RUGGEDCOM®
INDUSTRIAL STRENGTH NETWORKS™

RuggedSwitch® M969

MIL-STD and IP66/IP67 Rated 10-Port Managed Ethernet Switch with Fiber Uplink Ports

Installation Guide

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Federal Communications Commission Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his expense.

Warning:

Changes or modifications not expressly approved by RuggedCom Inc. could void the user's authority to operate the equipment.

Caution:

This product contains a laser system and is classified as a ***"CLASS 1 LASER PRODUCT"****.*

Caution – Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure. This product contains no user-serviceable parts. Attempted service by unauthorized personnel shall render all warranties null and void.

Should this device require service see the "Warranty and Service" section of this installation guide.

Important:

The M969 family of products should be installed in a ***restricted access location*** *where access can only be gained by service personnel or users who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken; and access is through the use of a tool or lock and key, or other means of security, and is controlled by the authority responsible for the location.*

Table of Contents

1 Product Overview

The RuggedSwitch® M969 is a MIL-STD hardened, fully managed Ethernet switch providing dual fiber optical Ethernet ports and eight Fast Ethernet copper ports in a MIL-STD 901D rated package (for protection against vibration and shock impacts) and is IP66/IP67 rated for protection against strong jets of water (IP66) or temporary immersion in water (IP67).

Designed to operate reliably in harsh environments the M969 provides a high level of tolerance to vibrations and shock impact; high level of immunity to electromagnetic interference; an operating temperature range of -40°C to +85°C; hazardous location certification and IP66/IP67 rated waterproof packaging. All of which allows the M969 to be placed in virtually any location.

The embedded Rugged Operating System (ROS™) provides advanced layer 2 and layer 3 networking functions, advanced cyber security features, and a full array of intelligent functionality for high network availability and manageability. Coupled with the ruggedized hardware design, the M969 is ideal for creating mission-critical, real-time, control applications in any harsh environment.

Ethernet Ports

- Fiber Optical Gigabit Ethernet Ports (1000BaseX) with IP65/IP67 Rated fiber optical LC connectors
- 8 - Fast Ethernet Ports (10/100BaseTX) with IP65/IP67 Rated M12 D-code connectors or IP65/IP67 Rated shrouded RJ45 style connectors
- Full compliance with IEEE: 802.3, 802.3u and 802.3z
- Non-blocking, store and forward switching
- Full duplex operation and flow control (IEEE 802.3x)

RuggedRated™ for Reliability in Harsh Environments

- MIL-STD 901D Shock
- IP67 Rated for protection against immersion in water
- IP66 Rated for protection against high pressure jets of water
- Meets IEEE 1613 (electric utility substations)
- Exceeds IEC 61850-3
- (electric utility substations)
- Exceeds IEEE 61800-3
- (variable speed drive systems)
- Exceeds IEC 61000-6-2
- (generic industrial environment)
- Exceeds NEMA TS-2
- (traffic control equipment)
- -40 to +85°C operating temperature (no fans)
- Conformal coated circuit boards (optional)

Universal Power Supply Options

- Fully integrated power supply
- Universal high-voltage range: 88-300VDC or 85-264VAC
- Popular low-voltage DC ranges: 12, 24, 48 VDC
- Dual redundant, parallel load-sharing power supplies (option)
- Can be powered from different sources for ultimate redundancy
- Available with M12 or M23 style connectors
- CSA/UL 60950 safety approved to +85°C

Simple Plug and Play Operation

- Automatic learning of up to 8192 MAC addresses
- Auto-negotiation on all 10/100BaseTX ports
- Auto-MDI/MDIX (crossover) on all 10/100BaseTX ports
- LED indicators for link and activity

ROS™ Advanced Network Management

- Enhanced Rapid Spanning Tree (eRSTPTM)
- Quality of Service (802.1p) for real-time traffic
- Port rate limiting: 128 kbps to 8 Mbps
- VLAN (802.1q) with double tagging
- IGMP Snooping for multicast filtering
- Port configuration, status, statistics, mirroring, security
- Loss of link management on fiber ports
- Web-based, Telnet, CLI management interfaces
- SNMP v2 and RMON
- Rich set of diagnostics with logging and alarms

1.1 M969 Family Ports/Connectors Description

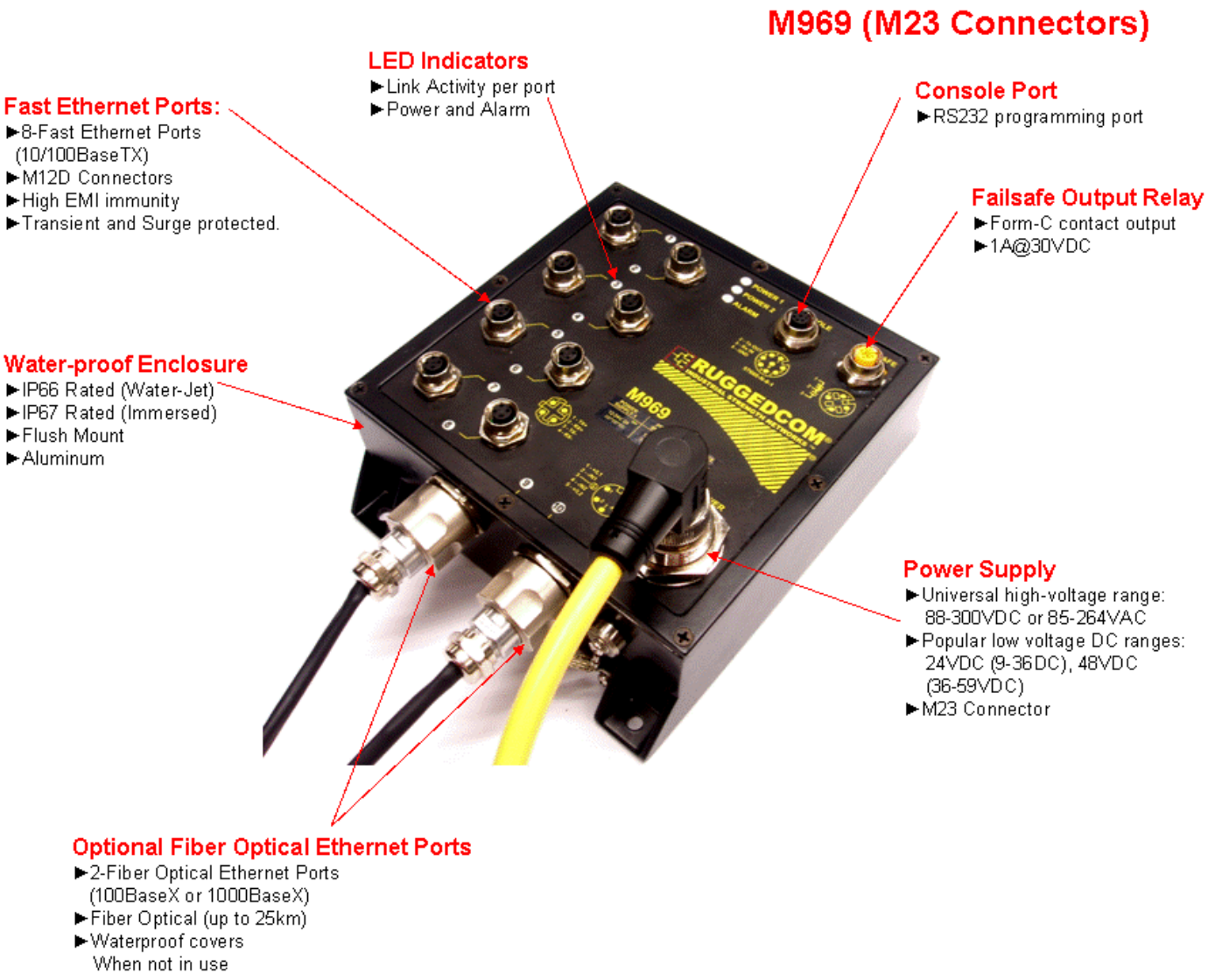


Figure 1: M969 with M12 D-Code Ethernet ports and M23 power

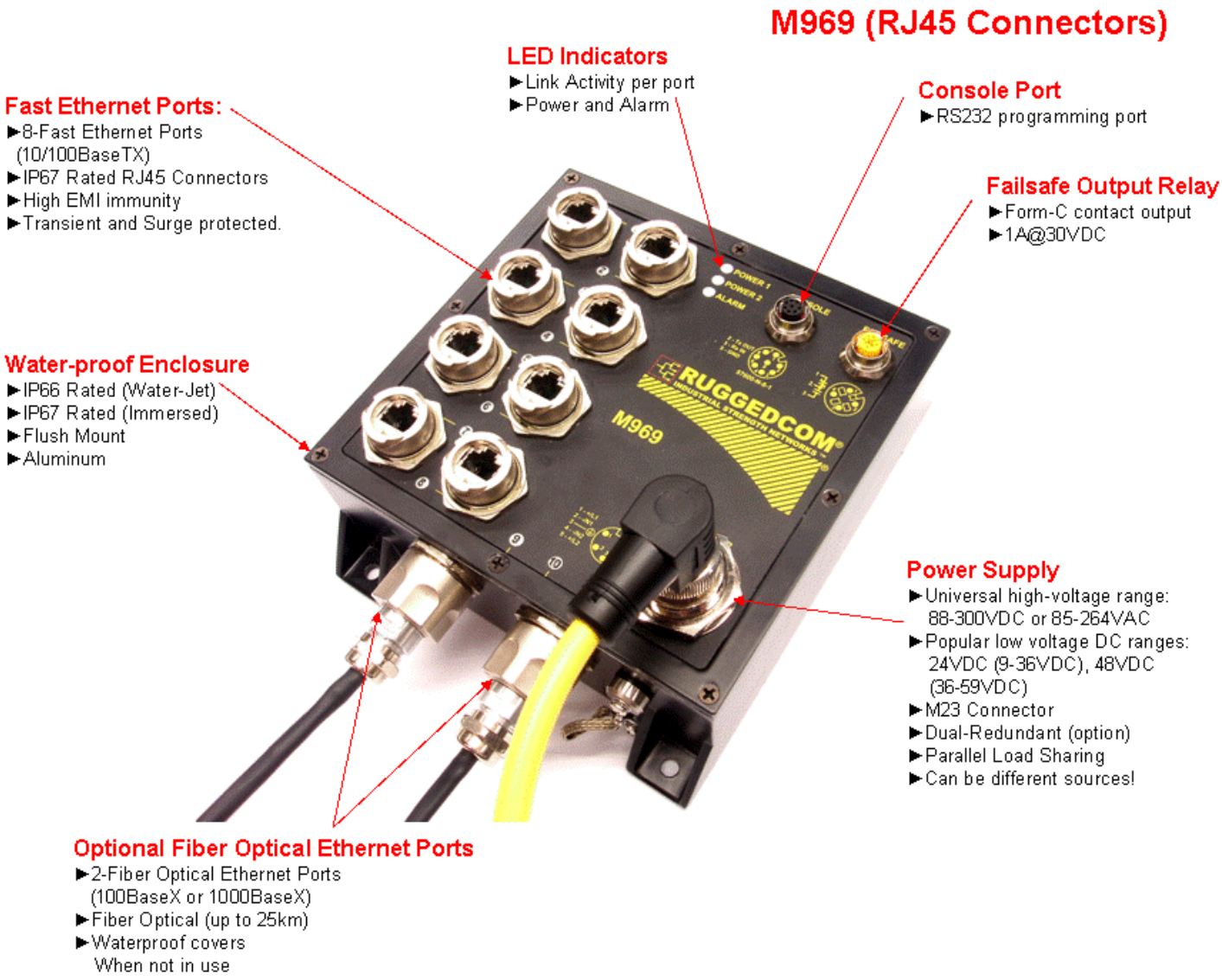


Figure 2: M969 with RJ45 IP67 Ethernet ports and M23 power

ITEM	Activity	Comments
LINK LED (Yellow)	Solid	Link Established
	Blinking	Tx/Rx Activity
Power 1 LED	Solid	Power Supply 1 On
Power 2 LED	Solid	Power Supply 2 On
Alarm LED (Red)	Solid	Alarm condition exists

2 Installation

2.1 Ingress Protection IP67

IEC International Standard 60529 (Edition 2.1: 2001-02) is a "classification of degrees of protection provided by enclosures as a system for specifying the enclosures of electrical equipment on the basis of the degree of protection provided by the enclosure." These ratings are determined by specific tests

The IP number is composed of two numbers, the first referring to the protection against solid objects and the second against liquids. The higher the IP number, the better the protection. The chart below defines levels of IP ratings.

1st IP#	***Degree of protection against access to hazardous parts & ingress of solid objects***
0	No protection
1	Protected against solid foreign objects of 50 mm Ø and >
2	Protected against solid foreign objects of 12.5 mm Ø and >
3	Protected against solid foreign objects of 2.5 mm Ø and >
4	Protected against solid foreign objects of 1.0 mm Ø and >
5	Dust protected
6	Dust tight

2nd IP#	***Degree of protection against the ingress of water***
0	No protection
1	Protected against vertically falling water drops
2	Protected against vertically falling water drops when enclosure titled up 15°
3	Protected against spraying water
4	Protected against splashing water
5	Protected against jet-water
6	Protected against strong jet-water
7	Protected against the effects of temporary submersion in water
8	Protected against the effects of permanent submersion in water

The RuggedCom M969 Industrial Ethernet Switch is manufactured and tested to IP67 standards. With an IP67 rating a product will be "dust tight" and remain completely sealed when immersed in water to a depth of 1 meter for 1 hour. (IEC 60529)
These caps completely seals off unused ports on the IP67 Industrial Ethernet Switch. It has an IP67 rated seal that keeps out all contaminants like dirt, oil, and water.

2.2 Power Supply Wiring and Grounding

2.2.1 Power Supply Input Connectors Description

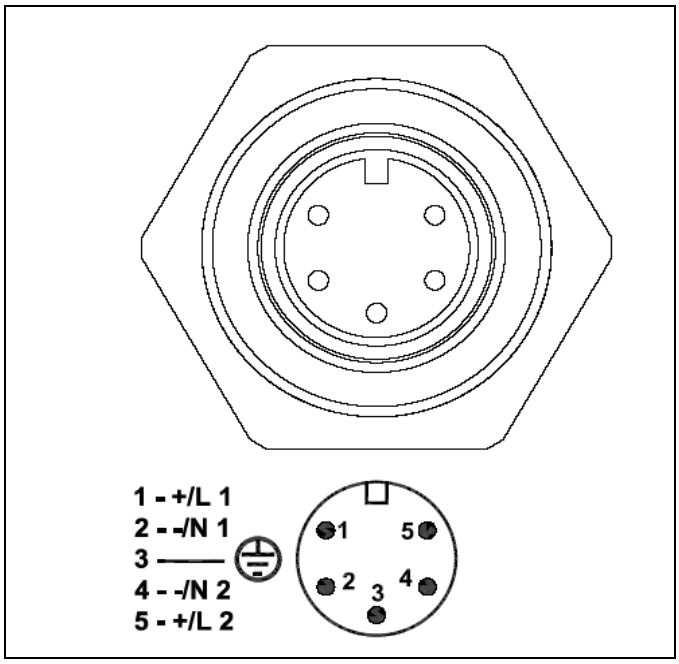


Figure 3 - M969 M23 power supply connector

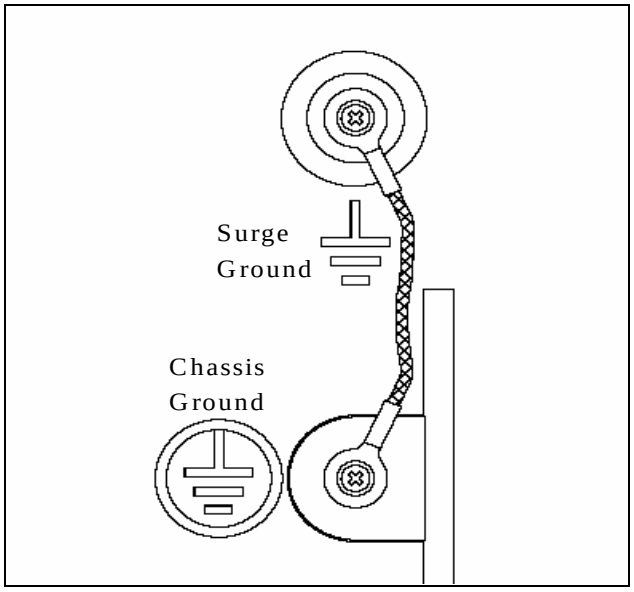


Figure 4 - M969 Surge Ground / Chassis Ground Connection

The M23 power connector has 5 terminal pins which mean two power supply sources are allowed to power the M969 with M23 power connector. The M969 family supports dual redundant power supplies – “Power Supply 1 (PS1)” and “Power Supply 2 (PS2)”. The connections for PS1, PS2 are shown in Table 1 and Table 2. Refer to Table 1 and Table 2 for a description of each terminal and sections 2.2.2 through 2.2.4 for wiring examples.

Terminal #	*Description*	*Usage*
1	PS1 Live / +	**PS1 Live / +** is connected to the positive (+) terminal if the power source is DC or to the (Live) terminal if the power source is AC.
2	PS1 Neutral / -	**PS1 Neutral / -** is connected to the negative (-) terminal if the power source is DC or to the (Neutral) terminal if the power source is AC.
3	Chassis Ground	**Chassis Ground** is connected to the Safety Ground terminal for AC inputs or the equipment ground bus for DC inputs. This terminal 3 is connected to chassis ground internally in the M969 family. There is also an additional chassis ground screw and the chassis ground connects to both power supply surge grounds via a removable jumper shown in Figure 4.
4	PS2 Neutral / -	**PS2 Neutral / -** is connected to the negative (-) terminal if the power source is DC or to the (Neutral) terminal if the power source is AC.
5	PS2 Live / +	**PS2 Live / +** is connected to the positive (+) terminal if the power source is DC or to the (Live) terminal if the power source is AC.

Table 1: M969 Power terminal block connection description for M23 connector

NOTES:

1. Equipment must be installed according to the applicable country wiring codes.
2. Surge Ground must be disconnected from the Chassis Ground during HIPOT (dielectric strength) testing.
3. All line-to-ground transient energy is shunted to the Surge Ground terminal. In cases where users require the inputs to be isolated from ground, remove the ground braid between Surge and Chassis Ground. All line-to-ground transient protection circuitry will be disabled.

2.2.2 Single AC Power Supply Wiring Examples

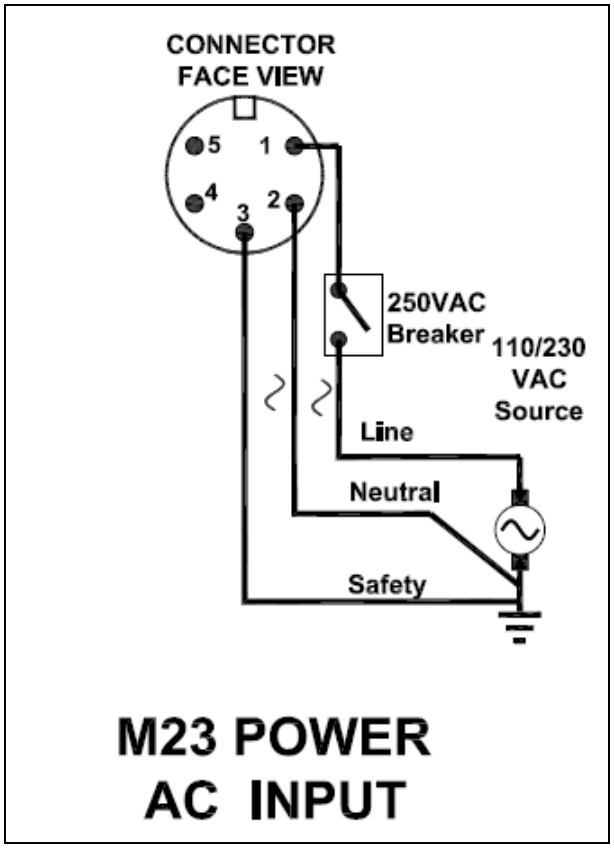


Figure 5: AC Power supply wiring example

NOTES:

1. 100-240VAC rated equipment: A 250VAC appropriately rated circuit breaker must be installed.
2. Equipment must be installed according to the applicable country wiring codes.
3. When equipped with two HI voltage power supplies, independent AC sources can be used to power the product for greater redundancy.

2.2.3 Single DC Power Supply Wiring Examples

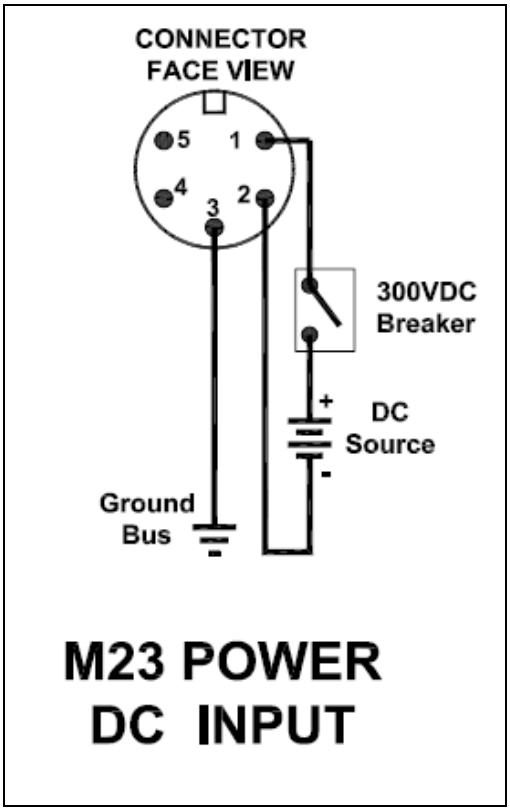


Figure 6: DC Power supply wiring example

NOTES:

1. 88-300VDC rated equipment: A 300VDC appropriately rated circuit breaker must be installed.
2. A circuit breaker is not required for 12, 24 or 48 VDC rated power supplies.
3. For dual DC power supplies, Separate circuit breakers must be installed and separately identified.
4. Equipment must be installed according to the applicable country wiring codes.

2.2.4 Dual Power Supplies – DC and AC Inputs

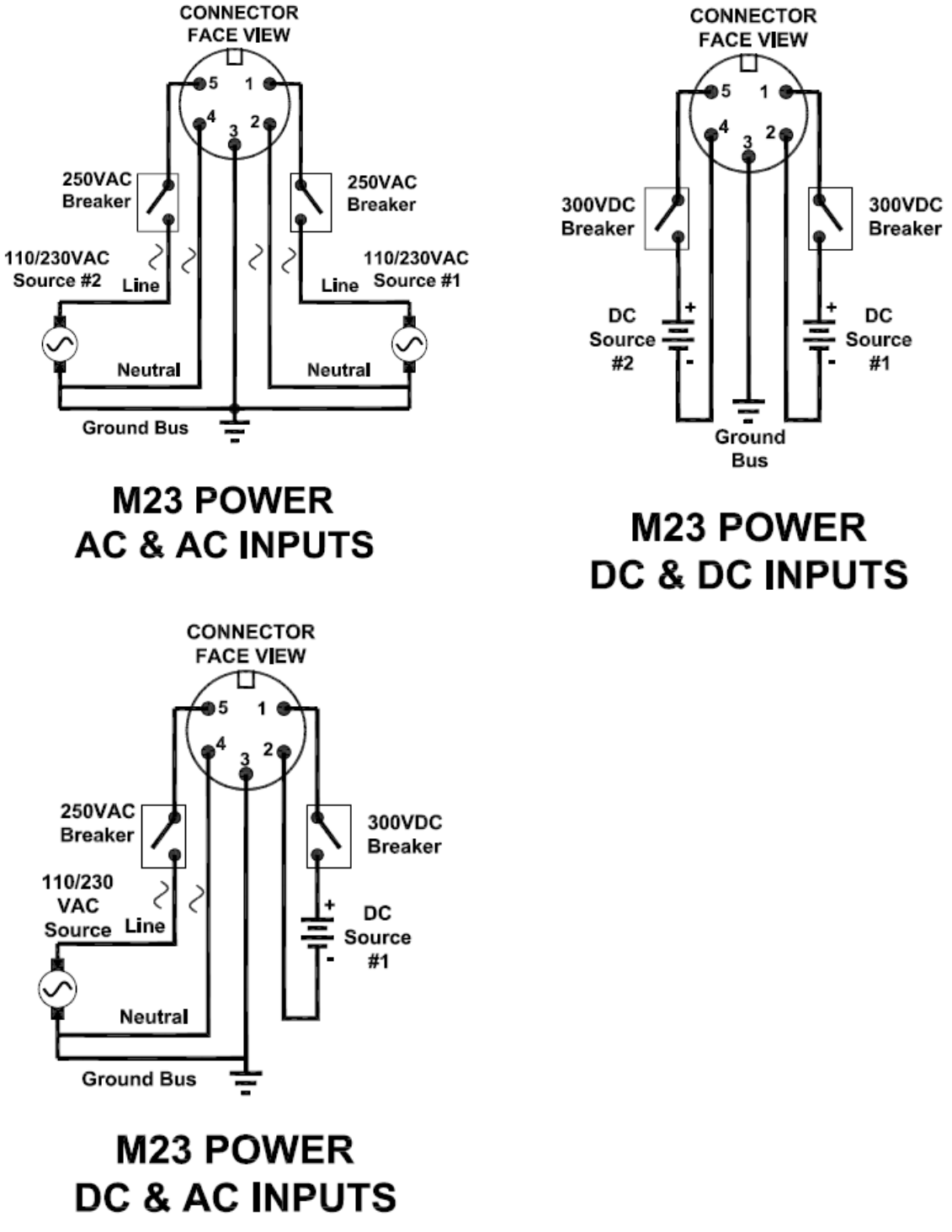


Figure 7: DC And AC power supply wiring examples

NOTES:

1. 88-300VDC rated equipment: A 300VDC appropriately rated circuit breaker must be installed.
2. A circuit breaker is not required for 12, 24 or 48 VDC rated power supplies.
3. Separate circuit breakers must be installed and separately identified.
4. Equipment must be installed according to the applicable country wiring codes.

2.3 Dielectric Strength (HIPOT) Testing

For dielectric strength testing in the field, users must remove the metal jumper located on terminal 2, 4, and 6 of the power supply terminal block. This metal jumper connects transient suppression circuitry to chassis ground, and must be removed in order to avoid damage to protection circuits. Figure 8 shows the proper dielectric strength test connections and should be followed to avoid damage to the device.

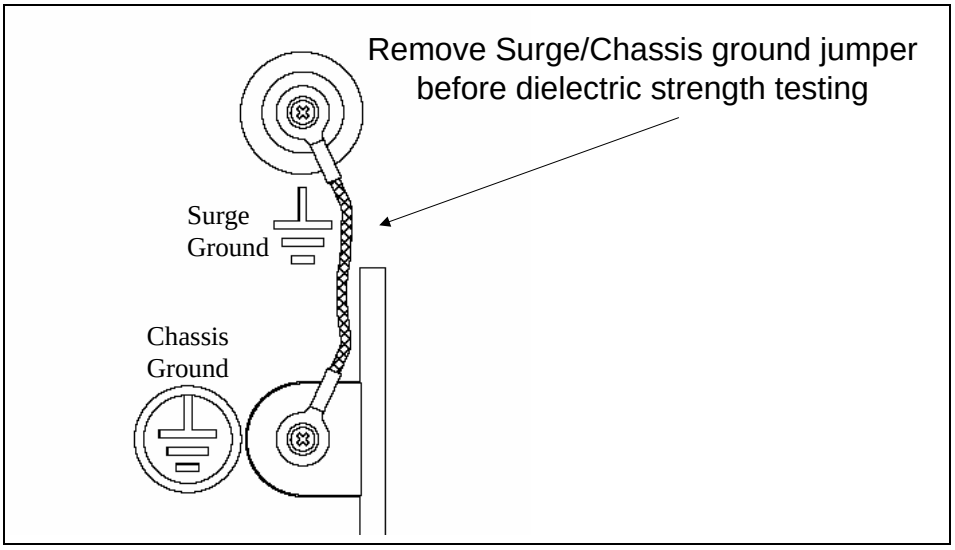


Figure 8: Dielectric Strength (HIPOT) Testing

2.4 Failsafe Alarm Relay Wiring and Specifications

The “Failsafe” output relay is provided to signal critical error conditions that may occur on the M969 series switches. The contacts are energized upon power up of the unit and remain energized until a critical error occurs. The proper relay connections are shown in Figure 9 below. One common application for this output is to signal an alarm if a power failure or removal of control power occurs.

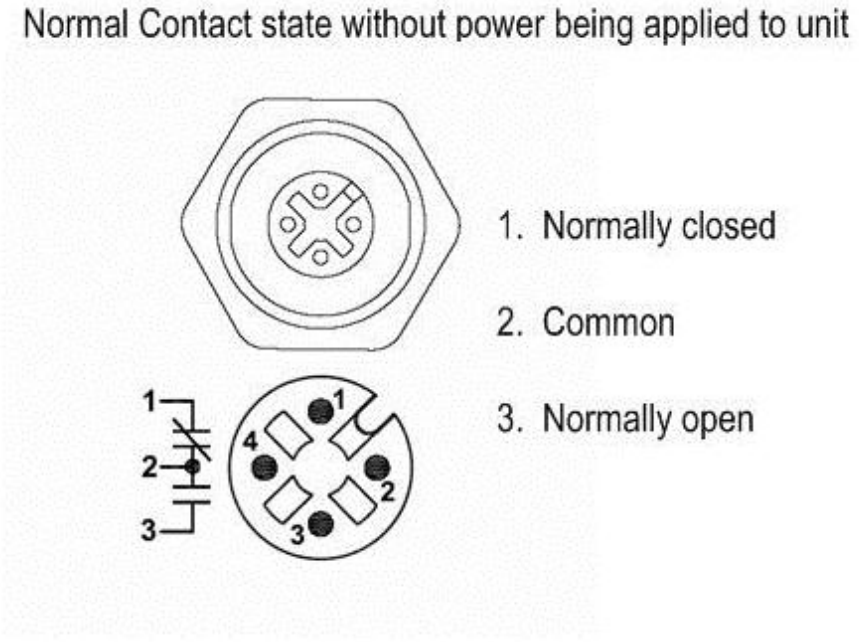


Figure 9: Failsafe Alarm Relay Wiring

2.5 Console Port Wiring

A RS232 console port for configuration and management of the device is shown in Figure 10. This port is intended to be a temporary connection during initial configuration or troubleshooting and allows for direct access to the serial-based management console. The connection is made using the DB9-Female to 8-Position-Male-M12 console cable shown in Figure 11. Console connection settings are: 57600 baud, no parity bits, 8 data bits, and 1 stop bit.

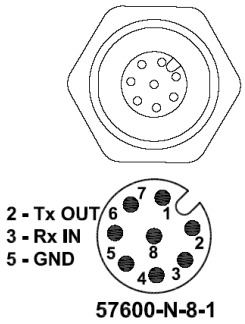


Figure 10: Console port

Figure 11: M969 Console cable

For user reference, the console cable pin-out is show in Table 2.

RuggedCom RS232 over M12 pin-out specification		
Signal Name (PC is DTE)	*DB9- Female*	*M12- Male*
RxD – Receive data (to DTE)	2	2
TxD – Transmit data (from DTE)	3	3
Signal GND	5	5

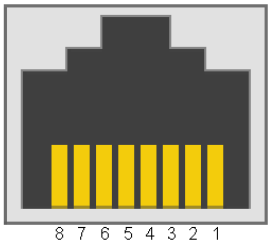
Table 2: RS232 over M12 console cable pin-out

After initial configuration, the RuggedSwitch device can be configured via a number of new mechanisms such as Telnet, and the built-in web server. Consult the RuggedSwitch ROS User Guide for further details.

NOTE: This port is not intended to be a permanent connection and the cable shall be less than 2m (6.5 ft) in length.

2.6 Twisted-Pair Data Ports

The M969 series switches have several 10/100BaseTX ports that allow connection to standard CAT-5 UTP cable with industrial RJ45 male connectors or industrial D-coded M12 male connectors. The RJ45/M12 receptacles are directly connected to the chassis ground on the M969 and can accept shielded CAT-5 cables. If shielded cables are used, care must be taken to ensure the shielded cables do not form a ground loop via the shield wire and the RJ45/M12 receptacles at either end. Figure 12 shows the pin configuration.



Pin	Signal
1	+Rx
2	-Rx
3	+Tx
4	No Connection
5	No Connection
6	-Tx
7	No Connection
8	No Connection
Case	Shield (Chassis Ground)

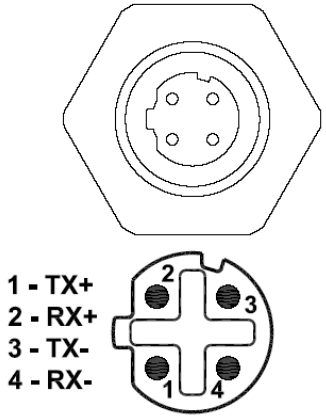


Figure 12: RJ45 Port and M12 Port Pins

NOTE: RuggedCom does not recommend the use of CAT-5 cabling of any length for critical real-time substation automation applications. However, transient suppression circuitry is present on all copper ports to protect against damage from electrical transients and to ensure IEC 61850-3 and IEEE 1613 Class 1 conformance. This means that during the transient event communications errors or interruptions may occur but recovery is automatic.

RuggedCom also does not recommended to use these ports to interface to field devices across distances which could produce high levels of ground potential rise, (i.e. greater than 2500V) during line to ground fault conditions.

3 Technical Specifications

3.1 Operating Environment

Parameter	Range	Comments
Ambient Operating Temperature	-40 to 85°C	Ambient Temperature as measured from a 30 cm radius surrounding the center of the M969 enclosure.
Ambient Relative Humidity	5% to 95%	Non-condensing
Ambient Storage Temperature	-40 to 85°C	
IP Rating	IP67	
Operating Altitude	0 to 15240m (0 to 50000 ft)	Over temperature range of -40 to 85°C

3.2 Power Supply Specifications

Power Supply Type	Minimum Input	Maximum Input	Internal Fuse Rating	Isolation	Maximum Power Consumption
12 – 24 VDC	10 VDC	36 VDC	3.15A (T)	1.5 kV DC	10W
24 VDC	18 VDC	36 VDC	3.15A (T)	1.5 kV DC	
48 VDC	36 VDC	72VDC	3.15A (T)	1.5 kV DC	
HI (125/250 VDC) [1] HI (110/230 VAC) [1]	88 VDC 85 VAC	300 VDC 265 VAC	3.15A (T)	4 kV AC 5.5 kV DC	

NOTES:

1. This is the same power supply for both AC and DC.
2. (T) denotes time-delay fuse

3.3 Failsafe Relay Specifications

Parameter	Value
Max Switching Voltage	30VAC, 80VDC
Rated Switching Current	0.3A @ 30VAC 1A @ 30VDC, 0.3A @ 80VDC

NOTES:

1. Resistive Load.
2. For Class-2 circuits only.

Isolation	Comments
1500 V_{rms}	Dielectric test voltage (1 minute) between coil & contacts

3.4 Twisted Pair Data Port Specifications

Data Port	Media	Distance	Connector Type
10/100 Mbps	Cat 5 UTP or STP	100m	RJ45 or M12

3.5 Fiber Optical Port Specifications

For maximum flexibility RuggedCom Inc. offers a number of different transceiver choices for Gigabit fiber optical communications. The following table details fiber optic specifications based on the order code / transceiver selected at time of ordering.

Order Code	Mode / Connector	Tx λ (nm)	Cable Type(μm)[2]	Tx Pwr (dBm)[3] (Min/Max)	Rx Sensitivity (dBm)[3]	Rx Saturation (dBm)[3]	Typical Distance[1] (km)	Power Budget (dB)
1FG01	MM / LC	850	50/125 62.5/125	-9.5 / -4	-20	0	0.5	14
1FG03	SM / LC	1310	8/125 9/125	-9.5 / -3	-22	-3	10	17
1FG05	SM / LC	1310	8/125 9/125	-7 / 3	-26	-3	25	19

NOTES:

1. Maximum segment length is greatly dependent on factors such as fiber quality, and number of patches and splices. Please consult RuggedCom sales associates when determining maximum segment distances.
2. All cabling is duplex type unless otherwise specified.
3. All optical power numbers are listed as dBm averages.

3.6 MIL-STD Test Specifications

Test	*Description*	
MIL-STD-167	Vibration Navy MIL-STD –167-1 Type I	
MIL-STD-461E	CE101	
	CE102	DC 28V
		AC 115V
	RE101	
	RE102	RE102-1, Surface Ship Applications
		RE102-2, Submarine Applications, Internal
		RE102-3, AirCraft and Space Applications
		RE102-4, Ground Applications
	CS101	
	CS114	
	CS115	
	CS116	
	RS101	
	RS103	
MIL-STD-810F	Low Pressure Altitude Method 500.4 Procedure I Storage	
	Low Pressure Altitude Method 500.4 Procedure II Operational	
	High Temperature Method 501.4 Procedure I Storage	
	High Temperature Method 501.4 Procedure II Operational	
	Low Temperature Method 502.4 Procedure I Storage	
	Low Temperature Method 502.4 Procedure II Operational	
	Temperature Shock Method 503.4 Procedure I Storage	
	Acceleration Method 513.5 Procedure II	
	Salt Fog Method 509.4 Procedure I	
	Vibration Method 514.5	
MID-STD 901D*	Shock Med WT HammerQuality	
MIL-STD-1275B	Power Quality	
MIL-STD-1399	DC Magnetic Field Testing Section 070 Part 1	

3.7 Mechanical Specifications

Parameter	*Value*	*Comments*
Dimensions	8,250 x 7,000 × 3.704 inches (209.55) × (177,80) × (94.08) mm	(Length × Width × Depth)
Enclosure	Die-cast Aluminum	

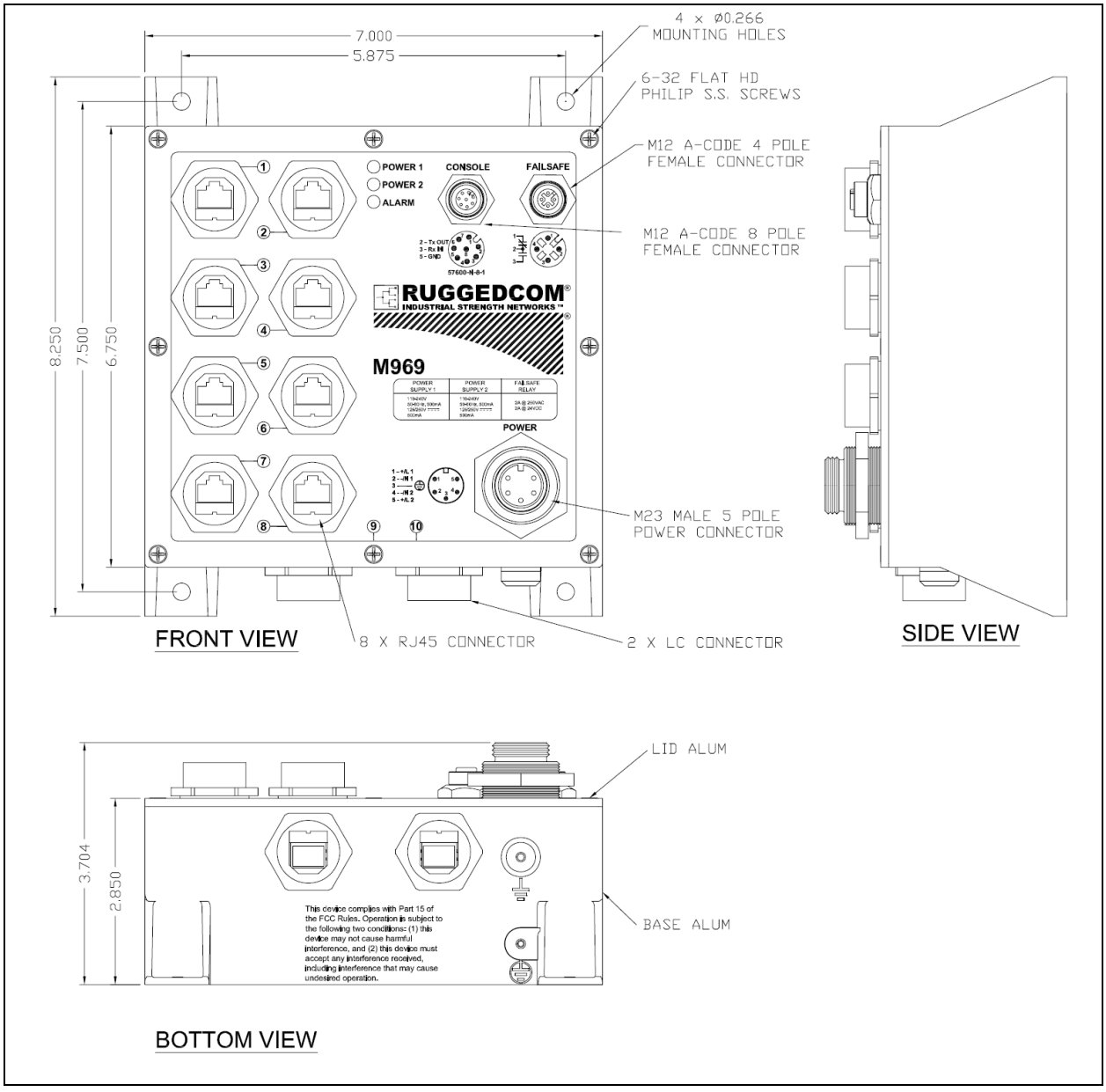


Figure 13: 8 RJ45 IP67 Ethernet ports and M23 power

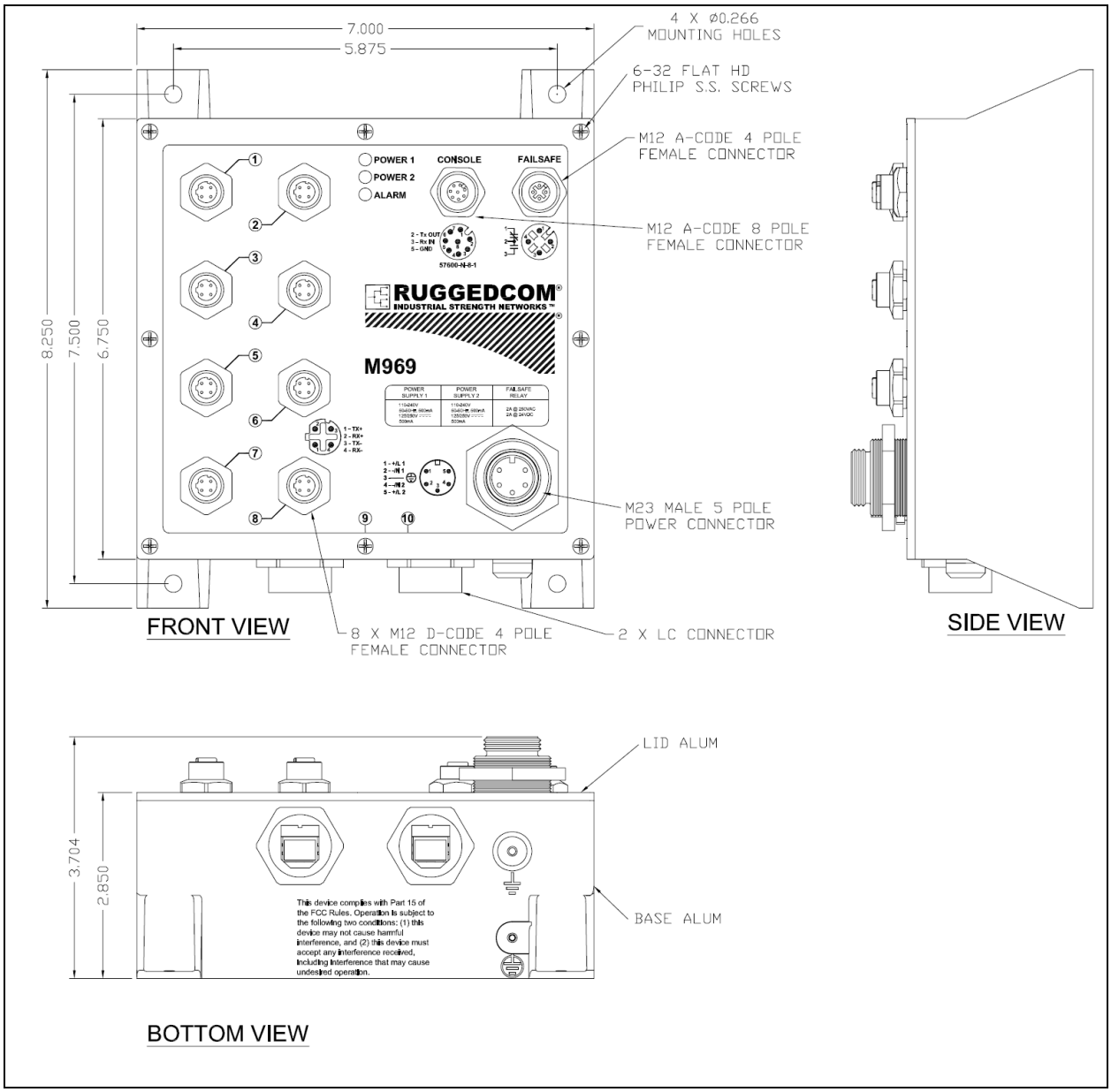


Figure 14: 8 M12 D-Code Ethernet ports and M23 power

4 Type Tests

4.1 IEC 61850-3 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	+/- 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	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
		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 [2]	N/A
IEC 61000-4-12	Damped Oscillatory	Signal ports	2.5kV common, 1kV differential mode @ 1MHz	3
		D.C. Power ports	2.5kV common, 1kV differential mode @ 1MHz	3
		A.C. Power ports	2.5kV common, 1kV differential 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	2kV AC (Fail-Safe Relay output)	N/A
		D.C. Power ports	1.5kVDC	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

Table 3 - IEC 61850-3 Type Tests

4.2 IEEE 1613 Type Tests

IEEE Test	IEEE 1613 Clause	Description		Test Levels
C37.90.3	9	ESD	Enclosure Contact	+/- 8kV
			Enclosure Air	+/- 15kV
C37.90.2	8	Radiated RFI	Enclosure ports	35 V/m
C37.90.1	7	Fast Transient	Signal ports	+/- 4kV @ 2.5kHz
			D.C. Power ports	+/- 4kV
			A.C. Power ports	+/- 4kV
			Earth ground ports	+/- 4kV
C37.90.1	7	Oscillatory	Signal ports	2.5kV common mode @ 1MHz
			D.C. Power ports	2.5kV common & differential mode @ 1MHz
			A.C. Power ports	2.5kV common & differential mode @ 1MHz
C37.90	6	H.V. Impulse	Signal ports	5 kV (Failsafe Relay)
			D.C. Power ports	5 kV
			A.C. Power ports	5 kV
C37.90	6	Dielectric Strength	Signal ports	2kVAC
			D.C. Power ports	1.5kVDC
			A.C. Power ports	2kVAC

Table 4 - IEEE 1613 Type Tests

Notes:

1. If the unit contains copper ports, the IEEE 1613 conformance is Class 1 (During disturbance errors may occur but recovery is automatic).
2. If the unit contains all fiber ports, the IEEE 1613 conformance is Class 2 (During disturbance no errors will occur).

4.3 IEC Environmental Type Tests

Test	Description		Test Levels	Severity Levels
IEC 60068-2-1	Cold Temperature	Test Ad	-40 deg. C, 16 Hours	N/A
IEC 60068-2-2	Dry Heat	Test Bd	+85 deg. 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		2g @ (10-150) Hz	Class 2
IEC 60529 (IPx6)	Ingress Protection	Water Jet	100l/m @ 2.5m as per 14.2.6	N/A
IEC 60529 (IPx7)	Ingress Protection	Water Submersion	30 min @ 1m as per 14.2.7	N/A
IEC 60529 (IP6x)	Ingress Protection	Dust	Talcum 2kg/m3 for 8h as per 13.4	Category 1&2

Table 5 - Environmental Type Tests

Note: 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).”

5 Agency Approvals

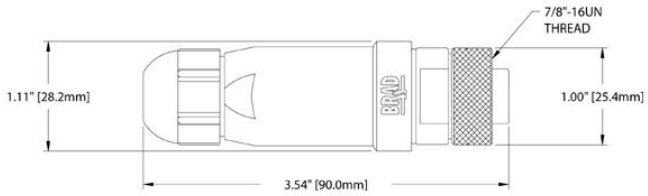
Agency	*Standards*	*Comments*
CSA	CSA C22.2 No. 60950, UL 60950	Approved
CE	EN 60950, EN 61000-6-2	Approved
FCC	FCC Part 15, Class A	Approved
CISPR	EN55022, Class A	Approved
FDA/CDRH	21 CFR Chapter 1, Subchapter J	Approved
IEC/EN	EN60825-1:1994 + A11:1996 + A2:2001	Approved

6 Accessories

6.1 Power (1/unit)

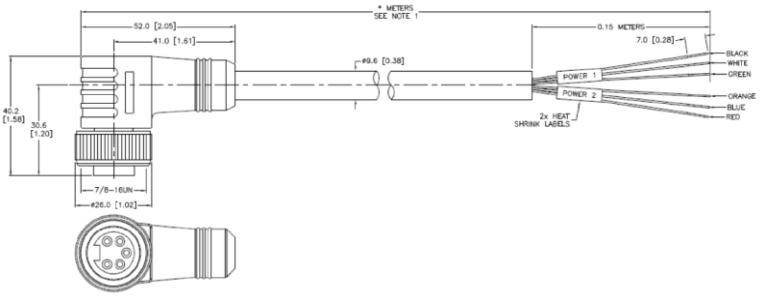
M23 Power Mating Connector

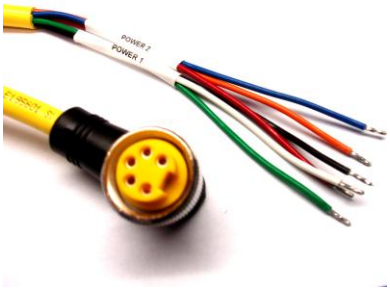
Description: M23 5 pin female connector, 600V, IP68 rated,
RuggedCom P/N 99-60-0007
Cable specs: 18AWG, jacket OD range 0.20" - 0.48"



M23 Power Cable

Description: Overmold R/A M23 plug to free end, 5m yellow PUR jacket, for dual power supply
RuggedCom P/N 99-43-0129-001
Cable specs: Overmold R/A M23 plug to free end, 5m

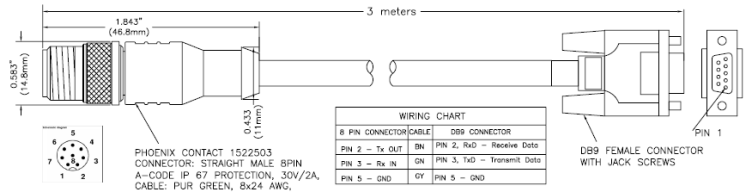




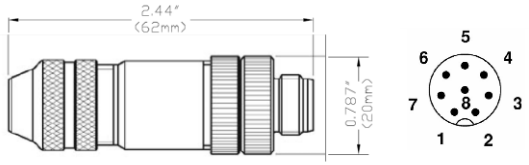
6.2 Console (1/unit)

M12 Console Port Mating Cable

Description: M12 8 pin A-code male to DB9 female; unshielded, PUR jacket cable, 30V/4A, 3m
RuggedCom P/N 99-43-0023-001
Cable specs: M12 8-pin A-code male to free end, 3m

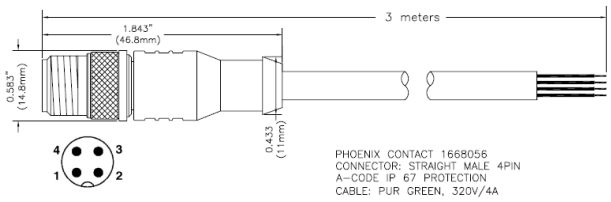


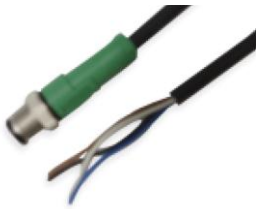
M12 Console Port Mating Connector
Description: M12-straight plug, 8 poles, A-coded, IP67 rated
RuggedCom P/N 99-60-0002



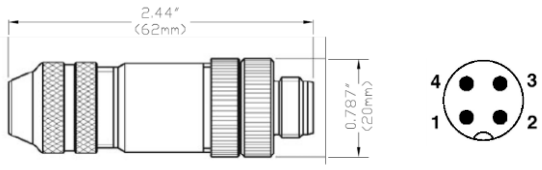
6.3 Failsafe (1/unit)

M12 Fail-Safe Port Mating Cable
Description: M12 4 pole A-coded; unshielded, PUR Jacket cable, 3m
RuggedCom P/N 99-43-0024-001



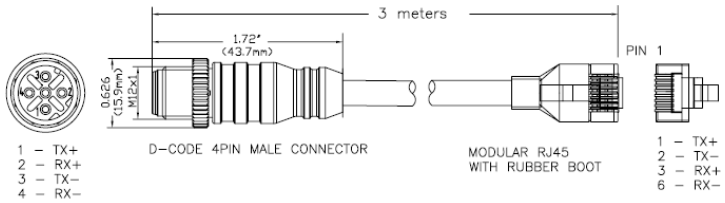


M12 Failsafe Port Mating Connector
Description: M12-straight plug, 4 pole, A-coded, IP67 rated
RuggedCom P/N 99-60-0009

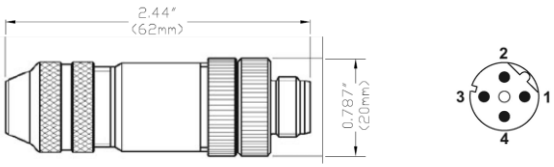


6.4 Ethernet (8/unit)

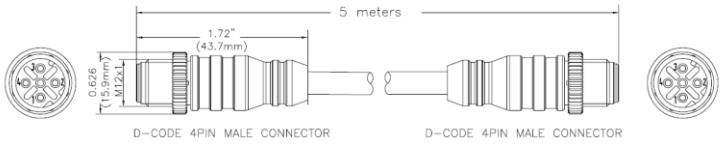
M12 D-Code Ethernet Port Mating Cable
Description: M12 D-code to RJ45; patch cable, 3 meters
RuggedCom P/N 99-43-0040-001
Cable specs: M12 male 4 pin, CAT 5e, 3m



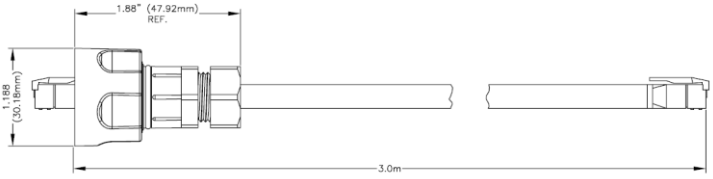
M12 D-code Ethernet Port Mating Connector
Description: M12-straight plug, 4 pole, D-coded, IP67 rated
RuggedCom P/N 99-60-0008



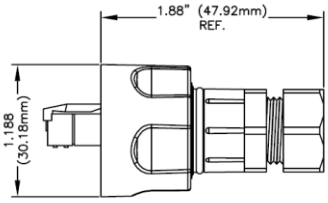
M12 D-Code Ethernet Port Mating Cable
Description: M12 male D-code to male D-code; shielded PUR jacket patch cable, 5 meters
RuggedCom P/N 99-43-0041-001
Cable specs: M12 male 4 pin, CAT 5e, 5m



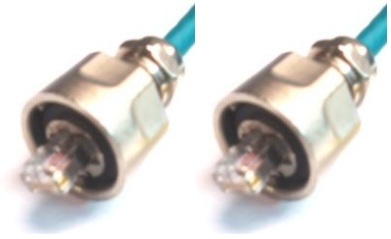
IP67 Metal RJ45 Ethernet Port Mating Cable
Description: IP67 Metal RJ45 plug to RJ45; Category 5e shielded patch cable, 3m
RuggedCom P/N 99-43-0182-001



IP67 Metal RJ45 Ethernet Port mating connector
Description: IP67 Metal RJ45 plug, field attachable
RuggedCom P/N 99-60-0010



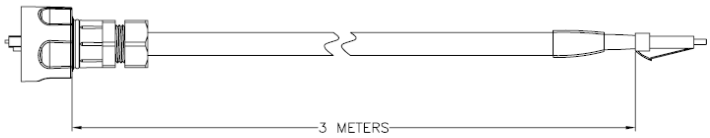
IP67 Metal RJ45 Ethernet Port Mating Cable
Description: IP67 Metal RJ45 plug on both ends; Category 5e shielded patch cable, 3m
RuggedCom P/N 99-43-0039-001



4.5 LC Fiber Optic (2/unit)

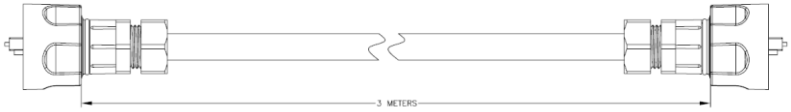
LC Port Mating Connector
Description: Cable Multimode Metal IP67LC to LC, Multimode fiber cable 3meters, IP67 rated
RuggedCom P/N 99-43-0057-001

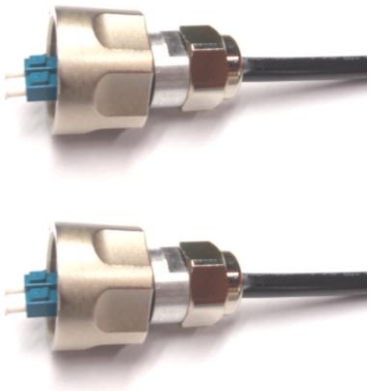
Description: Cable Singlemode Metal IP67 LC to LC, Singlemode fiber cable 3 meters, IP67 rated
RuggedCom P/N 99-43-0055-001



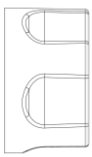
LC Port Mating Connector
Description: Cable Multimode Metal IP67 LC to Metal IP67 LC, Multimode fiber cable 3meters, IP67 rated
RuggedCom P/N 99-43-0047-001

Description: Cable Singlemode Metal IP67 LC to Metal IP67 LC, Singlemode fiber cable 3 meters,
IP67 rated
RuggedCom P/N 99-43-0053-001





LC, RJ45 Port Cap
Description: RJ45 outlet cap IP67, Metal
RuggedCom P/N 99-60-0011



7 Warranty

RuggedCom warrants this product for a period of five (5) years from date of purchase. For warranty details, visit http://www.ruggedcom.com/ or contact your customer service representative.

Should this product require warranty or service contact the factory at:

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Canada L4K 5C7

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Fax: +1 905 856 1995