RUGGEDCOM®
A Siemens Business

RuggedSwitch® M969
MIL-STD and IP65/IP67 Rated 10-Port Managed Ethernet Switch with Fiber Uplink Ports, 128-bit Encryption

RUGGED RATED™ | **MIL-STD** | **GIGABIT** | **IP66/67** | **eRSTP™** | **ROS** Rugged Operating System™ | **128-bit ENCRYPTION**

The RuggedSwitch™ M969 is a MIL-STD hardened, fully managed Ethernet switch providing dual fiber optical Ethernet ports and eight Fast Ethernet copper ports in a MIL-STD 901D rated package (for protection against vibration and shock impacts) and is IP66/IP67 rated for protection against strong jets of water (IP66) or temporary immersion in water (IP67).

Designed to operate reliably in harsh environments the M969 provides a high level of tolerance to vibrations and shock impact; high level of immunity to electromagnetic interference; an operating temperature range of -40°C to +85°C; hazardous location certification and IP66/IP67 rated waterproof packaging. All of which allows the M969 to be placed in virtually any location.

The embedded Rugged Operating System (ROS˚) 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 M969 is ideal for creating mission-critical, real-time, control applications in any harsh environment.

Features and Benefits

RuggedRated™ for Reliability in Harsh Environments
- MIL-STD 901D Shock
- IP67 Rated for protection against immersion in water
- IP66 Rated for protection against strong jets of water
- Immunity to EMI and heavy electrical surges
- Hazardous Location Certification: Class 1 Division 2
- -40°C to +85°C operating temperature (no fans)
- Conformal coated printed circuit boards

Cyber Security Features
- Multi-level user passwords
- SSH/SSL (128-bit encryption)
- Enable/disable ports, MAC based port security
- Port based network access control (802.1x)
- VLAN (802.1Q) to segregate and secure network traffic
- RADIUS centralized password management
- SNMPv3 authentication and 56-bit encryption

Rugged Operating System (ROS®) Features
- Simple plug and play operation - automatic learning, negotiation, and crossover detection
- MSTP 802.1Q-2005 (formerly 802.1s)
- 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
- Link aggregation (802.3ad)
- IGMP Snooping for multicast filtering
- Port Rate Limiting and Broadcast Storm Limiting
- Port configuration, status, statistics, mirroring, security
- Industrial automation features (eg. Modbus)

Management Tools
- Web-based, Telnet, CLI management interfaces
- SNMP v1/v2/v3 (56-bit encryption)
- Remote Monitoring (RMON)
- Rich set of diagnostics with logging and alarms

Universal Power Supply Options
- Fully integrated power supplies (no external adaptors)
- Popular low voltage ranges: 24VDC (10-36VDC), 48VDC (36-59VDC)
- Universal high-voltage range: 88-300VDC or 85-264VAC
- Dual redundant, parallel load-sharing power supplies (option)
- Powered from different sources
- Available with M23 style connectors
- CSA/UL 60950 safety approved to +85°C

Ethernet Ports
- Fiber Optical Ethernet Ports (100BaseX and 1000BaseX) with:
  - IP66/IP67 Rated fiber optical connectors (type LC)
- 8 - Fast Ethernet Ports (10/100BaseTX) with:
  - IP66/IP67 Rated M12 D-code connectors or
  - IP66/IP67 Rated shrouded RJ45 style connectors

RUGGEDCOM
ISO 9001 REGISTERED

RUGGEDCOM®
INDUSTRIAL STRENGTH NETWORKS™

M969 (M23 Connectors)

Fast Ethernet Ports:
▶ 8 - Fast Ethernet Ports (10/100BaseTX)
▶ M12D Connectors
▶ High EMI immunity
▶ Transient and Surge protected

LED Indicators
▶ Link Activity per port
▶ Power and Alarm

Console Port:
▶ RS232 programming port

Water-proof Enclosure
▶ IP66 Rated (Water-Jet)
▶ IP67 Rated (Immersed)
▶ Flush Mount
▶ Aluminum

Failsafe Output Relay
▶ Form-C contact output
▶ 1A@30VDC

Optional Fiber Optical Ethernet Ports
▶ 2 - Fiber Optical Ethernet Ports (100BaseX or 1000BaseX)
▶ Fiber Optical (up to 25km)
▶ Waterproof covers when not in use

Power Supply
▶ Universal high-voltage range: 88-300VDC or 85 - 264VAC
▶ Popular low voltage DC ranges: 24VDC (10-36VDC), 48VDC (36-59VDC)
▶ M23 Connector

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M969 (RJ45 Connectors)

Fast Ethernet Ports:
▶ 8 - Fast Ethernet Ports (10/100BaseTX)
▶ IP67 Rated RJ45 Connectors
▶ High EMI immunity
▶ Transient and Surge protected

LED Indicators
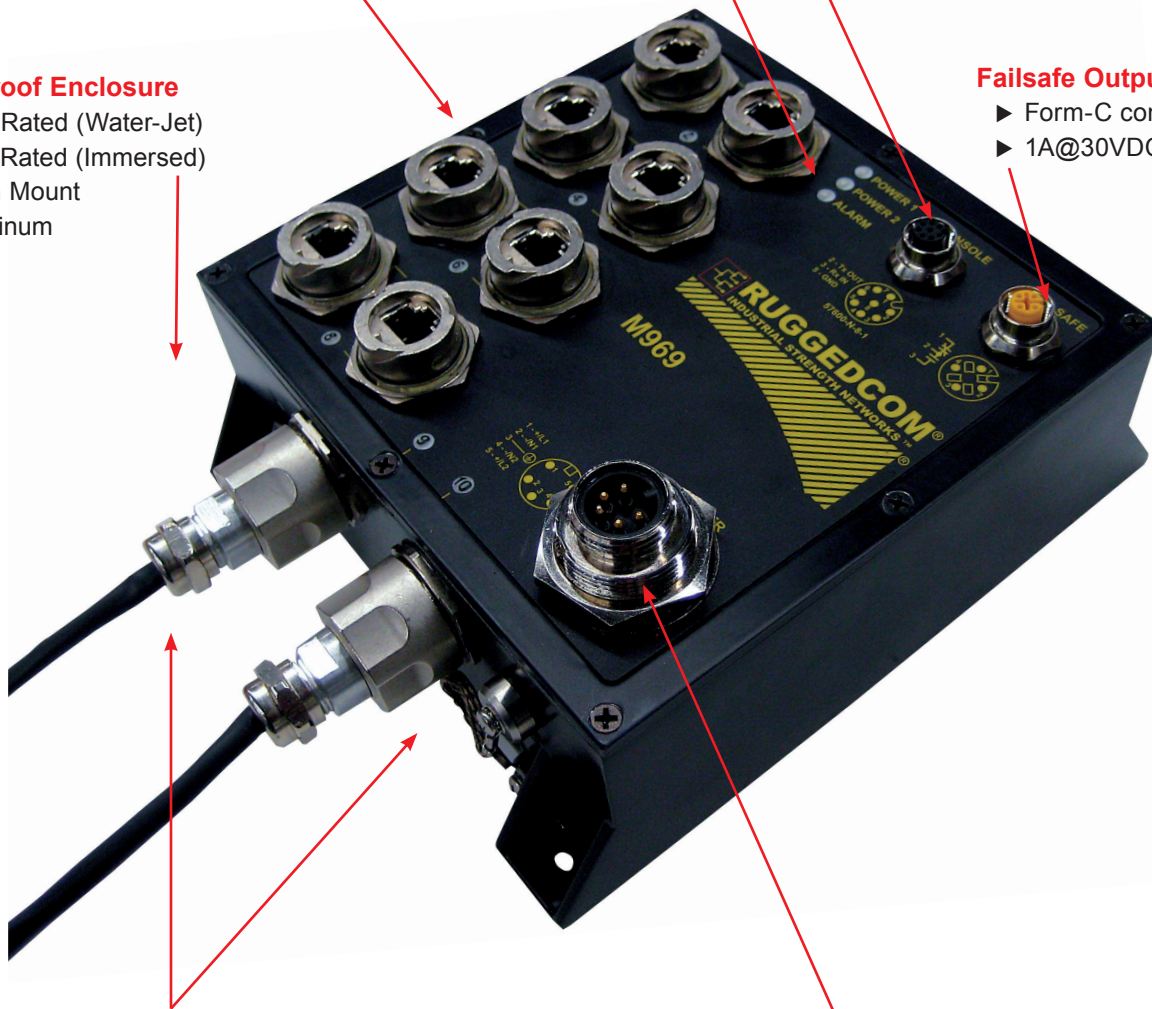▶ Link Activity per port
▶ Power and Alarm

Console Port:
▶ RS232 programming port

Water-proof Enclosure
▶ IP66 Rated (Water-Jet)
▶ IP67 Rated (Immersed)
▶ Flush Mount
▶ Aluminum

Failsafe Output Relay
▶ Form-C contact output
▶ 1A@30VDC

Optional Fiber Optical Ethernet Ports
▶ 2 - Fiber Optical Ethernet Ports (100BaseX or 1000BaseX)
▶ Fiber Optical (up to 25km)
▶ Waterproof covers when not in use

Power Supply
▶ Universal high-voltage range: 88-300VDC or 85 - 264VAC
▶ Popular low voltage DC ranges: 24VDC (10-36VDC), 48VDC (36-59VDC)
▶ M23 Connector
▶ Dual-Redundant (option)
▶ Parallel Load Sharing
▶ Can be different sources!

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ROS® Features

ROS
Rugged Operating System™

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 recovery1 of 5ms times the 'bridge diameter' and allows rings of up to 160 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 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).

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ROS® Features

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.

SNTP (Simple Network Time Protocol)
SNTP automatically synchronizes the internal clock of all ROS® devices on the network. This allows for correlation of time stamped events for troubleshooting.

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.

Loss of Link Management
Some intelligent electronic devices (IEDs) have dual fiber optic ports with automatic failover to a backup port should the primary fail. ROS® ensures this mechanism works reliably under all failure modes by appropriately disabling link signals when required. ROS® also flushes learned MAC addresses to ensure the failover occurs quickly.

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	x
IEC 61000-4-4	Burst (Fast Transient)	Signal ports	+/- 4kV @ 2.5kHz	x
		D.C. Power ports	+/- 4kV	4
		A.C. Power ports	+/- 4kV	4
		Earth ground ports [3]	+/- 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 [3]	10V	3
IEC 61000-4-8	Magnetic Field	Enclosure ports	40 A/m continuous, 1000 A/m for 1 s	N/A
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 [2]	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				
Test	**Description**		**Test Levels**	**Severity Levels**
IEEE C37.90.3	ESD	Enclosure Contact	+/- 8kV	N/A
		Enclosure Air	+/- 15kV	N/A
IEEE C37.90.2	Radiated RFI	Enclosure ports	35 V/m	N/A
IEEE C37.90.1	Fast Transient	Signal ports	+/- 4kV @ 2.5kHz	N/A
		D.C. Power ports	+/- 4kV	N/A
		A.C. Power ports	+/- 4kV	N/A
		Earth ground ports3	+/- 4kV	N/A
IEEE C37.90.1	Oscillatory	Signal ports	2.5kV common mode @1MHz	N/A
		D.C. Power ports	2.5kV common, 1kV diff. mode@1MHz	N/A
		A.C. Power ports	2.5kV common, 1kV diff. mode@1MHz	N/A
IEEE C37.90	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 C37.90	Dielectric Strength	Signal ports	2kVac	N/A
		D.C. Power ports	1.5kV DC	N/A
		A.C. Power ports	2kVac	N/A

Environmental Type Tests				
Test	**Description**		**Test Levels**	**Severity Levels**
IEC 60068-2-1	Cold Temperature	Test Ad	-40°C, 16 Hours	N/A
IEC 60068-2-2	Dry Heat	Test Bd	+85°C, 16 Hours	N/A
IEC 60068-2-30	Humidity (Damp Heat, Cyclic)	Test Db	95% (non-condensing), 55°C , 6 cycles	N/A
IEC 60255-21-1	Vibration	Tests Fc	2g @ (10 - 150) Hz	Class 2
IEC 60529 (IPx6)	Ingress Protection	Water Jet	100l/m @ 2.5m as per 14.2.6	N/A
IEC 60529 (IPx7)	Ingress Protection	Water Submersion	30 min @ 1m as per 14.2.7	N/A
IEC 60529 (IP6x)	Ingress Protection	Dust	Talcum 2kg/m³ for 8h as per 13.4	Category 1&2

MIL-STD Tests

MIL-STD Tests		
TEST	**Description**	
MIL-STD-167	Vibration Navy MIL-STD –167-1 Type I	
MIL-STD-461E	CE101	
	CE102	DC 28V
		AC 115V
	RE101	
	RE102	RE102-1, Surface Ship Applications
		RE102-2, Submarine Applications, Internal
		RE102-3, AirCraft and Space Applications
		RE102-4, Ground Applications
	CS101	
	CS114	
	CS115	
	CS116	
	RS101	
	RS103	
MIL-STD-810F	Low Pressure Altitude Method 500.4 Procedure I Storage	
	Low Pressure Altitude Method 500.4 Procedure II Operational	
	High Temperature Method 501.4 Procedure I Storage	
	High Temperature Method 501.4 Procedure II Operational	
	Low Temperature Method 502.4 Procedure I Storage	
	Low Temperature Method 502.4 Procedure II Operational	
	Temperature Shock Method 503.4 Procedure I Storage	
	Acceleration Method 513.5 Procedure II	
	Salt Fog Method 509.4 Procedure I	
	Vibration Method 514.5	
MID-STD 901D*	Shock Med WT HammerQuality	
MIL-STD-1275B	Power Quality	

* Testing complete, pending final documentation (contact RuggedCom for complete details)

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Technical Specifications

Power Supply
- Power Consumption: 10W Max
- 24VDC: 10-36 VDC, 0.4A
- 48VDC: 36-59 VDC, 0.2A
- HI Voltage AC/DC: 88-300VDC or 85-264VAC

Critical Alarm Relay
- Form-C failsafe contact relay: 1A@30VDC

Physical
- Height: 8.25"
- Width: 7"
- Depth: 3.7"
- Weight: 6.3lbs
- Ingress Protection: IP66/IP67
- Enclosure: Cast Aluminum
- Mounting: DIN rail or panel mounted

Switch Properties
- Switching method: Store & Forward
- Switching latency: 7 us
- Switching bandwidth: 5.6Gbps
- MAC addresses: 8192
- MAC address table size: 64kbytes
- Priority Queues: 4
- Frame buffer memory: 1 Mbit
- Simultaneous VLANs: 255
- VLAN ID Range: 1 to 4094
- IGMP multicast groups: 256
- Port rate limiting: 62kbps to 256Mbps
- No head of line blocking

Approvals
- Hazardous Locations: Class 1, Division 2 (Pending)
- ISO: Designed and manufactured using a ISO9001: 2000 certified quality program
- CE Marking (Pending)
- Emissions: FCC Part 15 (Class A), EN55022 (CISPR22 Class A) (Pending)
- Safety: cCSAus (Compliant with CSA C22.2 No. 60950, UL 60950, EN60950) (Pending)
- Laser Eye Safety (FDA/CDRH): Complies with 21 CFR Chapter1, Subchapter J. (Pending)

Warranty
- 5 Years - Applicable to design and 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

MIL-STD
- Listed on page 7

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 (pending)

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
- 802.1Q-2005 (formerly 802.1s) MSTP

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-VSM
- 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			
Parameter	Fiber Port Type		
Mode	Multimode	Singlemode	Singlemode
Connector	LC	LC	LC
Typical Dist.	500m	10km	25km
Optical Wavelength (nm)	850	1310	1310
Cable SizeCore/Cladding (um)	50/125 or 62.5/125	8/125 or 9/125	8/125 or 9/125
TX Power (Min/Max) (dBm)	-9.5/-4	-9/-3	-7 / 3
RX Sensitivity (dBm)	-20	-22	-26
RX Saturation (dBm)	0	-3	-3
Typical Budget (dB)	14	17	19

M969 (M12 Connectors)
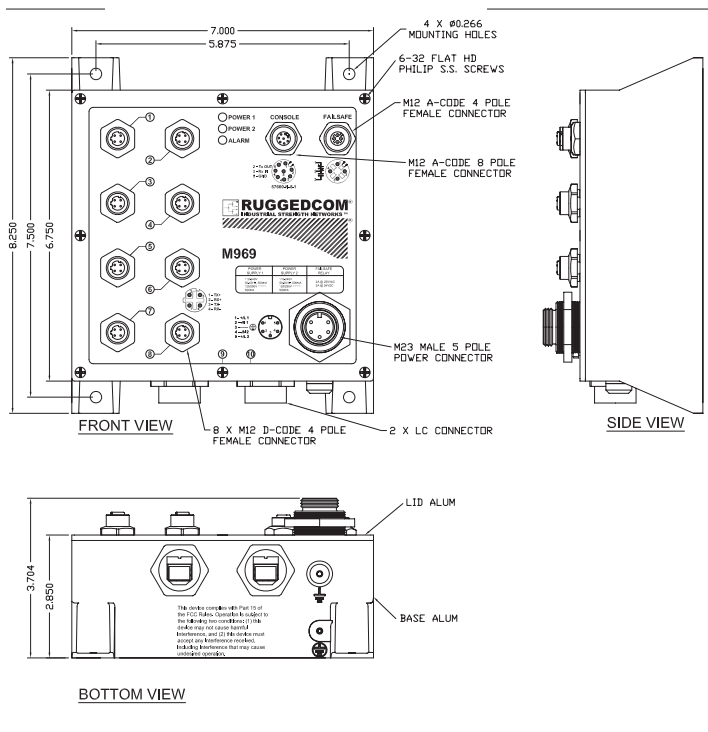
M969 (RJ45 Connectors)
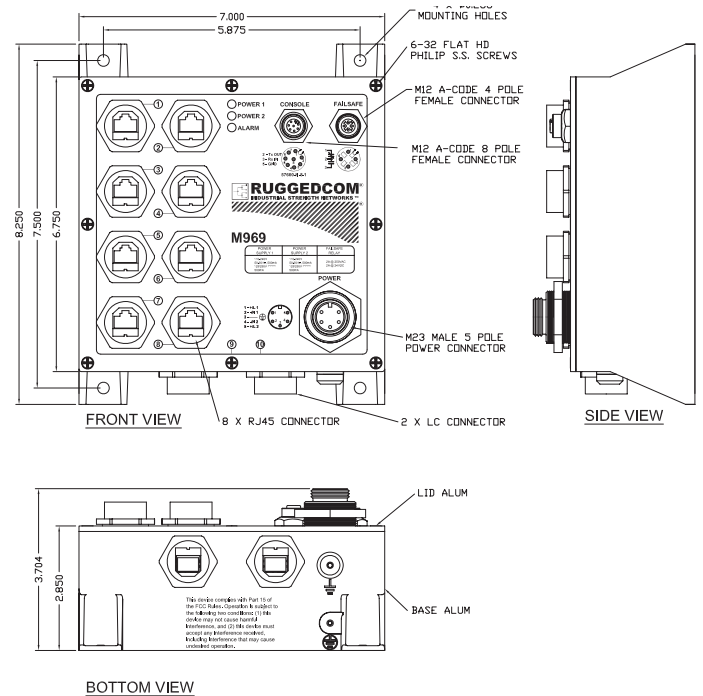
Order Codes

M969 - _____ - ____ - ____ - ____ - ____

            MODEL   PS1   PS2   P9   P10

MODEL: Ethernet and Power Connectors
- M23 = 8 M12 D-Code Ethernet ports and M23 power
- RJ45 = 8 RJ45 IP67 Ethernet ports and M23 power

PS1: Power Supply 1
- 24 = 24VDC (10 - 36VDC)
- 48 = 48VDC (36 - 59VDC)
- HI = 88-300VDC or 85-264VAC

PS2: Power Supply 2 (requires M23 Connector)
- 0 = None
- 24 = 24VDC (10 - 36VDC)
- 48 = 48VDC (36 - 59VDC)
- HI = 88-300VDC or 85-264VAC

P9/P10: Port 9 & 10 IP67 Rated Fiber Optical Ports*
- XXXXX = None
- 1FG01 = 1000SX Multimode, LC, 850, 500m
- 1FG03 = 1000LX Singlemode, LC, 1310nm, 10km
- 1FG05 = 1000LX Singlemode, LC, 1310nm, 25km
- 1FX11 = 100FX – Multimode, 1300nm, LC
- 1FX06 = 100FX – Singlemode, 1300 nm, LC connectors, 20km
- 1FX08 = 100FX – Singlemode, 1300 nm, LC connectors, 50km
- 1FX10 = 100FX – Singlemode, 1300 nm, LC connectors, 90km

*Note: if 2 ports are selected, they must be the same option.

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MIL-STD and IP65/IP67 Rated 10-Port Managed Ethernet Switch with Fiber Uplink Ports, 128-bit Encryption

Example Order Codes:

M969-M23-48-0-1FG01-0
8 Ethernet ports with M12D connectors, Single 48VDC Power
Supply with M23 connector, Single Gigabit IP67 rated Fiber
Optical port (Multimode, 850nm, 500m distance).

M969-RJ45-24-HI-1FG03-1FG03
8 Ethernet ports with RJ45 connectors, Dual Power Supply with
M23 connectors (24VDC and HI Type), Dual Gigabit IP67 rated
Fiber Optical ports (Singlemode, 1310nm, 10km distance).

Accessories/Options
41-11-0011 - Cable support bracket (one)

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

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