**RUGGEDCOM®**
A Siemens Business

**RuggedServer™ RS416**

Serial Device Server with Integrated 4-Port Managed Ethernet Switch with IEEE 1588 v2 & IRIG-B Conversion, 128-bit Encryption

**RUGGED RATED™**

**ROS** Rugged Operating System™

**eRSTP™**

**Time Sync**

**128-bit ENCRYPTION**

The RuggedServer™ RS416 is an industrially hardened serial device server with an integrated, fully managed, Ethernet switch, designed to operate reliably in electrically harsh and climatically demanding environments. Featuring a modular design that can support IEEE 1588 and IRIG-B time synchronization, up to 16 serial ports and up to 4 Ethernet ports, the RS416 is able to interconnect and synchronize multiple types of intelligent electronic devices (IEDs). The time source is provided via IEEE 1588 v2 and converted to IRIG-B for distribution to the IEDs via the serial ports or dedicated IRIG-B cabling. Each serial port supports standard data communications plus an IRIG-B time-synchronization output. Using the RS416 results in fewer connectivity devices reducing overall system costs and extends the useful life of existing legacy IEDs minimizing capital expenditure for new equipment.

The RS416 provides a high level of immunity to electromagnetic interference and heavy electrical surges typical of environments found in electric utility substations, factory floors or in curb side traffic control cabinets. The RS416 meets or exceeds a wide range of industry standards including IEC 61850-3, IEEE 1613, IEC 61000-6-2 and IEC 61800-3. The RS416 also features a wide operating temperature range of -40°C to +85°C allowing it to be installed in virtually any location. The embedded Rugged Operating System (ROS®) within the RS416 provides advanced layer 2 and layer 3 networking functions, advanced cyber security features, and a full array of intelligent functionality for high network availability and manageability. Coupled with the ruggedized hardware design, the RS416 is ideal for creating mission-critical, real-time, control applications in any harsh environment.

The RS416 is also backed by RuggedCom's five year warranty and unsurpassed technical support.

## Features and Benefits

### Serial Device Server
- Modular design allows for 4, 8, 12, or 16 serial ports
- Software selectable EIA/TIA RS232, RS485, RS422 serial ports with IRIG-B outputs
- Serial Fiber Interface (ST)
- Transmit serial data over an IP network
- Support for Modbus TCP, DNP 3, TIN serial protocols
- Baud rates up to 230 kbps
- Raw socket mode allows conversion of any serial protocol
- Point-to-point and multi-point modes
- Converts Modbus RTU to Modbus; Multiple Modbus masters
- Converts DNP3.0 to DNP over UDP/TCP

### Ethernet Ports
- Integrated Ethernet Switch
- Copper or Fiber options
- Supports IEEE 1588 v2
- Non-blocking, store and forward switching

### IRIG-B Option
- Conversion from IEEE 1588 v2
- One IRIG-B PWM/PPS Output
- One IRIG-B PWM Input
- Supports TTL levels (Format B002, B003)
- BNC Connectors

### IEEE 1588
- Internal clock is synchronized with IEEE 1588 version 2
- 100µs time accuracy

### RuggedRated™ for Reliability in Harsh Environments
- Immunity to EMI and heavy electrical surges
- Meets IEEE 1613 (electric utility substations)
- Exceeds IEC 61850-3 (electric utility substations)
- Exceeds IEC 61800-3 (variable speed drive systems)
- Exceeds IEC 61000-6-2 (generic industrial)
- Fully independent 2kV (RMS) isolated serial ports
- -40°C to +85°C operating temperature (no fans)
- 18 AWG galvanized steel enclosure

### Universal Power Supply Options
- Fully integrated, dual-redundant (optional) power supplies
- Universal high-voltage range: 88-300VDC or 85-264VAC
- Popular low voltage ranges: 24VDC (10-36VDC), 48VDC(36-59VDC)
- Terminal blocks for reliable maintenance free connections
- CSA/UL 60950 safety approved to +85°C

### Rugged Operating System (ROS®) Features
- Simple plug and play operation - automatic learning, negotiation, and crossover detection
- Integrated Cyber Security features
- RSTP (802.1w) and Enhanced Rapid Spanning Tree (eRSTP™) network fault recovery (<5ms)
- Quality of Service (802.1p) for real-time traffic
- VLAN (802.1Q) with double tagging and GVRP support
- IGMP Snooping for multicast filtering
- Port Rate Limiting and Broadcast Storm Limiting
- Port configuration, status, statistics, mirroring, security

**RUGGEDCOM ISO 9001 REGISTERED**

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# RuggedServer™ RS416

## Modularity:
▶ 6 available slots
▶ 4, 8, 12, 16 Serial Port Configurations
▶ 2 or 4 Fast Ethernet Ports

## IRIG-B Input:
▶ BNC Connector
▶ PWM TTL

## IRIG-B Output:
▶ BNC Connector
▶ PWM TTL
▶ PPS

## Mounting Options
▶ Panel/Din Rail
▶ 19" Rack Mount

## Serial Port Types:
▶ up to 16 Serial Ports
▶ Software selectable EIA/TIA RS232, RS485, RS422 serial ports with IRIG-B outputs
▶ DB9, RJ45 or ST Fiber Optical connectors
▶ Mix and match types and connector

## Fast Ethernet Ports Types:
▶ up to 4 Fast Ethernet Ports
▶ 10/100TX RJ45
▶ 10FL Multimode
▶ 100FX Multimode
▶ IEEE 1588

## Modular HMI:
▶ Front or Rear Mount

## Integrated Power Supply
▶ Universal high-voltage range: 88-300VDC or 85-264VAC
▶ Popular low voltage DC ranges: 24VDC (10-36VDC), 48VDC (36-59VDC)
▶ True Dual Redundant Parallel Load Sharing (Optional)

## Operating Temperature
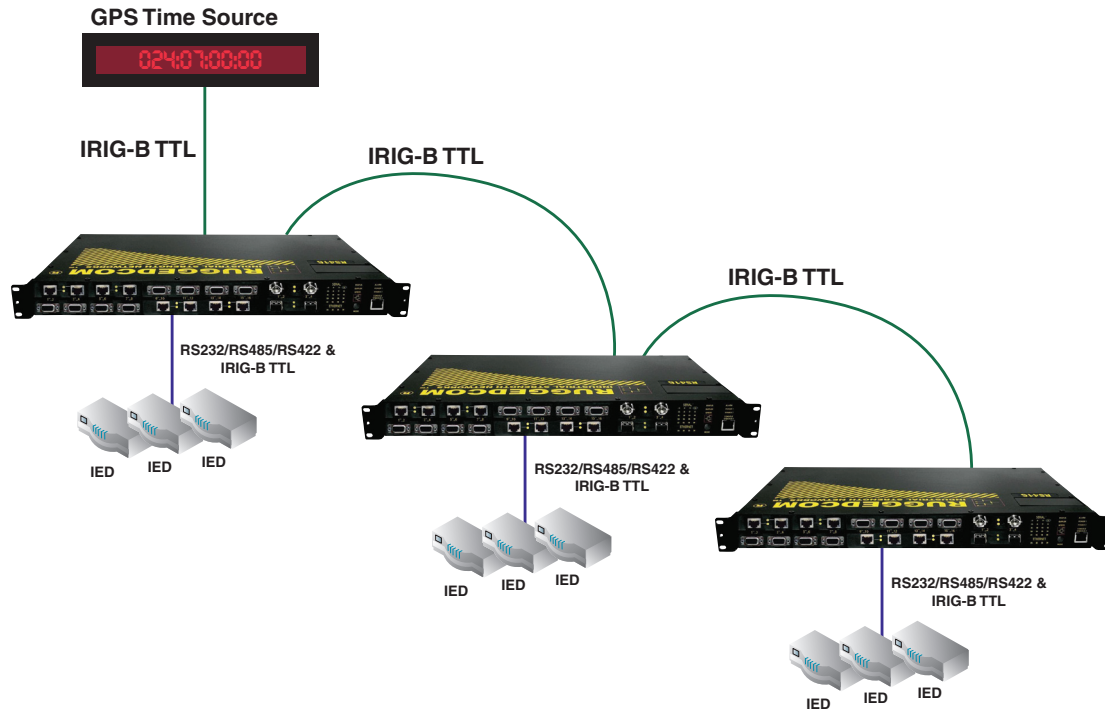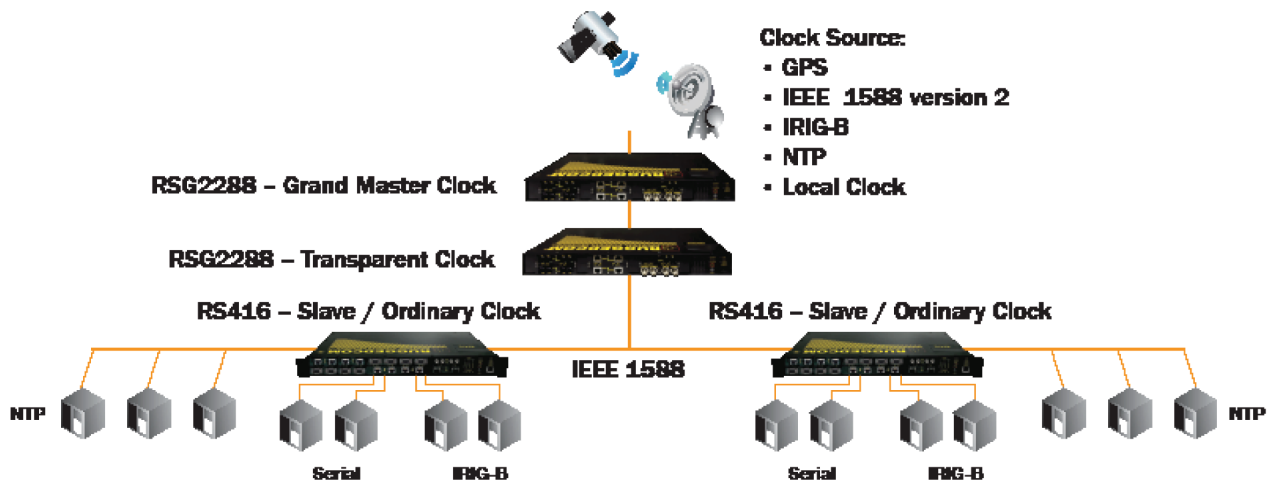▶ -40°C to +85°C

## Critical Alarm Relay
▶ Form-C contact ratings: Max Voltage 250VAC,125VDC Max Current 2A@250VAC, 2A@30VDC

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Typical Network Architecture: Distributing a  Time Source over IRIG-B TTL

**GPS Time Source**

024:07:00:00

**IRIG-B TTL**

**IRIG-B TTL**

**IRIG-B TTL**

RS232/RS485/RS422 &
IRIG-B TTL

IED    IED    IED

RS232/RS485/RS422 &
IRIG-B TTL

IED    IED    IED

RS232/RS485/RS422 &
IRIG-B TTL

IED    IED    IED

Typical Network Architecture: Distributing a  Time Source over IEEE 1588 version 2

**Clock Source:**
- **GPS**
- **IEEE 1588 version 2**
- **IRIG-B**
- **NTP**
- **Local Clock**

**RSG2288 – Grand Master Clock**

**RSG2288 – Transparent Clock**

**RS416 – Slave / Ordinary Clock**

**RS416 – Slave / Ordinary Clock**

**IEEE 1588**

NTP

Serial    IRIG-B

Serial    IRIG-B

NTP

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# ROS® Features

## Serial IP Encapsulation
Many 'legacy' devices (RTU, PLC, IED, etc.) only support serial communications via RS232, RS422 or RS485. ROS® encapsulates the serial data within a TCP connection allowing these devices to be reached via an IP network. A wide range of baud rates, frame packetization options, and diagnostics allows any serial protocol to function. The RS416 has specific support for the following serial protocols:

- Raw Socket serial encapsulation
- Modbus TCP (client and server)
- DNP 3
- WIN and TIN
- Microlok

## MODBUS TCP
The Modbus protocol is ubiquitous in the industrial control and automation world. ROS® converts Modbus RTU master/slave serial data packets to Modbus TCP client/server packets for transmission over an IP network. This allows communications to Modbus RTU slaves via Ethernet and allows multiple masters to poll the same slave device.

## Cyber Security
Cyber security is an urgent issue in many industries where advanced automation and communications networks play a crucial role in mission critical applications and where high reliability is of paramount importance. Key ROS® features that address security issues at the local area network level include:

- **Passwords** - Multi-level user passwords secures switch against unauthorized configuration
- **SSH/SSL** - Extends capability of password protection to add 128-bit encryption of passwords and data as they cross the network
- **Enable/Disable Ports** - Capability to disable ports so that traffic can not pass
- **802.1Q VLAN** - Provides the ability to logically segregate traffic between predefined ports on switches
- **MAC Based Port Security** - The ability to secure ports on a switch so only specific Devices / MAC addresses can communicate via that port
- **802.1x Port Based Network Access Control** - The ability to lock down ports on a switch so that only authorized clients can communicate via this port
- **RADIUS** - authentication service using MD5 hash and providing centralized password management
- **SNMPv3** - encrypted authentication access security and data encryption (CBC-DES with 56-bit encryption key)
- **Secure Socket Layer** - Web-based management using SSL with data encryption (128-bit encryption key)
- **RSA** – 1024 bit key for key management and key exchange
- **TACACS+** - Terminal Access Control and Accounting Services Client provides encrypted authentication and authorization

- **Point to Point (PPP)** - using CHAP (MD5 Hash) authentication service
- **SFTP** - Secure File Transfer Protocol using SSH encryption

The ROS® cyber security features are included to help address the various industry specific security standards such as NERC CIP, ISA S99, AGA 12, IEC 62443, ISO 17799:2005 and PCSRF SPP-ICS

## Enhanced Rapid Spanning Tree Protocol (eRSTP™)
RuggedCom eRSTP™ allows the creation of fault-tolerant ring and mesh Ethernet networks that incorporate redundant links that are 'pruned' to prevent loops. eRSTP™ yields worst-case fault recovery[1] of 5ms times the 'bridge diameter' and allows rings of up to 80 switches. For example, a ring of ten switches will have fault recovery times under 50ms. eRSTP™ implements both STP and RSTP to ensure interoperability with commercial switches unlike other proprietary 'ring' solutions.

## Quality of Service (IEEE 802.1p)
Some networking applications such as real-time control or VoIP (voice over IP) require predictable arrival times for Ethernet frames. Switches can introduce latency in times of heavy network traffic due to the internal queues that buffer frames and then transmit on a first come first serve basis. ROS® supports 'Class of Service' in accordance with IEEE 802.1p that allows time critical traffic to jump ahead to the front of the queue thus minimizing latency and reducing jitter to allow such demanding applications to operate correctly. ROS® allows priority classification by port, tags, MAC address, and IP type of service (ToS).

A configurable "weighted fair queuing" algorithm controls how frames are emptied from the queues.

## VLAN  (IEEE 802.1Q)
Virtual local area networks (VLAN) allow the segregation of a physical network into separate logical networks with independent broadcast domains. A measure of security is provided since hosts can only access other hosts on the same VLAN and traffic storms are isolated. ROS® supports 802.1Q tagged Ethernet frames and VLAN trunks. Port based classification allows legacy devices to be assigned to the correct VLAN. GVRP support is also provided to simplify the configuration of the switches on the VLAN.

## Link Aggregation (802.3ad)
The link aggregation feature provides the ability to aggregate several Ethernet ports into one logical link (port trunk) with higher bandwidth. This provides an inexpensive way to set up a high speed backbone to improve network bandwidth. This feature is also known as "port trunking", "port bundling", "port teaming", and "Ethernet trunk".

## IGMP Snooping
ROS® uses IGMP snooping (Internet Group Management Protocol v1&v2) to intelligently forward or filter multicast traffic

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# ROS® Features

**ROS**
Rugged Operating System™

streams (e.g. MPEG video) to or from hosts on the network. This reduces the load on network trunks and prevents packets from being received on hosts that are not involved. ROS® has a very powerful implementation of IGMP snooping that:

- Can be enabled on a per VLAN basis.
- Detects and filters all multicast streams regardless of whether subscribers exist.
- Supports "router-less" operation by supporting an "active" mode.
- Restores traffic streams immediately after an RSTP topology change.

## SNMP (Simple Network Management Protocol)
SNMP provides a standardized method for network management stations the ability to interrogate devices from different vendors. SNMP versions supported by ROS® are v1, v2c, and v3. SNMPv3 in particular provides security features such as authentication, privacy with data encryption (CBC-DES with 56-bit encryption key) and access control not present in earlier SNMP versions. ROS® also supports numerous standard MIBs (Management Information Base) allowing for easy integration with any network management system (NMS). A feature of SNMP supported by ROS® is the ability to generate "traps" upon system events. RuggedNMS™, the RuggedCom management solution, can record traps from multiple devices providing a powerful network troubleshooting tool. It also provides a graphical visualization of the network and is fully integrated with all RuggedCom products.

## SCADA and Industrial Automation
ROS® contains features that optimize network performance and simplify switch management based on the unique requirements found in SCADA and industrial automation applications. Features such as Modbus TCP management for retrieval of switch data using the ubiquitous Modbus protocol and DHCP Option 82, a Rockwell Automation ODVA requirement for IP address assignment based on the location of the end device, provide capabilities not found in typical "commercial" or "office grade" Ethernet switches.

## Port Based Network Access Control (802.1x)
ROS® supports the IEEE 802.1x standard that defines a mechanism for port-based network access control which provides a means of authenticating and authorizing devices attached to LAN ports.

## Port Rate Limiting
ROS® supports configurable rate limiting per port to limit unicast and multicast traffic. This can be essential to managing precious network bandwidth for service providers.It also provides edge security for denial of service (DoS) attacks.

## Broadcast Storm Filtering
Broadcast storms wreak havoc on a network and can cause attached devices to malfunction. This could be disastrous on a network with mission critical equipment. ROS® limits this by filtering broadcast frames with a user-defined threshold.

## Port Mirroring
ROS® can be configured to duplicate all traffic on one port to a designated mirror port. When combined with a network analyzer, this can be a powerful troubleshooting tool.

## Port Configuration and Status
ROS® allows individual ports to be 'hard' configured for speed, duplex, auto-negotiation, flow control and more. This allows proper connection with devices that do not negotiate or have unusual settings. Detailed status of ports with alarm and SNMP trap on link problems aid greatly in system troubleshooting.

## Port Statistics and RMON (Remote Monitoring)
ROS® provides continuously updating statistics per port that provide both ingress and egress packet and byte counters as well as detailed error figures.  Also provided is full support for the RMON statistics, history, alarms, and event groups. RMON allows for very sophisticated data collection, analysis and detection of traffic patterns.

## Event Logging and Alarms
ROS® records all significant events to a non-volatile system log allowing forensic troubleshooting. Events include link failure and recovery, unauthorized access, broadcast storm detection, and self-test diagnostics among others. Alarms provide a snapshot of recent events that have yet to be acknowledged by the network administrator. An external hardware relay is de-energized during the presence of critical alarms allowing an external controller to react if desired.

## HTML Web Browser and Telnet User Interfaces
ROS® provides a simple, intuitive user interface for configuration and monitoring via a standard graphical web browser or via Telnet. All system parameters include detailed on-line help to make setup a breeze. ROS® , presents a common look and feel and standardized configuration process allowing easy migration to other RuggedCom managed products.

## Configuration via ASCII Text File
All configuration parameters are stored in an ASCII formatted text file that can easily be transferred via TFTP or Xmodem. The configuration file can be saved for backup purposes and easily manipulated by a text editor. The same text file can be downloaded to the switch at a later date in order to re-configure or restore a previous configuration.

## Command Line Interface (CLI)
A command line interface can be used in conjunction with remote shell to automate data retrieval, configuration updates, and firmware upgrades. A powerful SQL-like capability allows expert users the ability to selectively retrieve or manipulate any parameters the device has to offer.

1 eRSTP™ fault recovery times may be approximated as follows:
> For 100 Mbps, fault recovery performance is <5ms/hop
> For 1,000 Mbps, fault recovery performance is <5ms/hop + 20ms

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# EMI and Environmental Type Tests

| IEC 61850-3 EMI TYPE TESTS | | | | |
|---|---|---|---|---|
| TEST | Description | | Test Levels | Severity Levels |
| IEC 61000-4-2 | ESD | Enclosure Contact | +/- 8kV | 4 |
| | | Enclosure Air | +/- 15kV | 4 |
| IEC 61000-4-3 | Radiated RFI | Enclosure ports | 20 V/m | Note 1 |
| IEC 61000-4-4 | Burst (Fast Transient) | Signal ports | +/- 4kV @ 2.5kHz | Note 1 |
| | | D.C. Power ports | +/- 4kV | 4 |
| | | A.C. Power ports | +/- 4kV | 4 |
| | | Earth ground ports | +/- 4kV | 4 |
| IEC 61000-4-5 | Surge | Signal ports | +/- 4kV line-to-earth, +/- 2kV line-to-line | 4 |
| | | D.C. Power ports | +/- 2kV line-to-earth, +/- 1kV line-to-line | 3 |
| | | A.C. Power ports | +/- 4kV line-to-earth, +/- 2kV line-to-line | 4 |
| IEC 61000-4-6 | Induced (Conducted) RFI | Signal ports | 10V | 3 |
| | | D.C Power ports | 10V | 3 |
| | | A.C. Power ports | 10V | 3 |
| | | Earth ground ports | 10V | 3 |
| IEC 61000-4-8 | 8 Magnetic Field | Enclosure ports | 40 A/m continuous, 1000 A/m for 1 s | Note 1 |
| | | | 1000 A/m for 1 s | 5 |
| IEC 61000-4-29 | Voltage Dips & Interrupts | D.C. Power ports | 30% for 0.1s, 60% for 0.1s, 100% for 0.05s | N/A |
| | | A.C. Power ports | 30% for 1 period, 60% for 50 periods | N/A |
| IEC 61000-4-11 | | | 100% for 5 periods, 100% for 50 periods | N/A |
| IEC 61000-4-12 | Damped Oscillatory | Signal ports | 2.5kV common, 1kV diff. mode@1MHz | 3 |
| | | D.C. Power ports | 2.5kV common, 1kV diff. mode@1MHz | 3 |
| | | A.C. Power ports | 2.5kV common, 1kV diff. mode@1MHz | 3 |
| IEC 61000-4-16 | Mains Frequency Voltage | Signal ports | 30V Continuous, 300V for 1s | 4 |
| | | D.C. Power ports | 30V Continuous, 300V for 1s | 4 |
| IEC 61000-4-17 | Ripple on D.C. Power Supply | D.C. Power ports | 10% | 3 |
| IEC 60255-5 | Dielectric Strength | Signal ports | 2kVac (Fail-Safe Relay output) | N/A |
| | | D.C. Power ports | 1.5kV DC | N/A |
| | | A.C. Power ports | 2kVac | N/A |
| IEC 60255-5 | H.V. Impulse | Signal ports | 5kV (Fail-Safe Relay output) | N/A |
| | | D.C. Power ports | 5kV | N/A |
| | | A.C. Power ports | 5kV | N/A |

| IEEE 1613 (C37.90.x) EMI IMMUNITY TYPE TESTS [2] | | | |
|---|---|---|---|
| Test | Description | | Test Levels |
| IEEE C37.90.3 | ESD | Enclosure Contact | +/-2kV, +/-4kV, +/- 8kV |
| | | Enclosure Air | +/-4kV, +/-8kV, +/-15kV |
| IEEE C37.90.2 | Radiated RFI | Enclosure ports | 35 V/m |
| IEEE C37.90.1 | Fast Transient | Signal ports | +/- 4kV @ 2.5kHz |
| | | D.C. Power ports | +/- 4kV |
| | | A.C. Power ports | +/- 4kV |
| | | Earth ground ports3 | +/- 4kV |
| IEEE C37.90.1 | Oscillatory | Signal ports | 2.5kV common mode @1MHz |
| | | D.C. Power ports | 2.5kV common, 1kV diff. mode@1MHz |
| | | A.C. Power ports | 2.5kV common, 1kV diff. mode@1MHz |
| IEEE C37.90 | H.V. Impulse | Signal ports | 5kV (Fail-Safe Relay output) |
| | | D.C. Power ports | 5kV |
| | | A.C. Power ports | 5kV |
| IEEE C37.90 | Dielectric Strength | Signal ports | 2kVac |
| | | D.C. Power ports | 1.5kV DC |
| | | A.C. Power ports | 2kVac |

| Environmental Type Tests | | | |
|---|---|---|---|
| Test | Description | | Test Levels |
| IEC 60068-2-1 | Cold Temperature | Test Ad | -40°C, 16 Hours |
| IEC 60068-2-2 | Dry Heat | Test Bd | +85°C, 16 Hours |
| IEC 60068-2-30 | Humidity (Damp Heat, Cyclic) | Test Db | 95% (non-condensing), 55°C , 6 cycles |
| IEC 60255-21-1 | Vibration | | 2g @ (10 - 150) Hz |
| IEC 60255-21-2 | Shock | | 30g @ 11mS |

Notes:     1. Ruggedcom specified severity levels
              2. Meets Class 2 requirements for an all fiber configuration.  Class 1 for copper ports.

# Technical Specifications

## Power Supply
- Power Consumption: 15W (max)
- 24VDC: 10-36VDC (max)
- 48VDC: 36-59VDC (max)
- HI Voltage AC/DC: 88-300VDC, 85-264VAC (max)

## Physical
- Height: 1.74"
- Width: 18.3"
- Depth: 12.4"
- Weight: 5.2kg
- Ingress Protection: IP40 (1mm objects)
- Enclosure: 18 AWG galvanized steel enclosure
- Mounting: DIN rail or panel mounted

## Switch Properties
- Switching method: Store & Forward
- Switching latency: 7 µs
- Switching bandwidth: 800 Mbps
- MAC addresses: 4096
- MAC address table size: 32kbytes
- Priority Queues: 4
- Frame buffer memory: 2 Mbit
- Simultaneous VLANs: 255
- VLAN ID Range: 1 to 4096
- IGMP multicast groups: 256
- Port rate limiting: 128kbps, 256, 512, 4, 8Mbps
- No head of line blocking

## Approvals
- ISO: Designed and manufactured using a ISO9001: 2000 certified quality program
- CE Marking
- Emissions: FCC Part 15 (Class A), EN55022 (CISPR22 Class A)
- Safety: cCSAus (Compliant with CSA C22.2 No. 60950, UL 60950, EN60950)
- Laser Eye Safety (FDA/CDRH): Complies with 21 CFR Chapter1, Subchapter J.

## Warranty
- 5 Years-Applicable to design or manufacturing related product defects.

## Network Management
- HTTP graphical web-based, SSL (128-bit encryption)
- SNMP v1, v2c, v3 (56-bit encryption)
- Telnet, VT100, SSH/SFTP (128-bit encryption)
- Command Line Interface (CLI)
- RSA Key Management (1024 bit key)
- Authentication and Accounting - TACACS+ (encrypted), RADIUS client, PPP

## IRIG-B Ports
- Input Impedance: greater than 1MΩ
- Output Impedance: 50Ω

## EMI Immunity and Environmental Compliance
- IEC 61000-6-2 Industrial (Generic)
- IEC 61800-3 Industrial (Variable Speed Drive Systems)
- IEC 61850-3 Electric Utility Substations
- IEEE 1613 Electric Utility Substations
- NEMA TS 2 Traffic Control Equipment

## IEEE Compliance
- 802.3-10BaseT
- 802.3u-100BaseTX, 100BaseFX
- 802.3x-Flow Control
- 802.3z-1000BaseLX
- 802.3ab-1000BaseTX
- 802.3ad-Link Aggregation
- 802.1D-MAC Bridges
- 802.1D-Spanning Tree Protocol
- 802.1p-Class of Service
- 802.1Q-VLAN Tagging
- 802.1w-Rapid Spanning Tree Protocol
- 802.1x-Port Based Network Access Control

## IETF RFC Compliance
- RFC768-UDP
- RFC783-TFTP
- RFC791-IP
- RFC792-ICMP
- RFC793-TCP
- RFC826-ARP
- RFC854-Telnet
- RFC894-IP over Ethernet
- RFC1112-IGMP v1
- RFC1519-CIDR
- RFC1541-DHCP (client)
- RFC2030-SNTP
- RFC2068-HTTP
- RFC2236-IGMP v2
- RFC2284-EAP
- RFC2475-Differentiated Services
- RFC2865-RADIUS
- RFC3414-SNMPv3-USM
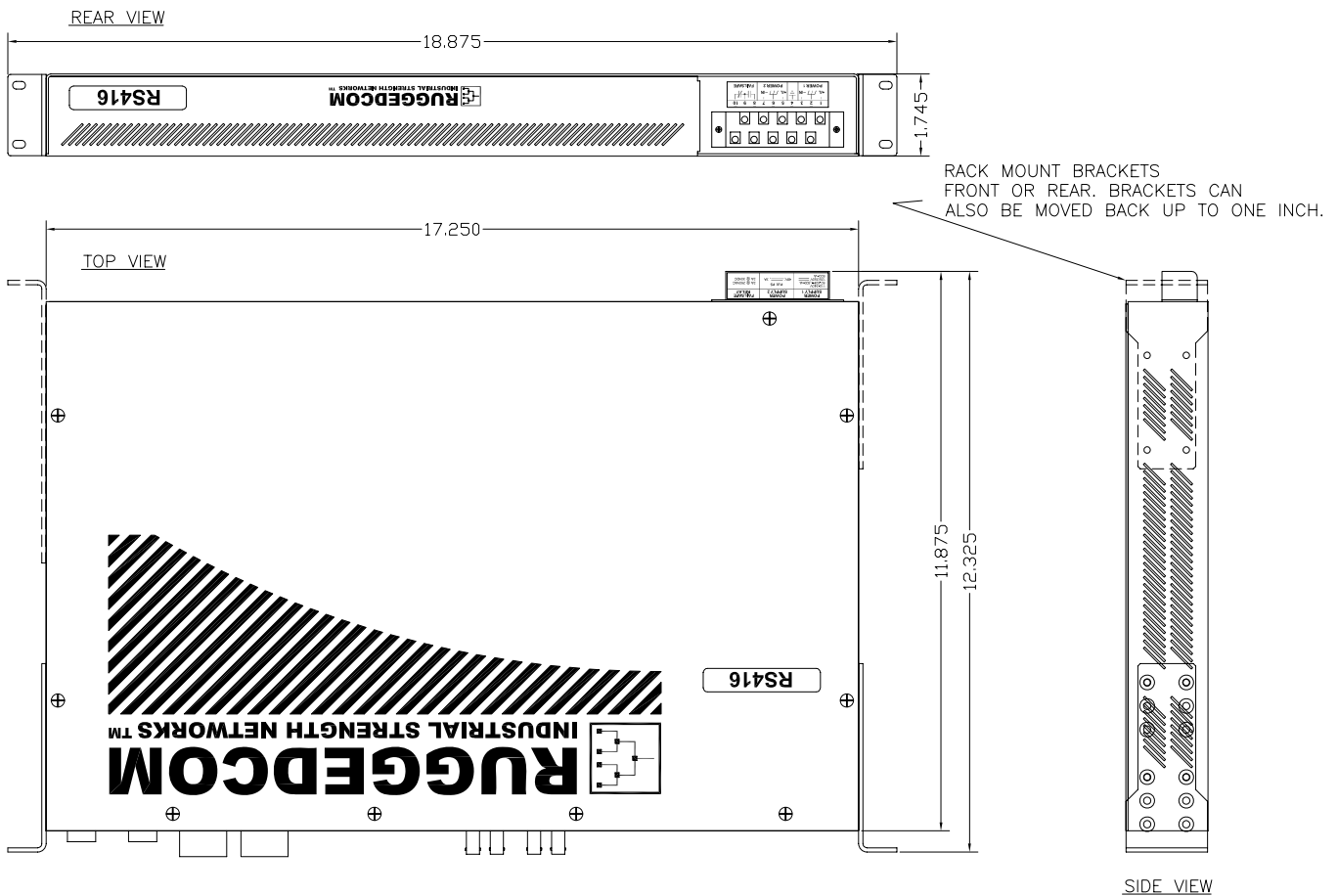- RFC3415-SNMPv3-VACM

## IETF SNMP MIBS
- RFC1493-BRIDGE-MIB
- RFC1907-SNMPv2-MIB
- RFC2012-TCP-MIB
- RFC2013-UDP-MIB
- RFC2578-SNMPv2-SMI
- RFC2579-SNMPv2-TC
- RFC2819-RMON-MIB
- RFC2863-IF-MIB
- draft-ietf-bridge-rstpmib-03-BRIDGE-MIB
- draft-ietf-bridge-bridgemib-smiv2-03-RSTP-MIB
- IANAifType-MIB

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# Fiber Specifications and Dimensions

| Fiber Optical Specifications (Ethernet Ports) | | | | | |
|---|---|---|---|---|---|
| Parameter | Fiber Port Type | | | | |
| | 10BaseFL | 100BaseFX | | | |
| | | Multimode | Singlemode | | |
| Mode | Multimode | Multimode | Singlemode | | |
| Connectors | ST | MTRJ / ST / SC | LC / SC | | |
| Typical Dist. (km) | 2 | 2 | 20 | 50 | 90 |
| Optical Wavelength (nm) | 820 | 1310 | 1310 | | |
| Cable Size Core/Cladding (um) | 50 or 62.5/125 | 50 or 62.5/125 | 8 or 9/125 | | |
| Tx Power (dBm) | -34.4 | -15.7 | -15.5 | -2.5 | 2.5 |
| Rx Sensitivity (dBm) | -8.2 | -33.5 | -32 | -37 | -39 |
| Typical Budget | 22 | 17 | 16.5 | 34.5 | 41.5 |
| Longer segment lengths dependent on fiber specifications. Consult factory for further details. | | | | | |

| Serial Fiber Specifications | |
|---|---|
| Parameter | Fiber Port Type |
| Connector | ST |
| Maximum Distance | 5km |
| Tx Power | -13.5 dBm Aug |
| Rx Sensitivity | -28.5 dBm Aug |
| Optical Budget | 15dB |

REAR VIEW

18.875

1.745

RACK MOUNT BRACKETS
FRONT OR REAR. BRACKETS CAN
ALSO BE MOVED BACK UP TO ONE INCH.
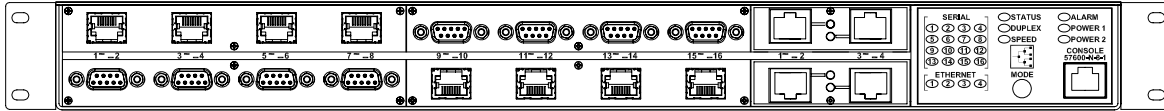
TOP VIEW

17.250

11.875

12.325

SIDE VIEW

FRONT VIEW

18.289

0.164

0.272

1.250

SERIAL MODULES
4 PORTS X 4 OF RJ45/DB9 CONNECTOR TYPE

CONFIGURABLE MODULES
2 PORTS X 2 OF ANY CONNECTOR TYPE

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# RuggedServer™ RS416

# Mounting Options

**19" Rack Front Mount - (Connectors At Front)**
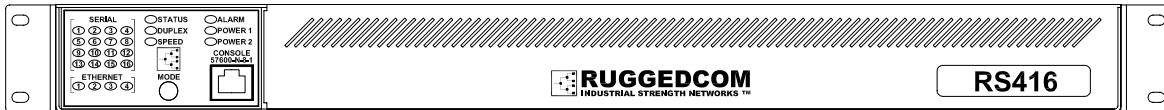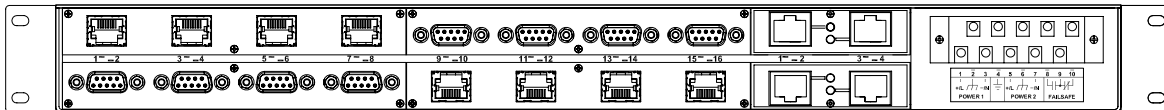**Main Order Code = F**



FRONT VIEW



REAR VIEW

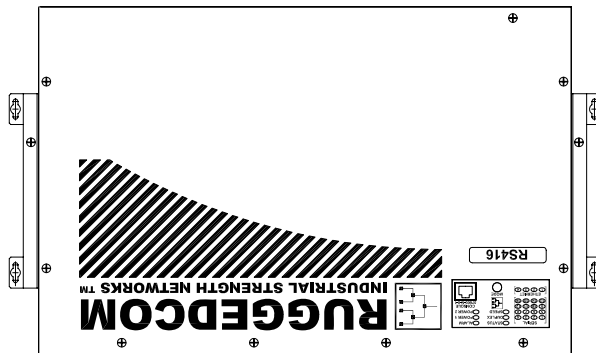**19" Rack Rear Mount - (Connectors At Rear)**
**Main Order Code = R**



FRONT VIEW



REAR VIEW

**Panel / DIN Rail Bottom Mount - (Connectors At Bottom)**
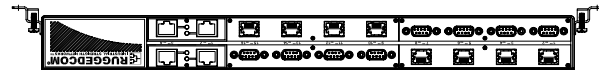**Main Order Code = B**



FRONT VIEW
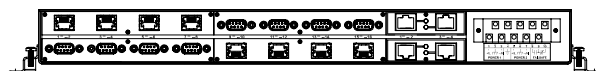
BOTTOM VIEW

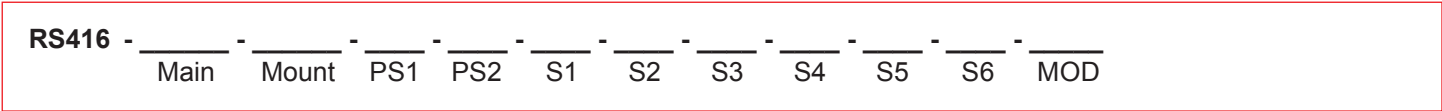**Panel / DIN Rail Top Mount - (Connectors At Top)**
**Main Order Code = T**



TOP VIEW

FRONT VIEW

# RuggedServer™ RS416

**RUGGEDCOM®**
A Siemens Business    Serial Device Server with Integrated 4-Port Managed Ethernet Switch with IEEE 1588 v2 & IRIG-B Conversion, 128-bit Encryption

# Order Codes

RS416 - _____ - _____ - \_\_\_ - \_\_\_ - \_\_\_ - \_\_\_ - \_\_\_ - \_\_\_ - \_\_\_ - \_\_\_ - \_\_\_\_

  Main    Mount   PS1   PS2   S1   S2   S3   S4   S5   S6   MOD
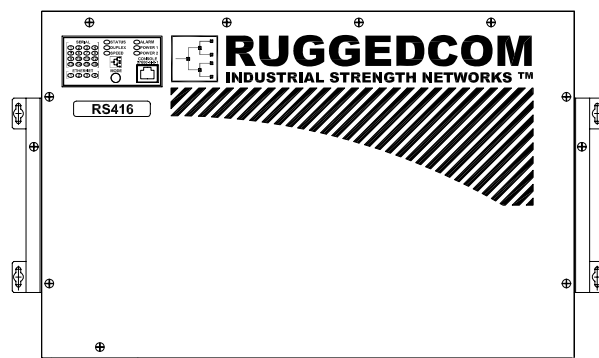
| Slot 1 | Slot 3 | Slot 5 | |
|--------|--------|--------|-------|
| Slot 2 | Slot 4 | Slot 6 | RS416 |

## Main: Ethernet and Power Connectors
- R = Ethernet on rear; LED panel on front; power connector on rear
- F = Ethernet on front; LED panel on front; power connector on rear
- B = Ethernet on rear; LED panel on top; power connector on rear
- T = Ethernet on front; LED panel on top; power connector on rear

## Mount: Mounting Options
- RM = 19" Rack Mount Kit
- DP = DIN and Panel Mount Kit
- RD = 19" Rack, DIN, and Panel Mount Kit
- 00 = No Mounting Option

## PS1 and PS2: Power Supply 1 and 2[3]
- 24 = 24VDC (10-36VDC), screw terminal block
- 48 = 48VDC (36-59VDC), screw terminal block
- HI = 88-300VDC or 85-264VAC, screw terminal block
- 24P = 24VDC (10-36VDC), pluggable terminal block
- 48P = 48VDC (36-59VDC), pluggable terminal block
- HIP = 88-300VDC or 85-264VAC, pluggable terminal block
- XX = No Power Supply (PS2 Only)

## S1, S2, S3, S4: Serial Port Modules for Slots 1, 2, 3, and 4[2]
- XX = Empty (S2,S3,S4 Only)
- 3D = 4 x RS232/RS422/RS485 via DB9
- 3R = 4 x RS232/RS422/RS485 via RJ45
- FS = 4 x Fiber Serial Interface (ST Connector)
- ID = 4 x RS232/RS422/RS485 & IRIG-B via DB9 [1]
- IR = 4 x RS232/RS422/RS485 & IRIG-B via RJ45 [1]

## S5, S6: Ethernet Modules for Slots 5 and 6 [2]
- XXXX = Empty (S6 Only)
- TX01 = 2 x 10/100Tx RJ45
- FL01 = 2 x 10FL - Multimode, 850nm, ST
- FX01 = 2 x 100FX - Multimode, 1300nm, ST
- FX02 = 2 x 100FX - Multimode, 1300nm, SC
- FX11 = 2 x 100FX – Multimode, 1300nm, LC
- FX03 = 2 x 100FX - Multimode, 1300nm, MTRJ
- FX04 = 2 x 100FX - Singlemode, 1300nm, ST, 20km
- FX05 = 2 x 100FX - Singlemode, 1300nm, SC, 20km
- FX06 = 2 x 100FX - Singlemode, 1300nm, LC, 20km
- FX07 = 2 x 100FX - Singlemode, 1300nm, SC, 50km
- FX08 = 2 x 100FX - Singlemode, 1300nm, LC, 50km
- FX09 = 2 x 100FX - Singlemode, 1300nm, SC, 90km
- FX10 = 2 x 100FX - Singlemode, 1300nm, LC, 90km
- IRIG = 1 x IRIG-B in, BNC
        1 x IRIG-B out, BNC (S5 only)

## MOD: Manufacturing Modifications
- XX = None
- C01 = Conformal Coating

**Notes:**
1. When IR or ID are ordered the IRIG module must be ordered for slot 5
2. IEEE 1588 Hardware Assist and Internal clock capable units are only available on units sold with the IRIG module
3. PS1 and PS2 must be both either pluggable or screw terminal block

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## Example Order Codes:

**RS416-R-RM-24-XX-3D-3D-XX-XX-TX01-XXXX-XX**
19" Rack mounted, 24VDC power supply, 2 10/100 RJ45 Ethernet
Ports, 8 DB9 Serial Ports, with all Ports on the rear.

**RS416-F-RM-48-48-3R-3R-3R-3R-FX01-FX01-XX**
19" Rack mounted, Dual 48VDC power supply, 4 100FX (Multi Mode
1300nm Fiber) Ethernet ports, 16 RJ45 Serial Ports, with all Ports
on the front.

**RS416-F-RM-HI-XX-3R-3R-3D-3D-FX01-TX01-C01**
19" Rack mounted, HI power supply, 2 100FX (Multi Mode 1300nm
Fiber) Ethernet Ports, 2 10/100 RJ45 Ethernet Ports, 8 RJ45 Serial
Ports, 8 DB9 Serial Ports, with all Ports on the front, conformal
coating.

**Accessories/Options**

41-11-0011 - Cable support bracket (one)

43-10-0007 - Power cable
(North America three prong connector -> beau)

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