



## Features and Benefits

### Ports Options

- Protocol independent RS485, RS422, or RS232 (user selectable) conversion to multimode fiber optics (ST connector only)
- RS232 to RS485/422 conversion mode
- Fully EIA/TIA RS485, RS422, RS232 compliant communications
- Built-in, defeatable, RS485/RS422 termination networks
- Point-to-point, or optical loop configurations
- Full or half duplex configurable
- Support for high-speed serial baud rates from 300 to 115200 baud

### Key Features

- Protocol independent (use for Modbus, DeviceNET, Profibus, DNP 3.0, proprietary, etc)
- Extend lengths of serial connections (up to 5km/hop)
- Media conversation is transparent to end devices

### 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

### 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
- 18 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

## Product Summary

The RMC™ series of media converters are industrially hardened and specifically designed to operate reliably in electrically harsh and climatically demanding environments.

The RMC20 is a utility-grade, protocol-independent, serial-to-fiber and serial standards converter for all your serial communication requirements. The RMC20 allows RS485, RS422, or RS232 devices or networks to communicate over secure, noise immune, optically isolated, fiber optic cabling at extended distances as well convert RS232 to either RS485 or RS422 serial standards.

The RMC20 was designed specifically to provide years of maintenance free operation for all your mission-critical, real-time control applications. To ensure the utmost in reliability, the RMC20 is tested to the most stringent international EMI and environmental standards for use in HV/MV electric utility substations and industrial manufacturing, process and control and intelligent transportation systems applications. All RMC™ products are packaged with a high reliability, built-in power supply (24V, 48V, or HI Voltage options) and enclosed in a rugged galvanized steel enclosure suitable for panel or DIN-rail mounting.

All RuggedCom Inc. products are backed by a five-year warranty and unsurpassed technical support.

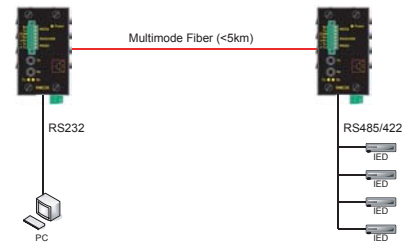
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**ISO 9001:2000**  
CERTIFIED

## Typical Configurations

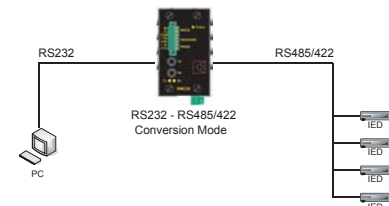
### Serial point-to-point over fiber

The RMC20 can be used to replace transient-susceptible serial communication links with noise-immune multimode optical fiber links. Using a pair of RMC20's, an RS485, RS422, or RS232 link can be extended up to 5km, operating at a maximum of 150kbaud. The RMC20 also allows seamless integration of RS232, RS485 and RS422 devices. All communications are protocol independent and media conversion is transparent to the end devices thus simplifying design and configuration.



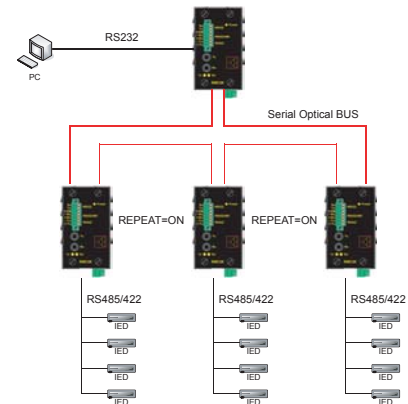
### RS232 to RS485/422 Converter

The RMC20 can be used as an RS232 to RS485/422 converter, allowing for quick and simple serial conversion. The RMC20 features a configurable RS485 turn-around timer for half duplex communications or RS422 compliant full duplex communications. Differential RS485/422 terminals feature built-in, defeatable, termination networks as specified by the Modbus standard to simplify setup and installation.



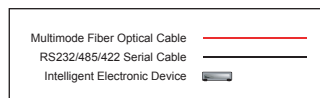
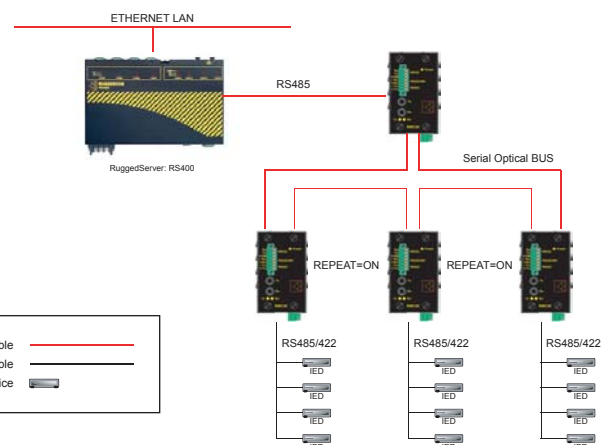
### Serial optical bus configuration

The RMC20 in an optical bus configuration can replace entire multi-drop RS485, RS422 or RS232 networks. In this topology, all messages travel through the optical ring and are echoed back to the master. This topology allows for extended distance up to 5km/hop multi-drop networks that isolate and protect individual IED's from electrical transients that can damage one more devices on the network. All communications are protocol independent, and media conversion is transparent to the end devices thus simplifying design and configuration.



### Connecting to an Ethernet LAN

The RMC20 can be used in conjunction with the RuggedServer™ RS400 to bring entire multi-drop networks onto the Ethernet LAN. This solution provides secure, accessible connectivity to entire serial networks with electrically isolated communications to guarantee years of reliable communications.



# 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 <sup>3</sup> | +/- 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 <sup>3</sup> | 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             |
| IEC 61000-4-11             |                             | A.C. Power ports                | 30% for 1 period, 60% for 50 periods        | N/A             |
| IEC 61000-4-12             | Damped Oscillatory          | Signal ports                    | 2.5kV common, 1kV diff. mode@1MHz           | 3               |
| IEC 61000-4-16             |                             | D.C. Power ports                | 2.5kV common, 1kV diff. mode@1MHz           | 3               |
| IEC 61000-4-16             |                             | 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               |
| IEC 60255-5                | Dielectric Strength         | D.C. Power ports                | 10%                                         | 3               |
|                            |                             | Signal ports                    | 2kVac (Fail-Safe Relay output)              | N/A             |
|                            |                             | D.C. Power ports                | 2kVac                                       | N/A             |
| IEC 60255-5                | H.V. Impulse                | A.C. Power ports                | 2kVac                                       | N/A             |
|                            |                             | 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 ports <sup>3</sup> | +/- 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                | 2kVac                             | 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 60255-21-2           | Shock                        | Tests Ea | 30g @ 11mS                            | Class 2         |

**Notes:**  
 1. Only applicable to functional earth connections separated from the safety earth connection.  
 2. Class 2 refers to "Measuring relays and protection equipment for which a very high security margin is required or where the vibration levels are very high, ( e.g. shipboard application and for severe transportation conditions")

## Technical Specifications

### Power Supply

- Power Consumption: 2W (max)
- 24VDC: 18-36VDC (max)
- 48VDC: 36-59VDC (max)
- HI Voltage AC/DC: 88-300VDC, 85-265VAC (max)

### Physical

- Height: 4.3"
- Width: 2.4"
- Depth: 3.3"
- Weight: 1.5lbs (0.68kg)
- Ingress Protection: IP40 (1mm objects)
- Enclosure: 18 AWG galvanized steel enclosure
- Mounting: DIN rail or panel mounted

### Serial Communications

- Fully EIA/TIA RS485, RS422, and RS232 compliant
- RS485, RS422, RS232 user selectable
- Configurable RS485 turn-around time
- 300 - 115200 Baud rates supported
- Duplex selectable (Full or half)
- Termination network: Defeatable 120ohm AC termination as per MODBUS v1.0

### 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

### Fiber Optical Specifications

- TX Power: -13.5 dBm Avg
- RX Sensitivity: -28.5 dBm Avg
- Optical Budget: 15 dB
- Maximum Link Distance: 5km

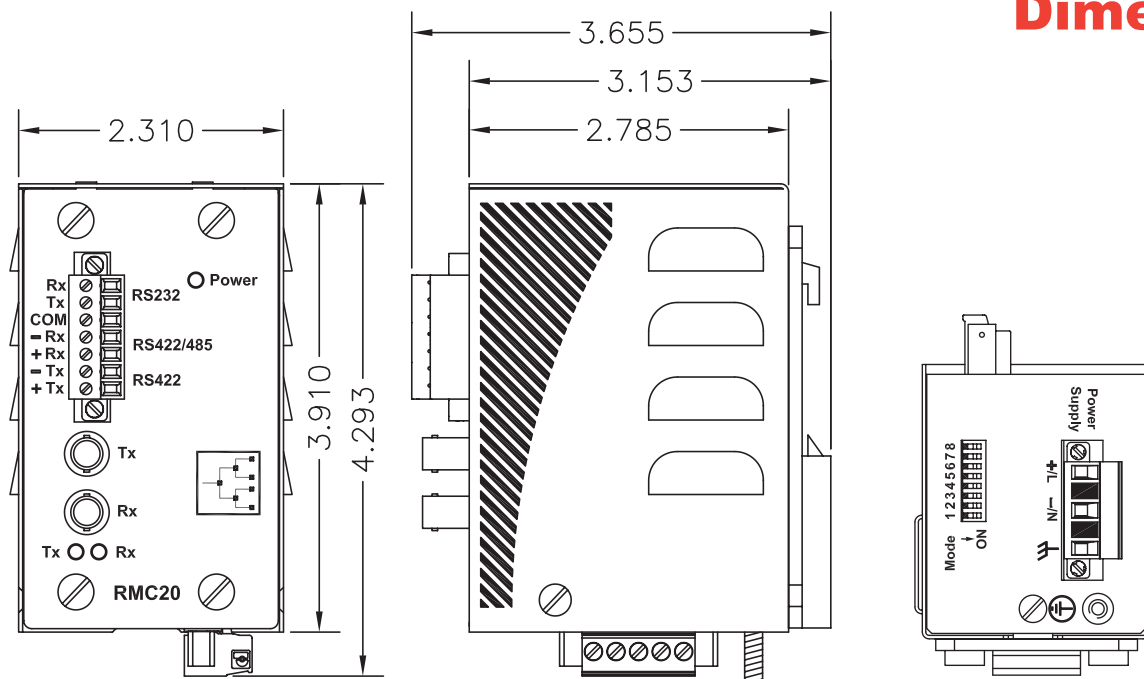
### Approvals

- 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.

## Dimensions



## Order Codes

### RMC20 - $\overline{\text{PS}}$

#### PS: (Power Supply)

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

#### Mounting Options

- DIN rail mounting is standard
- For Panel mounting, order P/N 41-12-006

**For additional information on our products and services, please visit our website at:**  
**[www.ruggedcom.com](http://www.ruggedcom.com)**

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