



Order your RuggedBackbone™ MX5000 pre-installed and cabled within the RuggedEnclosure™ for the industry's most complete MIL-STD Ethernet switch offering.

Enhanced Protection through the RuggedEnclosure™

The RuggedEnclosure™ is a tough aluminum enclosure built to improve the MX5000's already impressive shock and vibration performance and even further reduce, the already low, electronic emissions from the MX5000. The RuggedEnclosure™ uses EMI Glass and provides a patch panel with EMI gaskets to keep emissions at a minimum. This hard mounted enclosure when coupled with the MX5000 continues RuggedCom's tradition of pioneering advanced networking solutions specifically for the harsh environments found in Military applications.

Full descriptions of both the RuggedEnclosure™ and the RuggedBackbone™ MX5000 are available on their respective data sheets.



RuggedEnclosure™

EMI glass allows internal visibility of electronics

Removable front panel provides easy service and maintenance access

Ample room for on front panel application specific labels.

Tough Aluminum enclosure to absorb shock and vibration

Welded 6061-T4 3/16" aluminum construction

Hefty lift hook for transport



Welded 6061-T6 1/2" aluminium mounting brackets with three 1/2" mounting holes withstand MIL 901D hard mounting

IP65 Rated

Retractable feet prevent bottom connector damage during installation

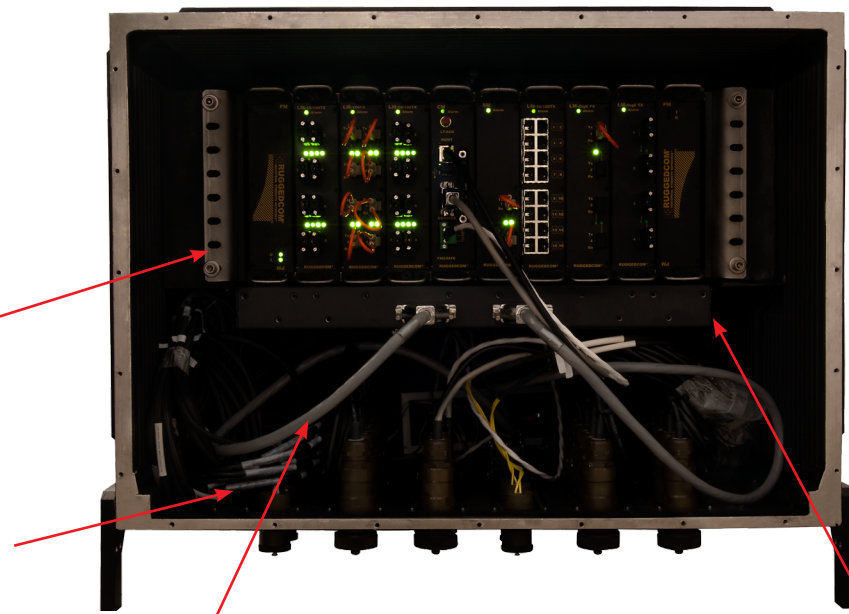
Extrusion fins inside and outside for optimal heat transfer

Hard mounted brackets fits standard 19" rack mount equipment.

Configurable patch panel allows up to 64 MIL grade circular connectors for both copper and fiber media

Integrated cable management for strain relief

Dual internal MIL grade high reliability fans minimize internal temperature gradient with no outside air exchange



RuggedBackbone™ MX5000

Modularity:

- ▶ Field Replaceable modules
- ▶ Up to 6 slots for Line Modules
- ▶ Up to 48 100TX or 48 100FX ports

Serial Ports:

- ▶ Up to 48 RS485, RS422, RS232

Fast Ethernet Port Types

- ▶ Up to 48 10/100TX MicroD
- ▶ Up to 96 10/100TX RJ45 ports
- ▶ Up to 48 100FX ports
- ▶ 100FX Multi- and Singlemode

Gigabit Port Types:

- ▶ Up to 24 Gigabit ports
- ▶ 1000SX Multimode
- ▶ 1000LX Multimode
- ▶ ST and LC connectors



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

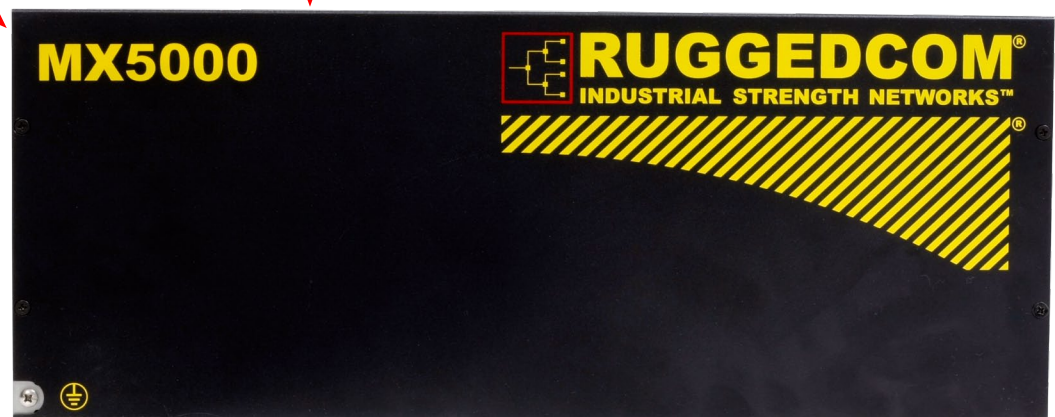
- ▶ Dual-redundant (optional) power supplies
- ▶ Universal high voltage ranges:
88-300VDC or 85-264VAC
- ▶ Hot-Swappable

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



Technical Specifications for the RuggedEnclosure™

Physical

- Height: 22.5"
- Width: 29.38"
- Depth: 19.06"
- Weight: 180 lbs fully loaded
- Ingress Protection: IP65 (dust tight, water jets)
- Enclosure: Aluminum alloy enclosure
- Mounting: panel mounted

MIL-STD Ratings (depends on enclosed electronics)

- MIL-STD 901D – Shock (Hard Mounted)
- MIL-STD 167 – Vibration
- MIL-STD 461 – EMI
- MIL-STD 1399 – Magnetic Field (DC Magnetic Exposure)
- MIL-STD 810 – Temperature and Humidity

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 250VAC,125VDC
- Max Current 2A@250VAC, 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 μ s
- Up to 88Gbps switching bandwidth
- MAC addresses: 98304*
- MAC address table size: 64 kbytes
- 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
- 802.1x-Port Based Network Access Control
- 802.1Q-2005 (formerly 802.1s) MSTP

IEC 61850 Compliance

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

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
- RFC2475-Differentiated Services

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

*Dependent on line modules selected

EMI and Environmental Type Tests

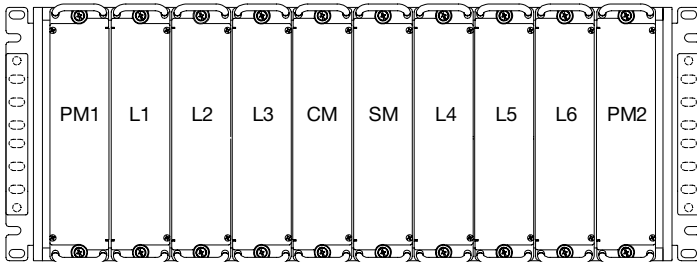
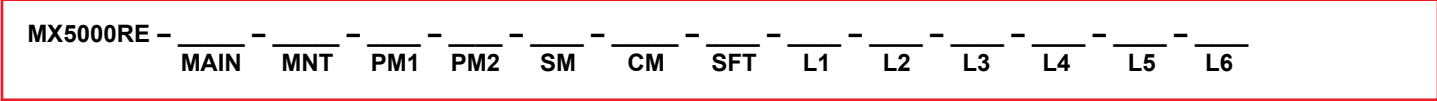
IEC 61850-3 EMI TYPE TESTS				
TEST	Description		Test Levels	Severity Levels
IEC 61000-4-2	ESD	Enclosure Contact	+/- 8kV	4
		Enclosure Air	+/- 15kV	4
IEC 61000-4-3	Radiated RFI	Enclosure ports	20 V/m	Note 1
IEC 61000-4-4	Burst (Fast Transient)	Signal ports	+/- 4kV @ 2.5kHz	Note 1
		D.C. Power ports	+/- 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 1000 A/m for 1 s	Note 1 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
IEC 61000-4-11		A.C. Power ports	30% for 1 period, 60% for 50 periods	N/A
			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
IEC 61000-4-17	Ripple on D.C. Power Supply	D.C. Power ports	30V Continuous, 300V for 1s	4
		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 ports ³	+/- 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	+85C, 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.

Order Codes



MAIN: Ethernet and Power Connectors

- MR1 = Fan Controller and Power Terminal Blocks on Front Panel

MNT: MX5000 Mounting Option within the enclosure

- 4RU = RuggedEnclosure Mounting option for the MX5000

PM1 and PM2: Power Modules 1 and 2

- MHIF = 88- 300VDC or 85 - 264VAC, supports power terminal block on front panel
- XX = Blank Module

SM: Switch Module

Layer 2 /8 Gigabit Throughput Switch Module Options

- MSM01 = with No Ports on Switch Module
- MSM04 = with 2x 1000SX Multimode, 850nm, LC, 500m
- MSM06 = with 2x 1000LX Singlemode, 1310nm, LC, 10km
- MSM08 = with 2x 1000LX Singlemode, 1310nm, LC, 25km

Layer 3 /8 Gigabit Throughput Switch Module Options

- MSM31 = with No Ports on Switch Module
- MSM34 = with 2x 1000SX Multimode, 850nm, LC, 500m
- MSM36 = with 2x 1000LX Singlemode, 1310nm, LC, 10km
- MSM38 = with 2x 1000LX Singlemode, 1310nm, LC, 25km

Layer 3 /88 Gigabit Throughput Switch Module Options

- MSM61 = no uplink ports

CM: Control Module

- MCM01: 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

- MS01 = 8x RS232/RS422/RS485 via DB9

10/100 BaseTX 8 Ports

- M8TX02 = 8x 10/100 BaseTX MicroD Ports

100FX modules with 8 Ports

- M8FX11 = 8x 100FX Multimode LC 2km
- M8FX06 = 8x 100FX Singlemode, 1310nm, LC, 20km
- M8FX08 = 8x 100FX Singlemode, 1310nm, LC, 50km
- M8FX10 = 8x 100FX Singlemode, 1310nm, LC, 90km

100FX modules with 4 Ports

- M4FX11 = 4x 100FX Multimode LC 2km
- M4FX06 = 4x 100FX Singlemode, 1310nm, LC, 20km
- M4FX08 = 4x 100FX Singlemode, 1310nm, LC, 50km
- M4FX10 = 4x 100FX Singlemode, 1310nm, LC, 90km

Gigabit Ethernet Modules with 4 Ports†

- M4CG02 = 4x 10/100/1000TX microD
- M4FG01 = 4x 1000SX Multimode, 850nm, LC, 500m
- M4FG03 = 4x 1000LX Singlemode, 1310nm, LC, 10km
- M4FG05 = 4x 1000LX Singlemode, 1310nm, LC, 25km

† 4 port Gigabit modules require the 88Gbps switch module.

Example Order Codes:

MX5000-MR-RM-MHIF-MHIF-MSM04-MCM01-L2SEL2HW-M8TX02-M8TX02-M8FX02-M8FX02-M8FX02-M4FX04

The MX5000RE is a RuggedEnclosure™ loaded with a MX5000 RuggedBackbone™ with the following: a fan controller, dual HI power supplies, one control module, an 8 Gigabit throughput layer 2 switch module with 2-Ports Gigabit multimode interfaces, running Layer 2 Standard Edition Software, 2 (two) 8-Port 10/100BaseTX line modules, 3 (three) 8-Port 1000FX multimode line modules, and 1(one) 4-Port 20km line module. All Ethernet

connectors are at the rear of the MX5000, while the fan controller and power connectors are at the front.

The MX5000 is mounted within the RuggedEnclosure™. The cabling within the RuggedEnclosure™ is done at the factory and made accessible from the underside of the enclosure.

Modules, Power, Switch & Line Modules:

Power, Switch or Line Modules, may be ordered as individual parts. Brackets may also be ordered as single pieces.

MX5000REPN - _____
PT

PT: Individual Part to be ordered

The Part may be chosen from, MNT or any module from the above selection.

By specifying a module you are selecting a line module that may be seated into the MX5000 unit along with the cabling and enclosure panel.

By specifying a MNT option you are selecting brackets for the MX5000

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:

MX5000REPN - MCM01 - XX - _____
PT MOD SFT

PT: Individual Part to be ordered

- MCM01 = 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:

MX5000RE-MHIF

This is one HI power supply module with cabling to the enclosure panel and the panel piece for the enclosure.

Siemens Canada Limited
300 Applewood Crescent
Concord, ON, Canada L4K 5C7

Tel: +1 (905) 856-5288 **Fax:** +1 (905) 856-5288

Toll Free: 1 (888) 264-0006

Technical Support Center: 1 (866) 922-7975

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Patent Pending
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Rev 1j — 10/17/13

For additional information on our products and services, please visit our website at: www.RuggedCom.com