

Installation Manual

SIMATIC NET

Rugged Ethernet Switches

RUGGEDCOM RMC20

https://www.siemens.com/ruggedcom

SIEMENS

SIMATIC NET

Rugged Ethernet Switches RUGGEDCOM RMC20

Installation Manual

Preface

Introduction	1
Installing the Device	2
Communication Ports	3
Technical Specifications	4
Certification	5

Legal Information

Warning Notice System

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.



indicates that death or severe personal injury will result if proper precautions are not taken.



indicates that death or severe personal injury may result if proper precautions are not taken.



indicates that minor personal injury can result if proper precautions are not taken.



indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper Use of Siemens Products

Note the following:



Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by [®] are registered trademarks of Siemens Canada Ltd.. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Table of Contents

Pref	SIMATIC N Accessing Registered Warranty . Training Customer	ET Glossary Documentation Trademarks Support Siemens	\ \ \ V
1	Introducti	on	1
	1.1	Feature Highlights	1
	1.2	Description	2
	1.3	Required Tools and Materials	3
	1.4	Decommissioning and Disposal	4
	1.5	Supported Fiber Optic Cables	4
2	Installing	the Device	5
	2.1	General Procedure	6
	2.2	Unpacking the Device	6
	2.3 2.3.1 2.3.2	Mounting the Device	7
	2.4 2.4.1 2.4.2 2.4.3	Setting the Operating Mode	1
	2.5 2.5.1 2.5.2	Connecting Power	4
3	Communi	cation Ports 1	7
	3.1	Fiber Optic Ports	7
	3.2 3.2.1 3.2.2	Serial Terminal	9
4	Technical	Specifications	:3
	4.1	Power Supply Specifications	3
	4.2	Fiber Optic Port Specifications	13
	4.3	Operating Environment	2

	4.4	Mechanical Specifications	24
	4.5	Dimension Drawings	24
5	Certificati	on	27
	5.1	Approvals	27
	5.1.1	UKCA	
	5.1.2	CSA	27
	5.1.3	European Union (EU)	28
	5.1.4	FCC	28
	5.1.5	FDA/CDRH	29
	5.1.6	ISED	
	5.1.7	ISO	29
	5.1.8	ACMA	29
	5.1.9	RoHS	30
	5.1.10	Other Approvals	30
	5.2	FMC and Environmental Type Tests	30

Preface

This guide describes the RUGGEDCOM RMC20. 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.

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

Accessing Documentation

The latest user documentation for RUGGEDCOM RMC20 is available online at https://support.industry.siemens.com. To request or inquire about a user document, contact Siemens Customer Support.

Registered Trademarks

RUGGEDCOM®, ROS®, RCDP®, and RUGGEDCOM Discovery Protocol® are registered trademarks of Siemens Canada Ltd.

Other designations in this manual might be trademarks whose use by third parties for their own purposes would infringe the rights of the owner.

Warranty

Siemens warrants this product for a period of five (5) years from the date of purchase, conditional upon the return to factory for maintenance during the warranty term. This product contains no user-serviceable parts. Attempted service by unauthorized personnel shall render all warranties null and void. The warranties set forth in this article are exclusive and are in lieu of all other warranties, performance guarantees and conditions whether written or oral, statutory, express or implied (including all warranties and conditions of merchantability and fitness for a particular purpose, and all warranties and conditions arising from course of dealing or usage

Training

or trade). Correction of nonconformities in the manner and for the period of time provided above shall constitute the Seller's sole liability and the Customer's exclusive remedy for defective or nonconforming goods or services whether claims of the Customer are based in contract (including fundamental breach), in tort (including negligence and strict liability) or otherwise.

For warranty details, visit https://www.siemens.com or contact a Siemens customer service representative.

Training

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

Siemens' Educational Services team thrives on providing our customers with the essential practical skills to make sure users have the right knowledge and expertise to understand the various technologies associated with critical communications network infrastructure technologies.

Siemens' unique mix of IT/Telecommunications expertise combined with domain knowledge in the utility, transportation and industrial markets, allows Siemens to provide training specific to the customer's application.

For more information about training services and course availability, visit https:// www.siemens.com or contact a Siemens Sales representative.

Customer Support

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:



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

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	Canada, L4K 5C7			
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Web	https://www.siemens.com			

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Contacting Siemens

Introduction

The RUGGEDCOM RMC20 series of media converters are industrially hardened and specifically designed to operate reliably in electrically harsh and climatically demanding environments.

The RUGGEDCOM RMC20 is a utility-grade, protocol-independent, serial-to-fiber and serial standards converter for all your serial communication requirements. The RUGGEDCOM RMC20 allows RS485, RS422, or RS232 devices or networks to communicate over secure, noise immune, optically isolated, fiber optic cabling at extended distances as well convert RS232 to either RS485 or RS422 serial standards.

The RUGGEDCOM RMC20 was designed specifically to provide years of maintenance free operation for all your mission-critical, real-time control applications. To provide the utmost in reliability, the RUGGEDCOM RMC20 is tested to the most stringent international EMI and environmental standards for use in HV/MV electric utility substations and industrial manufacturing, process and control and intelligent transportation systems applications. All RUGGEDCOM products are packaged with a high reliability, built-in power supply (24V, 48V or HI voltage options) and enclosed in a rugged galvanized steel enclosure suitable for panel or DIN-rail mounting.

1.1 Feature Highlights

Key Features

- Extend lengths of serial connections (up to 5 km or 3 mi per hop)
- Media conversation is transparent to end devices

Port Options

- Protocol independent RS485, RS422, or RS232 (user selectable) conversion to multi-mode fiber optics (ST connector only)
- RS232 to RS485/422 conversion mode
- Fully EIA/TIA RS485, RS422, RS232 compliant communications
- Built-in, defeat-able, RS485/RS422 termination networks
- Point-to-point, or optical loop configurations
- Full or half duplex configurable
- Support for high-speed serial baud rates from 300 to 115200 baud

1.2 Description

Designed for Harsh Environments

- Operates over a temperature range of -40 to 85 °C (-40 to 185 °F) without the use of fans for improved reliability
- 21 AWG galvanized steel enclosure suitable for DIN or panel mounting provide secure mechanical reliability

Simple Plug and Play Operation

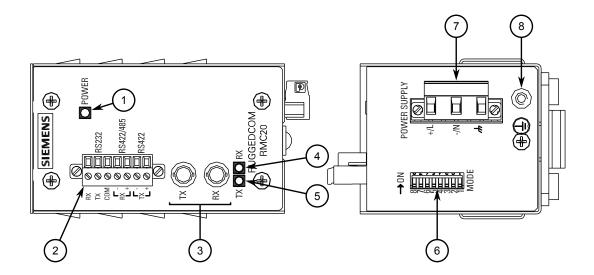
- Simple, externally-accessible configuration
- Transmit and receive data LED indicators for quick and easy troubleshooting
- Fully integrated power supply connects directly to power source permanently for reliable maintenance-free operation

Universal Power Supply Options

- 24VDC, 48VDC or HI (88-300VDC / 85 264VAC) options for worldwide operability
- Integrated high-reliability power supply eliminates the need for external power transformer
- Screw down terminal blocks ensure reliable maintenance-free connections
- All power supplies CSA/UL 62368-1 approved for 85 °C (185 °F) operation

1.2 Description

The RUGGEDCOM RMC20 features various ports, controls and indicator LEDs on the display panel for connecting, configuring and troubleshooting the device. The display panel can be located on the rear, front or top of the device, depending on the mounting configuration.



- 1 POWER LED
- ② Serial Terminal
- 3 Fiber Optic Ethernet Ports
- A RX LED
- (5) TX LED
- 6 MODE Switch
- Power Terminal Block
- ® Chassis Ground Terminal

Figure 1.1 RUGGEDCOM RMC20

POWER LED	Illuminates when power is being supplied to the device.			
	State		Description	
	Green		Power is on	
	Off		Power is off	
TX/RX LEDs	Indicate the con	nection status of	the serial terminal.	
	LED	State	Description	
	TX	Yellow (Blinking)	Transmitting serial data	
	RX	Yellow (Blinking)	Receiving serial data	
Serial Terminal	The RS232/RS422/RS485 serial terminal serves a dual purpose:			
	 The RS232 terminals allow for a direct interface with the device and access to initial management functions. 			
	 The RS422/RS485 terminals allow for half or full duplex serial connections respectively. For more information, refer to "Communication Ports" (Page 17). 			
Power Supply Terminal	A pluggable terminal. For more information, refer to:			
	"Connecting Power" (Page 14)			
	"Power Supply Specifications" (Page 23)			
MODE Switch	Sets the operating mode for the device. For more information, refer to "Setting the Operating Mode" (Page 9).			
Communication Ports	Receive and transmit data. For more information about the various ports available for the RUGGEDCOM RMC20, refer to "Communication Ports" (Page 17).			

1.3 Required Tools and Materials

The following tools and materials are required to install the RUGGEDCOM RMC20:

Tools/Materials	Purpose
AC or DC power cord (16 AWG)	For connecting power to the device.
CAT-5 Ethernet cables	For connecting the device to the network.
Flathead screwdriver	For mounting the device to a DIN rail.
Phillips screwdriver	For mounting the device to a panel.
4 x #8-32 screws	For mounting the device to a panel.

1.4 Decommissioning and Disposal

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

Decommissioning

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

For more information, refer to the associated "Configuration Manual".

Recycling and Disposal

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

1.5 Supported Fiber Optic Cables

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

Cable Type	Wavelength (nm)	Modal Bandwidth		Distance (m)	
		(MHz·km)	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.

Installing the Device

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



riangle 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.



riangle warning

Radiation hazard - risk of serious personal injury

This product contains a laser system and is classified as a *CLASS 1 LASER PRODUCT*. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



riangle caution

Burn hazard - risk of serious 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

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.

riangle notice

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

2.1 **General Procedure**

The general procedure for installing the device is as follows:

Note

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 27).
- Mount the device. 2.
- 3. Set the operating mode.
- Connect power to the device and ground the device to safety Earth.
- Connect the device to the network.
- 6. Configure the device.

2.2 **Unpacking the Device**

When unpacking the device, do the following:

- Inspect the package for damage before opening it.
- 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 RUGGEDCOM RMC20 is designed for maximum mounting and display flexibility. It can be equipped with adapters that allow it to be attached to a DIN rail or panel.

riangle notice

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

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

Note

For detailed dimensions of the device with either DIN rail or panel hardware installed, refer to "Dimension Drawings" (Page 24).

2.3.1 Mounting the Device on a DIN Rail

For DIN rail installations, the RUGGEDCOM RMC20 can be ordered with a DIN rail adapter preinstalled on the back of the chassis. Use the adapter to mount the device to a standard 35 mm (1.4 in) IEC/EN 60715 or TS35 DIN rail.

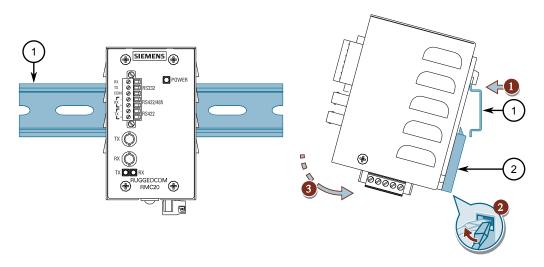
Mounting the Device

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

1. Hook the top teeth of the adapter onto the DIN rail.

Note

The adapter features a sliding release with a slot at the bottom for a flathead screwdriver.



- ① DIN Rail
- 2 DIN Rail Adapter

Figure 2.1 Mounting the Device to a DIN Rail

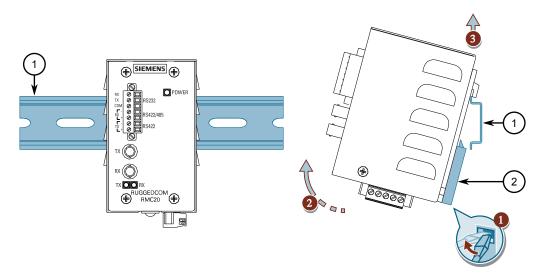
- 2. Insert a flathead screwdriver into the slot of the sliding release and move it down.
- 3. Push the device against the bottom of the DIN rail, then let go of the sliding release to latch the device.

2.3.2 Mounting the Device to a Panel

Removing the Device

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

1. Insert a flathead screwdriver into the slot of the sliding release and move it down.



- ① DIN Rail
- ② DIN Rail Adapter

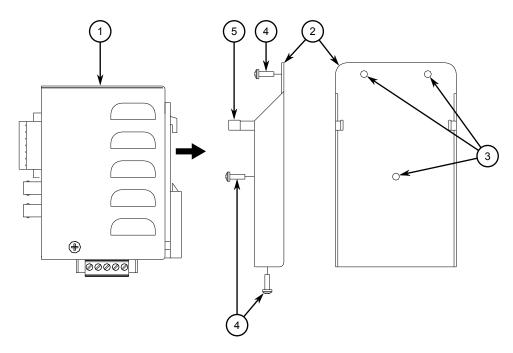
Figure 2.2 Removing the Device from a DIN Rail

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

2.3.2 Mounting the Device to a Panel

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

- 1. Disassemble the device and panel adapter.
 - a. Remove the screw at the bottom of the adapter.
 - b. Pull the device out of the adapter.



- ① RUGGEDCOM RMC20
- 2 Panel Adapter
- 3 Mounting Holes
- Screw
- Metal Clips

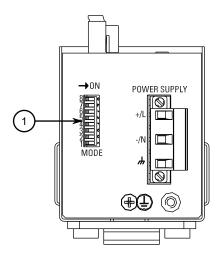
Figure 2.3 Panel Mounting

- 2. Place the panel adapter against the panel and align the adapater with the mounting holes.
- 3. Secure the panel adapter using three #6-32 screws.
- 4. Insert the device into the adapter. Make sure the device is secured between the two metal clips.
- 5. Install the screw previously removed from the bottom of the panel adapter.

2.4 Setting the Operating Mode

To accommodate a wide array of serial devices, the RUGGEDCOM RMC20 is equipped with a **MODE** DIP switch located on the bottom of the device. The switch configures the RUGGEDCOM RMC20 to accommodate different serial partners that operate at various duplex modes and speeds. Choose the appropriate operating mode according to the serial link partner.

2.4.1 Serial-to-Fiber Conversion: Point-to-Point



MODE DIP Switch

Figure 2.4 MODE DIP Switch

The configuration settings are as follows:

Position	ON	OFF	
1	RS232 to fiber mode	RS485/422 to fiber mode	
2	RS232 to RS485/422 conversion mode	Serial (RS232/485/422) to fiber mode	
3	Full Duplex Serial (RS232/RS422)	Half Duplex Serial (RS485)	
4	Fiber Repeat ON	Fiber Repeat OFF	
5	RESERVED		
6	> 57600 baud	300 – 2400 baud	
7	19200 – 57600 baud		
8	4800 – 14400 baud		

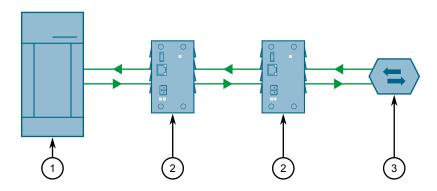
The RUGGEDCOM RMC20 is equipped to provide conversion from serial (RS232, RS485, or RS422) to fiber optics, or between serial standards (RS232 to RS485 / RS422). Serial to fiber optic conversion connections can be further implemented in point-to-point, as well as optical loop configurations.

2.4.1 Serial-to-Fiber Conversion: Point-to-Point

The following illustrates the serial-to-fiber conversion mode of operation.

Note

In this example, the distance between the two RUGGEDCOM RMC20 devices is less than 5 km (3.1 mi).



- 1 RS232 Device
- 2 RUGGEDCOM RMC20
- 3 RS485 Device/Network

Figure 2.5 Serial-to-Fiber Point-to-Point Topology

RS232 Device

RS422 Device/Network

Position	State	Notes	Position	State	Notes
1	ON	RS232 <-> Fiber	1	OFF	RS422 <-> Fiber
2	OFF	Serial-to-Fiber Mode	2	OFF	Serial-to-Fiber Mode
3	ON	Full Duplex	3	ON	Full Duplex
4	OFF	Fiber repeat OFF	4	OFF	Fiber repeat OFF

In this mode, serial data is converted directly into light impulses, and transmitted over multi-mode fiber optics. The serial standard is selected by position 1 of the DIP switches: OFF (default) is for RS485/RS422, and ON is for RS232. Position 2 should be OFF for serial to fiber conversion. Position 6-8 should be configured if RS485 communications are used, in order to have the appropriate turn-around timer shown below selected. Positions 6-8 do not impact communications in full-duplex mode.

Note

A baud rate lower than 1200 bps is not supported in half-duplex or RS485 mode.

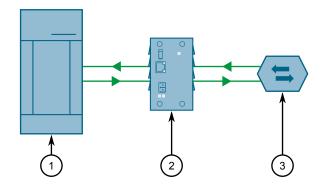
Baud Rate (bps)	DIP6	DIP7	DIP8	Turn- Around Time ^a
1200-2400	OFF	OFF	OFF	9.5 ms
4800-14400	OFF	OFF	ON	2.3 ms
19200-57600	OFF	ON	OFF	0.58 ms
>57600	ON	OFF	OFF	0.10 ms

^a Turn-around time is the amount of time after the start bit was transmitted and before the transceiver changed back to receiver mode

2.4.2 Serial Standard Conversion

The following illustrates the connections for conversion between RS232 and RS485/422 devices.

2.4.3 Serial-to-Fiber Conversion: Loop Topology



- 1 RS232 Device
- ② RUGGEDCOM RMC20
- 3 RS485 Device/Network

Figure 2.6 RS232 to RS485/422 Topology

Position	State	Notes	
2	ON	Serial Conversion Mode	
3	OFF	Half Duplex	
4	OFF	Fiber repeat OFF	
6	OFF	9600 Baud	
7	OFF		
8	ON		

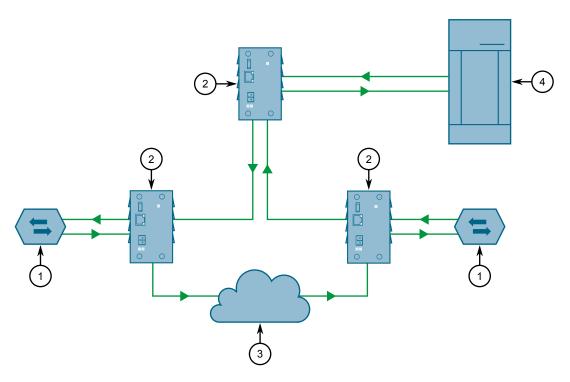
In this mode of operation, RS232 voltage levels are converted to the appropriate RS485 or RS422 signalling levels depending on the DIP switch configuration. In this mode of operation position 2 of the DIP switches must be in the ON position. The topology depicted in figure 2.6, "RS232 to RS485/422 Topology" (Page 12) illustrates an RS232 device, connected to an RS485 device or network. Since RS485 requires automatic turn-around, position 3 must be set to the OFF state, and position 6 – 8 of the DIP switches must reflect the proper operating baud rate.

Note

In this mode of operation, no isolation is provided between RS232 device and the RS485/422 network – both devices share the same common terminal. It should be noted that the common terminal on RS232 devices are connected to ground. In some instances (i.e. when connecting to large RS485 networks), it may be preferential for the user to leave the RS485/RS422 shield terminal unconnected to the RUGGEDCOM RMC20 in this mode.

2.4.3 Serial-to-Fiber Conversion: Loop Topology

The following illustrates the optical loop topology that utilizes the RUGGEDCOM RMC20 repeat mode function.



- 1 RS485 Slave (Repeat = ON)
- 2 RUGGEDCOM RMC20
- 3 Multiple RUGGEDCOM RMC20 Devices
- (4) RS485 Master (Repeat = OFF)

Figure 2.7 Serial-to-Fiber Conversion in Example Optical Loop Topology

Position	State	Notes
1	OFF	RS485/422 <-> Fiber
2	OFF	Serial-to-Fiber Mode
3	OFF	Half Duplex
4	OFF	Fiber repeat: Refer to figure 2.7, "Serial-to-Fiber Conversion in Example Optical Loop Topology" (Page 13)
6	OFF	9600 Baud
7	OFF	
8	ON	

The repeat function will optically re-transmit any data received on the optical receiver, in addition to any connected serial devices. As a result, any data transmitted from the master, will be re-transmitted optically to all the slaves. This mode of operation requires that the master device tolerate receiving echoes of transmitted data since any transmissions will be received once again via the optical ring.

This topology can be used for RS232, RS485 or RS422 multi-drop networks. In all cases, all slaves have the repeat function (DIP position 4) ON, while the master is configured with the repeat function OFF. This topology can allow for the mixture of RS232, RS485 and RS422 devices, operating on the same baud rate, on a single

2.5 Connecting Power

optical serial network because the RUGGEDCOM RMC20 utilizes a common optical signalling protocol for all serial standards.

2.5 Connecting Power

The RUGGEDCOM RMC20 supports a single integrated high AC/DC or low DC power supply

Note

- For 110/230 VAC rated equipment, an appropriately rated AC circuit breaker must be installed.
- For 125/250 VDC rated equipment, an appropriately rated DC circuit breaker must be installed.
- Use minimum #16 gage copper wiring when connecting terminal blocks.
- Equipment must be installed according to applicable local wiring codes and standards.
- All line-to-ground transient energy is shunted to the Surge Ground terminal. In cases where users require the inputs to be isolated from ground, remove the ground braid between Surge and Chassis Ground. Note that all line-to-ground transient protection circuitry will be disabled.

Note

Siemens requires the use of external surge protection in VDSL applications where the line may be subject to surges greater than that for which the device is rated. Use the following specifications as a guide for VDSL external surge protection:

Clamping Voltage: 50 V to 200 V

• Insertion Loss: < 0.1 dB at 10 MHz

Peak Surge Current: 10 kA, 8x20µs waveform

2.5.1 Connecting AC Power

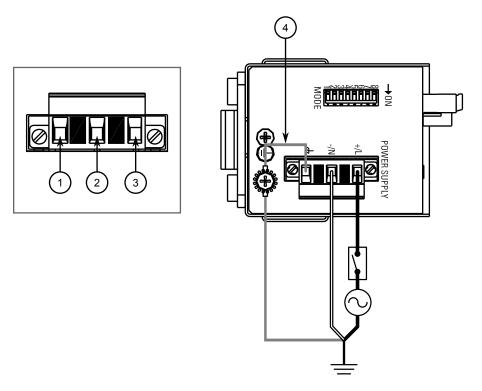
To connect a high AC power supply to the device, do the following:

riangle notice

Electrical hazard - risk of damage to equipment

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

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



- 1 Positive/Live (+/L) Terminal
- 2 Negative/Neutral (-/N) Terminal
- 3 Surge Ground Terminal
- A Braided Ground Cable

Figure 2.8 Terminal Block Wiring

- 2. Connect the negative wire from the power source to the negative/neutral (-/N) terminal on the terminal block.
- 3. Using a braided wire or other appropriate grounding wire, connect the surge ground terminal to the chassis ground connection. The surge ground terminal is used as the ground conductor for all surge and transient suppression circuitry internal to the unit.
- 4. Connect the ground terminal on the power source to the chassis ground terminal on the device.

2.5.2 Connecting DC Power

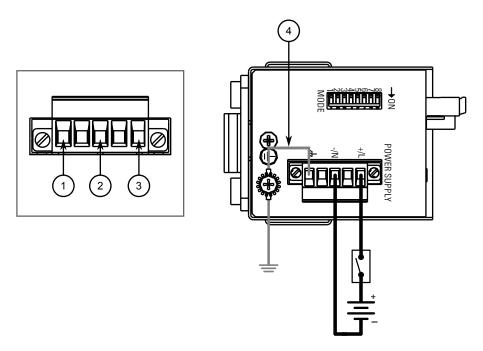
To connect a high or low DC power supply to the device, do the following:

riangle notice

Electrical hazard - risk of damage to equipment

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

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



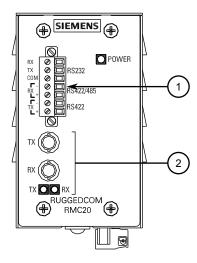
- 1) Positive/Live (+/L) Terminal
- 2 Negative/Neutral (-/N) Terminal
- 3 Surge Ground Terminal
- 4 Braided Ground Cable

Figure 2.9 Terminal Block Wiring

- 2. Connect the negative wire from the power source to the negative/neutral (-/N) terminal on the terminal block.
- 3. Using a braided wire or other appropriate grounding wire, connect the surge ground terminal to the chassis ground connection. The surge ground terminal is used as the ground conductor for all surge and transient suppression circuitry internal to the unit.
- 4. Connect the ground terminal on the power source to the chassis ground terminal on the device.

Communication Ports

The RUGGEDCOM RMC20 can be equipped with various types of communication ports to enhance its abilities and performance.



- 1 Port 1
- Port 2

Figure 3.1 Port Assignment

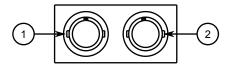
Port	Туре
1	RS232/RS485/RS422 Serial Terminal
2	Multi-Mode Fiber Optic Port

3.1 Fiber Optic Ports

Fiber optic ports are available with ST (Straight Tip) connectors. Make sure the Transmit (Tx) and Receive (Rx) connections of each port are properly connected and matched to establish a proper link.

3.2 Serial Terminal

Available Ports



- 1 Tx Connector
- ② Rx Connector

Figure 3.2 ST Port

Specifications

For specifications on the available fiber optic ports, refer to "Fiber Optic Port Specifications" (Page 23).

3.2 Serial Terminal

The RUGGEDCOM RMC20 is equipped with a seven-terminal Phoenix-style connector. This connector can accommodate one RS232 connection, and one RS485/422 connection. The following is the pin-out for the serial terminal:

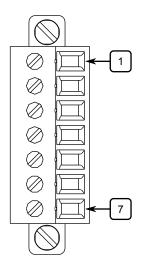


Figure 3.3 Serial Terminal Pin Configuration

Pin	Name	Mode	Description	
1	Rx	RS232 Receive data		
2	Tx	RS232 Transmit data		
3	СОМ	Shared common		
4	-Rx	RS422 Receive data-		
		RS485	Transmit/Receive data-	

Pin	Name	Mode	Description
5	+Rx	RS422	Receive data+
		RS485	Transmit/Receive data+
6	-Tx	RS422	Transmit data-
7	+Tx	RS422	Transmit data+

3.2.1 RS232 Data Ports

The serial terminal includes a single EIA/TIA RS232 compliant port, consisting of three terminals: Transmit (Tx), Receive (Rx) and Common (COM).

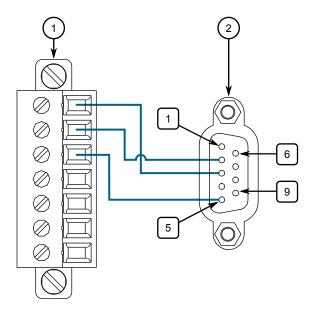
Note

The RS232 port is intended for point-to-point applications only.

In adherence to the EIA/TIA guidelines for RS232 communications, the following is recommended by Siemens:

- Always use shielded cabling to minimize the effects of ambient electrical noise
- Although greater distances are possible, limit the cable length to 15 m (49 ft) or less for more reliable communications
- Use a baud rate of 120 kbps

The RS232 port can be wired to standard DB9 console port.



- Serial Terminal
- ② DB9 Console Port

Figure 3.4 RS232 Port to Console Port Pin Configuration

3.2.2 RS485/422 Data Ports

DB9 Pin	Name	Description	
1		Reserved (Do Not Connect)	
2	RD	Receive Data	
3	TD	Transmit Data	
4	Reserved (Do Not Connect)		
5	SGND Signal Ground		
6	Reserved (Do Not Connect)		
7	Reserved (Do Not Connect)		
8	Reserved (Do Not Connect)		
9		Reserved (Do Not Connect)	

3.2.2 RS485/422 Data Ports

The serial terminal includes a single RS485/RS422 data port. In half duplex mode, the RS485 connections (Rx+, Rx-, COM) should be connected. In full-duplex mode, the RS422 connections (Rx+, Rx-, Tx+, Tx-, COM) should be connected. Both RS485 and RS422 can accommodate multi-drop networks, for master-slave serial network communications. For both RS485/RS422 connections, the following general guidelines should be followed:

- To minimize the effects of ambient electrical noise, use shielded cabling.
- The correct polarity must be observed throughout a single sequence or ring.
- The number of devices wired should not exceed 32, and total distance should be less than 1219 m (4000 ft) at 100 kbps.
- The Common terminals should be connected to the common wire inside the shield.
- The shield should be connected to earth ground at a single point to avoid loop currents.
- The twisted pair should be terminated at each end of the chain (typically with a 120 Ohm resistor and a 10nF capacitor in series across the twisted pair).

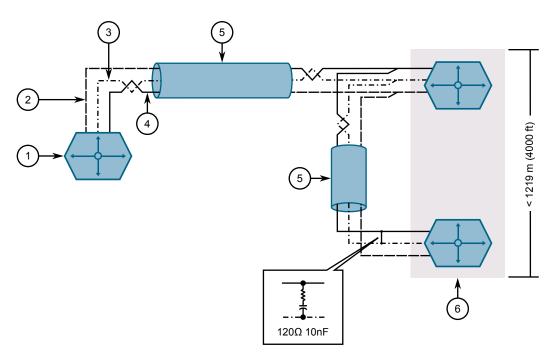
Note

The RUGGEDCOM RMC20 features built-in pull-up and pull-down resistors. As such, external bias resistors are only recommended when connecting the RUGGEDCOM RMC20 to third-party serial devices that do not have built-in pull-up and pull-down resistors.

Note

Transient protection is provided on all terminals. Lightning strikes and ground surge currents can cause large momentary voltage differences between ends of communication links. For maximum reliability of the entire link, all equipment should have similar transient protection installed.

The following shows the recommended RS485 wiring.



- 1 RUGGEDCOM RMC20 Device With Built-In Termination
- ② Common (Isolated Ground)
- 3 Negative
- Positive
- Shield to Earth (Connected At a Single Point)
- 6 RS485 Devices (32 Total)

Figure 3.5 Recommended RS485 Wiring

3.2.2 RS485/422 Data Ports

Technical Specifications

This section provides important technical specifications related to the device and available modules.

4.1 Power Supply Specifications

Power Supply Type	Minimum Input	Maximum Input	Internal Fuse Rating ^a	Max. Power Consumption
24 VDC	18 VDC	36 VDC	3.15A (T)	3 W
48 VDC	36 VDC	59 VDC		
HIp	88 VDC	300 VDC		
	85 VAC	264 VAC		

^a (T) denotes time-delay fuse.

4.2 Fiber Optic Port Specifications

The following details the specifications for fiber optic ports that can be ordered with the RUGGEDCOM RMC20.

Note

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

Data Rate	Mode	Connector	Cable (µm)	Wavelen	gth (nm) ^a		nsmit (dBm)		Receiver Saturation	Distance (km) ^a
				Transmit	Receive	Min	Max	(dBm)	(dBm)	
10 Mbps	ММ	ST	62.5/125	820	820	-16	-9	_	_	0.7
5 MBd	ММ	ST	62.5/125	820	820	_	_	-33.7	-9	1.5

^a Typical.

^b This is the same power supply for both AC and DC.

4.3 Operating Environment

4.3 Operating Environment

The RUGGEDCOM RMC20 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%
Maximum Altitude	2000 m (6562 ft)

^a Typical. May change based on which fiber optic transceivers are installed. For more information, refer to "Fiber Optic Port Specifications" (Page 23).

4.4 Mechanical Specifications

Weight	0.68 kg (1.5 lbs)
Ingress Protection	IP30
Enclosure	21 AWG Galvanized Steel

4.5 Dimension Drawings

Note

All dimensions are in millimeters, unless otherwise stated.

 $^{^{\}it b}$ Measured from a 30 cm (12 in) radius surrounding the center of the enclosure.

^c Non-condensing.

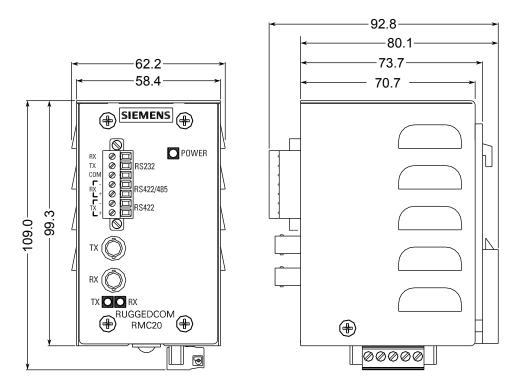


Figure 4.1 Overall Dimensions

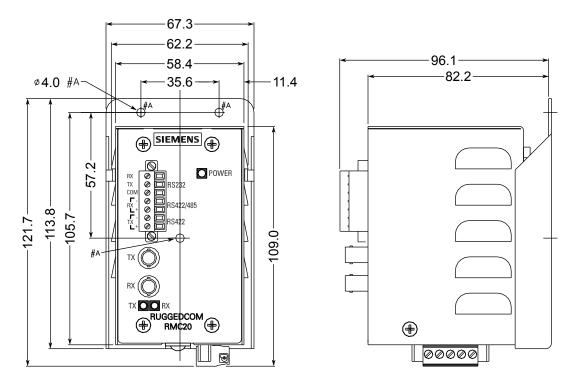


Figure 4.2 Panel Mount Dimensions

4.5 Dimension Drawings

Certification

The RUGGEDCOM RMC20 device has been thoroughly tested to guarantee its conformance with recognized standards and has received approval from recognized regulatory agencies.

5.1 Approvals

This section details the standards to which the RUGGEDCOM RMC20 complies.

Note

All relevant certificates and test reports are available on Siemens Industry Online Support [https://support.industry.siemens.com].

5.1.1 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, along with the identification number of the notified body.



5.1.2 CSA

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

- CAN/CSA-C22.2 No. 62368-1
 Information Technology Equipment Safety Part 1: General Requirements (Bi-National Standard, with UL 62368-1)
- UL 62368-1 Information Technology Equipment – Safety – Part 1: General Requirements

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

5.1.3 European Union (EU)



European Union (EU) 5.1.3

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 61000-6-2 Electromagnetic Compatibility (EMC) – Part 6-2: Generic Standards – Immunity for Industrial Environments
- EN 60825-1 Safety of Laser Products – Equipment Classification and Requirements
- EN 55022 Information Technology Equipment – Radio disturbance characteristics – Limits and methods of measurement

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



5.1.4 **FCC**

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

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

5.1.5 FDA/CDRH

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

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

5.1.6 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)

5.1.7 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

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

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



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

5.1.9 RoHS

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

China RoHS 2

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

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

5.1.10 Other Approvals

This device meets the requirements of the following additional standards:

• IEEE 1613

IEEE Standard Environmental and Testing Requirements for Communications Networking Devices in Electric Power Substations

IEC 61850-3

Communications Networks and Systems for Power Utility Automation – Part 3: General Requirements

5.2 EMC and Environmental Type Tests

The RUGGEDCOM RMC20 has passed the following EMC and environmental tests.

IEC 61850-3 Type Tests

Test	Description		Test Levels	Severity Levels
IEC 61000-4-2	ESD	Enclosure Contact	± 8 kV	4
		Enclosure Air	± 15 kV	4
IEC 61000-4-3	Radiated RFI	Enclosure Ports	20 V/m	Note ^a
IEC	Burst (Fast Transient)	Signal Ports	± 4 kV @ 2.5 kHz	Note ^a
61000-4-4		DC Power Ports	± 4 kV	4
		AC Power Ports	± 4 kV	4
		Earth Ground Ports	± 4 kV	4
IEC 61000-4-5	Surge	Signal Ports	± 4 kV Line-to-Earth, ± 2 kV Line-to-Line	4

Test	Description		Test Levels	Severity Levels
		DC Power Ports	± 2 kV Line-to-Earth, ± 1 kV Line-to-Line	3
		AC Power Ports	± 4 kV Line-to-Earth, ± 2 kV Line-to-Line	4
IEC	Induced (Conducted) RFI	Signal Ports	10 V	3
61000-4-6		DC Power Ports	10 V	3
		AC Power Ports	10 V	3
		Earth Ground Ports	10 V	3
IEC 61000-4-8	Magnetic Field	Enclosure Ports	40 A/m continuous, 1000 A/m for 1 s	Note ^a
			1000 A/m for 1 s	5
IEC 61000-4-29	Voltage Dips and Interrupts	DC Power Ports	30% for 0.1 s, 60% for 0.1 s, 100% for 0.05 s	
		AC Power Ports	30% for 1 period, 60% for 50 periods	
IEC 61000-4-11			100% for 5 periods, 100% for 50 periods	
IEC	Dielectric Strength	Signal Ports	2 kV	
60225-27		DC Power Ports	1.5 kV	
		AC Power Ports	2 kV	
	HV Impulse	Signal Ports	5 kV	
		DC Power Ports	5 kV	
		AC Power Ports	5 kV	

^a Siemens specified severity level.

IEEE 1613 EMC Immunity Type Tests

Note

RUGGEDCOM products meet Class 1 requirements for copper Ethernet configurations and Class 2 for fiber Ethernet configurations. Class 1 allows for temporary communication loss, while Class 2 requires error-free and interrupted communications.

	Description	Test Levels
ESD	Enclosure Contact	± 8 kV
	Enclosure Air	± 15 kV
Radiated RFI	Enclosure Ports	35 V/m
Fast Transient	Signal Ports	± 4 kV @ 2.5 kHz

5.2 EMC and Environmental Type Tests

	Description	Test Levels	
	DC Power Ports	± 4 kV	
	AC Power Ports	± 4 kV	
	Earth Ground Ports	± 4 kV	
Oscillatory	Signal Ports	2.5 kV common mode @ 1MHz	
	DC Power Ports	2.5 kV common, 1 kV differential mode @ 1MHz	
	AC Power Ports	2.5 kV common, 1 kV differential mode @ 1MHz	
HV Impulse	Signal Ports	5 kV	
	DC Power Ports	5 kV	
	AC Power Ports	5 kV	
Dielectric Strength	Signal Ports	2 kV	
	DC Power Ports	1.5 kV	
	AC Power Ports	2 kV	

Environmental Type Tests

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

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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