RuggedBackbone™ RX5000

Utility Grade Multi-Service Platform

U.S. Patent 7,974,093

The RuggedBackbone™ RX5000 has the carrier grade performance that you would expect to find in a high port density routing and switching platform. The ROX™II firmware supports a rich array of features such as eRSTP™, RuggedCom's enhanced rapid spanning tree protocol, support for transaction based configuration with rollback, and a powerful CLI.

The RX5000 delivers utility grade reliability by being designed to withstand high levels of electromagnetic interference, radio frequency interference and a wide temperature range of -40°C to +85°C. This platform is designed to meet the challenging climatic and environmental demands found in utility, industrial and military network applications. The RX5000's superior rugged hardware design coupled with the embedded ROX™II operating system provides improved system reliability when your network needs it the most. The cyber security and networking features make it ideally suited for creating secure Ethernet networks for mission critical, real-time, control applications.

The RuggedBackbone™ RX5000 has the lowest total cost of ownership for products in its class. The RX5000's modular and scalable design allows customers to defer module purchases if they are not immediately needed.

The field replaceable modules reduce the mean time to repair, and allow field upgrades so customers can reconfigure the RX5000 as their network grows or their needs change.

Key Features and Benefits

Ethernet Ports

- Up to 96 10/100TX + 2 10/100/1000T copper ports
- Up to 48 100FX optical ports
- Up to 24 Gigabit Ethernet ports
- Up to 2 x 10Gigabit Ethernet ports
- Long-haul optics allow distances up to 90km
- Multiple connector types (ST, MTRJ, LC, SC)

Serial Ports

- Fully compliant EIA/TIA RS485, RS422, RS232 serial ports (software selectable) – DB9 connectors
- DNP, MODBUS, Raw Socket
- Raw socket provides encapsulation of any serial protocol

Cyber Security Features

- Multi-level passwords
- SSH/SSL encryption
- Enable/disable ports, MAC based port security
- VLAN (802.1Q) to segregate and secure network traffic
- Integrated stateful firewall
- VPN/IPSEC
- Role based access control

RuggedRated™ for Reliability in Harsh Environments

- Immunity to EMI and high voltage electrical transients
  - Zero-Packet-Loss Technology
  - 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 environment)
- -40°C to +85°C operating temperature (no fans)
- Conformal coated printed circuit boards (optional)

ROX™II Software Features

- Next Generation of ROX™
- 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
- L2TPv2 and L2TPv3
- VLAN (802.1Q) with GVRP support
- Link aggregation
- Traffic control/traffic shaping
- Transaction based configuration with rollback
- GMRP and services
- PIM-SM

Advanced Services

- MPLS Static Label Support
- MPLS Label Distribution Protocol (LDP)

Management Tools

- Web-based, Telecom Standard CLI management interfaces
- SNMP v1/2/3
- Rich set of diagnostics with logging
- NETCONF

Universal Power Supply Options

- Fully integrated, dual-redundant (optional) power supplies
- Universal high voltage ranges: 88-300VDC or 85-264VAC
- Terminal blocks for reliable maintenance free connections
- CSA/UL 60950 safety approved to 85°C

Warranty

- 5 Year Warranty

RUGGEDCOM ISO 9001 REGISTERED

RuggedBackbone™ RX5000

Modularity:
- Field replaceable
- Up to 6 slots for Line Modules

Serial Ports:
- Up to 48 RS485, RS422, RS232

Fast Ethernet Port Types
- Up to 96 100TX or 48 100FX ports
- 10/100TX RJ45
- 100FX Multi- and Singlemode

Gigabit Port Types:
- Up to 24 Gigabit ports
- 10/100/1000TX
- 1000SX Multimode
- 1000LX Singlemode
- Fixed or SFP Optics
- SC, LC Optics

Switch Module: Supports up to 88Gbps

8Gbps Switch Module
- Layer 2 or Layer 3 switching
- Up to 2 x 1Gigabit copper, fiber or SFP ports

88Gbps Switch Module
- Layer 2 or Layer 3 switching
- Up to 2 x 10Gigabit SFP ports

Integrated Power Supplies
- Dual-redundant (optional) power supplies
- Universal high voltage ranges: 88-300VDC or 85-264VAC
- Hot-Swappable

Operating Temperature
- -40°C to +85°C
- No Fans

Critical Alarm Relay
- Form-C contact ratings: Max Voltage 150VAC,125VDC Max Current 2A@150VAC, 2A@30VDC

ROX™II Features

ROX™II Software Features

- Enhanced Security/Reliability through Data and Control path separation
- Simple plug and play operation – automatic learning, negotiation, and crossover detection
- Telecom Standard Command Line Interface (CLI)
- Single File Configuration Automation ensures easy installation & Configuration control
- Automatic Rollback in the event of configuration errors (Configurable)
- NETCONF configuration interface supports powerful remote configuration and status features.
- VLAN (802.1Q)
- Port Rate and Broadcast Storm Limiting
- Port configuration, status, statistics, mirroring
- NTP time synchronization (client and server)
- MSTP 802.1Q-2005 (formerly 802.1s)
- RSTP (802.1w) and Enhanced Rapid Spanning Tree (eRSTP™) network fault recovery
- Quality of Service (802.1p) for real-time traffic
- Traffic Control
- SNMP v1, v2c and v3

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 ROX™II 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 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

Firewall - Integrated stateful firewall provides protected network zones

VPN/IPSEC - Allows creation of secure encrypted and authenticated tunnels

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 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. eRSTP also provides fast and deterministic behaviour for root bridge failure

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. ROX™II 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. ROX™II 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. ROX™II 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.

A feature of SNMP supported by ROX™II 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.

NETCONF Configuration Interface

The NETCONF configuration interface will allow administrators to set device parameters and receive device updates through the use of XML based commands. This standard, supported by multiple vendors, makes it possible to greatly simplify the task of network management.

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

ROX™II Features

ROX® Rugged Operating System™ on Linux

NTP (Simple Network Time Protocol)

NTP automatically synchronizes the internal clock of all ROX™II devices on the network. This allows for correlation of time stamped events for troubleshooting.

Port Rate Limiting

ROX™II 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. ROX™II limits this by filtering broadcast frames with a user-defined threshold.

Port Mirroring

ROX™II 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

ROX™II 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

ROX™II provides continuously updating statistics per port that provide both ingress and egress packet and byte counters as well as detailed error figures.

HTML User Interface

ROX™II provides a simple, intuitive user interface for configuration and monitoring via a standard graphical web browser or via standard telcom UI. All system parameters include detailed on-line help to make setup a breeze. ROX™II presents a common look and feel and standardized configuration process allowing easy migration to other RuggedCom managed products.

Command Line Interface (CLI)

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

OSPF (Open Shortest Path First)

OSPF is a routing protocol that determines the best path for routing IP traffic over a TCP/IP network based on link states between nodes and several quality parameters. OSPF is an interior gateway protocol (IGP), which is designed to work within an autonomous system. It is also a link state protocol, meaning that the best route is determined by the type and speed of the inter-router links, not by how many router hops they are away from each other (as in Distance-Vector routing protocols, i.e. Rip and RIP II).

BGP (Border Gateway Protocol)

BGPv4 is a path vector routing protocol where routing decisions are made based on the policies or rules laid out by the network administrator. It is typically used where networks are multihomed between multiple Internet Service Providers, or in very large internal networks where internal gateway protocols do not scale sufficiently.

Software Options

Feature	Layer 2 Standard Edition	Layer 3 Standard Edition	Layer 3 Security Options
VLANs (802.1Q)	✓	✓	✓
QoS (802.1p)	✓	✓	✓
MSTP (802.1Q-2005) formerly 802.1s	✓	✓	✓
RSTP	✓	✓	✓
eRSTP	✓	✓	✓
SNTP	✓	✓	✓
L2TPv2 and L2TPv3	✓	✓	✓
Port Rate Limiting	✓	✓	✓
Broadcast Storm Filtering	✓	✓	✓
Port Mirroring	✓	✓	✓
SNMP v1/v2/v3	✓	✓	✓
RMON	✓	✓	✓
CLI	✓	✓	✓
HTML User Interface	✓	✓	✓
MPLS		✓	✓
DHCP		✓	✓
VRRPv2 and VRRPv3		✓	✓
PIM-SM		✓	✓
Firewall		✓	✓
OSPF		✓	✓
BGP		✓	✓
RIP v1/v2		✓	✓
Traffic Prioritization		✓	✓
VPN			✓
IPSec			✓

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	2kVac	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	2kVac
		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 Response		Level 2 (1G @ 10-150 Hz)
	Vibration Endurance		Level 2 (2G @ 10-150 Hz)
IEC 60255-21-2	Shock Response		Level 1 (5G @ 11ms)
	Shock Withstand		Level 2 (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: 100W Max
- HI Voltage AC/DC: 88-300VDC or 85-264VAC

Critical Alarm Relay
- Form-C contact ratings:
- Max Voltage 150VAC,125VDC
- Max Current 2A@150VAC, 2A@30VDC

Physical
- Height: 6.9”
- Width: 17.9”
- Depth: 11.89”
- Weight: Dependent upon module selection
- Ingress Protection: IP40 (1mm objects)
- Mounting: rack mounted, panel mounted

Switch Properties
- Switching method: Store & Forward
- Switching latency: 10.5 µs
- Up to 88Gbps switching bandwidth
- MAC addresses: 98304**
- Priority Queues: 4
- Frame buffer memory: 2 Mbit
- Simultaneous VLANs: 255
- VLAN ID Range: 1 to 4094
- IGMP multicast groups: 256
- Port rate limiting
- No head of line blocking

Approvals
- ISO: Designed and manufactured using a ISO 9001 certified quality program
- ISO: Environmental Management System is certified ISO 14001
- CE Marking
- Emissions: FCC Part 15 (Class A),EN55022 (CISPR22 Class A)
- Safety: cTUVus (Compliant to UL 60950-1:2007; CAN/CSA-C22.2 No. 60950-1-07; EN 60950-1:2006)
- Laser Eye Safety (FDA/CDRH): Complies with 21 CFR Chapter1, Subchapter J.

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

Network Management
- HTTP graphical web-based
- SNMP v1, v2c, v3
- SSH, VT100
- Command Line Interface (CLI)

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
- 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
- 802.1Q-2005 (formerly 802.1s) MSTP

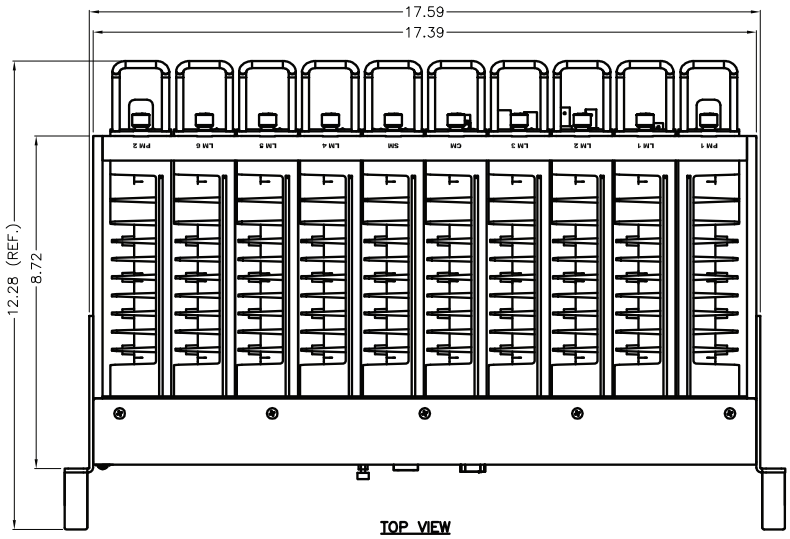
IETF RFC Compliance
- RFC768-UDP
- RFC783-TFTP
- RFC791-IP
- RFC792-ICMP
- RFC793-TCP
- RFC826-ARP
- RFC854-Telnet
- RFC894-IP over Ethernet
- RFC1112-IGMP v1
- RFC1519-CIDR
- RFC1541-DHCP (client)
- RFC2030-SNTP
- RFC2068-HTTP
- RFC2236-IGMP v2
- RFC2284-EAP
- RFC2475-Differentiated Services
- RFC2865-RADIUS
- RFC3414-SNMPv3-USM
- RFC3415-SNMPv3-VACM
- RFC2661-L2TPv2
- RFC3931-L2TPv3
- RFC3768-VRRPv2
- RFC5798-VRRPv3

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

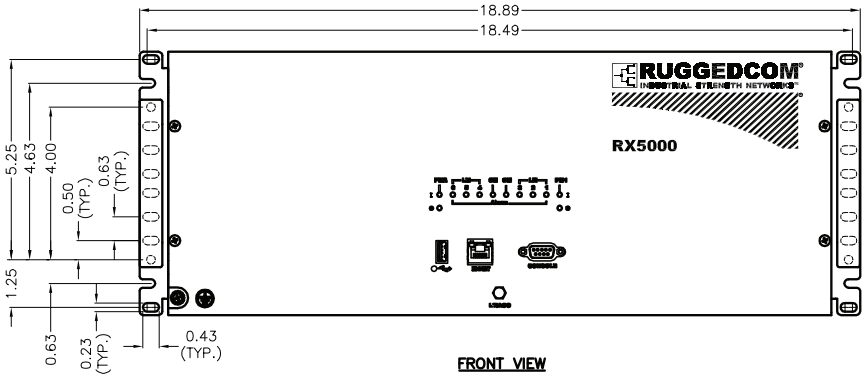
IEC 61850 Compliance
- IEC 61850-9-2 Sampled Values
- IEC 61850-8-1 GOOSE Messages

** Dependent on Line Modules selected

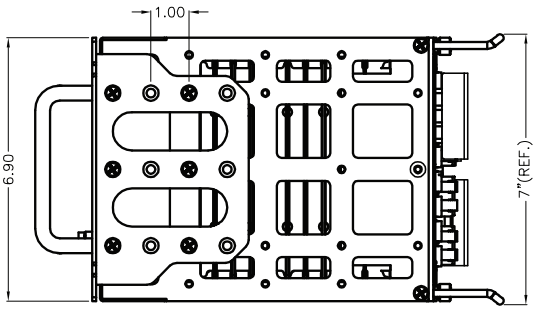
Mechanical Drawing – Front Panel Mount



TOP VIEW

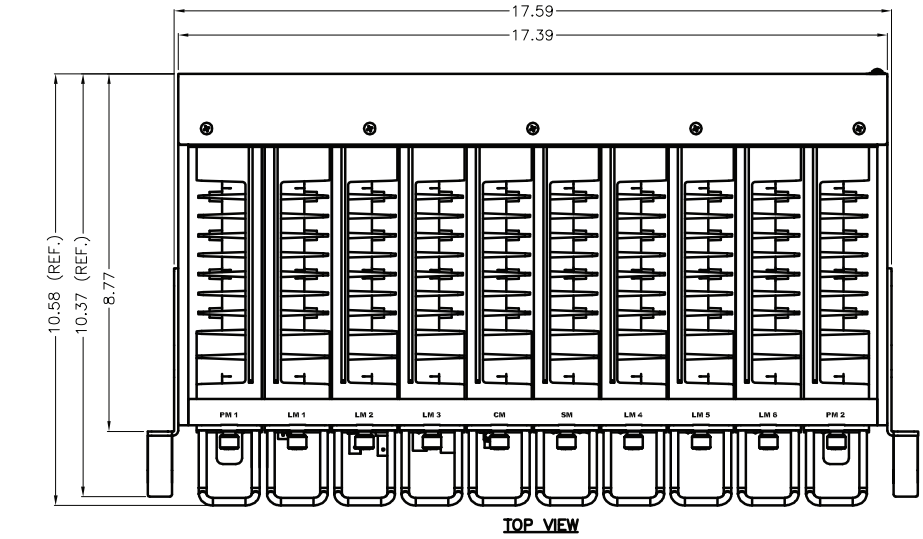


FRONT VIEW

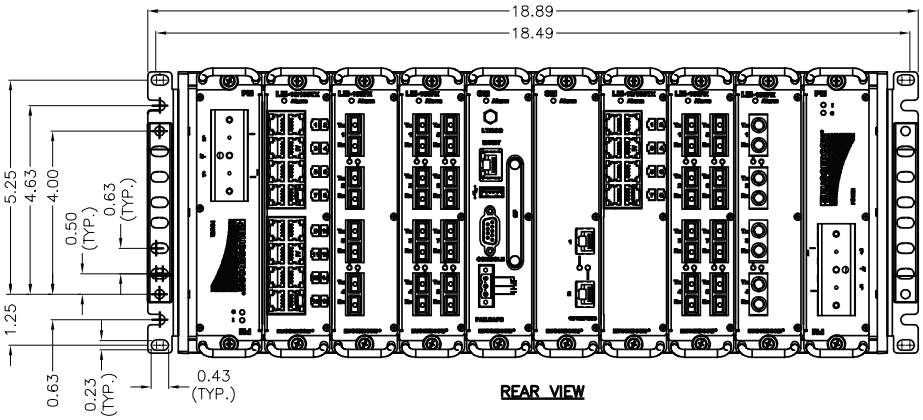


SIDE VIEW

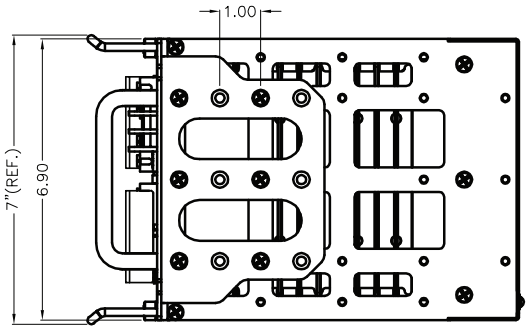
Mechanical Drawing – Rear Rack Mount



TOP VIEW

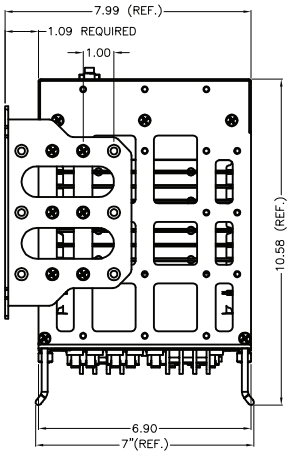


REAR VIEW



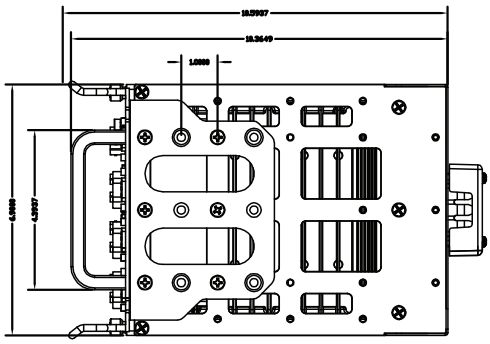
SIDE VIEW

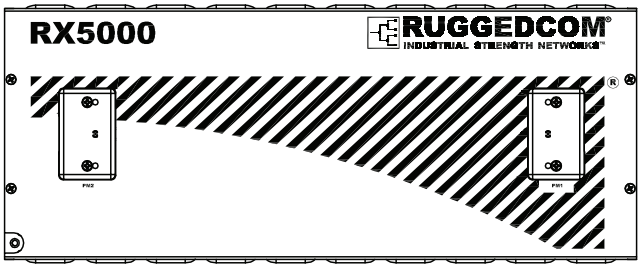
Mechanical Drawing – Example of Panel Mount

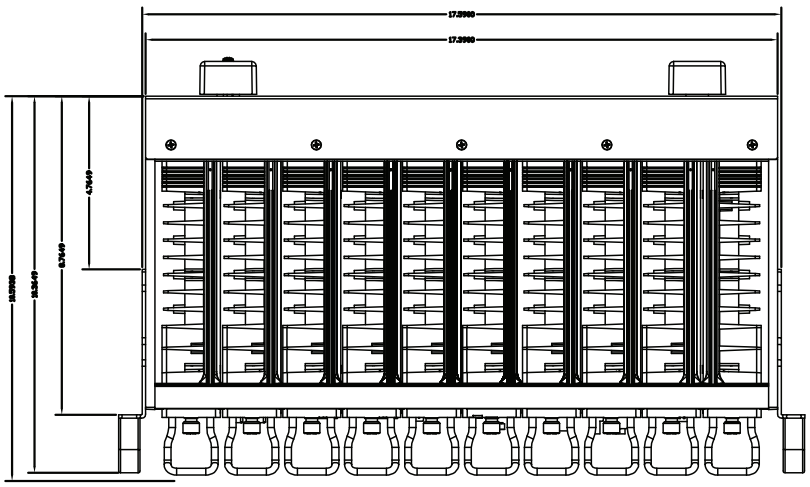


SIDE VIEW

Mechanical Drawing – Rear Rack Mount with power terminal blocks on front



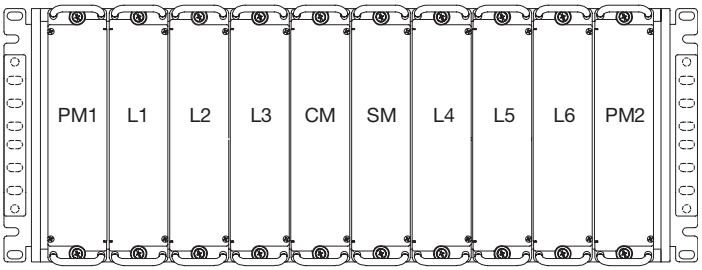




Order Codes

RX5000 – ____ – ____ – ____ – ____ – ____ – ____ – ____ – ____ – ____ – ____ – ____ – ____ – ____ – ____

Main MNT PM1 PM2 SM CM SFT L1 L2 L3 L4 L5 L6 MOD



MAIN: Ethernet and Power Connectors

- F = Rack Front Mount, Interfaces and LEDs on Front
- R = Rack Rear Mount, no interfaces/LEDs on Front Panel
- R2 = Rack Rear Mount, Front panel with Power Terminal Blocks

MNT: Mounting Options

- PM = Panel Mount Kit
- RM = 19" Rack Mount Kit
- 00 = No Mounting Option

PM1 and PM2: Power Modules 1 and 2
Power Modules for MAIN type: F and R

- HI = 88- 300VDC or 85 - 264VAC screw terminal block
- XX = Blank Module

Power Modules for MAIN type: R2

- HIF = 88-300VDC or 85-264VAC w/Front screw terminal block
- XX = Blank Module

SM: Switch Module:
Layer 2/8 Gigabit Throughput Switch Module Options

- SM01 = no uplink ports
- SM02 = 2x 10/100/1000T RJ45
- SM04 = 2x 1000SX Multimode 850nm LC 500m
- SM05 = 2x 1000LX Singlemode 1310nm SC 10km
- SM06 = 2x 1000LX Singlemode 1310nm LC 10km
- SM07 = 2x 1000LX Singlemode 1310nm SC 25km
- SM08 = 2x 1000LX Singlemode 1310nm LC 25km
- SM09 = 2x 1000LX SFP

Layer 3/8 Gigabit Throughput Switch Module Options

- SM31 = no uplink ports
- SM32 = 2x 10/100/1000T RJ45
- SM34 = 2x 1000SX Multimode 850nm LC 500m
- SM35 = 2x 1000LX Singlemode 1310nm SC 10km
- SM36 = 2x 1000LX Singlemode 1310nm LC 10km
- SM37 = 2x 1000LX Singlemode 1310nm SC 25km
- SM38 = 2x 1000LX Singlemode 1310nm LC 25km
- SM39 = 2x 1000LX SFP Blank (no optical transceiver)

Layer 3/88 Gigabit Throughput Switch Module Options

- SM61 = no uplink ports
- SM69 = 2x 10G SFP+ Blank (no optical transceiver)

CM: Control Module

- CM01: Control Module

SFT: Software

- L2SE = Layer 2 Standard Edition
- L3SEL3HW = Layer 3 Standard Edition (with L3 HW)
- L3SEL2HW = Layer 3 Standard Edition (with L2 HW)
- L3SECL3HW = Layer 3 Security Edition (with L3 HW)
- L3SECL2HW = Layer 3 Security Edition (with L2 HW)

L1 through L6: Line Modules
Blank Module

- XX = Blank Module

Serial Line Module

- S01 = 8x RS232/RS422/RS485 via DB9

10/100 BaseTX 16 Ports

- 16TX01 = 16x 10/100TX RJ45

100FX modules with 8 Ports

- 8FX01 = 8x 100FX Multimode 1310nm ST 2km
- 8FX02 = 8x 100FX Multimode 1310nm SC 2km
- 8FX11 = 8x 100FX Multimode 1310nm LC 2km
- 8FX03 = 8x 100FX Multimode 1310nm MTRJ 2km
- 8FX04 = 8x 100FX Singlemode 1310nm ST 20km
- 8FX05 = 8x 100FX Singlemode 1310nm SC 20km
- 8FX06 = 8x 100FX Singlemode 1310nm LC 20km
- 8FX07 = 8x 100FX Singlemode 1310nm SC 50km
- 8FX08 = 8x 100FX Singlemode 1310nm LC 50km
- 8FX09 = 8x 100FX Singlemode 1310nm SC 90km
- 8FX10 = 8x 100FX Singlemode 1310nm LC 90km

100FX modules with 4 Ports

- 4FX01 = 4x 100FX Multimode 1310nm ST 2km
- 4FX02 = 4x 100FX Multimode 1310nm SC 2km
- 4FX11 = 4x 100FX Multimode 1310nm LC 2km
- 4FX03 = 4x 100FX Multimode 1310nm MTRJ 2km
- 4FX04 = 4x 100FX Singlemode 1310nm ST 20km
- 4FX05 = 4x 100FX Singlemode 1310nm SC 20km
- 4FX06 = 4x 100FX Singlemode 1310nm LC 20km
- 4FX07 = 4x 100FX Singlemode 1310nm SC 50km
- 4FX08 = 4x 100FX Singlemode 1310nm LC 50km
- 4FX09 = 4x 100FX Singlemode 1310nm SC 90km
- 4FX10 = 4x 100FX Singlemode 1310nm LC 90km

1G modules with 4 Ports†

- 4CG01 = 4x 10/100/1000TX RJ45
- 4FG01 = 4x 1000SX Multimode 850nm LC 500m
- 4FG02 = 4x 1000LX Singlemode 1310nm SC 10km
- 4FG03 = 4x 1000LX Singlemode 1310nm LC 10km
- 4FG04 = 4x 1000LX Singlemode 1310nm SC 25km
- 4FG05 = 4x 1000LX Singlemode 1310nm LC 25km
- 4FG50 = 4x 1000LX SFP Blank (no transceivers)

MOD: Hardware Modifications

- XX = No Hardware modifications
- C01 = Conformal Coating

† 4 port Gigabit modules require the 88Gbps switch module

Example Order Codes:

RX5000–R–RM–HI–XX–SM02–CM01–L2SE-16TX01–16TX01–8FX01–8FX01–8FX01–4FX04–XX

19" Rack Mounted, a single HI power supply, a blank module, one control module, a switch module with 2 copper gigabit ports, running layer 2 standard edition software, 2 (two) 16-Port 10/100BaseTX line modules, 3 (three) 8-Port 100FX multimode line modules, and 1 (one) 4-Port singlemode 20km line module. All Ethernet and Power connectors are on the rear of unit. No hardware modifications.

RX5000–F–RM–HI–HI–SM09–CM01–L2SE–8FX03–8FX03–8FX03–8FX03–4FX04–XX–XX

19" Rack Mounted, 2 (two) HI power supplies, one control module, a switch module with 2 Gigabit Ethernet SFP blank slots (no transceivers), running layer 2 standard edition software, 4 (four) 8-Port 100FX Multimode line modules, 1 (one) 4-Port 100FX singlemode line module, and a blank line module. All Ethernet ports and Power connectors will be on the rear. A LED panel will be on the front of the unit. No hardware modifications.

Accessories/Options:

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

10Gigabit SFP+ Module

- 99-25-0008 - 10G SFP+, Single Mode LC, 10Km, 1310nm

Gigabit SFPs

- 99-25-0111 – 1000SX SFP Multimode LC, 850nm, 500m
- 99-25-0100 – 1000LX SFP Singlemode LC, 1310nm, 10km
- 99-25-0101 – 1000LX SFP Singlemode LC, 1310nm, 25km
- 99-25-0109 – 1000LX SFP Singlemode LC, 1550nm, 70km

Bidirection SFPs

- 99-25-0206 – 1000BX SFP Singlemode LC, 1310Tx 1490Rx,10km
- 99-25-0207 – 1000BX SFP Singlemode LC, 1490Tx 1310Rx,10km
- 99-25-0208 – 1000BX SFP Singlemode LC, 1310Tx 1490Rx, 40km
- 99-25-0209 – 1000BX SFP Singlemode LC, 1490Tx 1310Rx, 40km

Modules, Power, Switch & Line Modules:

Power, Switch or Line Modules, may be ordered as individual parts. An empty chassis and brackets may also be ordered as single pieces.

RX5000PN – ____– ____
PT MOD

PT: Individual Part to be ordered

The Part may be chosen from MNT or any module from the RX5000 order codes page.

By specifying a module you are selecting a line module that may be seated into the RX5000 unit without any cabling.

By specifying a Main option you are selecting an empty chassis.

By specifying a MNT option you are selecting brackets for the RX5000

MOD: Hardware Modifications

- XX = No Hardware modifications
- C01 = Conformal Coating

Additional Part numbers used for Software Upgrades:

- SFTUP1 = Layer 2 Standard Edition to Layer 3 Standard Edition
- SFTUP2 = Layer 2 Standard Edition to Layer 3 Security Edition
- SFTUP3 = Layer 3 Standard Edition to Layer 3 Security Edition

Control Modules:

Control Modules may be ordered as ordered as individual parts. The order code is below:

RX5000PN - CM01 - XX - ____
PT MOD SFT

PT: Individual Part to be ordered

- CM01 = Control Module

MOD: Hardware Modifications

- XX = None

SFT: Software

- L2SE = Layer 2 Standard Edition
- L3SEL3HW = Layer 3 Standard Edition (with L3 HW)
- L3SEL2HW = Layer 3 Standard Edition (with L2 HW)
- L3SECL3HW = Layer 3 Security Edition (with L3 HW)
- L3SECL2HW = Layer 3 Security Edition (with L2 HW)

Example Order Codes:

- **RX5000PN–HI–XX**
  This is one HI power supply module
- **RX5000PN-CM01-XX-L2SE**
  One Control Module with Layer 2 Standard Edition software

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Rev 1t - 02/03/14

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