

RJ Switch

Harsh Environment Gigabit Military Ethernet Switches



Sealed, Rugged & Waterproof Switch

Amphenol offers 9 ports managed, RING and unmanaged Ethernet Switches that can withstand a variety of extreme conditions. Whatever the situation - high temperatures, extreme shocks & vibrations, dust particles or even liquid immersion there is a solution available. This is an easy way to make the Ethernet networks of your systems deterministic. Up to **3 gigabit ports** are offered! The switch electronics are sealed within a waterproof IP68 metallic enclosure. The conductive cadmium plating is suitable for most demanding EMI-RFI environments. The I/O interface includes redundant power inputs as well as waterproof rugged RJ45 connectors from the RJF TV FIELD threaded product series based on MIL-DTL-38999 (Series III) metallic shell size 19. This serie enables the transformation without tooling of any standard RJ45 cordset into a robust and waterproof connection system.

Sealed and Rugged
Military Ethernet
Switches

Key Features

Rugged environmental features

- ✓ Rugged metal packaging with cadmium or paint protection
- ✓ **MIL-DTL-38999 III** connectors for both power and Ethernet ports
- ✓ **IP65/IP68** rated when mated
- ✓ **MIL-STD-461E (CE03)**
MIL-STD-704A
RTCA/DO-160B | 600V spike suppression (optional)
- ✓ **MIL-STD-1275** Surge and Spike protection (*)
- ✓ **MIL-STD-810F** shocks
- ✓ **RTCA/DO-160C** Vibrations
- ✓ Wide operating temperature range of **-40°C to 70°C**
- ✓ **MIL-STD-810F** Altitude 50,000 ft – 15,000 m

Ethernet features

- ✓ **3 ports 10/100/1000-BaseT(X)** + 6 ports 10/100-BaseT(X) (*)
- ✓ Unmanaged, RING unmanaged and **Managed** models
- ✓ Full-Duplex operation with flow control (no collisions!)
- ✓ Auto-detecting, auto-crossover and auto-polarity

RING switch (RS & RG)

- ✓ Ring for fast fault-tolerant loops
- ✓ Recovery time of 30 ms + 5 ms per hop!
- ✓ QoS and CoS priority queuing

MANAGED switch (MS & MG)

- ✓ RSTP for redundant rings
- ✓ QoS and CoS priority queuing
- ✓ SNMPv3 authentication and encryption
- ✓ IGMP for multicast filtering
- ✓ VLAN for traffic segregation
- ✓ And much more !

(*): depend on models

Gigabit included !

New models

ROHS

MIL-STD-461

Military Applications

- Data Acquisition & Transmission
- Battlefield Communication C4ISR
- Rugged Networks
- Mobile Communications
- Test Equipment
- Avionic & Shipboard Systems

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Managed & Ring & Unmanaged Switch Features

IEEE Ethernet Standards

Models	Features	802.3/u	802.3x	802.3z	802.1p	802.1D	802.1w	802.1Q
RJS ML 9ES	Unmanaged	✓	✓					
RJS ML 9RS	RING	✓	✓		✓			
RJS ML 9RG	RING - Gigabit	✓	✓	✓	✓			
RJS ML 9MS	Managed	✓	✓		✓	✓	✓	✓
RJS ML 9MG	Managed - Gigabit	✓	✓	✓	✓	✓	✓	✓

IEEE 802.3/u	10 Mbps & 100 Mbps Fast Ethernet	IEEE 802.1p	Priority queuing – QoS, CoS, ToS/DS
IEEE 802.3x	Full-Duplex with Flow Control	IEEE 802.1D/w	Rapid Spanning Tree for redundant rings
IEEE 802.3z	Gigabit 1000 Mbps Ethernet	IEEE 802.1Q	VLAN for traffic segregation

Environmental specifications

EMI emissions	EN55022 class A, FCC part 15, ICES-003
EMC immunity	IEC61326-1, IEEE C37.90
Shocks	MIL-STD-810F : 40g, 11ms, 18 saw tooth shocks
Vibrations	RTCA/DO-160C Sinusoidal vibrations 5-55 Hz: 0.01 inch ; 55-500 Hz: 1.5 g
Altitude	MIL-STD-810F : 50,000 ft - 15,000 m
Temperature	Operating - 40°C to +70°C Storage - 40°C to +85°C
Weight	approx 2.2Kg

Power Supply

24 VDC Input	10 – 30 VDC for 9ES model (single power) 10 – 50 VDC redundant for 9RS models 10 – 30 VDC redundant for 9RG, 9MS and 9MG models
Input power	4 to 9 W typical (all ports active), depends on models
Connectors for power	MIL-DTL-38999 III Jam nut receptacle, olive drab cadmium or Nickel plated 9ES models: 1 connector TVx07xx 0998P: 3 cts # 20 (wire 0.6 mm ² maxi) Other models: 2 connectors TVx07xx 0935P: 6 cts # 22D (wire 0.4 mm ² maxi) The second connector facilitates the cabling for redundant power.
“OK” contact output	(Ring models only) Sourcing power; Maximum current: 0.5 A

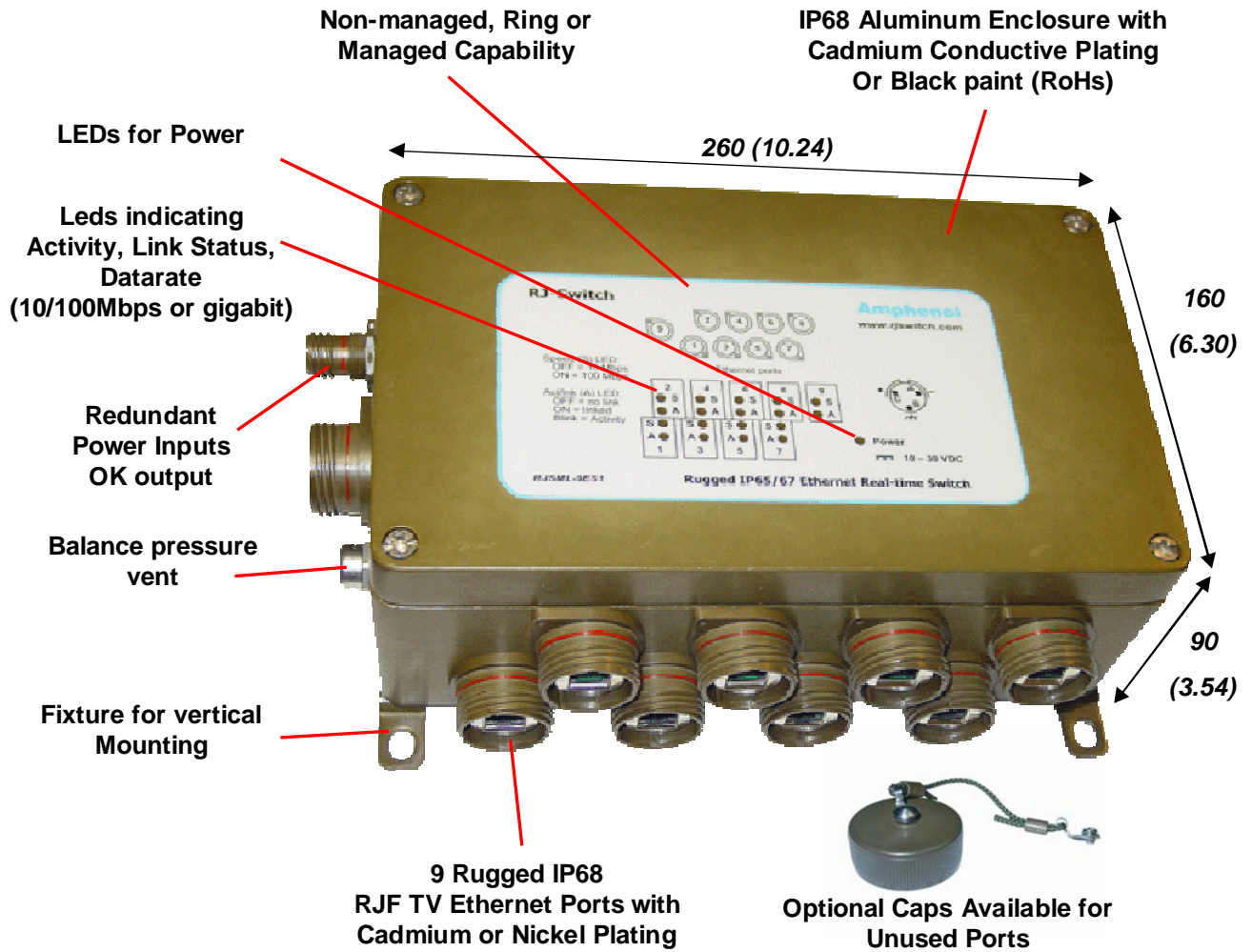
Ethernet features

RJ45 ports	9 shielded RJ45 ports 10/100 Base T(X) or 1000 Base T(X)
Connectors for RJ45 ports	RJFTV 7: Jam nut receptacle based on MIL-DTL-38999 III Olive drab cadmium or Nickel plated
RJ45 speed	10, 100 or 1000 Mbps auto-negotiation
Typical latency	16 us + frame time @ 10 Mbps (varies on load and settings) 5 us + frame time @ 100 Mbps
Full / Half Duplex	Automatic or configurable
MDI / MDIX	Auto-crossover
MAC addresses supported	8192 (MG & RG); 2048 for all other models
Memory bandwidth	32 Gbps (gigabit); 3.2 Gbps for all other models

Power Protection	Models ES; MS; RG & MG	Model RJS-ML-9RS1 MIL-STD-1275	Optional -704 Specifications Available for all models
Surge		100 V for 1s	100 V, 60 ms MIL-STD-1275A Fig. 8&9 of MIL-STD-704A
Transient	15 KW peaks	15 KW peaks	
Spike	5 KW (10x for 10 µs)	5 KW (10x for 10 µs) 250 V (50x for 100 µs)	400 V, 5 µs (DO160) 600 V, 10 µs (MIL-STD-461C CS06 limits) Protection against reverse voltages

Description

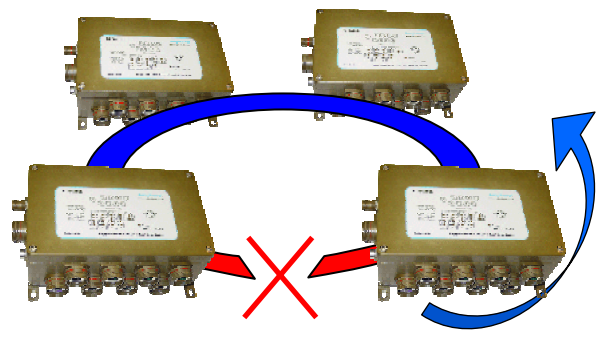
Dimensions in mm (inch)
Other dimensions in user manuals



Real-Time Ring Switches

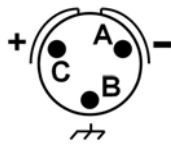
Amphenol Real-Time Ring switches combines the Plug&Play **simplicity** of an unmanaged switch with **high performances** of managed switches.

- ✓ **Real-Time fault-tolerant Ring**
Recovery time of 30 ms + 5 ms per hop!
- ✓ **Real-Time traffic prioritization (QoS & CoS)**
Assure delivery of real-time data
- ✓ **Available Managed features**
User configurable port settings
Port mirroring for traffic diagnostics
Pre-configurable for Plug & Play simplicity

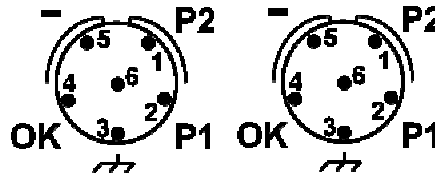


The use of such switches provides a fast network and avoids faults. When a break occurs, the switch instantly transfers data to new path. The link loss recovery is 30 ms plus 5 ms times the number of Ring switches in the ring. For example, 10 ring switches will recover in less than 80 ms. Rings can be pre-configured to “just run”. They don’t need an assigned IP address. But if you like, you can fine tune the performance of the ring by using a simple Windows wizard (which is free). Ring networks can be divided into multiple “sub-rings” which enhance reliability and recovery speed through the small ring paths.

Pin-out for power



Pin-out for the 9ES1 models



Pin-out for the 2 power connectors of the Ring and managed models

Note: The use of 2 connectors facilitates the cabling of redundant power inputs.

Part Numbers

Serie	RJS	ML	9ES1	-	-
Type of Enclosure					
ML	MIL-DTL-38999 (Series III) Receptacles, OD Cadmium Plating				
BKN	RAL 9005 (Jet black) Paint on Aluminum box, Nickel plated 38999 (Series III) Receptacles, Additional coating on PCB, RoHs compliant				
Type of Electronics					
9ES1	Unmanaged 9 ports 10/100 Base T(X)				
9RS1	Unmanaged RING 9 ports 10/100 Base T(X)				
9RG1	Unmanaged RING 6 ports 10/100 Base T(X) + 3 ports 10/100/1000 Base T(X)				
9MS1	Managed 9 ports 10/100 Base T(X)				
9MG1	Managed 6 ports 10/100 Base T(X) + 3 ports 10/100/1000 Base T(X)				
Optional: Transient suppression module; 600V spike suppressor					
Blank	No transient suppression module				
704	Switch equipped with additional transient suppression module				
Accessories: Caps for receptacles fixed with cord directly to the receptacle					
Blank	No caps included. The Ethernet ports are still sealed but the contacts are not protected.				
CAPS	Attached caps for both power and data included				

Examples:

RJS ML 9MG1 CAPS

Managed switch in an aluminum enclosure with olive drab green conductive cadmium plating, 6 ports 10/100 Base T(X) + 3 gigabit ports, RJF TV threaded coupling receptacles, caps are added to the switch

RJS BKN 9ES1 704 CAPS

Unmanaged switch in a black paint enclosure, 9 ports 10/100 Base T(X), RJF TV threaded coupling receptacles, both power and Ethernet receptacles are Nickel plated, caps are added to the switch, additional transient suppression module included.

Note: All BKN Ethernet switches and nickel plated accessories are RoHs compliant.

ROHS COMPLIANT

Note: With the -704 option, a filter module is included inside the switch allowing to meet MIL-STD-461 and other aircraft standards.

Accessories

Plugs for Ethernet ports

RJF TV 6 M G: cadmium OD plating

RJF TV 6 M N: nickel plating

Based on MIL-DTL-38999
No tool required !!!



Caps for Ethernet ports

RJSML C7G: cadmium OD plating

RJSML C7N: Nickel plating

A simple screwdriver is needed!
Note: Do not order the caps in addition with pre-equipped RJS-xxxx-CAPS switches.



Plugs for I/O ports:

MIL-DTL-38999,
cadmium plated, crimp contacts

For 9ES1 model: One plug (3 cts #20)

TV 06 RW 0998 S: cadmium OD plating

TV S06 RF 0998 S: nickel plating

For 9RS1, 9RG1, 9MS1 and 9MG1 models

Two plugs (6 cts # 22D)

TV 06 RW 0935 S: cadmium OD plating

TV S06 RF 0935 S: nickel plating



Backshells for I/O plugs

We suggest to use MIL-DTL-38999 III backshells.

Consult the dedicated catalog (E118) for details.



Examples:

TVNSA 09 014: shielding backshell, cadmium OD plating

TVNSA 09 023: shielding backshell, nickel plating

+ **804221** straight heat shrink for sealing

Example: with an **RJSML 9MG1 CAPS** switch, we suggest to use hereafter accessories:

RJF TV 6 M G (up to 9) for Ethernet ports

TV 06 RW 0935 S (x2) + **TVNSA 09 014** (x2) + **804221** (x2) for power ports