



The RuggedMC™ is an industrially hardened fiber optical media converter specifically designed to operate in harsh environments such as those found in electric utility substations and factory floors. The RuggedMC™ provides industrial strength Ethernet copper-to-fiber media conversion allowing for 10BaseT-to-10BaseFL and 100BaseTX-to-100BaseFX over SingleMode or MultiMode fiber optics.

The RuggedMC™ is specifically designed to meet the same EMI immunity and environmental requirements as mission critical protective relaying devices in accordance with the newly issued IEC 61850-3 (2002) and IEEE 1613 (2003) standards for communications and networking equipment in electric power utility substations as well as NEMA TS 2 (1998) EMI and environmental requirements for traffic

control equipment. The reliability of the RuggedCom product families exceeds those of commercial devices by having no rotating mechanical parts (i.e. no cooling fans), utilizing high-temperature solid state components and incorporating the necessary transient and surge suppression circuitry required for substation and electrically harsh environments.

Features and Benefits

Universal Power Supply Options

- 24VDC, 48VDC or HI (88-300VDC / 85 - 264VAC) options for worldwide operability
- Integrated high-reliability power supply eliminates the need for external power transformer
- Screw down terminal blocks ensure reliable maintenance-free connections
- All power supplies CSA/UL 60950 approved for +85°C (+185°F) operation
- Meets NEMA TS 2 (1998) Environmental Requirements for traffic control equipment.

Designed for Harsh Environments

- Exceeds IEC 61850-3 and IEEE 1613 Standards for communication equipment in electric power substations.
- Operates over a temperature range of -40°C to +85°C without the use of fans for improved reliability
- 21 AWG galvanized steel enclosure suitable for DIN or panel mounting provide secure mechanical reliability

Simple Plug and Play Operation

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

Key Features

- 10BaseT to 10BaseFL, MM (820nm) via ST Connectors, 2km
- 10BaseT to 10BaseFL, SM (1310nm) via ST Connectors, 15km
- 100BaseTX to 100BaseFX, MM (1300nm) via SFF MTRJ Connector, 2km
- 100BaseTX to 100BaseFX, SM (1310nm) via SFF LC Connector, 15km
- IEEE 802.3 (Ethernet) and IEEE 802.3u (Fast Ethernet) compliant
- Full Duplex and Half Duplex Operation (Configurable).
- Fiber Negotiation Mode Switch to support FDX, HDX or Auto-negotiation on fiber port
- Link Pass Through support
- Switch on faceplate for Uplink Configuration (Pass Through or Cross Over)
- Power Input via 3 position screw terminal on baseplate

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ISO 9001
REGISTERED

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 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 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	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: 5W (max)
- 24VDC: 18-36VDC (max)
- 48VDC: 36-59VDC (max)
- HI Voltage AC/DC: 88-300VDC, 85-265VAC (max)

Physical Dimensions

- Height: 4.3"
- Width: 2.3"
- Depth: 3.7" (Max)
- Weight: 1.5lbs (0.68kg)
- Enclosure: 21 AWG galvanized steel enclosure
- Mounting: DIN rail or panel mounted

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

Approvals

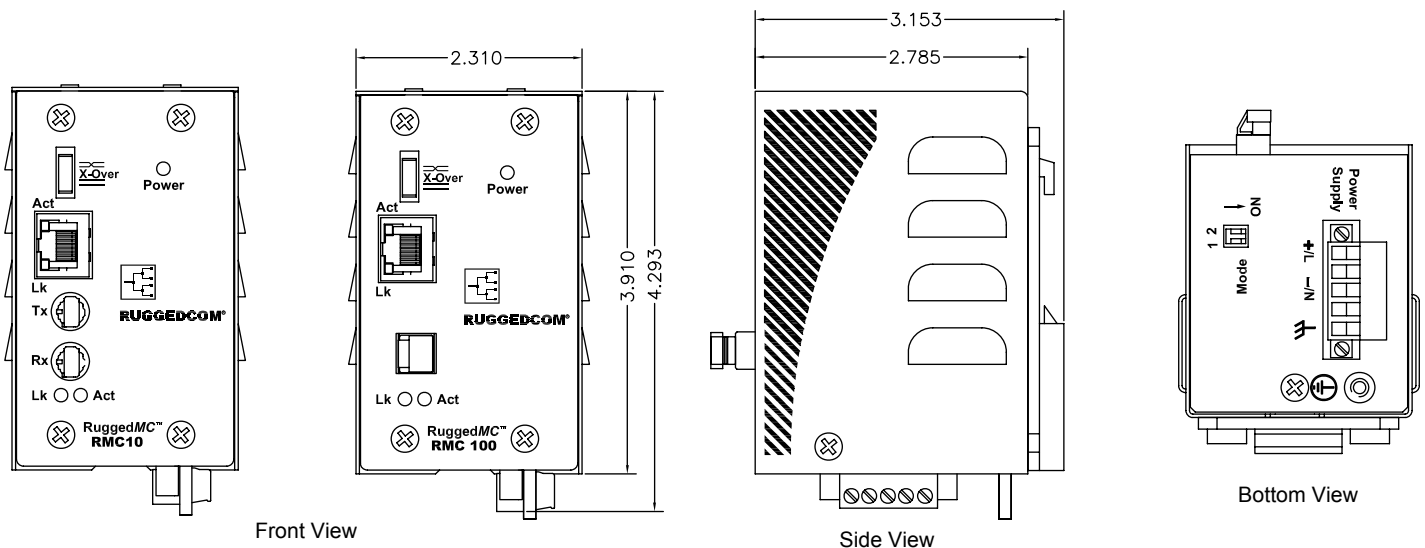
- ISO: Designed and manufactured using a ISO9001: 2000 certified quality program
- CE Marking
- Emissions: FCC Part 15 (Class A), EN55022 (CISPR22 Class A)
- Safety: cCSAus (Compliant with CSA C22.2 No. 60950, UL 60950, EN60950)
- Laser Eye Safety (FDA/CDRH): Complies with 21 CFR Chapter1, Subchapter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

Warranty

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

Fiber Optical Specifications				
Parameter	Fiber Port Type			
	10BaseFL		100BaseFX	
Speed				
Mode	Multimode	Singlemode	Multimode	Singlemode
Connectors	ST		MTRJ	LC
Typical Dist. (km)	2	15	2	15
Optical Wavelength (nm)	820	1310	1300	1310
Cable Size Core/Cladding (um)	62.5/125	-9/125	62.5/125	-9/125
Tx Power (dBm)	-13.5/-7.6	-23/-15	-16/-11	-15/-8
Rx Sensitivity (dBm)	-34.4	-38	-33.5	-31
Typical Budget	22	18	17	16.5

Dimensions



Order Codes

RMC - - -
PS CT MOD

PS: Power Supply

- 24 = 24VDC (18-36VDC)
- 48 = 48VDC (36-59VDC)
- HI = 88-300VDC or 85-264VAC

CT: Conversion Type

- TFLMM = 10BaseT to 10FL MM, 820nm, 2km via ST connectors
- TFLSM = 10BaseT to 10FL SM, 1310nm, 15km via SFF ST connector
- TFXMM = 100BaseTX to 100FX MM, 1300nm, 2km via SFF MTRJ connector
- TFXSM = 100BaseTX to 100FX SM, 1310nm, 15km via SFF LC connector
- TFXMMLC = 100BaseTX to 100FX MM, 1300nm, 2km via LC connector

MOD: Manufacturing Modifications

- XX = None
- C01 = Conformal Coating

Valid Order Code Examples

- RMC-HI-TFLMM-XX
- RMC-HI-TFLSM-C01
- RMC-48-TFXSM-C01

*MM=MultiMode

*SM=SingleMode

Mounting Options

- DIN rail mounting is standard
- For Panel mounting, order P/N 41-12-0006

Example Order Codes:

RSRMC-HI-TFLMM-XX

RMC-HI-TFLSM-C01

RMC-48-TXFXSM-C01

*MM=MultiMode

*SM=SingleMode

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Patent Pending
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