible with SFP/SFP+ Transceiver Sockets.

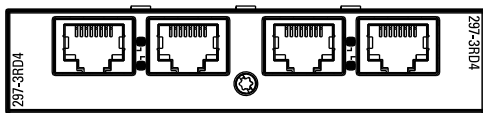
Section 4.2

Available Modules

The following modules are available for use with the RUGGEDCOM RST2228. For more information about individual modules, refer to the *RUGGEDCOM Modules Catalog* for the device available online.

» Copper Ethernet Modules

RUGGEDCOM RMM2973-4RJ45



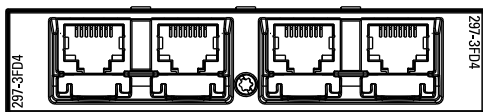
Specifications

Ports: 4
Port Type: RJ45
Speed: 10/100/1000 Mbps
Interface: TX
Distance: 100 m (328 ft)

Article Numbers

6GK6297-3RD00-4AB0 (Standard)
6GK6297-3RD00-4AB1 (Conformal Coated)

RUGGEDCOM RMM2973-4FC



Specifications

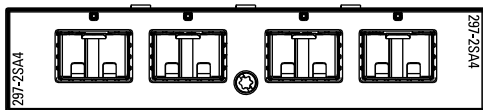
Ports: 4
Port Type: FastConnect RJ45
Speed: 10/100/1000 Mbps
Interface: TX
Distance: 100 m (328 ft)

Article Numbers

6GK6297-3FD00-4AB0 (Standard)
6GK6297-3FD00-4AB1 (Conformal Coated)

» Fiber Optic Ethernet Modules

RUGGEDCOM RMM2972-4SFP



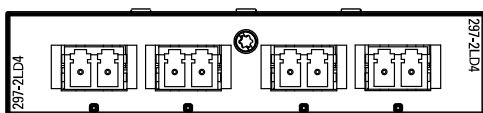
Specifications

SFP Sockets: 4
Speed: 100/1000 Mbps

Article Numbers

6GK6297-2SA00-4AA0 (Standard)
6GK6297-2SA00-4AA1 (Conformal Coated)

RUGGEDCOM RMM2942-4LC2



Specifications

Ports: 4
Port Type: LC
Mode: MM (Multi-Mode)
Speed: 100 Mbps
Interface: FX
Wavelength: 1310 nm
Distance: 2 km (1.2 mi)

Article Numbers

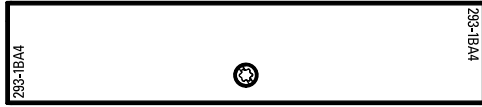
6GK6294-2LD00-4AC0 (Standard)
6GK6294-2LD00-4AC1 (Conformal Coated)

» Blank Modules

RUGGEDCOM RMM2972-4SFP

Specifications

Article Numbers



Blank module

6GK6293-1BA00-4AA0

Section 4.3

Installing/Removing Modules

Upon installing a new media module in the device, all features associated with the module are available in RUGGEDCOM ROS. For more information, refer to the *RUGGEDCOM ROS User Guide* for the RUGGEDCOM RST2228.

Once a media module is removed, all the features associated with the module are hidden or disabled in RUGGEDCOM ROS.



CAUTION!

Contamination hazard – risk of equipment damage. Prevent the ingress of water, dirts and other debris that may lead to premature equipment failure. Always make sure slots are not left empty and open ports are protected with plugs or covers.

» Removing a Module

To remove a media module, do the following:

1. Make sure power to the device has been disconnected and wait approximately two minutes for any remaining energy to dissipate.
2. [Optional] If the device is installed in a rack, remove it from the rack.
3. Loosen the screw(s) that secure the module.
4. Pull the module from the chassis to disconnect it.

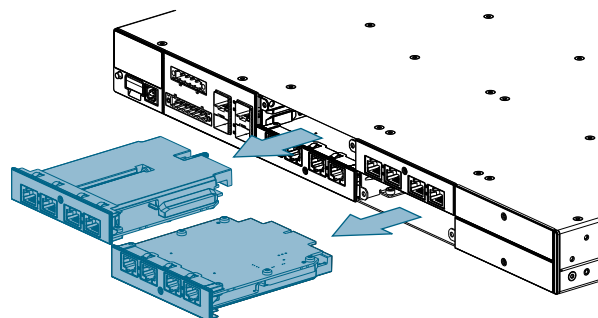


Figure 25: Removing a Module

5. Install a new module or a blank module (to prevent the ingress of dust and dirt).
6. [Optional] If necessary, install the device in the rack.

7. Connect power to the device.

» Installing a Module

To install a media module, do the following:

1. Make sure power to the device has been disconnected and wait approximately two minutes for any remaining energy to dissipate.
2. [Optional] If the device is installed in a rack, remove it from the rack.
3. Remove the current module from the slot.
4. Insert the new module into the slot.

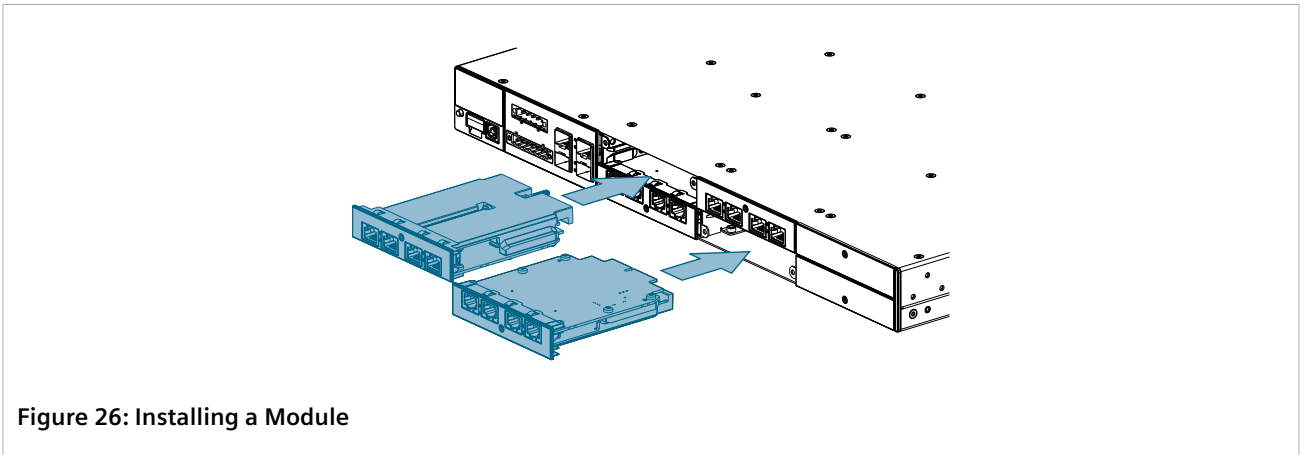


Figure 26: Installing a Module

5. Tighten the screw(s) to secure the module.
6. [Optional] If necessary, install the device in the rack.
7. Connect power to the device.

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, "Operating Environment"](#)
- [Section 5.5, "Mechanical Specifications"](#)
- [Section 5.6, "Dimension Drawings"](#)

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.



NOTE

Use the internal fuse rating to determine the size of the external circuit breaker/fuse.

Power Supply Type	Terminal Block Type	Input Range		Internal Fuse Rating	Maximum Power Consumption ^a	Wire Gage
		Min	Max			
12 VDC (Single)	Screw	10.5 VDC	15 VDC	12 A	77 W	#14 AWG
24 VDC (Single)		13 VDC	36 VDC	10 A	72 W	#14 AWG
48 VDC (Single)		36 VDC	72 VDC	5 A	72 W	#16 AWG
High Voltage AC/DC	Screw/Pluggable	88 VDC	300 VDC	3.15 A	77 W/ 76W	#16 AWG
		85 VAC	264 VAC		75 W/ 75W	

^a Based on nominal input voltages and 60W output load.

Section 5.2

Failsafe Alarm Relay Specifications

Maximum Switching Voltage	Rated Switching Current	Isolation
250 VAC	2 A @ 250 VAC	150 W
30 VDC	2 A @ 30 VDC	500 VA

Section 5.3

Supported Networking Standards

Parameter	10 Mbps	100 Mbps	1000 Mbps	10000 Mbps	Notes
IEEE 802.1AB	✓	✓	✓	✓	Link Layer Discovery Protocol (LLDP)
IEEE 802.1D	✓	✓	✓	✓	MAC bridges
IEEE 802.1Q	✓	✓	✓	✓	VLAN (Virtual LAN)
IEEE 802.1p	✓	✓	✓	✓	Priority levels
IEEE 802.1x	✓	✓	✓	✓	Port-based network access control
IEEE 802.3	✓				10Base-T
IEEE 802.3u		✓			100Base-TX/100Base-FX
IEEE 802.3z			✓		1000Base-SX/LX
IEEE 802.3ab			✓		1000Base-TX
IEEE 802.3ae				✓	10GBase
IEEE 802.3x	✓	✓	✓	✓	Full duplex operation

Section 5.4

Operating Environment

The RUGGEDCOM RST2228 is rated to operate under the following environmental conditions.

Ambient Operating Temperature^b	-40 to 85 °C (-40 to 185 °F)
Ambient Storage Temperature	-40 to 85 °C (-40 to 185 °F)
Ambient Relative Humidity^c	5% to 95%
Maximum Altitude	3000 m (9842 ft)

^b Measured from a 30 cm (11.8 in) radius surrounding the center of the enclosure.

^c Non-condensing.

Section 5.5

Mechanical Specifications

Weight	8.0 kg (18 lbs)
Ingress Protection	IP40
Enclosure	Galvanized steel

Section 5.6

Dimension Drawings



NOTE

All dimensions are in millimeters, unless otherwise stated.

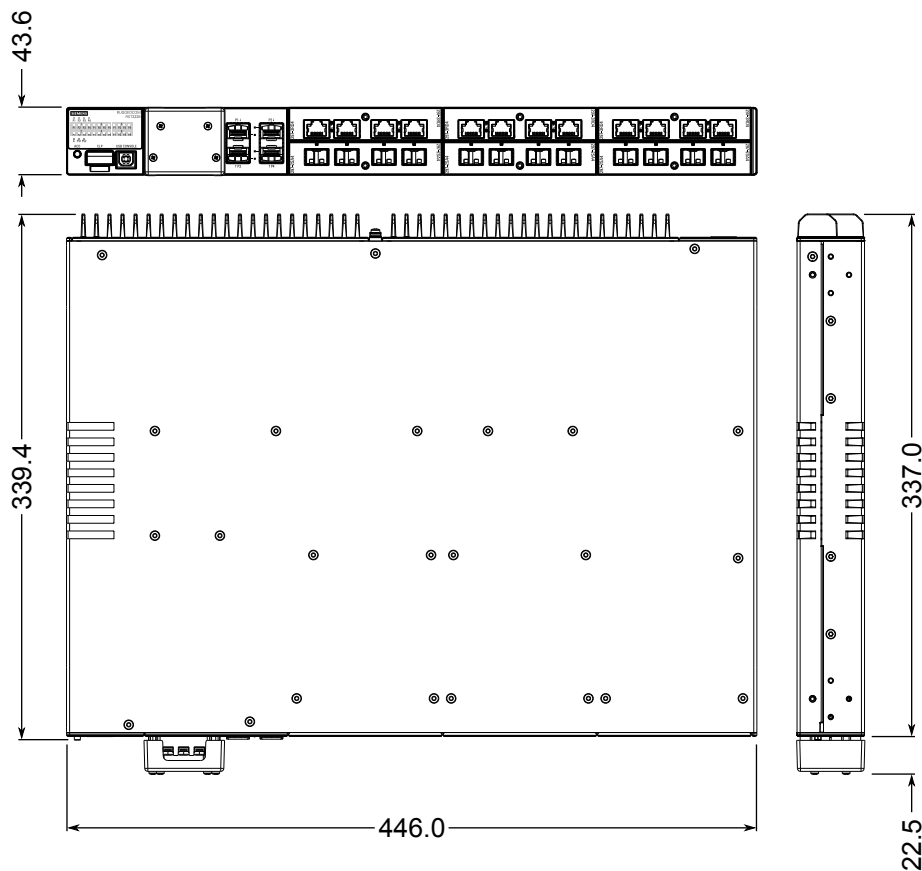


Figure 27: Overall Dimensions

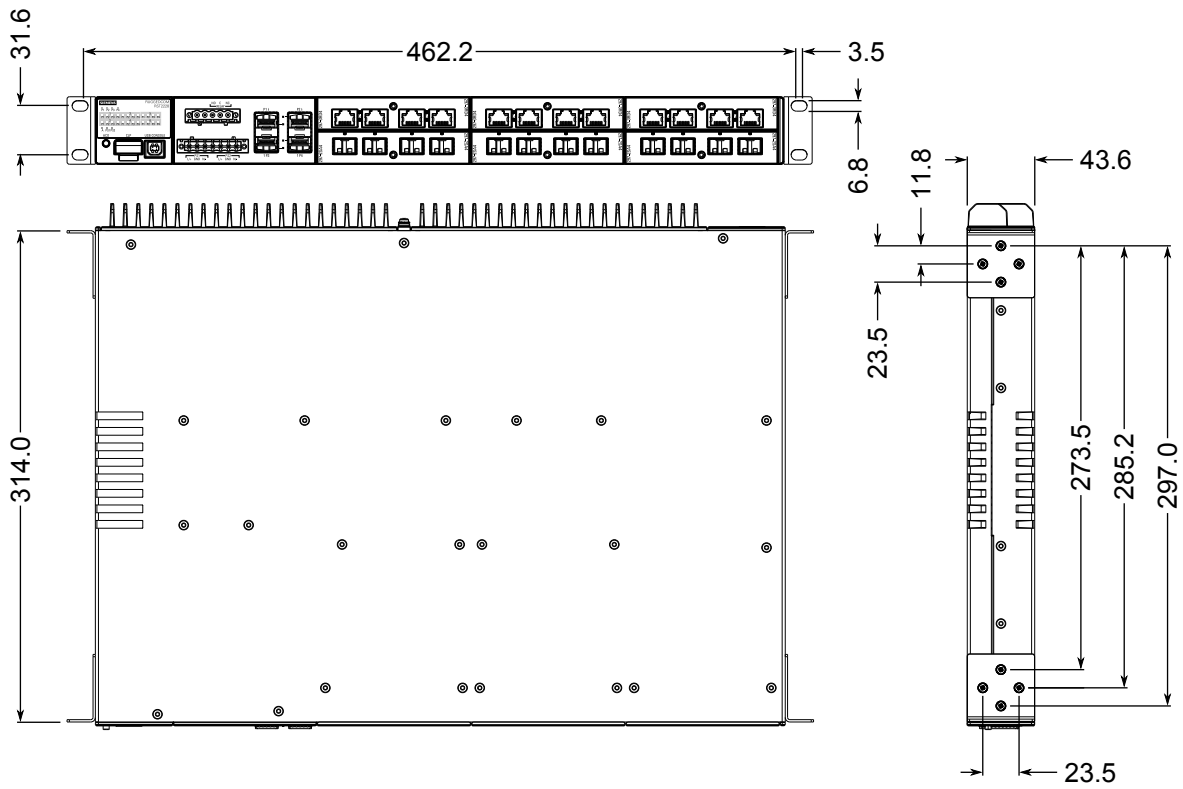


Figure 28: Rack Mount Dimensions

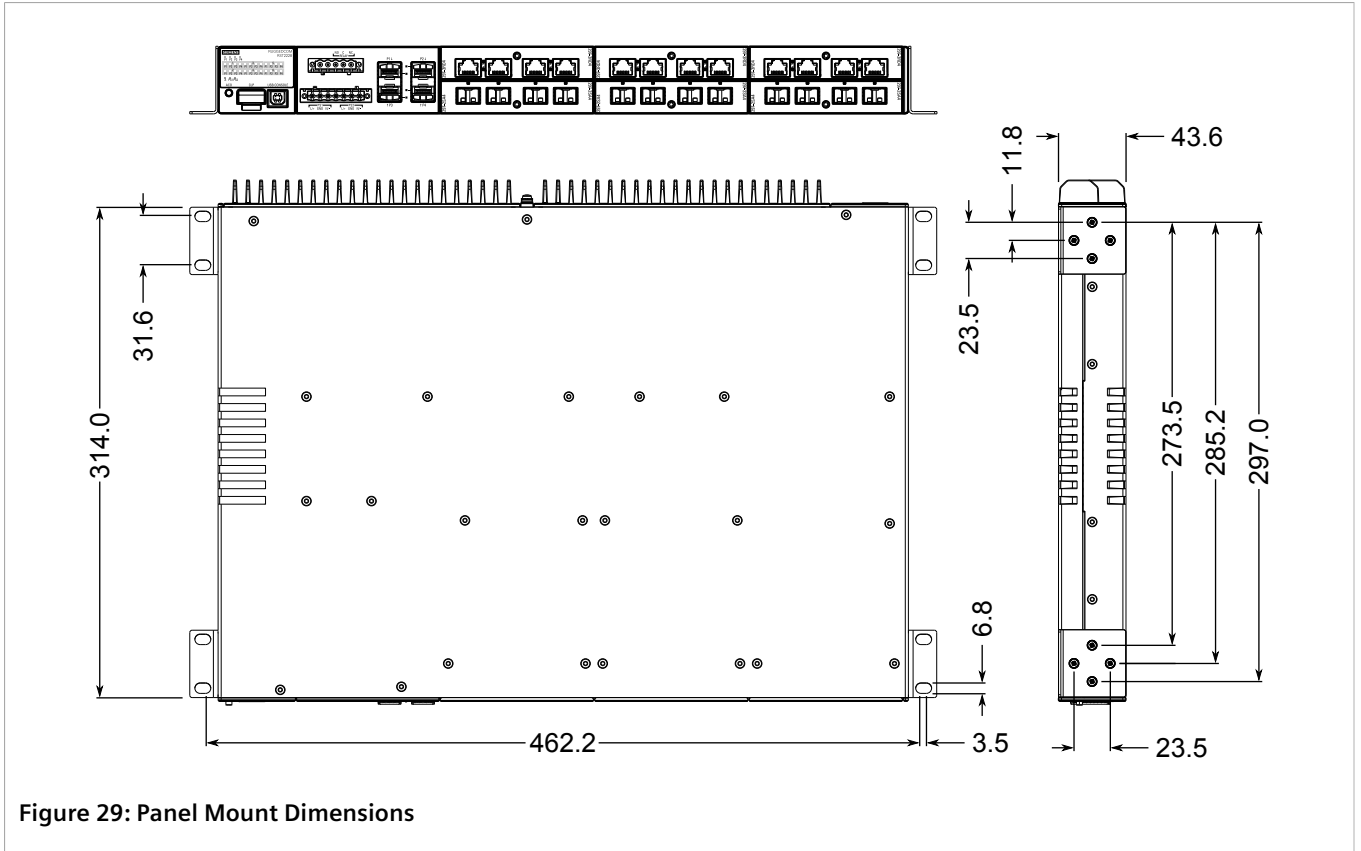


Figure 29: Panel Mount Dimensions

6 Certification

The RUGGEDCOM RST2228 device has been thoroughly tested to guarantee its conformance with recognized standards and has received approval from recognized regulatory agencies.

**NOTE**

Certifications related to individual modules are detailed in the RUGGEDCOM Modules Catalog for the device available online.

CONTENTS

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

Section 6.1

Approvals

The following details the approvals issued for the RUGGEDCOM RST2228.

CONTENTS

- [Section 6.1.1, "CSA"](#)
- [Section 6.1.2, "European Union \(EU\)"](#)
- [Section 6.1.3, "FCC"](#)
- [Section 6.1.4, "FDA/CDRH"](#)
- [Section 6.1.5, "ISED"](#)
- [Section 6.1.6, "TÜV SÜD"](#)
- [Section 6.1.7, "RoHS"](#)
- [Section 6.1.8, "Other Approvals"](#)

Section 6.1.1

CSA

This device meets the requirements of the following Canadian Standards Association (CSA) standards under certificate 16.70068356:

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

- **UL 60950-1**
Information Technology Equipment – Safety Part 1: General Requirements

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



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 61000-3-2**
Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
- **EN 61000-3-3**
Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection
- **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 55032**
Information Technology Equipment – Radio disturbance characteristics – Limits and methods of measurement
- **EN 50581**
Technical Documentation for the Assessment of Electrical and Electronic Products with Respect to the Restriction of Hazardous Substances

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

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 6.1.4

FDA/CDRH

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

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

Section 6.1.5

ISED

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

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

Section 6.1.6

TÜV SÜD

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

- **CSA/EN/IEC/UL 60950-1**
Information Technology Equipment – Safety – Part 1: General Requirements

Section 6.1.7

RoHS

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

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

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

Section 6.1.8

Other Approvals

This device meets the requirements of the following additional standards:

- **IEC 61850-3**
General Requirements
- **EN 50121-4**
Railway Applications – Electromagnetic Compatibility – Emission and Immunity of the Signaling and Telecommunications Apparatus
- **EN 50121-3-2**
Railway applications – Electromagnetic compatibility – Part 3-2: Rolling stock – Apparatus
- **EN 50155**
Railway applications – Rolling stock – Electronic equipment
- **NEMA TS-2**
Traffic Controller Assemblies with NTCIP Requirements

Section 6.2

EMC and Environmental Type Tests

The RUGGEDCOM RST2228 has passed the following EMC and environmental tests.

» EMC Type Test for IEC 61850-3



NOTE

- *In the case of an all fiber port configuration, this product meets all Class 2 requirements. Otherwise, all Class 1 requirements are met for copper ports.*
- *If the unit contains copper ports, the IEC 1613 conformance is Class 1, during which disturbance errors may occur but recovery is automatic.*
- *If the unit contains all fiber ports, the IEC1613 conformance is Class 2, during which no disturbance errors will occur.*

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	Note ^a
IEC 61000-4-4	Burst (Fast Transient)	Signal Ports	± 4 kV at 2.5 and 5 kHz	Note ^a

Test	Description	Test Levels	Severity Levels	
		DC Power Ports	± 4 kV at 2.5 and 5 kHz	4
		AC Power Ports	± 4 kV at 2.5 and 5 kHz	4
		Earth Ground Ports	± 4 kV at 5 kHz	4
IEC 61000-4-5	Surge	Signal Ports	± 4 kV Line-to-Earth ± 2 kV Line-to-Line	4
		DC Power Ports	± 2 kV Line-to-Earth, ± 1 kV Line-to-Line	3
		AC Power Ports	± 4 kV Line-to-Earth ± 2 kV Line-to-Line	4
IEC 61000-4-6	Induced (Conducted) RFI	Signal Ports	10 V	3
		DC Power Ports	10 V	3
		AC Power Ports	10 V	3
		Earth Ground Ports	10 V	3
IEC 61000-4-8	Magnetic Field	Enclosure Ports	100 A/m for 3 min 1000 A/m for 1 s	5
IEC 61000-4-10	Damped Oscillating Magnetic Field	Enclosure Ports	100 A/m for 1 s (100 kHz and 1 MHz)	5
IEC 61000-4-11	Voltage Dips and Interrupts	AC Power Ports	30% for 1 period 60% for 50 periods 100% for 5 periods 100% for 50 periods	
IEC 61000-4-16	Mains Frequency Voltage	Signal Ports	30 V for 60 s 300 V for 1 s	4
		DC Power Ports	30 V for 60 s 300 V for 1 s	4
		AC Power Ports	30 V for 60 s 300 V for 1 s	4
IEC 61000-4-17	Ripple on DC Power Supply	DC Power Ports	15%	3
IEC 61000-4-18	Damped Oscillatory Wave	Signal Ports	2.5 kV Common Mode	3
		DC Power Ports	2.5 kV Common Mode 1.0 kV Differential Mode	3
		AC Power Ports	2.5 kV Common Mode 1.0 kV Differential Mode	3
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 (Fail-Safe Relay Output)	

Test	Description		Test Levels	Severity Levels
		DC Power Ports	2.9 kVdc	
		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	

^a Siemens-specified severity levels

» EMC Immunity Type Tests per IEEE 1613

Description		Test Levels	Severity Levels
ESD	Enclosure Contact	± 8 kV	
	Enclosure Air	± 15 kV	
Radiated RFI	Enclosure Ports	35 V/m (80% modulation)	
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	
	DC Power Ports	2.5 kV common and 1.0 kV Differential Mode	
	AC Power Ports	2.5 kV common and 1.0 kV Differential Mode	
HV Impulse	Signal Ports	5 kV (Failsafe Relay)	
	DC Power Ports	5 kV	
	AC Power Ports	5 kV	
Dielectric Strength	Signal Ports	2 kV (Failsafe Relay Output)	
	DC Power Ports	2.9 kVdc	
	AC Power Ports	2 kV	
Damped Oscillating Magnetic Field	Enclosure Ports	100 A/m (peak) for 1 s (100 kHz and 1 MHz)	5

» 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	

Test	Description		Test Levels	Severity Levels
IEC 60068-2-14	Change of Temperature	Test Nb	5 Cycles, -40 to 85° C (40 to 185° F)	
IEC 60068-2-30	Humidity (Damp Heat, Cyclic)	Test Db	93% upper temperature, 97% lower temperature 55 °C (131 °F), 6 Cycles	
IEC 60068-2-78	Humidity (Damp Heat, Steady State)	Test Cab	10 days @ 55 °C (131 °F) and 93% Relative Humidity	
IEC 60255-21-1	Vibration		Level 2 (2 g @ 10 to 150 Hz)	Class 2
IEC 60255-21-2	Shock		Level 2 (30 g @ 11 mS)	Class 2
	Bump		Level 1 (10 g @ 16 mS)	Class 1
IEC 60255-21-3	Seismic		Method A, Class 2	Class 2
IEC 60529	Ingress Protection		IP4x	
IEC 60068-2-31	Free Fall	Test Ec	25 cm	

