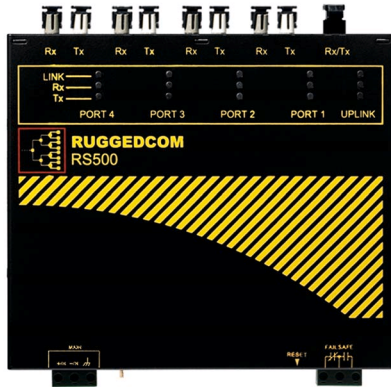




The **RuggedSwitch™ RS500** is an industrially hardened fiber optical Ethernet switch specifically designed to operate in harsh environments such as those found in electric utility substations and factory floors. The RS500 combines advanced Ethernet networking features with the immunity, reliability and security characteristics of fiber optical communications in a cost effective package.

The RS500 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. 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.



**“SUBSTATION HARDENED”**  
with  
**Zero-Packet-Loss™**  
**TECHNOLOGY**



## DESIGNED FOR HARSH ENVIRONMENTS

## ADVANCED NETWORKING FEATURES

### ADDRESSES SUBSTATION EMI AND ENVIRONMENTAL REQUIREMENTS VIA “ZERO - PACKET - LOSS™” TECHNOLOGY!

- Exceeds the new IEC 61850 - 3 (2002) standard for networks in substations.
- Meets the new IEEE 1613 (2003) standard - qualifies as a class 2 “Error Free” Networking Device.

### EXTENDED OPERATING TEMPERATURE RANGE: -40 TO 85°C!

- No rotating mechanical parts (i.e No Fans!) ensuring the highest reliability.

### DUAL REDUNDANT POWER SUPPLIES:

- Individually configurable allowing for a variety of combinations.

### WIDE POWER SUPPLY OPTIONS:

- 24Vdc, 48Vdc, HI=(88Vdc - 150Vdc).

### FAILSAFE OUTPUT RELAY:

- For critical failure or error alarming.

### SOLID METAL ENCLOSURE:

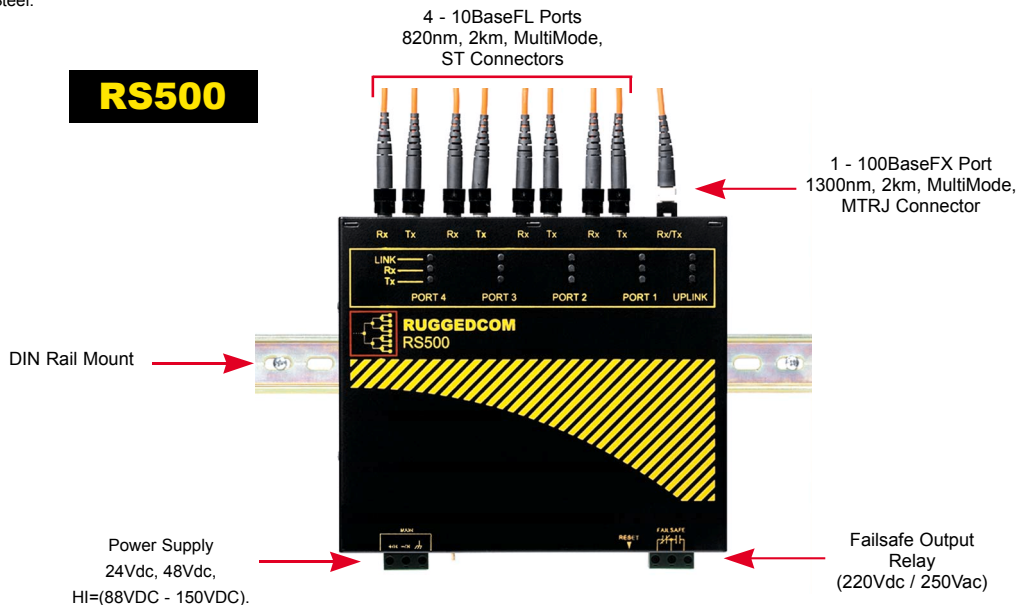
- 18 Gauge Galvanized Steel.

### STANDARD:

- 4 - 10BaseFL, 1 - 100BaseFX.
- Optional SingleMode fiber optical Uplink port for distances of up to 15km.
- Pass thru mode allows 802.1Q VLAN and 802.1p Priority tagged messages.
- Store-and-forward switching mode.
- IEEE 802.3, IEEE 802.3u.
- Support for up to 4096 MAC addresses.
- Automatic address learning and aging.
- Full - Duplex operation.

### COMPLIANCE:

- IEEE 802.3 (10Mbps Ethernet)
- IEEE 802.3u (Fast Ethernet 100Mbps)



# Technical Specifications

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
		Signal ports	+/- 4kV @ 2.5kHz	x
IEC 61000-4-4	Burst (Fast Transient)	D.C. Power ports	+/- 4kV	4
		A.C. Power ports	+/- 4kV	4
		Earth ground ports <sup>3</sup>	+/- 4kV	4
		Signal ports	+/- 4kV line-to-earth, +/- 2kV line-to-line	4
IEC 61000-4-5	Surge	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
		Signal ports	10V	3
IEC 61000-4-6	Induced (Conducted) RFI	D.C. Power ports	10V	3
		A.C. Power ports	10V	3
		Earth ground ports <sup>3</sup>	10V	3
		Enclosure ports	40 A/m continuous, 1000 A/m for 1 s	N/A
IEC 61000-4-8	Magnetic Field	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 61000-4-29	Voltage Dips & Interrupts	A.C. Power ports	100% for 50 periods, 100% for 50 periods <sup>2</sup>	N/A
IEC 61000-4-11		Signal ports	2.5kV common, 1kV diff. mode@1MHz	3
IEC 61000-4-12	Damped Oscillatory	D.C. Power ports	2.5kV common, 1kV diff. mode@1MHz	3
		A.C. Power ports	2.5kV common, 1kV diff. mode@1MHz	3
		Signal ports	30V Continuous, 300V for 1s	4
IEC 61000-4-16	Mains Frequency Voltage	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

## POWER SUPPLY OPTIONS

(24) 24Vdc:  
Input Range: 18Vdc to 36Vdc (max)

(48) 48Vdc:  
Input Range: 36Vdc to 75Vdc (max)

(HI) 110VDC:  
Input Range: 88Vdc - 150Vdc (max)

## PHYSICAL DIMENSIONS

**DIMENSIONS (L X W X H)**  
8.0 x 6.84 x 2.43 inches  
(203.20 x 173.74 x 61.72 mm)

## WEIGHT

5lbs (2.3 Kg)

## ENCLOSURE

18 Gauge Galvanized Steel

## WARRANTY

**5 Years:**  
Applicable to design or manufacturing related product defects.

For details visit [www.ruggedcom.com](http://www.ruggedcom.com) - see "Rugged-Warranty"

## APPROVALS

ISO: Manufactured in an ISO9001 facility  
Safety: CSA C22.2 No. 60950, UL 60950, EN 60950, IEC 6950.

Emissions: FCC Part 15, Class A, EN 55022 (CISPR22 Class A)

CE Marking

## ORDER CODES

RS500 -  $\overline{\text{PS}}$  -  $\overline{\text{FO}}$

PS (Power Supply)

24 = 24Vdc

48 = 48Vdc

HI = (88Vdc - 150Vdc)

FO (Fiber Options for Uplink port)

MM = 1300nm, MM, 2km via SFF MTRJ connectors

SM = 1310nm, SM, 15km via SFF LC connectors

## VALID ORDER CODE EXAMPLES:

RS500 - 24 - MM

RS500 - 48 - MM

RS500 - HI - SM

\*MM= MultiMode

\*SM= SingleMode

IEEE P1613 (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
		Signal ports	+/- 4kV @ 2.5kHz	N/A
IEEE C37.90.1	Fast Transient	D.C. Power ports	+/- 4kV	N/A
		A.C. Power ports	+/- 4kV	N/A
		Earth ground ports <sup>3</sup>	+/- 4kV	N/A
		Signal ports	2.5kV common mode @1MHz	N/A
IEEE C37.90.1	Oscillatory	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
		Signal ports	2kVac	N/A
IEEE C37.90	Dielectric Strength	D.C. Power ports	2kVac	N/A
		A.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	N/A
IEC 60068-2-2	Dry Heat	Test Bd	+85°C	N/A
IEC 60068-2-30	Humidity (Damp Heat, Cyclic)	Test Db	95% (non-condensing), 55°C, 6cycles	N/A
IEC 60255-21-1	Vibration	Tests Fc		Class 1
IEC 60255-21-2	Shock	Tests Ea		Class 1
IEC 60255-21-2	Bump	Tests Eb		Class 1

NETWORKING SPECIFICATIONS			
Parameter	10Mbps Ports	100Mbps Ports	Notes
Latency	16us + frame time	5us + frame time	
Filtering Rate	14 880	148 800	Frames/sec
MAC Address Table	4096		

Parameter	Ports 1-4, 10Mbps Ports		Port 5, 100Mbps Ports	
	MultiMode		MultiMode	SingleMode
Speed Standard	10BaseFL		100BaseFX	
Connector Type	ST		MTRJ	LC
Segment Length	2km		2 km +	15 km +
Optical Wavelength	820nm		1300nm	1310nm
Cable Size/Core Cladding	62.5/125µm		62.5/125µm	9/125µm

**NOTE:** Longer segment length dependent on fiber specifications. Consult factory for further details.