SIEMENS

Edition 10/2023

Equipment Manual

SIMATIC NET

Rugged Ethernet switches

RUGGEDCOM RST2428P

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Rugged Ethernet switches RUGGEDCOM RST2428P

Equipment Manual

10/2023
C79000-G8976-1528-01

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Digital Industries
Process Automation
300 Applewood Crescent
Concord, Ontario, L4K 4E5
Canada

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Table of contents

Preface

This guide describes the RUGGEDCOM RST2428P. 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.

Accessing documentation

The latest user documentation for RUGGEDCOM RST2428P is available online at https://support.industry.siemens.com. To request or inquire about a user document, contact Siemens Customer Support.

Supplementary documentation

Documentation related to RUGGEDCOM RST2428P is available on the Siemens Industry Online Support website at https://support.industry.siemens.com/cs/ww/en/ps/29634.

For specific documents, search the following:

Product notes	https://support.industry.siemens.com/cs/ww/en/ps/29634/pm.
Manuals	https://support.industry.siemens.com/cs/ww/en/ps/29634/man
FAQs	https://support.industry.siemens.com/cs/ww/en/ps/29634/faq
Application examples	https://support.industry.siemens.com/cs/ww/en/ps/29634/ae
Catalogs/brochures	https://support.industry.siemens.com/cs/ww/en/ps/29634/cat
Certificates	https://support.industry.siemens.com/cs/ww/en/ps/29634/cert
Downloads	https://support.industry.siemens.com/cs/ww/en/ps/29634/dl

Other documents that may be of interest include:

SINEC NMS Operating Instructions	https://support.industry.siemens.com/cs/ww/en/ps/25518
SINEC PNI Operating Instructions	https://support.industry.siemens.com/cs/ww/en/ps/26672
RUGGEDCOM RPS2410 Operating Instructions	https://support.industry.siemens.com/cs/ww/en/ps/29063

SIMATIC NET glossary

The SIMATIC NET glossary describes special terms that may be used in this document.

The glossary is available online via Siemens Industry Online Support (SIOS) at:

https://support.industry.siemens.com/cs/ww/en/view/50305045

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- RCDP
- Discovery Protocol

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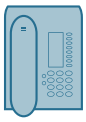
Customer support is available 24 hours, 7 days a week for all Siemens customers. For technical support or general information, contact Siemens Customer Support through any of the following methods:

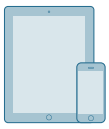
Online

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 https://w3.siemens.com/aspa_app/?lang=en.



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

Contacting Siemens

Address	Siemens Canada Ltd. Digital Industries

	Process Automation 300 Applewood Crescent Concord, Ontario Canada, L4K 5C7
Telephone	Toll-free: 1 888 264 0006 Tel: +1 905 856 5288 Fax: +1 905 856 1995
E-Mail	info.ruggedcom@siemens.com
Web	https://www.siemens.com

1 Introduction

The RUGGEDCOM RST2428P 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 RST2428P provides a high level of immunity to electromagnetic interference and heavy electrical surges, and can withstand extreme temperatures.

Highly modular, the RUGGEDCOM RST2428P switch supports up to 24 PoE ports and 28 optical interfaces with data transfer rates of 10/100/1000 Mbps. Four ports include data transfer rates of 10 Gbps. This makes it the ideal industry-standard switch for constructing electrical and/or optical line, ring, and star topologies.

The RUGGEDCOM RST2428P switch is supported by RUGGEDCOM SINEC OS, which provides advanced Layer 2 networking functions, and advanced cyber security features.

1.1 Feature highlights

Power over Ethernet (PoE)

Note

The PoE feature is not supported by the current release of SINEC OS. Support will be added in a future release.

- Supports up to 24 PoE ports with data transfer rates of 10/100/1000 Mbps
- Supports 4-pair, up to 60 W of PoE power/port
- Supports up to 120 W of PoE power/module (e.g. two 60 W ports or four 30 W ports)
- Supports up to maximum 500 W per system
- Data and power over a single Ethernet cable
- No mid-span patch panel required
- Compatible with IEEE 802.3af, IEEE 802.3at, and IEEE 802.3ab powered devices
- Auto-sensing ports that provide power only to PoE end devices
- Power to port is turned off if cables are removed

Extreme flexibility

- Hot swappable media modules
- 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 Gigabit Ethernet ports, including 8 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

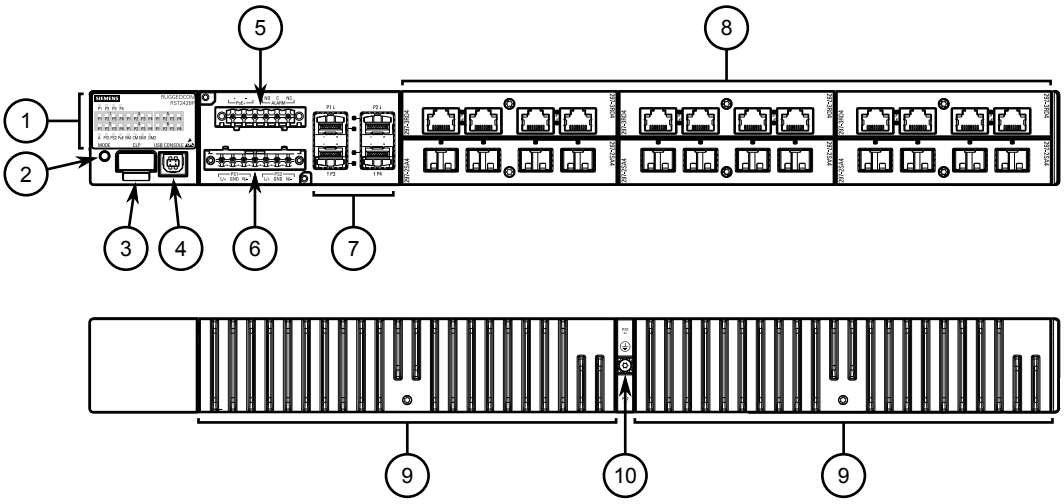
- Hot swappable/pluggable power supply modules
- HI voltage AC/DC: 88-300 VDC or 85-264 VAC
- LO voltage DC: 10.5-15 VDC, 13-36 VDC or 36-72 VDC
- Smart power supplies able to detect loss of input voltage
- Load sharing of 45/55 percent during normal operation

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)

1.2 Description

The RUGGEDCOM RST2428P features various ports, controls and indicator LEDs for connecting, configuring, and troubleshooting the device.

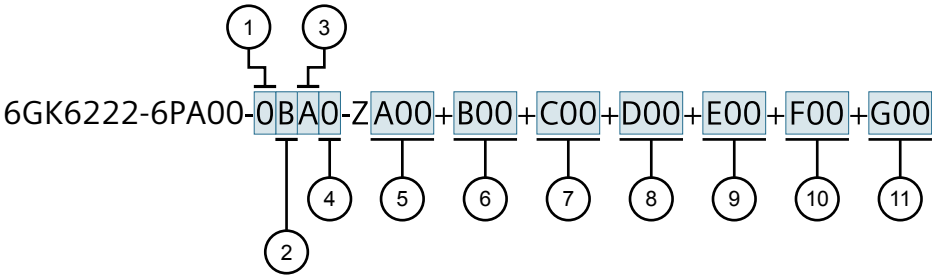


① Status panel
② Mode button
③ CLP port
④ USB console port
⑤ PoE and failsafe alarm relay terminal block
⑥ Main power input terminal block
⑦ SFP/SFP+ transceiver sockets
⑧ Media modules
⑨ Power modules
⑩ Chassis ground screw

Figure 1.1 Device features

1.2.1 Article number

The article number defines the device's hardware configuration. It is generated from the options selected in the RUGGEDCOM Selector at the time of ordering and printed on the product label affixed to the device.



① Mounting kit
② Power supply 1
③ Power supply 2
④ Manufacturing modification
⑤ Service panel
⑥ Slot 1 options
⑦ Slot 2 options
⑧ Slot 3 options
⑨ Slot 4 options
⑩ Slot 5 options
⑪ Slot 6 options

Figure 1.2 Article Number

Mounting kit options

Option	Description
0	None
5	19" rack/panel mount kit

Power module options

Power supply 1 and terminal block

Option	Description
A	24 VDC, screw terminal
B	48 VDC, screw terminal
C	HI voltage (88-300 VDC/86-264 VAC) with screw terminal
D	24 VDC, plug terminal
E	48 VDC, plug terminal
F	HI voltage (88-300 VDC/86-264 VAC) with plug terminal
G	12 VDC, screw terminal
H	12 VDC, plug terminal

Power Supply 2

Option	Description
A	24 VDC
B	48 VDC
C	HI voltage (88-300 VDC/86-264 VAC)
G	12 VDC
N	No power supply module

Manufacturing modification options

Option	Description
0	None
1	Conformal coated

Service panel options

Option	Description
A00	LED panel mounted on the front (connector side)
A01	LED panel mounted on the back (heatsink side)

Slot 1 options

Option	Description
B00	RUGGEDCOM RMM2931-4 (Blank Module)
B01	RUGGEDCOM RMM2973-4RJ45 (4 x RJ45, 10/100/1000 BASE-TX)
B02	RUGGEDCOM RMM2973-4FC (4 x FastConnect (RJ45), 10/100/1000 BASE-TX)
B06	RUGGEDCOM RMM2972-4SFP (4 x SFP-slot, Supporting 100BASE-FX, 1000BASE-X SFPs, SFPs are not included)

Slot 2 options

Option	Description
C00	RUGGEDCOM RMM2931-4 (Blank Module)
C01	RUGGEDCOM RMM2973-4RJ45 (4 x RJ45, 10/100/1000 BASE-TX)
C02	RUGGEDCOM RMM2973-4FC (4 x FastConnect (RJ45), 10/100/1000 BASE-TX)
C06	RUGGEDCOM RMM2972-4SFP (4 x SFP-slot, Supporting 100BASE-FX, 1000BASE-X SFPs, SFPs are not included)

Slot 3 options

Option	Description
D00	RUGGEDCOM RMM2931-4 (Blank Module)
D01	RUGGEDCOM RMM2973-4RJ45 (4 x RJ45, 10/100/1000 BASE-TX)
D02	RUGGEDCOM RMM2973-4FC (4 x FastConnect (RJ45), 10/100/1000 BASE-TX)
D06	RUGGEDCOM RMM2972-4SFP (4 x SFP-slot, Supporting 100BASE-FX, 1000BASE-X SFPs, SFPs are not included)

Slot 4 options

Option	Description
E00	RUGGEDCOM RMM2931-4 (Blank Module)
E01	RUGGEDCOM RMM2973-4RJ45 (4 x RJ45, 10/100/1000 BASE-TX)
E02	RUGGEDCOM RMM2973-4FC (4 x FastConnect (RJ45), 10/100/1000 BASE-TX)
E06	RUGGEDCOM RMM2972-4SFP (4 x SFP-slot, Supporting 100BASE-FX, 1000BASE-X SFPs, SFPs are not included)

Slot 5 options

Option	Description
F00	RUGGEDCOM RMM2931-4 (Blank Module)
F01	RUGGEDCOM RMM2973-4RJ45 (4 x RJ45, 10/100/1000 BASE-TX)
F02	RUGGEDCOM RMM2973-4FC (4 x FastConnect (RJ45), 10/100/1000 BASE-TX)
F06	RUGGEDCOM RMM2972-4SFP (4 x SFP-slot, Supporting 100BASE-FX, 1000BASE-X SFPs, SFPs are not included)

Slot 6 options

Option	Description
G00	RUGGEDCOM RMM2931-4 (Blank Module)
G01	RUGGEDCOM RMM2973-4RJ45 (4 x RJ45, 10/100/1000 BASE-TX)
G02	RUGGEDCOM RMM2973-4FC (4 x FastConnect (RJ45), 10/100/1000 BASE-TX)
G06	RUGGEDCOM RMM2972-4SFP (4 x SFP-slot, Supporting 100BASE-FX, 1000BASE-X SFPs, SFPs are not included)

1.2.2 Orientation options

The following orientation options are available at the time of purchase:

- **Option 1**
  Status panel, buttons, and ports are located on the front panel.

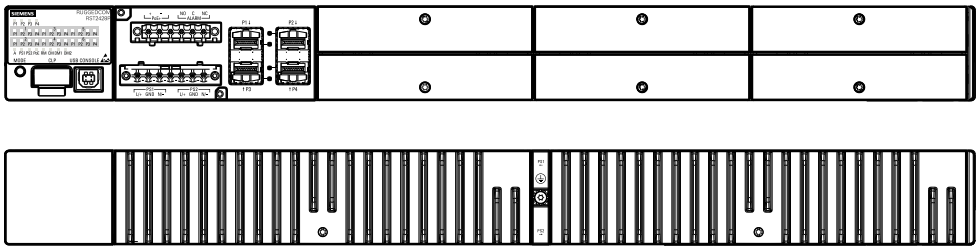


Figure 1.3 RUGGEDCOM RST2428P (Front panel orientation)

- **Option 2**
  Status panel, buttons, and ports are located on the rear panel.

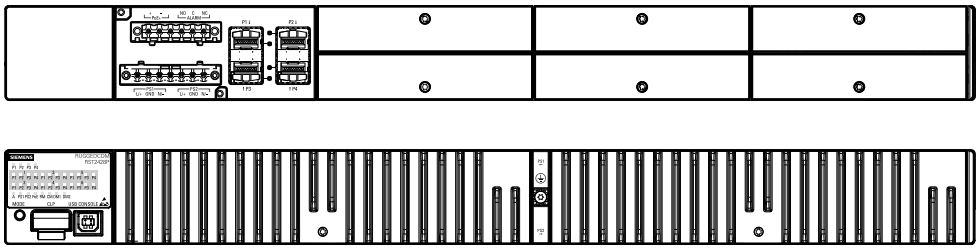
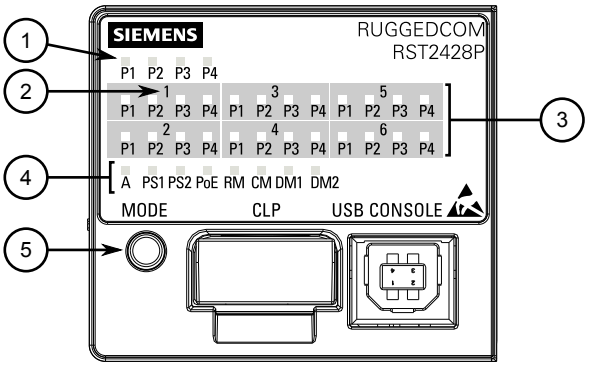


Figure 1.4 RUGGEDCOM RST2428P (Rear panel orientation)

1.2.3 Status panel

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



① LEDs for 10GBase SFP+ transceivers (slot 0)
② Module slot locators
③ LEDs for module ports
④ Status and mode LEDs

⑤ Mode button

Figure 1.5 Status panel

Display mode

The **Mode** button switches between display modes A, B, C, and D. The **DM1** and **DM2** LEDs in combination indicate the current display mode.

To set the display mode, do the following:

Pressing the Mode button starting at display mode A	LED color	LED state		Display mode
		DM1	DM2	
—	Green	Off		Display mode A
Press once	Green	On	Off	Display mode B
Press twice	Green	Off	On	Display mode C
Press three times	Green	On		Display mode D

Depending on the set display mode, the port status and and power supply LEDs show different information.

Port status LEDs

LEDs marked **P1** to **P4** indicate the status of the corresponding port. LEDs representing module ports are grouped and assigned the number of the corresponding module slot (1 to 6). LEDs not assigned a module slot represent the four fixed uplink ports (Slot 0).

The meaning of each LED is as follows:

The meaning of each LED is dependent on the current display mode.

Display mode A

In display mode A, the port LEDs indicate if a link has been established.

LED color	LED state	Description
—	Off	No valid link detected.
Green	On	A link is established. In this state, the port can receive and send data.
Green	Flashes once per period[a]	A link is established and the port is in a "blocking" state. In this state, the port only receives management data (no user data).
Green	Flashes three times per period[a]	A link is established, but the port is turned off by management. In this state, no data is sent or received via the port.
Green	Flashes four times per period[a]	A link is established, but the port is in a "monitoring" state. In this state, ingress traffic is mirrored to this port.

LED color	LED state	Description
Yellow	Flashing	The port is receiving data.

[a] 1 period ≙ 2.5 seconds

Display mode B

In display mode B, the port LEDs indicate the transmission speed.

Note

Ports configured to auto-negotiate their settings with their link partners will turn off when a connection error occurs. If auto-negotiation is disabled and a connection error occurs, the port LED will continue to display the set transmission speed.

LED color	LED state	Description
—	Off	Port operating at 10 Mbps
Green	On	Port operating at 100 Mbps.
Green	Flashes once per period[a]	Port operating at 10 Gbps.
Yellow	On	Port operating at 1 Gbps.
Yellow	Flashes twice per period[a]	Port operating at 2.5 Gbps.
Yellow	Flashes five times per period[a]	Port operating at 2.5 Gbps.

[a] 1 period ≙ 2.5 seconds

Display mode C

In display mode C, the port LEDs indicate the duplex mode.

LED color	LED state	Description
—	Off	The port is operating in half duplex mode.
Green	On	The port is operating in full duplex mode.

Display mode D

In display mode D, the port LEDs indicate whether the port is monitored.

LED color	LED state	Description
—	Off	The port is not monitored.
Green	On	The port is monitored for changes to its "link up" state. Error handling is triggered when the port changes to an active state. If a link has been established at the port, but it should not be available, an alarm is generated.
Yellow	On	The port is monitored for changes to its "link down" state. Error handling is triggered when the port changes to an inactive state. If no valid link has been established at the port (e.g. the link partner is switched off or the cable is not connected), an alarm is generated.

Alarm LED

The **A** LED indicates when an alarm condition exists.

The meaning of the LED is dependent on whether the device is starting up or in operation.

During device startup

LED color	LED state	Description
Red	On	Device startup is still in progress.
—	Off	Device startup was completed successfully.

During operation

LED color	LED state	Description
Red	On	One or more active alarms.
—	Off	No active alarms.

Power supply LEDs

The **PS1** and **PS2** LEDs indicate whether the corresponding power supply module is connected or monitored, depending on the current display mode.

These LEDs only illuminate during operation, not during startup.

Display modes A, B, and C

In the display modes A, B, and C, the **PS1** and **PS2** LEDs indicate whether the power supply is connected.

LED color	LED state	Description
—	Off	No external power supply connected.
Green	On	An external power supply is connected.

Display mode D

In display mode D, the **PS1** and **PS2** LEDs indicate whether the power supply is monitored.

LED color	LED state	Description
—	Off	Power supply is not monitored. An alarm is not generated if either power supply module is connected to an insufficient external power supply.
Green	On	The power supply is monitored. An alarm is generated if either power supply module is connected to an insufficient external power supply.

PoE LED

The **PoE** LED indicates the status of the Power-over-Ethernet (PoE) power source.

Note

PoE is not currently supported in SINEC OS. Feature support will be added in a future release.

LED color	LED state	Description
Green	On	The device is receiving power.
—	Off	The device is not receiving sufficient power.

RM LED

The **RM** LED is associated with the Media Redundancy Protocol (MRP) feature. It indicates if the device is a Media Redundancy Manager (MRM), or ring manager, in a Media Redundancy Protocol (MRP) ring.

Note

MRP is not currently supported in SINEC OS. Feature support will be added in a future release.

LED color	LED state	Description
Green	On	The device is an MRM, the ring is operating without errors, and monitoring has been activated.
Green	Flashing	The device is an MRM. However, an interruption in the ring has been detected.
—	Off	The device is not an MRM.

CM LED

The **CM** LED is associated with the Redundant Network Access (RNA) feature. It indicates if the device is an HSR/PRP RedBox.

Note

RNA is not currently supported in SINEC OS. Feature support will be added in a future release.

LED color	LED state	Description
Green	On	The device is an HSR/PRP RedBox.
—	Off	The device is not an HSR/PRP RedBox.

1.2.4 Configuration and License PLUG (CLP)

The Configuration and License PLUG (CLP) is a removable USB storage medium for backing up and exchanging data, such as configuration files, system firmware, and product licenses.

The CLP has a USB type C interface and can be used with the following devices that have a corresponding interface:

- Siemens products
- Personal computers (PCs), such as desktop PCs, tablet PCs, laptops, or smartphones

Firmware and configuration data are stored in a secured memory area on the CLP, which can only be accessed via the device.

Position

The CLP slot is located below the status panel.

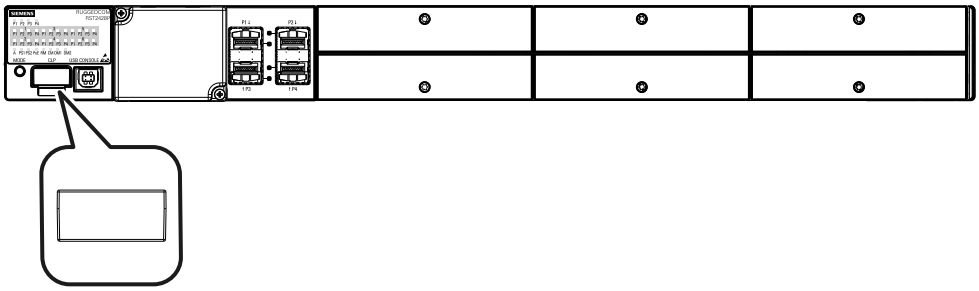


Figure 1.6 Configuration License PLUG (CLP)

Function

In the startup phase:

- When a CLP with no data (default setting) is plugged into a device, the device automatically saves its configuration data on the CLP.
- If a CLP with data is plugged into a device, the device automatically adopts the configuration installed on the CLP.

During operation:

- Changes to the configuration are saved on the CLP and in the internal memory.
- The device checks every second if a CLP is inserted. If the device detects the CLP has been removed, it restarts automatically.
- Errors detected in the CLP data and/or file system (e.g. incompatible data, incorrect operation, or malfunctions) are communicated to users via SINEC OS.

Insertion and removal

For information about how to insert or remove the CLP, refer to "Inserting/removing the CLP" (Page 58).

⚠ NOTICE
Operating hazard – risk of data loss
Only insert or remove the CLP when the device is de-energized.

1.2.5 USB console port

The USB console port is for interfacing directly with the device and accessing initial management functions.

For information about connecting to the device via the USB console port, refer to "Connecting to the device" (Page 55).

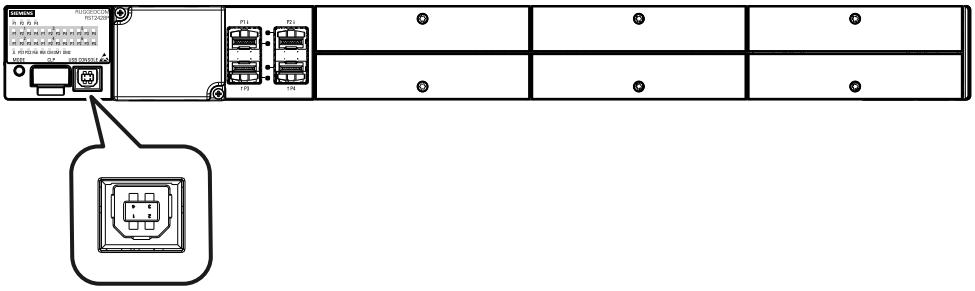


Figure 1.7 USB console port

1.2.6 Removable media

The device supports removable media, allowing users to change or expand the capabilities of the device to suit their application requirements.

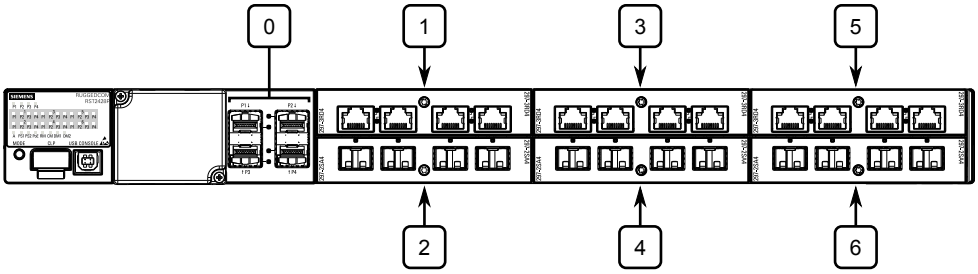


Figure 1.8 Removable media

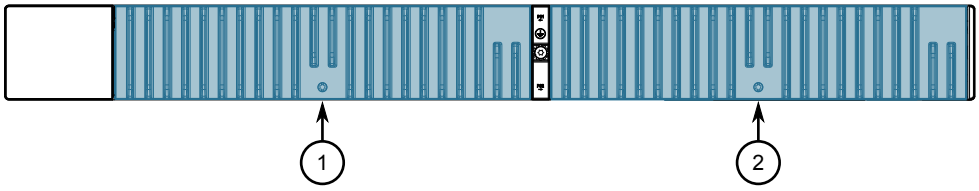
Slot	Description
0	Four transceiver sockets for 1 Gigabit and 10 Gigabit SFP+ transceivers.
1 to 6	Six slots for removable modules.

1.2.7 Power supply modules

Power module slots support up to two redundant smart power supplies.

For information about how to install power modules, refer to "Installing/removing power supply modules" (Page 29).

For information about how to connect power to the device, refer to "Connecting power" (Page 28).



① PS1 power supply module
② PS2 power supply module

Figure 1.9 Power supply modules

1.2.8 Operating system

The RUGGEDCOM RST2428P runs SINEC OS v2.3 and higher.

1.3 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 " SINEC OS Configuration Manual".

Recycling and disposal

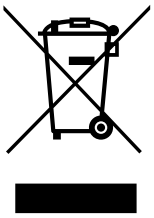
This device is low in pollutants, can be recycled, and meets the requirements of the WEEE directive 2012/19/EU for the disposal of electrical and electronic equipment.

Do not dispose of devices at public disposal sites.

For environmentally friendly recycling and the disposal of devices, contact a certified disposal company for electronic scrap or your Siemens contact.

For more information, refer to https://support.industry.siemens.com/cs/ww/en/view/109479891.

Note the different national regulations.



1.4 Cabling recommendations

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

1.4.1 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.

1.4.2 Gigabit Ethernet 1000Base-TX Cabling Recommendations

The IEEE 802.3ab Gigabit Ethernet standard defines 1000 Mbps 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.

Cabling Category	1000Base-TX Compliant	Required Action
> 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.

1.4.3 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.

1.5 Required tools/hardware

The following tools and hardware are required to install the device:

Tools

Tools	Quantity	Detail
#1 Phillips screwdriver	1	For removing/installing screw-type terminal block plugs and the terminal block cover.
Slotted screwdriver	1	For removing/installing European-style (Euroblock) terminal block plugs.
Torx T10 screwdriver	1	For removing/installing modules.

Tools	Quantity	Detail
1.5 mm (1/16 in) Allen key	1	For removing/installing the power supply module set screw.
10-18 AWG multipurpose crimping tool	1	For stripping and crimping wires.

Hardware

Tools	Quantity	Detail
AC/DC power cord	1 per power supply	For connecting power to a power supply module. For the required wire gauge, refer to the power supply specifications in the "RUGGEDCOM Modules Reference Manua"l [https://support.industry.siemens.com/cs/ww/en/ps/29634/man].
Mounting brackets	4	Included with the device or available as part of a separate mounting kit. For more information, refer to "Parts and accessories" (Page 17).
M3-0.5 x 5 mm flat head screws	8	For securing the mounting brackets to the device. Included with the device or available as part of a separate mounting kit. For more information, refer to "Parts and accessories" (Page 17).
Pan head mounting screws	8	For securing the mounting brackets to the rack or panel.
6 POS power terminal block plug	1	For PoE power and the failsafe alarm relay. The device includes one European-style (Euroblock) or screw-type terminal block plug. Additional plugs are also available for purchase. For more information, refer to "Parts and accessories" (Page 17).
7 POS power terminal block plug	1	For HI ACDC or LO DC main power connections. The device includes one European-style (Euroblock) or screw-type terminal block plug. Additional plugs are also available for purchase. For more information, refer to "Parts and accessories" (Page 17).
M3.5 (#6) ring tongue	4	For connecting wires to a screw-type terminal block plug or the chassis ground connection. Except for the chassis ground connection, the ring tongue must have short insulated ring terminals with a minimum distance of 5 mm (0.2 in) from the ring center to the insulation.
Braided or equivalent ground wire	1	For grounding the device to safety Earth.

1.6 Parts and accessories

Parts and accessories, including removable media, kits, cables, and other components, are available through the RUGGEDCOM Selector [https://ruggedcom-selector.automation.siemens.com].

Modules

Available modules are listed in the RUGGEDCOM Modules Reference Manual [https://support.industry.siemens.com/cs/ww/en/ps/29634/man].

SFP transceivers

Available SFP transceivers are listed in the RUGGEDCOM SFP Transceivers Reference Manual [https://support.industry.siemens.com/cs/us/en/view/109482309].

Mounting kits

Component	Description	Article number
RUGGEDCOM RST2428P rack mounting kit	Mounting kit for 48 cm (19 in) rack or panel mounting.	6GK6000-8MA01-0AA0

Terminal blocks

Component	Description	Article number
RUGGEDCOM RST2428P power supply terminal plug connector kit	Kit containing European-style (Euroblock) terminal blocks, including one 7 POS terminal block for main power and one 6 POS terminal block for PoE/ Failsafe Alarm Relay.	6GK6000-8HC07-0AA0
RUGGEDCOM RST2428P screw terminal plug connector kit	Kit containing screw-type terminal blocks, including one 7 POS terminal block for main power and one 6 POS terminal block for PoE/Failsafe Alarm Relay.	6GK6000-8HC08-0AA0

Cables

Component	Description	Article number
USB Cable	USB2.0 A to B type Cable Assembly 10ft.	6GK6000-8DT01-0AA0

Configuration and License PLUG (CLP)

Component	Description	Article number
RUGGEDCOM CLP	RUGGEDCOM CLP Storage media, Blank, 2GB Capacity,	6GK6000-8RA00-1HA0 (Standard)

Component	Description	Article number
	for simple device exchange in case of failure, for storage of configurations or user data.	6GK6000-8RA00-1HA1 (Conformal Coated)

Other

Component	Description	Article number
RUGGEDCOM RST2428P Module Labeling Kit	Kit containing labels for module slots and LED panels to assist in identification of slot and module numbers. Each kit contains labels for 35 devices.	6GK6000-8HT30-0AA0

2 Installing the device

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

⚠ DANGER

Electrocution hazard – risk of serious personal injury and/or damage to equipment.

Before performing any maintenance tasks, make sure all power to the device has been disconnected and wait approximately two minutes for any remaining energy to dissipate.

⚠ WARNING

Radiation hazard – risk of serious personal injury.

This product 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.

⚠ WARNING

Fire/electrical/burn hazard – risk of serious personal injury and/or damage to the device

Do not use any parts that show evidence of damage. If damaged parts are used, the device may not function according to the specification. Damaged parts can lead to:

- Injury to personnel
- Loss of certification/approvals
- Violation of EMC regulations
- Damage to the device or other components

⚠ CAUTION

Burn hazard – risk of personal injury

The surface of the device may be hot during operation, or as a result of the ambient air temperature.

Wear appropriate personal protective equipment and use caution when working with or around the device.

⚠ NOTICE

Pollution degree

This device must be installed in an environment with a minimum pollution degree of PD2.

⚠ NOTICE

Changes and modifications

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.

⚠ NOTICE

Restricted access

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.

2.1 General procedure

The general procedure for installing the device is as follows:

⚠ NOTICE

User responsibility

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 "Approvals" (Page 67).

2. **Review the "RUGGEDCOM Modules Reference Manual" for the device and note any special installation or regulatory requirements related to the installed modules.**

   Some modules may also operate at lower ambient temperatures than the overall chassis.

The "RUGGEDCOM Modules Reference Manual" [https://support.industry.siemens.com/cs/ww/en/ps/29634/man] is available on SIOS at https://support.industry.siemens.com/cs/ww/en/ps/29634/man.

3. **Unpack and inspect the device.**

   For more information, refer to "Unpacking the device" (Page 21).

4. **Mount the device.**

   For more information, refer to "Mounting the device" (Page 21).

5. **Connect the failsafe alarm relay.**

   For more information, refer to "Connecting the failsafe alarm relay" (Page 25).

6. **Connect power to the device and ground the device to safety Earth.**

   For more information, refer to "Connecting power" (Page 28).

7. **Secure all wires.**

   Secure all wires from the terminal blocks so they cannot be disturbed by casual contact. For example, in rack mount installations, use tie wraps to secure the wires to the rack.

8. **Connect the device to the network.**

   For more information, refer to "Communication ports" (Page 49).

9. **Configure the device.**

   For more information, refer to "Configuring the device" (Page 57).

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.

Note

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

2.3 Mounting the device

The device can be mounted to a panel or standard 48 cm (19 in) rack.

⚠ NOTICE

Heat dissipation

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

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

Note

For detailed dimensions of the device with either rack or panel hardware installed, refer to "Dimension drawings" (Page 63).

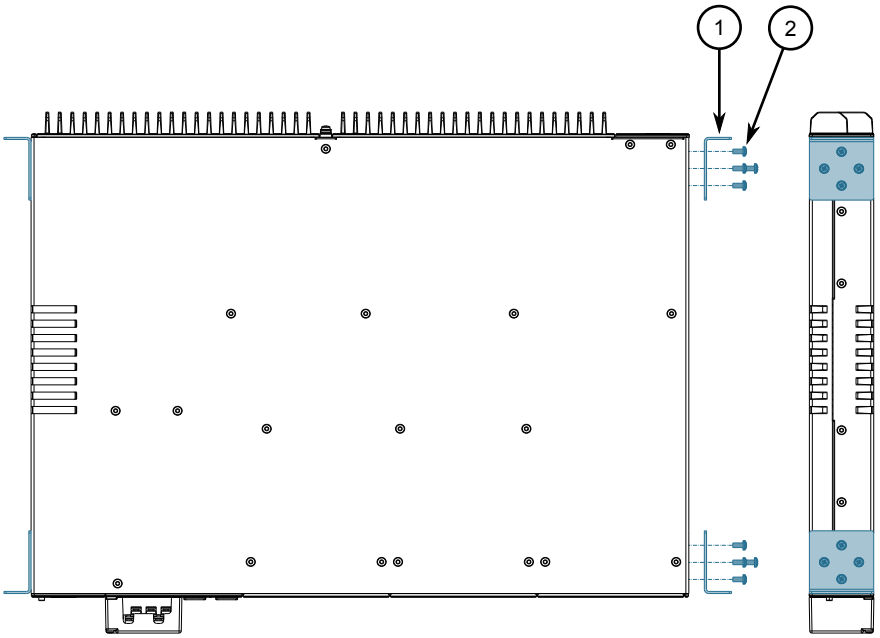
Required tools/hardware

Hardware	Quantity	Detail
Mounting brackets	4	Included with the device or available as part of a separate mounting kit. For more information, refer to "Parts and accessories" (Page 17).
M3-0.5 x 5 mm flat head screws	16	For securing the mounting brackets to the device. Included with the device or available as part of a separate mounting kit. For more information, refer to "Parts and accessories" (Page 17).
Pan head mounting screws	8	For securing the mounting brackets to the rack or panel.

Mounting the device to a rack

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

1. Secure the four mounting brackets to both sides of the chassis using four M3-0.5 x 5 mm flat head per bracket.



① Mounting bracket
② Screw

Figure 2.1 Rack mounting

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 and below the device. This allows a small amount of convectional airflow.

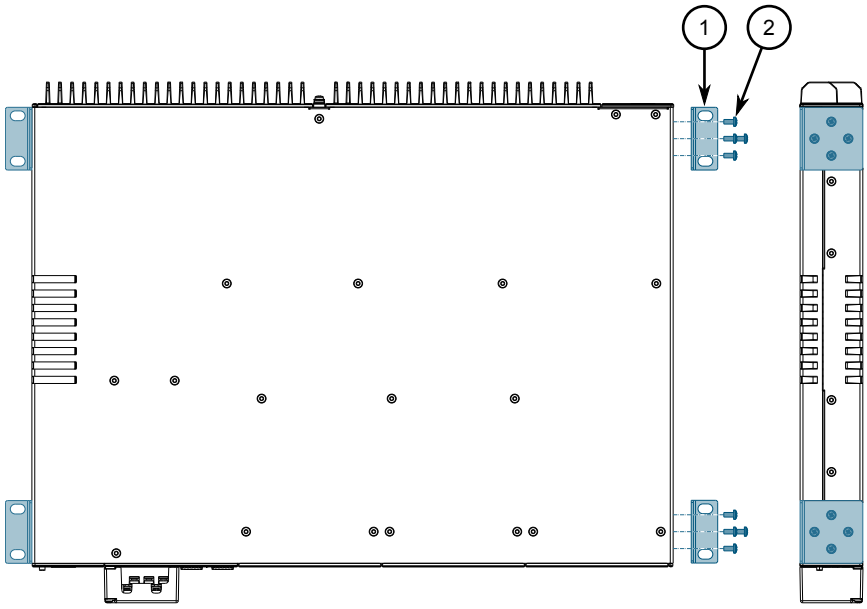
   Forced airflow is not required. However, any increase in airflow will result in a reduction of ambient temperature and improve the long-term reliability of all equipment mounted in the rack space.

3. Secure the brackets to the rack using two pan head mounting screws per bracket.

Mounting the device to a panel

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

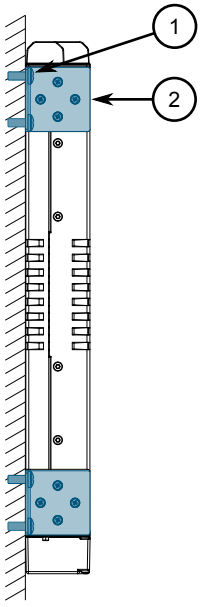
1. Secure the mounting brackets to both sides of the chassis using four M3-0.5 x 5 mm flat head per bracket.



① Mounting bracket
② Screw

Figure 2.2 Installing the mounting brackets

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



① Screw
② Mounting bracket

Figure 2.3 Panel mounting

3. Secure the brackets to the panel using two pan head screws per bracket.

2.4 Connecting the failsafe alarm relay

The failsafe alarm relay is a floating switch that latches to its default state when a power disruption or alarm condition occurs. Individual alarms can be configured to trigger the failsafe alarm relay.

The relay can also be triggered manually through SINEC OS. For more information, refer to the associated "SINEC OS Configuration Manuals" [https://support.industry.siemens.com/cs/ww/en/ps/29634/man] associated with the installed software release.

Connect the failsafe alarm relay to an I/O output to remotely monitor the relay state.

Relay states

Status	Contact state	
	NO[a] contact	NC[b] contact
Normal operation	Closed	Open
Error condition	Open	Closed

[a] NO = Normally Open

[b] NC = Normally Closed

Manual control

Manually controlling the failsafe alarm relay may be useful to:

- Verify the failsafe alarm relay is connected properly following the installation of the device
- Verify the open/close state is caused by the device itself or some other hardware
- Keep the relay in an open/close state while troubleshooting a network issue

Required tools/hardware

Tool/hardware	Quantity	Detail
6 POS power terminal block plug	1	Device includes one European-style (Euroblock) or screw-type terminal block plug. Additional plugs are also available for purchase. For more information, refer to "Parts and accessories" (Page 17).
10-18 AWG multipurpose crimping tool	1	For stripping and crimping wires.
M3.5 (#6) ring tongue	2	**Only for screw-type terminal block plugs.** Must have short insulated ring terminals with a minimum distance of 5 mm (0.2 in) from the ring center to the insulation.

Terminal block

The failsafe alarm relay is connected via the PoE and failsafe alarm relay terminal block port.

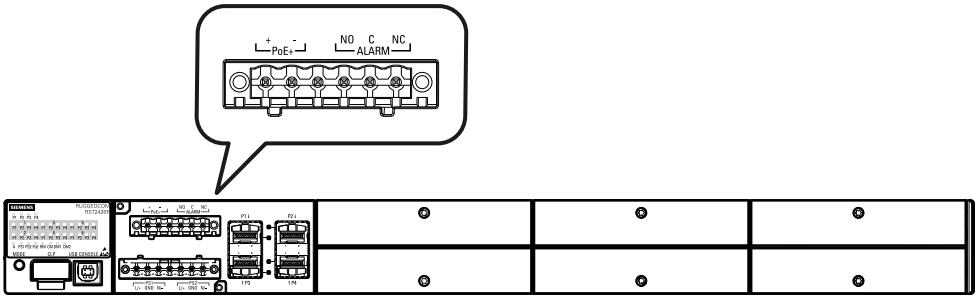
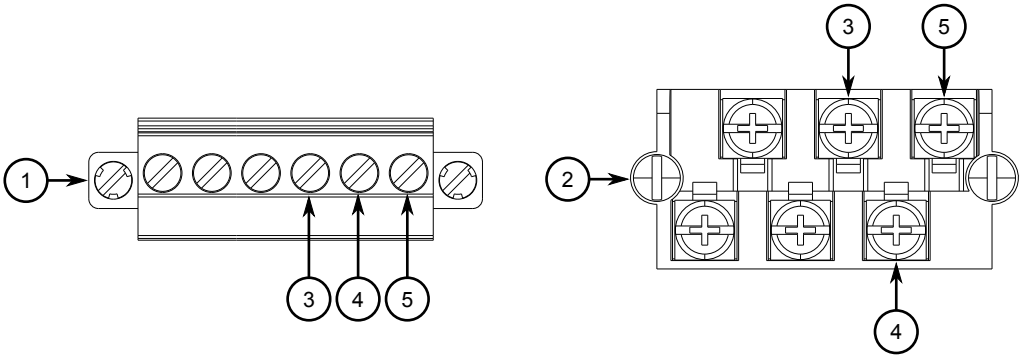


Figure 2.4 PoE and failsafe alarm relay terminal block port

Terminal designations are marked on the device for easy identification.



① European-style (Euroblock) terminal block
② Screw-type terminal block
③ Normally open terminal
④ Common terminal
⑤ Normally closed terminal

Figure 2.5 Failsafe alarm relay terminals

Procedure

To connect the failsafe alarm relay, do the following:

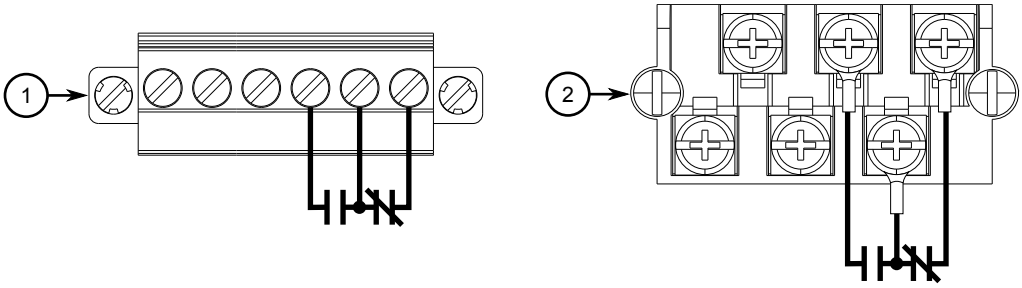
Note

The screw-type terminal block is installed using Phillips screws and compression plates, allowing either bare wire connections or crimped terminal lugs.

Use M3.5 ring tongues that have short insulated ring terminals with a maximum distance of 5 mm (0.2 in) from the ring center to the insulation.

1. Remove the safety cover.

2. If equipped, remove the PoE and failsafe alarm relay terminal block plug from the device.
3. Connect the terminal block plug to an I/O device.

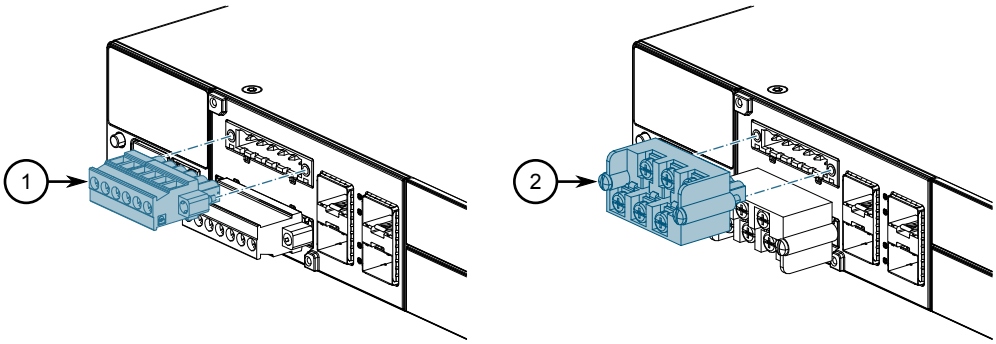


① European-style (Euroblock) terminal block
② Screw-type terminal block

Figure 2.6 Failsafe alarm relay terminals

4. Reinsert the terminal block plug into the device.

   For European-style (Euroblock) terminal block plugs, use a slotted screwdriver to tighten the captive screws.



① European-style (Euroblock) terminal block plug
② Screw-type terminal block plug

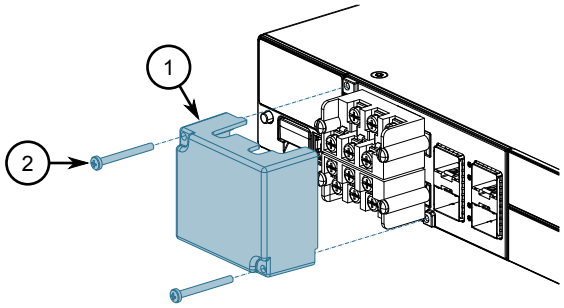
Figure 2.7 Assembling the PoE and failsafe alarm relay terminal block plug

5. Install the safety cover.

⚠ DANGER

Electrocution hazard – risk of death, serious personal injury, and/or damage to the device

Make sure the supplied safety cover is always installed before the device is powered.



① Safety cover
② Screw

Figure 2.8 Installing the safety cover

2.5 Connecting power

This section describes how to connect HI AC/DC and/or LO DC power to the device, as well as power for Power over Ethernet (PoE) ports.

2.5.1 Safety when connecting power

⚠ DANGER

Electrocution hazard – risk of serious personal injury or death

Make sure all power sources are de-energized before servicing the power supply terminals.

⚠ DANGER

Electrocution hazard – risk of death, serious personal injury, and/or damage to the device

Prevent contact with exposed wire leads while the device is energized. Make sure the supplied safety cover is always installed when high voltage screw-type terminal blocks are used.

⚠ 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.

⚠ CAUTION

Electrical hazard – risk of damage to equipment

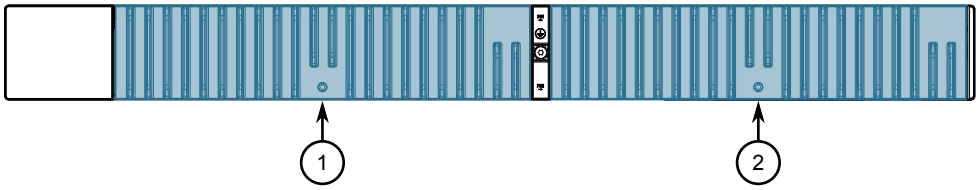
Do not connect high voltage (> 72 V) AC/DC power cables to terminals if a low voltage (12/24/48 V) DC power supply module is installed in the associated slot. Damage to the module will occur.

⚠ NOTICE

Do not disconnect protective Earth connections while the device is energized.

2.5.2 Installing/removing power supply modules

The RUGGEDCOM RST2428P supports dual redundant power supply modules.



① Power supply module (PS1)
② Power supply module (PS2)

Figure 2.9 Power supply modules

⚠ CAUTION

Contamination hazard – risk of equipment damage

Prevent the ingress of water, dirt, and other debris that may lead to premature equipment failure. Always make sure slots are not left empty.

⚠ NOTICE

Hot swapping power supply modules

Power supply modules are hot swappable. Hot swapping allows you to exchange power supply modules that have the same voltage rating while the device is powered by the redundant power supply module

⚠ NOTICE

Hot plugging power supply modules

Power supply modules are hot pluggable. Hot plugging allows you to exchange power supply modules that have different voltage ratings while the device is powered by the redundant power supply module

Wiring from the power source to the power supply module must be redesigned following any hot plug operation. When replacing a HI AC/DC power supply module

with a LO DC power supply module, an additional redesign of the power module slot is also required.

The device must be powered down before any redesign of the power supply module wiring is conducted.

A system restart is required following any redesign of the power supply module wiring.

Required tools/hardware

Hardware	Quantity	Detail
Torx T10 screwdriver	1	For removing/installing power modules.
1.5 mm (1/16 in) Allen key	1	For removing/installing the power supply module set screw.

Removing a power supply module

To remove a power supply module, do the following:

⚠ DANGER

Electrocution hazard – risk of serious personal injury or death

Make sure power to the device is turned off before servicing the power supply terminal.

1. Using a Torx T10 screwdriver, loosen the screw that secures the module to the chassis until the module can be removed.

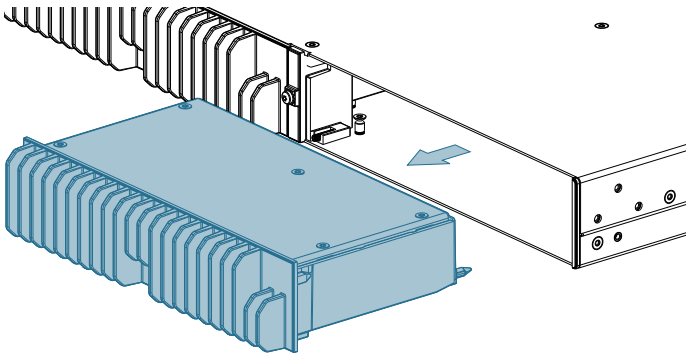


Figure 2.10 Removing a power supply module

2. Slide the module out of the chassis.
3. Install a new power supply module or a blank module to prevent the ingress of dust and dirt.

Installing a power supply module

There are four scenarios in which a power module can be installed.

Scenario 1: Hot swapping a power supply module
To replace a power supply module with the exact same module, do the following:

Note

This procedure can be performed while power is supplied to the redundant power supply module.

1. Remove the existing module and insert the new module into the empty slot.

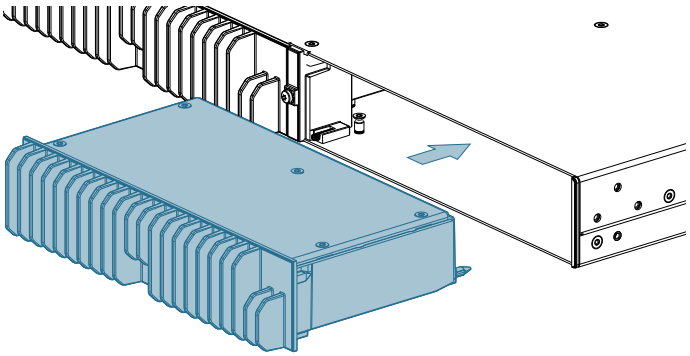


Figure 2.11 Installing a power supply module

2. Using a Torx T10 screwdriver, hand-tighten the screw on the power supply module to secure it to the chassis.
3. Check the power supply status LEDs on the status panel.

   Depending on which module was installed, the **PS1** or **PS2** LED is illuminated. This indicates the power supply module is receiving and distributing power.

Scenario 2: Installing a power supply module in an empty slot
To install a power supply module in an empty slot, do the following:

1. Turn off power to the device and wait approximately two minutes for any remaining energy to dissipate.
2. Remove the blank power supply module.
3. Install or remove the power supply module set screw. The screw is intended to prevent the insertion of a low DC power supply in a module slot configured for high AC/DC voltage.
   - If installing a HI AC/DC power supply module, install the set screw.
   - If installing a LO DC power supply module, remove the set screw.

   Note

   An Allen key is included with high AC/DC power modules.

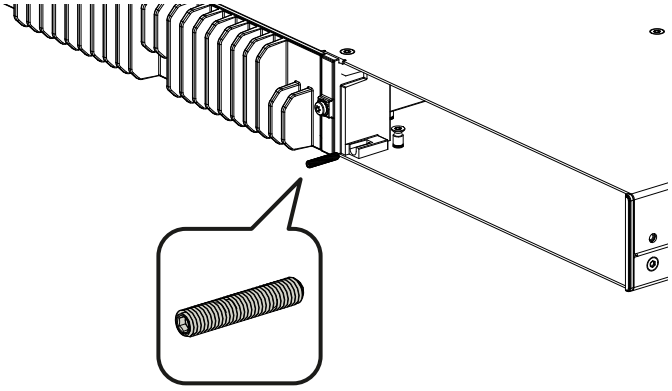


Figure 2.12 Set screw

4. Insert the power supply module into the empty slot.
5. Using a Torx T10 screwdriver, hand-tighten the screw on the power supply module to secure it to the chassis.
6. Connect an appropriate power source to the associated terminals on the main power input terminal block.

   For more information, refer to "Connecting main power" (Page 34).
7. Power on the device.
8. Check the power supply status LEDs on the status panel.

   Depending on which module was installed, the **PS1** or **PS2** LED is illuminated. This indicates the power supply module is receiving and distributing power.

Scenario 3: Replacing a LO DC power supply module with a different LO DC power supply module

To replace a LO DC power supply module with a different LO DC module (e.g. 24 VDC to 48 VDC), do the following:

Note

This procedure can be performed while power is supplied to the redundant power supply module.

1. Disconnect the wiring from the power source for the current power supply module.
2. Remove the existing module and insert the new module into the empty slot.

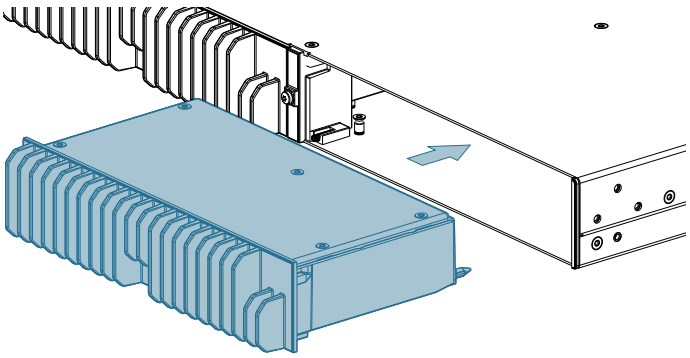


Figure 2.13 Installing a power supply module

3. Using a Torx T10 screwdriver, hand-tighten the screw on the power supply module to secure it to the chassis.
4. Connect the wiring for the power supply module to an appropriate power source.
5. Restart the device.

   For more information, refer to the associated "SINEC OS Configuration Manuals" [https://support.industry.siemens.com/cs/ww/en/ps/29634/man].
6. Check the power supply status LEDs on the status panel.

   Depending on which module was installed, the **PS1** or **PS2** LED is illuminated. This indicates the power supply module is receiving and distributing power.

Scenario 4: Replacing a HI voltage power supply module with a LO voltage module, or vice versa

To replace a HI voltage power supply module with a LO voltage module, or vice versa, do the following:

1. Turn off power to the device and wait approximately two minutes for any remaining energy to dissipate.
2. Remove the existing module.
3. Install or remove the power supply module set screw. The screw is intended to prevent the insertion of a low DC power supply in a module slot configured for high AC/DC voltage.
   - If installing a HI AC/DC power supply module, install the set screw.
   - If installing a LO DC power supply module, remove the set screw.

   Note

   An Allen key is included with high AC/DC power modules.

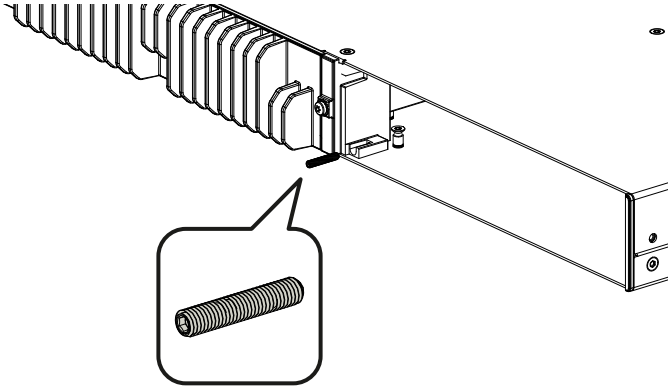


Figure 2.14 Set screw

4. Insert the new module into the empty slot.

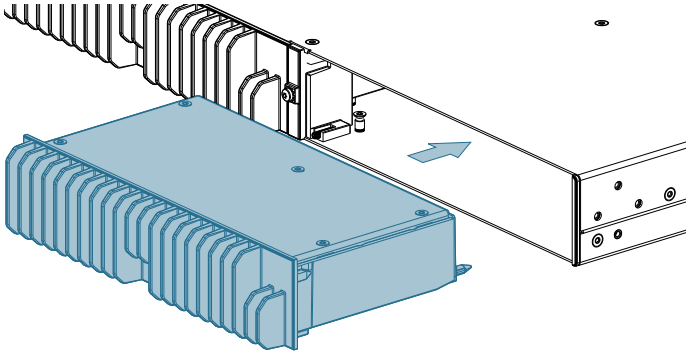


Figure 2.15 Installing a power supply module

5. Using a Torx T10 screwdriver, hand-tighten the screw on the power supply module to secure it to the chassis.
6. Connect an appropriate power source to the associated terminals on the main power input terminal block.

   For more information, refer to "Connecting main power" (Page 34).
7. Power on the device.
8. Check the power supply status LEDs on the status panel.

   Depending on which module was installed, the **PS1** or **PS2** LED is illuminated. This indicates the power supply module is receiving and distributing power.

2.5.3 Connecting main power

The device features slots (PS1 and PS2) for dual redundant AC and/or DC power supply modules. Modules can be installed in any combination (e.g. AC and AC, DC and DC, or AC and DC).

Available power modules

For a list of available power supply modules, including technical specifications and ordering information, refer to the "RUGGEDCOM Modules Reference Manua"l [https://support.industry.siemens.com/cs/ww/en/ps/29634/man].

Required tools/hardware

Tool/hardware	Quantity	Detail
#1 Phillips screwdriver	1	For removing/installing screw-type terminal block plugs and the terminal block cover.
Slotted screwdriver	1	For removing/installing European-style (Euroblock) terminal block plugs.
AC/DC power cord	1 per power supply	For connecting power to a power supply module. For the required wire gauge, refer to the power supply specifications in the "RUGGEDCOM Modules Reference Manua"l [https://support.industry.siemens.com/cs/ww/en/ps/29634/man].
7 POS power terminal block plug	1	Device includes one European-style (Euroblock) or screw-type terminal block plug. Additional plugs are also available for purchase. For more information, refer to "Parts and accessories" (Page 17).
10-18 AWG multipurpose crimping tool	1	For stripping and crimping wires.
M3.5 (#6) ring tongue	3 per power supply	**Only for screw-type terminal block plugs.** Must have short insulated ring terminals with a minimum distance of 5 mm (0.2 in) from the ring center to the insulation.

Terminal block

A single terminal block provides power to both power supply modules. The terminal block requires a 7 POS European-style (Euroblock) or screw-type terminal block plug.

Separate positive, chassis ground, and negative terminals are available for each power supply module on the same terminal block plug.

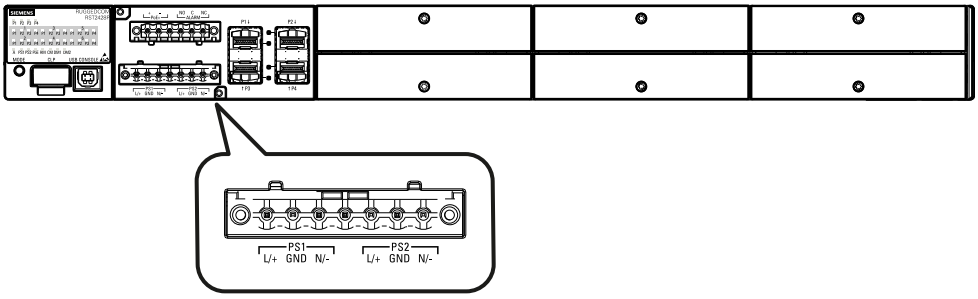
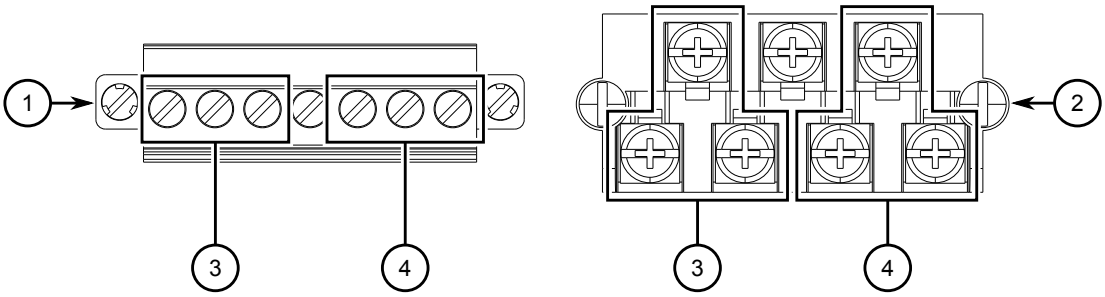


Figure 2.16 Main power input terminal block port

Terminal designations are marked on the device for easy identification.



① European-style (Euroblock) terminal block
② Screw-type terminal block
③ PS1 terminals
④ PS2 terminals

Figure 2.17 Terminals for PS1 and PS2

Before connecting power

- A minimum wire gauge is required for each power supply type.

  For more information, refer to the "RUGGEDCOM Modules Reference Manual [https://support.industry.siemens.com/cs/ww/en/ps/29634/man]".
- When determining cable lengths, make sure the nominal input voltage for the power supply is provided at the input power terminal.

  For more information, refer to the "RUGGEDCOM Modules Reference Manual [https://support.industry.siemens.com/cs/ww/en/ps/29634/man]".
- Use the internal fuse rating to determine the size of the external circuit breaker/ fuse.

  For more information, refer to the "RUGGEDCOM Modules Reference Manual [https://support.industry.siemens.com/cs/ww/en/ps/29634/man]".
- Install a circuit breaker rated no higher than 20 A 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.

Procedure

1. Remove the safety cover.
2. If equipped, remove the power terminal block plug from the device.

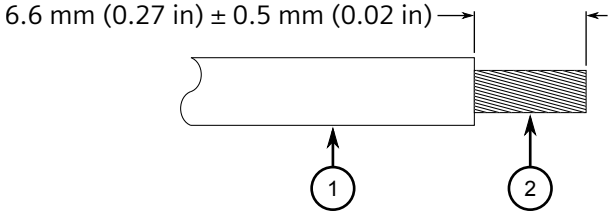
⚠ NOTICE

European-style (Euroblock) terminal block connections

When connecting wires to a European-Style (Euroblock) terminal block plug, note the following requirements:

- When stripping wires from the external power source, strip up to 6.6 mm (0.27 in) ± 0.5 mm (0.02 in) of insulation.

  Do not strip more than 7.4 mm (0.29 in). Stripping more than the recommended amount can leave non-insulated wire exposed outside the terminal block plug.



① Insulation
② Wire lead

Figure 2.18 Stripped wire dimensions

- Terminate wire ends using insulated wire ferrules, when possible.
- When inserting a wire into the terminal block plug, make sure the wire lead is not visible. Only the wire insulation should extend from the terminal block.
- Using a slotted screwdriver, secure wires to the terminal block plug by torquing the captive screw (above the installed wire lead) to 0.5 N·m (4.5 lbf-in).

  Failure to securely tighten the captive screws can result in an electrical arc if the connector is accidentally removed.

⚠ NOTICE

Screw-type terminal block connections

When connecting wires to a screw-type terminal block plug, note the following:

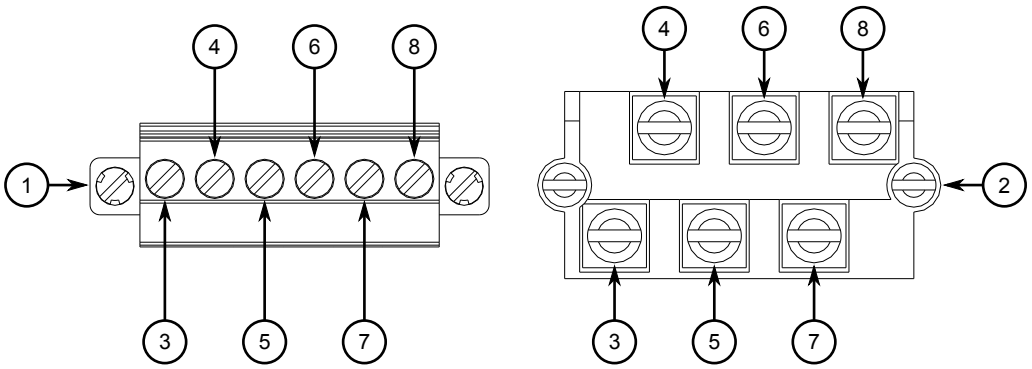
- Screw-type terminal plugs features Phillips screws and compression plates, allowing either bare wire connections or crimped terminal lugs.
- Use M3.5 ring tongues that have short insulated ring terminals with a maximum distance of 5 mm (0.2 in) from the ring center to the insulation.

Note

When determining cable lengths, make sure the nominal input voltage for the power supply is provided at the input power terminal.

For more information, refer to the "RUGGEDCOM Modules Reference Manua"l [https://support.industry.siemens.com/cs/ww/en/ps/29634/man].

3. Connect the power source to the power terminal block plug.
   a. Connect the line wire to the positive terminal ③⑥.
   b. Connect the ground wire to the chassis/ground terminal ④⑦.
   c. Connect the neutral wire to the negative terminal ⑤⑧.



① European-style (Euroblock) terminal block plug
② Screw-type terminal block plug
③ Positive terminal for PS1
④ Chassis/ground terminal for PS1
⑤ Negative terminal for PS1
⑥ Positive terminal for PS2
⑦ Chassis/ground terminal for PS2
⑧ Negative terminal for PS2

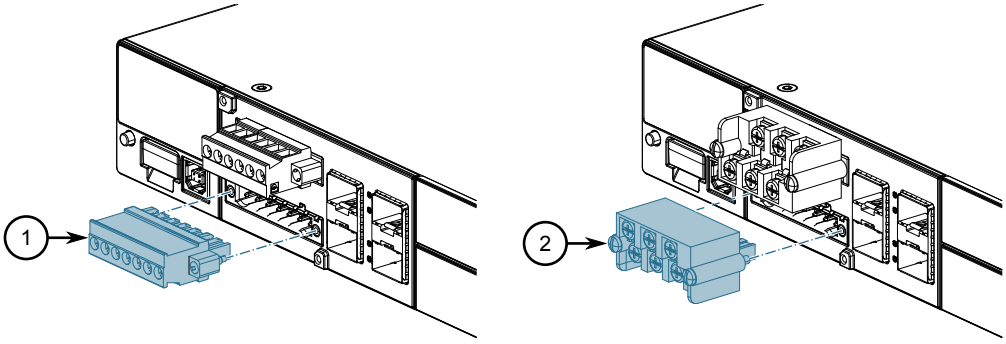
Figure 2.19 PS1 and PS2 terminals

Note

For examples of various wiring combinations, refer to "Wiring examples" (Page 39).

4. Reinsert the terminal block plug into the device.

   For European-style (Euroblock) terminal block plugs, use a slotted screwdriver to tighten the captive screws.



① European-style (Euroblock) terminal block plug
② Screw-type terminal block plug

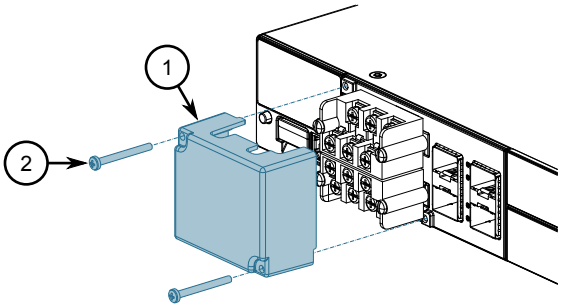
Figure 2.20 Assembling the power supply terminal block plug

5. Install the safety cover.

⚠ DANGER

Electrocution hazard – risk of death, serious personal injury, and/or damage to the device

Make sure the supplied safety cover is always installed before the device is powered.



① Safety cover
② Screw

Figure 2.21 Installing the safety cover

6. Connect the device to ground (Protective Earth).

   For more information, refer to "Grounding the device" (Page 45).

2.5.3.1 Wiring examples

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

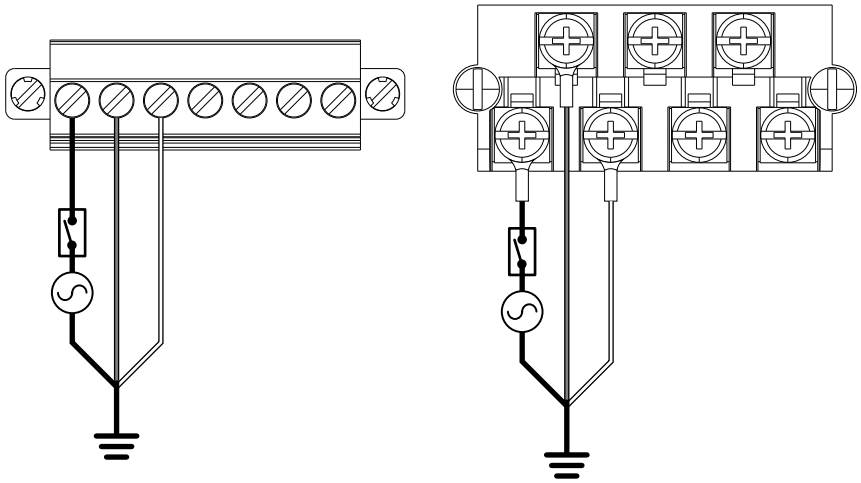


Figure 2.22 Single high AC/DC power supply

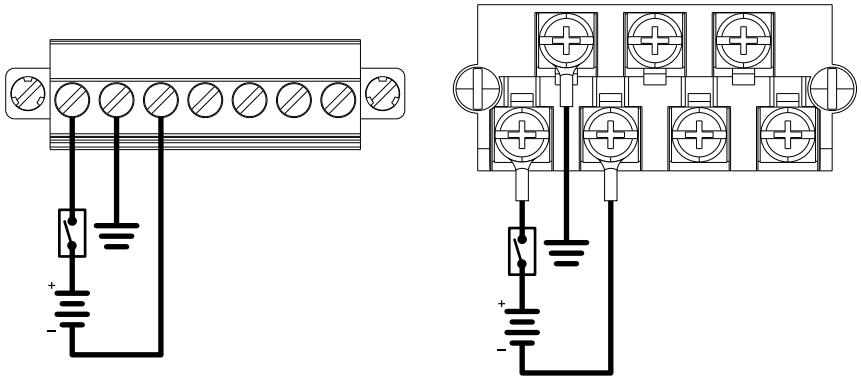


Figure 2.23 Single low DC power supply

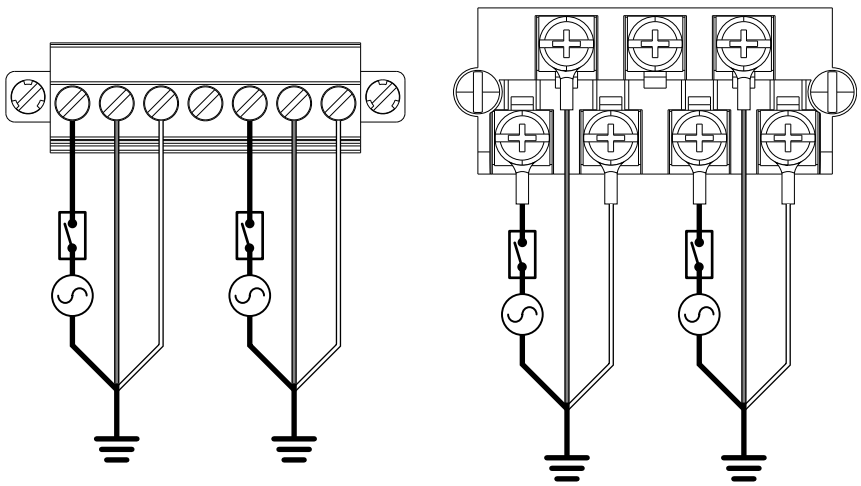


Figure 2.24 Dual high AC/DC power supply

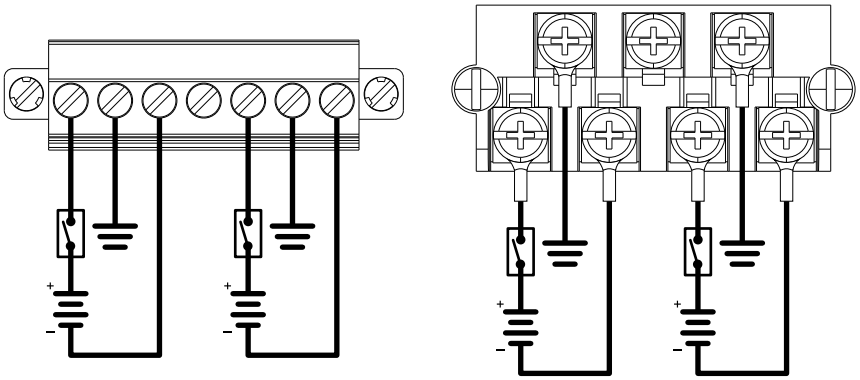


Figure 2.25 Dual low DC power supply

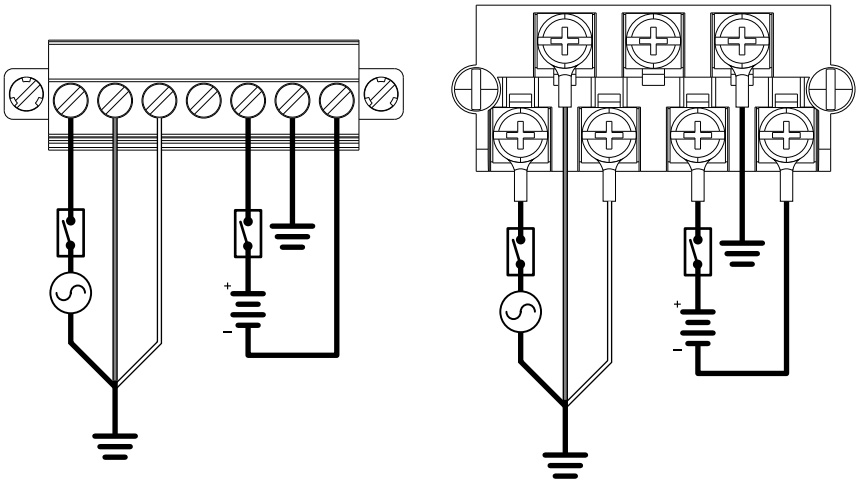


Figure 2.26 High AC/DC power supply and low DC power supply

2.5.4 Connecting external PoE power

The device supports up to twenty-four 10/100/1000 Mbps Power-over-Ethernet (PoE) ports that require external power. An external PoE output power supply, such as the RUGGEDCOM RPS2410, can be connected to the device via the PoE and failsafe alarm relay power terminal block.

⚠ **DANGER**
Electrocution hazard – risk of serious personal injury
The PoE power supply is intended to have a local connection to a PoE DC output power supply. Make sure the power source for PoE power is galvanically isolated from mains electricity and chassis/earth ground with at least 1500 VAC/2250 VDC of isolation.

⚠ CAUTION

Electrical hazard – risk of damage to the device

Do not connect or disconnect the PoE terminal block when the external power supply is energized.

Note

IEC 61850 compliance

For IEC 61850 compliance, use an IEC 61850 compliant PoE power supply with power cabling no longer than 3 m (118 in).

Otherwise, Siemens recommends using the RUGGEDCOM RPS2410 switch-mode AC power supply. For more information about this power supply, refer to RUGGEDCOM RPS2410 Operating Instructions [https://support.industry.siemens.com/cs/ww/en/ps/29063].

Input power requirements

Requirements for the external power source(s) are dependent on the IEEE 802.3 standard required by the application:

IEEE standard	Watts/ port output	Power supply type	Input range		Isolation
			Minimum	Maximum	
802.3af (Type 1)	15 W	DC	45 VDC	57 VDC	1.5 kVAC/2.2 kVDC
802.3at (Type 2)	30 W	DC	51 VDC	57 VDC	1.5 kVAC/2.2 kVDC
802.3bt (Type 3)	60 W	DC	51 VDC	57 VDC	1.5 kVAC/2.2 kVDC

Required tools/hardware

Tool/hardware	Quantity	Detail
6 POS power terminal block plug	1	Device includes one European-style (Euroblock) or screw-type terminal block plug. Additional plugs are also available for purchase. For more information, refer to "Parts and accessories" (Page 17).
10-18 AWG multipurpose crimping tool	1	For stripping and crimping wires.
M3.5 (#6) ring tongue	2	**Only for screw-type terminal block plugs.** Must have short insulated ring terminals with a minimum distance of 5 mm (0.2 in) from the ring center to the insulation.

Terminal block

External PoE power is connected via the PoE and failsafe alarm relay terminal block port.

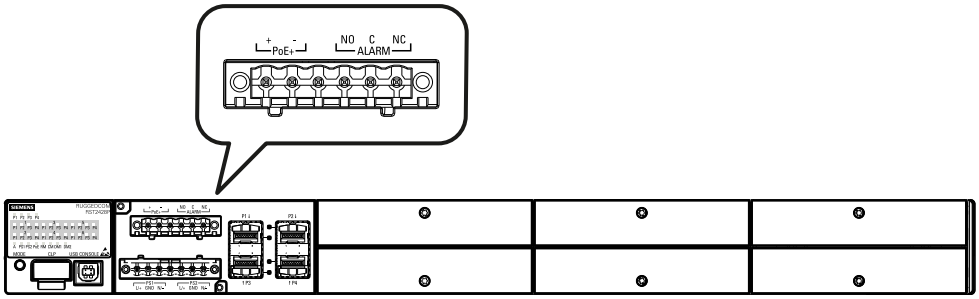
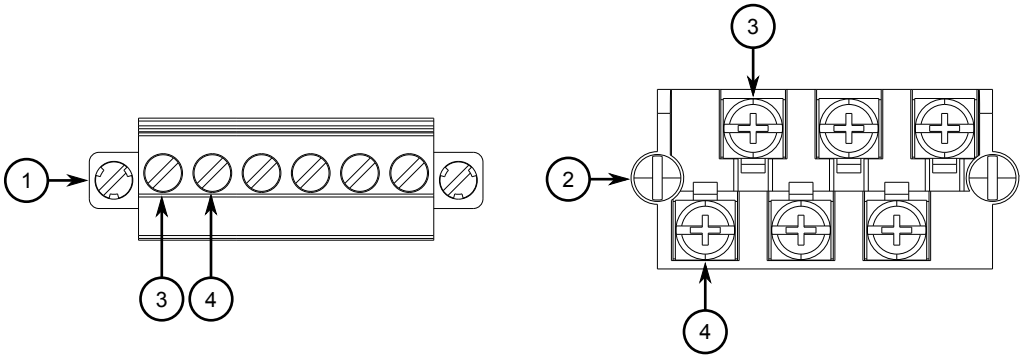


Figure 2.27 PoE and failsafe alarm relay terminal block port

Terminal designations are marked on the device for easy identification.



① European-style (Euroblock) terminal block
② Screw-type terminal block
③ Positive (+) terminal for PoE
④ Negative (-) terminal for PoE

Figure 2.28 PoE terminals

Procedure

1. Remove the safety cover.
2. If equipped, remove the PoE and failsafe alarm relay terminal block plug from the device.

Note

Screw-type terminal block connections

When connecting wires to a screw-type terminal block plug, note the following:

- Screw-type terminal plugs features Phillips screws and compression plates, allowing either bare wire connections or crimped terminal lugs.

- Use M3.5 ring tongues that have short insulated ring terminals with a maximum distance of 5 mm (0.2 in) from the ring center to the insulation.

3. Connect the RUGGEDCOM RPS2410 (or another external power supply) to the terminal block plug.
   a. Connect the positive wire from the RUGGEDCOM RPS2410 (or another external power supply) to the positive (+) terminal on the terminal block.
   b. Connect the negative wire from the RUGGEDCOM RPS2410 (or another external power supply) to the negative (-) terminal on the terminal block.

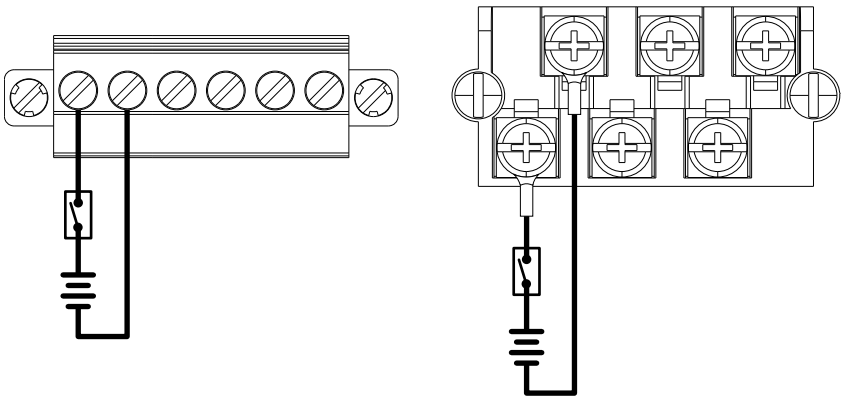


Figure 2.29 PoE power supply wiring

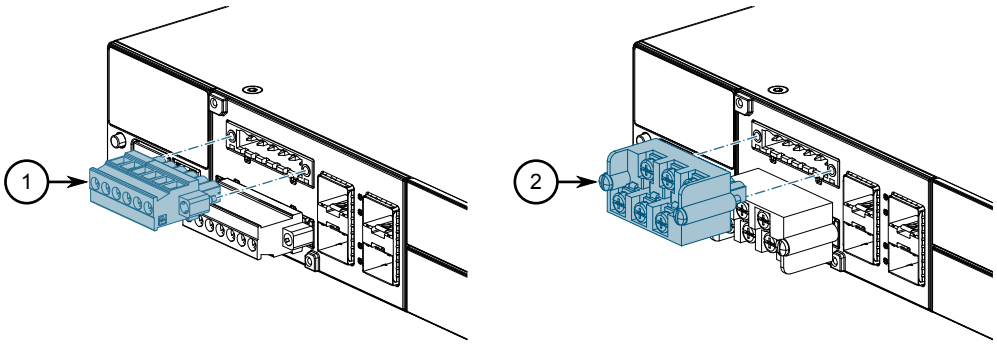
⚠ DANGER

Electrocution hazard – risk of death, serious personal injury and/or damage to the device

Make sure the supplied terminal block cover is always installed before the device is powered.

4. Reinsert the terminal block plug into the device.

   For European-style (Euroblock) terminal block plugs, use a slotted screwdriver to tighten the captive screws.



① European-style (Euroblock) terminal block plug

② Screw-type terminal block plug

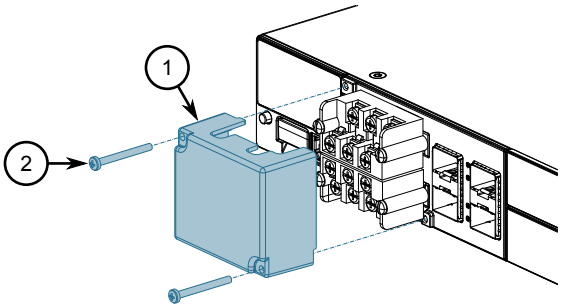
Figure 2.30 Assembling the PoE and failsafe alarm relay terminal block plug

5. Install the safety cover.

⚠ DANGER

Electrocution hazard – risk of death, serious personal injury, and/or damage to the device

Make sure the supplied safety cover is always installed before the device is powered.



① Safety cover
② Screw

Figure 2.31 Installing the safety cover

2.5.5 Grounding the device

In accordance with UL 62368-1/CSA-C22.2 No. 62368-1, the device must be grounded via the grounding screw between the power module slots.

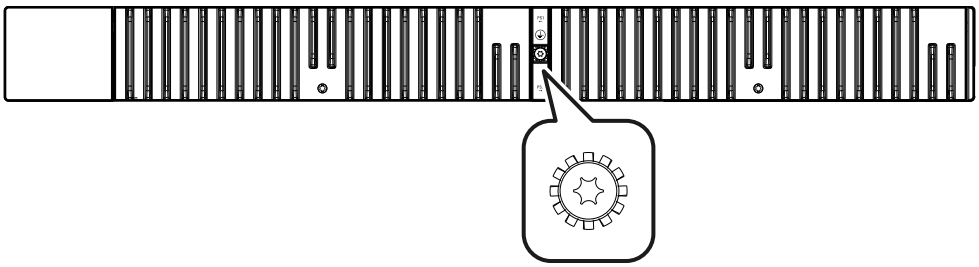


Figure 2.32 Grounding screw

Functional ground

EMC disturbances are diverted to ground via the functional ground. This ensures the immunity of the data transmission.

The functional ground must be implemented with low impedance. The connection of the functional ground must be established directly on the mounting plate or the DIN rail terminal.

Requirements

Note

Protective grounding during operation in compliance with UL 62368-1/CSA-C22.2 No. 62368-1

When operating in compliance with UL 62368-1/CSA-C22.2 No. 62368-1, the device must be connected to protective grounding via the grounding screw to meet UL approval requirements. The work must be performed by a qualified electrician in accordance with UL 62368-1/CSA-C22.2 No. 62368-1.

To wire a permanently connected protective grounding, use #14-8 AWG copper cables or copper cables with a cross-section of 1.5 to 6 mm^2 (0.05 to 0.2 in^2).

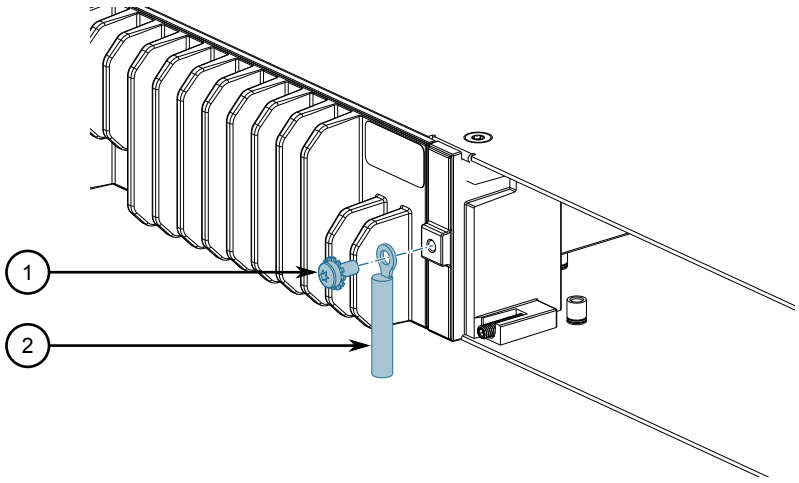
Required tools/hardware

Hardware	Quantity	Detail
#1 Phillips screwdriver	1	For removing/installing terminal blocks and the terminal block cover.
Braided or equivalent ground wire	1	For grounding the device to safety Earth.
M3.5 (#6) ring tongue	1	For connecting the ground wire to the chassis ground connection.

Attaching the ground connection

To permanently attach a ground connection to the device, do the following:

1. Remove the M3 screw ①.



① M3 screw

② M3 ring tongue

Figure 2.33 Ground connection assembly

2. Crimp an M3 ring tongue to the end of the ground wire.
3. Using the M3 screw ①, secure the M3 ring tongue ② of the ground wire to the chassis ground connection.
4. Tighten the screw ① with a maximum tightening torque of 1 N·m (8.9 lbf-in).

3 Communication ports

The device features four Small Form-factor Pluggable (SFP) transceiver sockets for uplink communications, as well as six slots for field-replaceable media modules.

Media 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. Specialized media modules are also available.

The device has the ability to analyze SFP types and port hardware capabilities at runtime.

The status of each communication port is indicated on the status panel. For more information, refer to "Status panel" (Page 6).

Use SINEC OS to determine which ports are equipped on the device. For more information, refer to the associated "SINEC OS Configuration Manuals" [https://support.industry.siemens.com/cs/ww/en/ps/29634/man] associated with the installed software release.

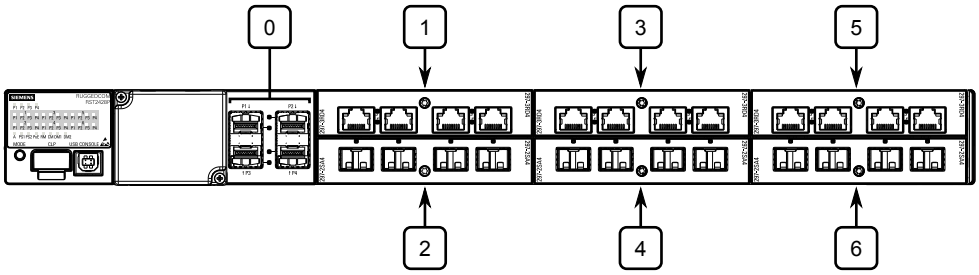


Figure 3.1 Slot designations

Slot	Media type
0	4 x SFP/SFP+ transceiver sockets
1 to 6	Field-replaceable modules

⚠ NOTICE

Electrostatic sensitive devices (ESD)

Modules and SFPs contain electrostatic sensitive components.

These components can easily be destroyed if handled incorrectly.

Note the following instructions to avoid damage:

- Only touch modules/SFPs when work is required.
- If a module/SFP needs to be handled, the body of the person involved must first be electrostatically discharged and grounded.

- Do not bring modules/SFPs in contact with electrically isolating materials such as plastic film, isolating table top pads, or clothing made of synthetic fibers.
- Place the modules/SFPs only on conductive surfaces.
- Pack, store, and transport modules/SFPs in conductive packaging only, such as metalized plastic or metal containers, conductive foam, or household aluminum foil.

3.1 Media modules

Media modules extend the functionality of the device by adding new ports and/or features. All ports and associated features are instantly available via SINEC OS upon the next reboot. A media module can also be replaced by a module of the same type while the device is in operation. In this case, all configurations related to the module are retained.

Available modules

A variety of modules are available for use with the RUGGEDCOM RST2428P.

For more information, refer to the "RUGGEDCOM Modules Reference Manual" [https://support.industry.siemens.com/cs/ww/en/ps/29634/man].

Requirements/restrictions

Note the following restrictions:

Module type	Maximum allowed
Copper Ethernet modules	6
Fiber Optic Ethernet modules	6

Installing/removing media modules

⚠ CAUTION

Contamination hazard – risk of equipment damage

Prevent the ingress of water, dirt, 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.

⚠ NOTICE

Changing media modules

With the exception of PoE media modules, all other media modules are hot swappable. This allows you to replace a media module with one of the same type while the device is in operation.

A system restart or reset to factory defaults may be required if:

- The new media module is of a different type
- The module was installed in an empty slot while the device is in operation

For more information about hot swapping/hot plugging requirements, refer to the associated "SINEC OS Configuration Manuals" [https://support.industry.siemens.com/cs/ww/en/ps/29634/man].

Required tools/hardware

Hardware	Quantity	Detail
Torx T10 screwdriver	1	For removing/installing modules.

Removing a media module

To remove a media module, do the following:

1. Using a Torx T10 screwdriver, loosen the screw that secures the media module to the chassis.
2. Pull the media module from the chassis to disconnect it.

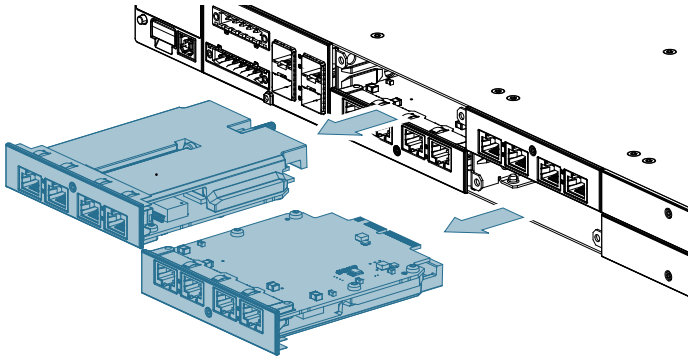


Figure 3.2 Removing a media module

3. Install a new media module or a blank module (to prevent the ingress of dust and dirt).

Installing a media module

To install a media module, do the following:

1. Remove the current media module from the slot.
2. Insert the new media module into the slot.

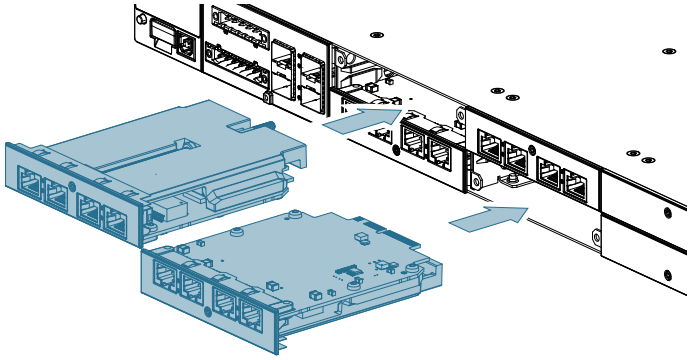


Figure 3.3 Installing a media module

3. Tighten the screw(s) to secure the media module.
4. If the new media module is of a different type than the previous module, a system restart or reset to factory defaults may be required.

   For more information, refer to the associated "SINEC OS Configuration Manuals" [https://support.industry.siemens.com/cs/ww/en/ps/29634/man].

3.2 SFP transceivers

The device 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

In SINEC OS, these ports are assigned to slot 0 (e.g. ethernet0/1).

Note

When more than two 40 km or 80 km 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

The port status is also indicated on the status panel. For more information, refer to "Status panel" (Page 6).

Compatible SFP transceivers

For more information about which SFP transceivers are compatible with the RUGGEDCOM RST2428P, as well as instructions for ordering and installation/removal, refer to the "RUGGEDCOM SFP Transceivers Reference Manual" [https://support.industry.siemens.com/cs/ww/en/ps/29634/man].

Note

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.

Installation/removal

For instructions on how to install and remove SFP transceivers, refer to the "RUGGEDCOM SFP Transceivers Reference Manual" [https://support.industry.siemens.com/cs/ww/en/ps/29634/man].

⚠ NOTICE

Replacement/exchange during operation

SINEC OS supports replacing and exchanging SFP transceivers while the device is in operation.

After you have replaced an SFP transceiver with another SFP transceiver of the same or a different type, the new SFP transceiver is automatically configured in such a way that it works in the same operating state as the previous SFP transceiver.

When replacing a plug-in transceiver, the parts of the configuration that are not suitable for the new plug-in transceiver (e.g. autonegotiation) are reset to their default settings.

3.3 PoE Ports

The device supports up to twenty-four 10/100/1000 Mbps Power over Ethernet (PoE) ports powered by an external power supply. Each port complies with the IEEE 802.3af, IEEE 802.3at, and IEEE 802.3ab standards. Ports also feature auto-sensing and automatic power off when cables are removed.

The total allowable power budget for all ports is 500 W. If the external power supply is less than the PoE power demand, to prevent exceeding the power budget, port priorities can be set via the RUGGEDCOM SINEC OS operating system to disable low priority ports when demand is too high. Ports can also be enabled/disabled and placed on a power schedule to conserve power. For more information, refer to the associated "SINEC OS Configuration Manuals" [https://support.industry.siemens.com/cs/ww/en/ps/29634/man] associated with the installed software release.

For information about connecting the external power supply, refer to "Connecting external PoE power" (Page 41).

LEDs

Each port features an LED to indicate the state of the port.

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

Specifications

For specifications on the available PoE ports, refer to "PoE output specifications" (Page 61).

4 Device management

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

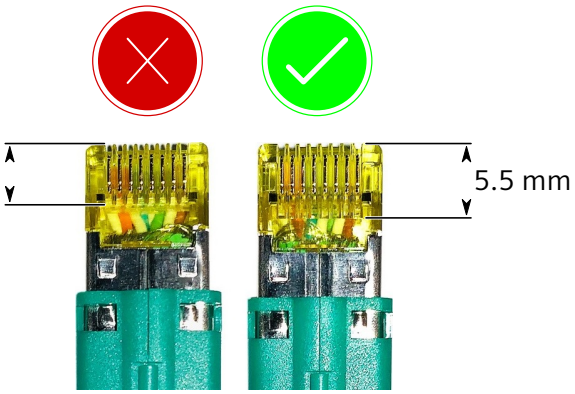
4.1 Connecting to the device

The following describes the various methods for accessing the console and Web interfaces on the device. For more detailed instructions, refer to the associated "SINEC OS Configuration Manuals" [https://support.industry.siemens.com/cs/ww/en/ps/29634/man] associated with the installed software release.

⚠ NOTICE

Intermittent LINK DOWN alarms and RJ45 connectors

Intermittent LINK DOWN alarms may be caused by an improper physical connection at an RJ45 port. If intermittent LINK DOWN alarms are experienced on an RJ45 port, consider the RJ45 cable in use. On some RJ45 connectors, the slots on the connector where the contacts connect is too short, causing the connector pins in the port to lift before a proper connection is made. It is determined the minimum slot length must be 5.5 mm (0.216 in).



Adjusting the position of the connector in the port, either by wiggling or pulling the connector back, corrects the issue temporarily, but is not recommended. It may cause damage to the contact pins of the RJ45 ports. For a permanent solution, use Siemens 6XV1870-3Qxxx certified cables (manufactured December 2019 or after) or equivalent.

Siemens recommends using Siemens certified cables and connectors for Siemens RUGGEDCOM products. Contact your Siemens RUGGEDCOM representative for more details.

USB console port

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

⚠ NOTICE

Electrical Hazard – risk of temporary network packet corruption

Do not expose the USB console port to large static electric fields.

⚠ NOTICE

For service only

The USB console port is intended to be used for service of the device only, such as initial configuration or troubleshooting. Management of the system during normal operation must be done over Ethernet.

Note

Required driver for Microsoft Windows

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 associated " SINEC OS Configuration Manual""SINEC OS Configuration Manuals" [https://support.industry.siemens.com/cs/ww/en/ps/29634/man] associated with the installed software release.

Use the following settings to connect to the port:

Speed	115200 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 SINEC OS console and Web interfaces remotely. Requires an IP address.

For more information about available ports, refer to "Communication ports" (Page 49).

For more information about how to assign an IP address to the device, refer to "IP address assignment" (Page 57).

Note

Single-mode fiber ports only support Ultra Physical Contact (UPC) cable connectors.

4.2 IP address assignment

An IP address must be assigned to the device to access the command line and Web interfaces. The device is not assigned an IP address by default.

During initial commissioning, use one of the following methods to assign an IP address to the device:

- **Connect the device to a DHCP server**
  The device is configured by default to connect with a DHCP server. Once connected, an IP address is assigned automatically.

  For more information, refer to the "SINEC OS Configuration Manuals" [https://support.industry.siemens.com/cs/ww/en/ps/29634/man].
- **Set an IP address with SINEC PNI**
  Use the SINEC PNI (Primary Network Initialization) tool to manually assign a static IP address to the device. Requires a Windows PC and Ethernet connection.

  For more information, refer to https://support.industry.siemens.com/cs/ww/en/ps/26672.
- **Set a static IP address through a serial connection**

  1. Connect a PC to the USB serial console port and establish a serial connection with a terminal emulator, such as PuTTy or Tera Term.

     For more information, refer to "Connecting to the device" (Page 55).
  2. Through the SINEC OS command-line interface, override the default configuration for VLAN1 and assign a static IPv4 address.

     For example:

```
localhost# config
Entering configuration mode terminal
localhost(config)# interface vlan1
localhost(config-interface-vlan1)# no ipv4 dhcp
localhost(config-interface-vlan1)# ipv4 address 192.168.10.33 pre
fix-length 24
localhost(config-address-192.168.10.33)# commit
Commit complete.
```

4.3 Configuring the device

Once the device is installed and connected to the network, it must be configured. All configuration management is done via SINEC OS.

For more information, refer to the " SINEC OS Configuration Manual" [https://support.industry.siemens.com/cs/ww/en/ps/29634/man] associated with the installed software release.

4.4 Inserting/removing the CLP

The device 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.

⚠ NOTICE

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

⚠ NOTICE

Operating hazard – risk of data loss

Only insert or remove the CLP when the device is de-energized.

⚠ NOTICE

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.

⚠ NOTICE

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

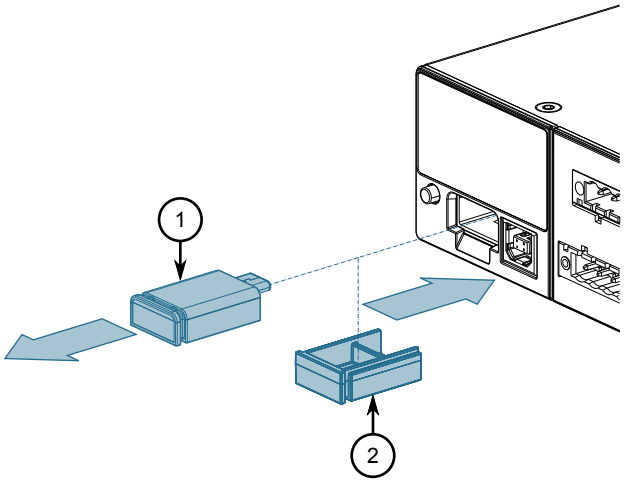
To remove the CLP, do the following:

⚠ NOTICE

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.

1. Power down the device.



① CLP
② Protective cover

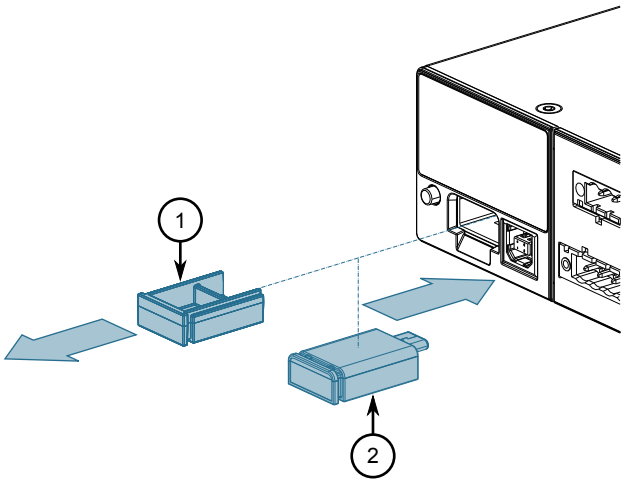
Figure 4.2 Removing the CLP

2. Remove the CLP ① from the slot. If necessary, insert a standard screwdriver between the bottom edge of the CLP and the device to move the CLP forward.
3. Insert the protective cover ② or a new CLP to prevent the ingress of dust and dirt.
4. [Optional] Restart the device.

Installing the CLP

To install the CLP, do the following:

1. Power down the device.



① Protective cover

② CLP

Figure 4.3 Installing the CLP

2. Remove the protective cover ① from the CLP port.
3. Insert the CLP ② into the CLP port.
4. [Optional] Restart the device.

5 Technical specifications

This section provides important technical specifications related to the device.

Note

Technical specifications related to modules are detailed separately in the "RUGGEDCOM Modules Reference Manua"l [https://support.industry.siemens.com/cs/ww/en/ps/29634/man].

For technical specifications related to SFP transceivers, refer to the "RUGGEDCOM SFP Transceivers Reference Manual" [https://support.industry.siemens.com/cs/ww/en/ps/29634/man].

5.1 General specifications

Insulation	Class I
Overvoltage Category	OVC II

5.2 PoE output specifications

The RUGGEDCOM RST2428P adheres to the following power output and IEEE 802.3 specifications depending on the input voltage supplied to the device.

IEEE standard	Power in			Power out	
	Input	Internal fuse rating (maximum)	Required power supply isolation	Output	Per port (maximum)
802.3af (Type 1)	45 to 57 VDC	12 A	1.5 KVAC 2.2 KVDC	44 to 57 VDC	15 W
802.3at (Type 2)	51 to 57 VDC			50 to 57 VDC	30 W
802.3bt (Type 3)					60 W

5.3 Failsafe alarm relay specifications

Maximum switching voltage	Rated switching current	Isolation
30 VDC	2 A	1.5 kVAC
125 VDC	0.15 A	1.5 kVAC

Maximum switching voltage	Rated switching current	Isolation
250 VAC	2 A	1.5 kVAC

5.4 Supported networking standards

Standard	10 Mbps	100 Mbps	1000 Mbps	10000 Mbps	Associated feature
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 802.3	✓				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

5.5 Operating environment

The device is rated to operate under the following environmental conditions.

Ambient operating temperature[ab]	-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%
Pollution degree	PD2
Maximum altitude	3000 m (9842 ft)

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

[b] Operating temperature may vary based on the limitations of installed SFPs. For information about SFP transceiver temperature ratings, refer to the "RUGGEDCOM SFP Transceivers Reference Manual" [https://support.industry.siemens.com/cs/ww/en/ps/29634/man].

[c] Non-condensing.

5.6 Mechanical specifications

Weight	8.0 kg (18 lbs)
Ingress protection	IP4x (for pluggable connectors)
Enclosure	Aluminum/galvanized steel

5.7 Dimension drawings

Note

All dimensions are in millimeters, unless otherwise stated.

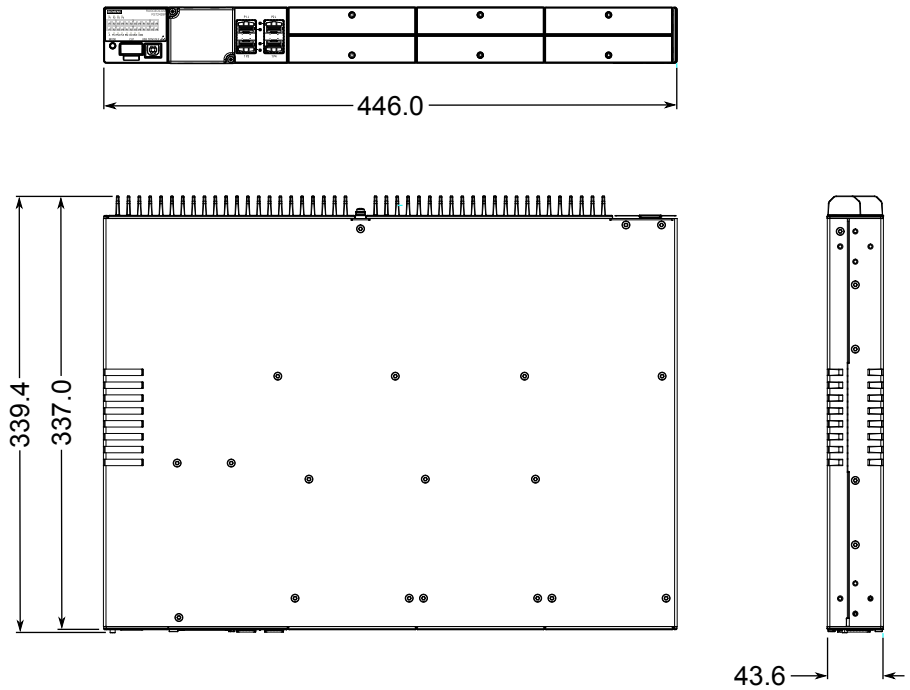


Figure 5.1 Overall dimensions

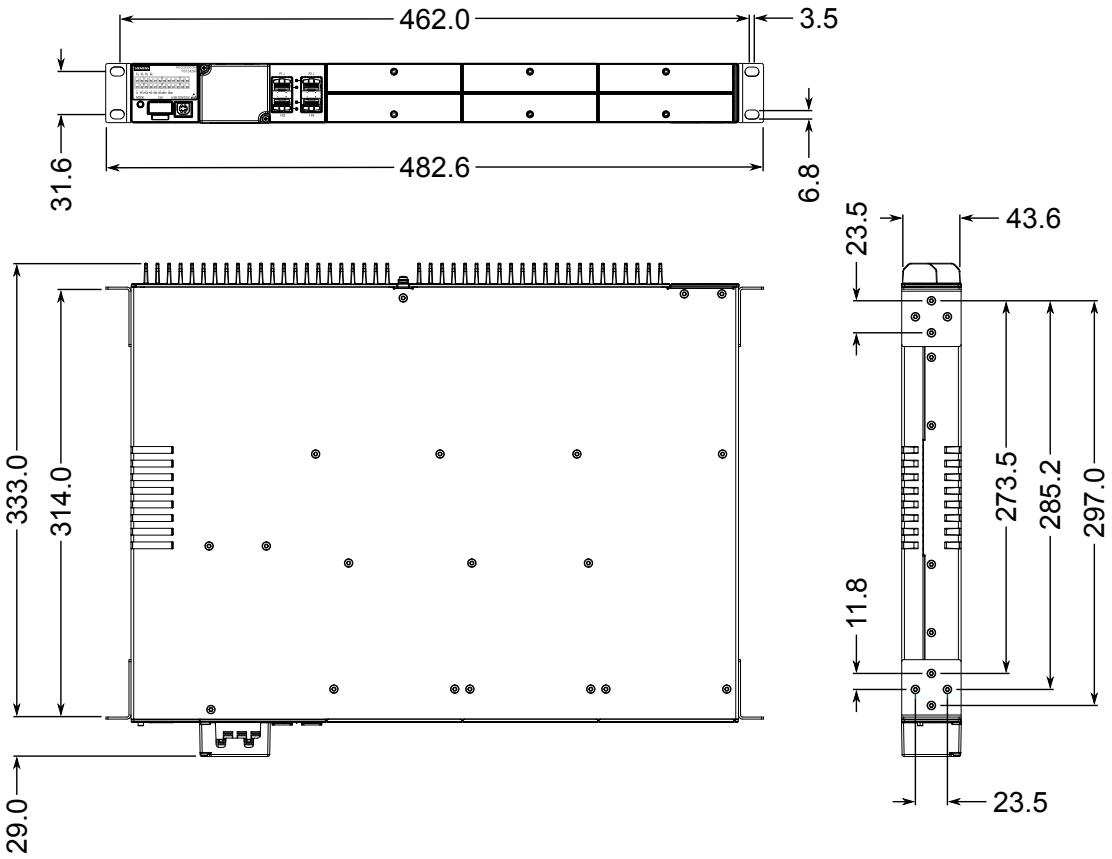


Figure 5.2 Rack mount dimensions

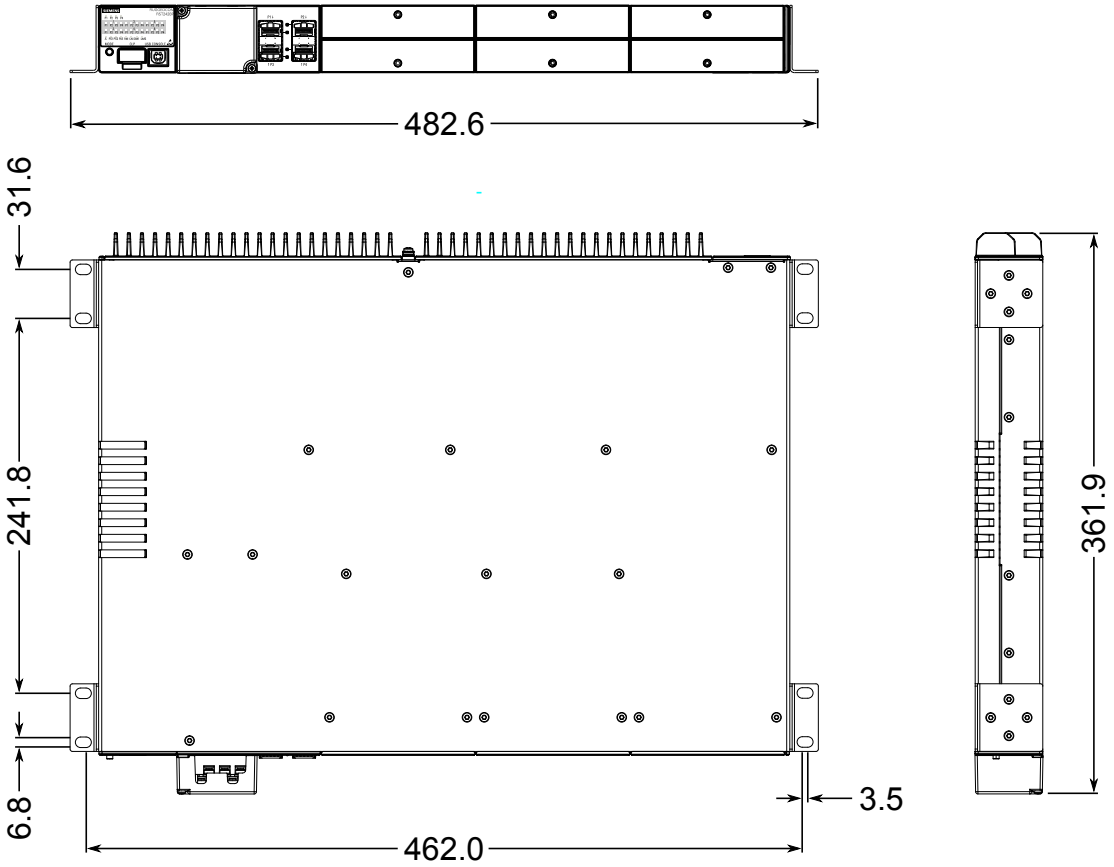


Figure 5.3 Panel mount dimensions

6 Certification

The RUGGEDCOM RST2428P 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 Reference Manual" [https://support.industry.siemens.com/cs/ww/en/ps/29634/man].

6.1 Approvals

This section details the standards to which the RUGGEDCOM RST2428P complies.

Note

All relevant certificates and test reports are available on Siemens Industry Online Support [https://support.industry.siemens.com/cs/ww/en/ps/16008/cert].

6.1.1 UKCA

This device is certified for use in Great Britain and bears the United Kingdom Certified Assessed (UKCA) marking. The marking is printed on the body of the device.

UK
CA

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 62368-1**
  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 63000**
  Technical Documentation for the Assessment of Electrical and Electronic Products with Respect to the Restriction of Hazardous Substances
- **CISPR 32/EN 55032**
  Electromagnetic Compatibility of Multimedia Equipment – Emission Requirements

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

CE

6.1.3 TÜV SÜD

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

- **CSA/IEC/UL 62368-1**
  Information Technology Equipment – Safety – Part 1: General Requirements

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

6.1.5 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.

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

6.1.6 ISED

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

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

6.1.7 ISO

This device was designed and manufactured using a certified ISO (International Organization for Standardization) quality program that adheres to the following standard:

- **ISO 9001:2015**
  Quality management systems – Requirements

6.1.8 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 Labeling – Devices) Notice 2014 made under section 182 of the Radiocommunications Act 1992
- Radiocommunications Labeling (Electromagnetic Compatibility) Notice 2017 made under section 182 of the Radiocommunications Act 1992
- Radiocommunications (Compliance Labeling – Electromagnetic Radiation) Notice 2014 made under section 182 of the Radiocommunications Act 1992
- Telecommunications (Labeling Notice for Customer Equipment and Customer Cabling) Instrument 2015 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.

6.1.9 RoHS

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

- **EU RoHS Directives (EU) 2011/65 and (EU) 2015/863**
  European Directive for Restriction of Hazardous Substances
- **China RoHS (relating to SJ/T 11364)**
  Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products

Declarations of conformity for each directive are available online via Siemens Industry Online Support [https://support.industry.siemens.com/]>.

6.1.10 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 55011**
  Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement
- **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
- **EN 45545-2**
  Railway Applications – Fire Protection on Railway Vehicles – Requirements for fire Behavior of Materials and Components

6.2 EMC and environmental type tests

The RUGGEDCOM RST2428P has passed the following EMC and environmental tests.

EMC type test for IEC 61850-3

Note

IEC 61850-3 Class 1/Class 2 Conformance

- 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 and mixed fiber/copper ports.
- If the unit contains copper ports, the IEC 61850-3 and IEEE 1613 conformance is Class 1, during which disturbance errors may occur but recovery is automatic.
- If the unit contains all fiber ports, the IEC 61850-3 and IEEE 1613 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	± 2 kV at 5 or 100 kHz	Note[a]
		DC power ports	± 4 kV at 5 or 100 kHz	4
		AC power ports	± 4 kV at 5 or 100 kHz	4
		Earth ground ports	± 4 kV at 5 or 100 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
		PoE power ports	± 1 kV line-to-earth ± 1 kV line-to-line	2
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	5

Test	Description		Test levels	Severity levels
			1000 A/m for 1 s	
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)	
		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	
		PoE power ports	1 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	
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

Test	Description		Test levels	Severity levels
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	

For more information

Siemens RUGGEDCOM
https://www.siemens.com/ruggedcom

Industry Online Support (service and support)
https://support.industry.siemens.com

Industry Mall
https://mall.industry.siemens.com

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