



## IP67 rugged Ethernet Managed Switch RESMLAC 28MG - Installation Guide -

### Contents

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<b>Section 1</b>	<b>General Information</b>	<b>Page 3</b>
<b>Section 2</b>	<b>Hardware</b>	<b>Page 4</b>
<b>Section 3</b>	<b>Installation</b>	<b>Page 5</b>
<b>Section 4</b>	<b>Wiring</b>	<b>Page 6</b>
<b>Section 5</b>	<b>Management</b>	<b>Page 10</b>
<b>Section 6</b>	<b>Features Overview</b>	<b>Page 11</b>
<b>Section 7</b>	<b>Service Information</b>	<b>Page 15</b>

This manual applies to the following products:

- **RESMLAC 28 MG (options)**  
Rugged IP67 Managed Ethernet Switch with 24 gigabit ports + 4 *optional fiber ports*.  
For options and detailed P/N, please consult us.

Révision	Date	Modifications
1.0	August 2011	Initial document
1.1	November 2011	Pinout of power connector.
1.2	August 2020	Technical updates, Reference to the CLI
1.3	January 2021	Mounting brackets, temperature and dimensions specifications

## ***Amphenol Statement of Limited Warranty***

The characteristics of the Products shall be defined as those published in the most recent version of the Vendor's specifications, unless different characteristics are expressly agreed between the Vendor and the Customer.

Unless expressly agreed to the contrary, the guarantee shall be valid for one year from the date of delivery.

The guarantee shall be made invalid:

- Where the cover of the switch enclosure has been opened.
- Where the components have been damaged in transit or have not been stored by the Customer in conditions in accordance with the specification.
- Where the components have been subjected to abuse (mechanical, electrical or thermal) on installation or on use and, in the case of slices/dice, have been subjected to handling or such operations as the welding of connecting wires mounting by soldering or sticking.
- Where the unfitness or defectiveness of the components has resulted from exceeding the maximum values for usage (temperature limit, maximum voltage, etc.) as defined by the Vendor, or from incorrect choice of application.

Furthermore, the guarantee shall not cover consequential liability, direct or indirect which may result from the failure of a component supplied by the Vendor.

The foregoing constitutes the Vendor's guarantee in its entirety and takes the place of any other format guarantee, implied or otherwise.

The guarantee is limited, at the Vendor's option, to either the replacement or the repair of the component accepted by him as being defective, to the exclusion of any other form of compensations.

**Note: All information in this document is subject to change without notice.**

## Section 1

## General Information

### Overview

This manual will help you install and maintain the 28 ports Amphenol Rugged Ethernet Gigabit Managed switches.

Military applications can now take full advantage of 1000Mbps Gigabit Ethernet performance.

The installation guide describes how to install and use the hardened Ethernet RESMLAC28MG Military Rugged Switch. Capable of operating at extreme temperature of -40°C to +70°C and meet the toughest industrial and military environments such as MIL-STD-810, MIL-STD-461, RTCA-DO-160 up to the highest levels. The mentioned ability turns the RESMLAC28MG to the optimal solutions switch of choice for harsh environments constrained by space.

Developed for military and harsh mobile applications, the RESMLAC28MG features mechanical packaging enhancements designed for MIL-STD-810 airborne and ground environmental compliance and high reliability. The unit has been especially hardened to improve ingress, impact, and shock/vibration protection, as well as eliminate all moving parts through passive cooling, and interface through sealed MIL-D-38999 and SCE TERRAPIN circular connectors.

Leveraging best-in-class switching technology from Techaya, the RESMLAC28MG serves as a robust solution for providing local area network (LAN) connectivity to IP-enabled computing and net-centric devices. Compact in size, the RESMLAC28MG is particularly useful for expanding port density to tactical IP routers in space-constrained airborne and ground vehicle environments.

RESMLAC28MG is specifically designed for Data Acquisition & Transmission, Battlefield Communication C4ISR, Rugged Networks, Mobile Communications, Combat vehicles and Avionic & Shipboard Systems.

### Operation

The switch supports triple speed 10/100/1000BaseTx (up to 1000 Mbps) for each of the 24 ports. Each of these ports will independently auto-sense the speed, allowing you to interface to regular, fast or gigabit Ethernet devices.

The switch offers also 4 combo ports providing alternative 4 fiber optics ports. These ports withstand up to 10 Gbps.

### Performance Specifications

These general specifications apply to these switches. Refer to Section 5 for complete technical specifications.

Copper Ports	24x 10/100/1000BaseT(x) (Shielded SCE Terrapin connectors)
Fiber ports	4x optional combo fiber ports up to 10Gbps rated
Voltage	24Vdc Nominal (18-32V) Power Consumption: 20W Typical
Ethernet Standards	<ul style="list-style-type: none"><li>• IEEE 802.3 (10BaseT), 802.3u (100BaseTX), 802.3x (Full Duplex), 802.3z (Gigabit)</li><li>• IEEE 802.1x MAC based Authentication</li><li>• IEEE 802.1Q Vlan Tagging</li><li>• IEEE 802.1P QoS</li><li>• IEEE 802.1S Multiple STP</li><li>• IEEE 802.1W Rapid STP</li><li>• IEEE 802.1AD Link Aggregation</li></ul>
MIL standards	RTCA-DO-160, MILSTD-461, MILSTD-810
Electromagnetic	MIL-STD-461 Electromagnetic compatibility
Operating Temp.	-40°C to +70°C (-40°F to +158°F) – Cold Start-Up
Waterproof	IP67

## Section 2

## Hardware

### Overview

The switches can be mounted directly to a flat surface or to a wall. Refer to the mechanical drawing below. Its high protected enclosure makes it able to withstand immersion (IP67 rating).

The Ethernet connections come out from rugged MIL-DTL-38999 serie III connectors for power and fiber and with SCE Terrapin connectors for Ethernet.

### Front Panel Display

The following describes the front panel, and LED indicators of the RESMLAC28MG.



### LED Indicators for Power

The Single Power 1 and Power 2 Led indicators on the front panel provide the operative status of the switch. Some models come with only 1 power supply, some come with 2 separate power supplies.

On models with only 1 power supply, only Power 1 LED indicator will be operational. Once the LED is turned on, the switch is powered and ready-for-use. This LED will be ON solid green when proper power has been applied to the unit.

### LED indicators for Ethernet ports

Each port has 2 LEDs indicators:

- Link / Activity (Off – there is no link, Steady Green – There is a device connected, Flashing Green – there is data transmission)
- Speed (Steady Green for 1000Mbps, Off for 100 and 10 Mbps)

### ON/OFF switch

The RESMLAC28MG is equipped with an ON/OFF switch, located at the rear of the unit. The ON/OFF switch has a lock apparel. To move from one position to the other, **pull and move** the ON/OFF switch.



## Section 3

## Installation

### Selecting a Site

As with any electronic device, you should place the switch where it will not be subject to extreme temperatures, humidity, or electromagnetic interference that exceeds the RESMLAC28MG's profile. Specifically, the site you select should meet the following requirements:

- The ambient temperature should be between -35 to 75 degrees Celsius.
- The relative humidity is recommended to be less than 95% percent, non-condensing.
- Surrounding electrical devices should not exceed the electromagnetic field (RFC) standards for MIL-STD-461.

The switches are pre-equipped with plastic or metallic caps on all ports, including power and Ethernet.

→ **Make sure all connectors are protected with cap or sealed plug to ensure sealing and prevent from deterioration of the contacts.**

### Mounting

The RESMLAC28MG Ethernet Switch can be fastened to any flat surface by mounting the box directly or installed inside a 19" rack. Refer to the mechanical drawings below. Make sure to allow enough room to route your Ethernet and power cables.

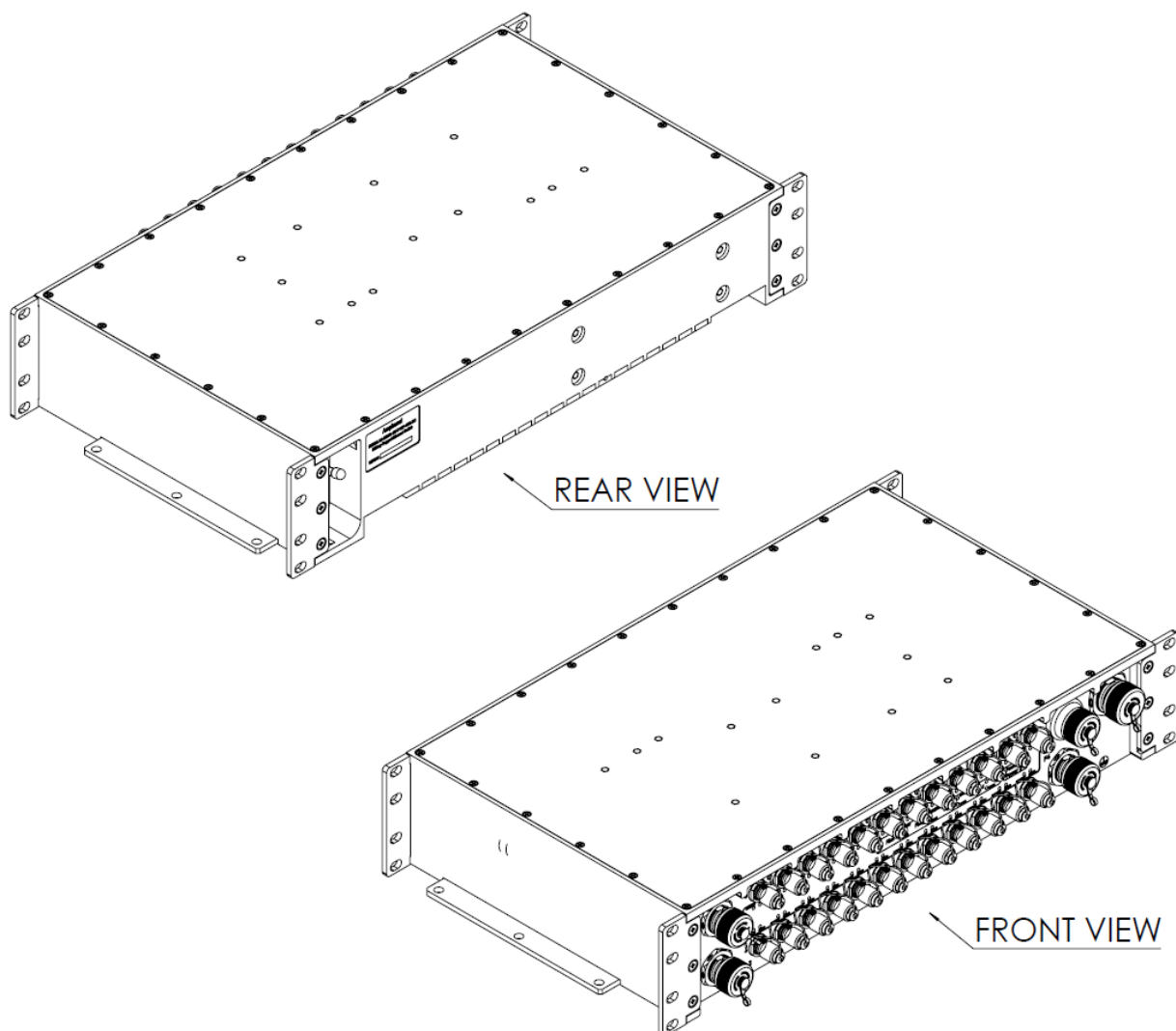
Two types of brackets are available:

- Type A for 19" rack mounting

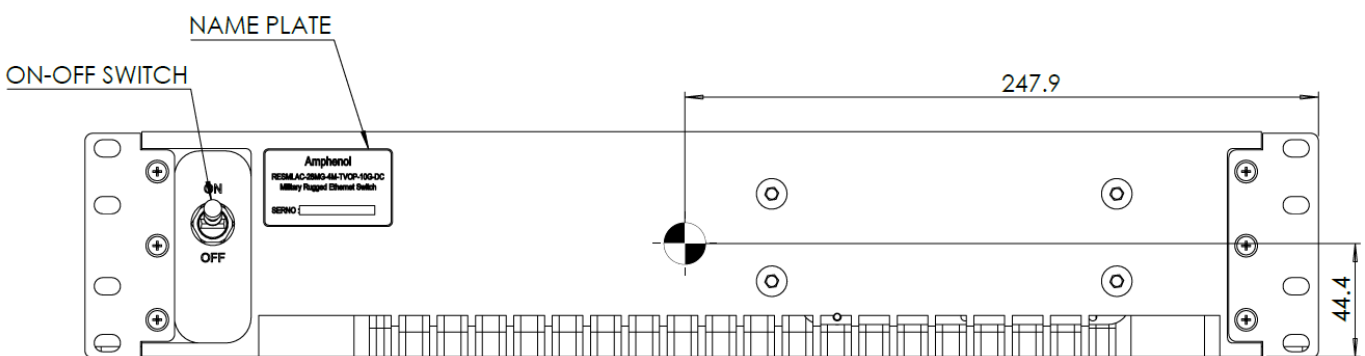
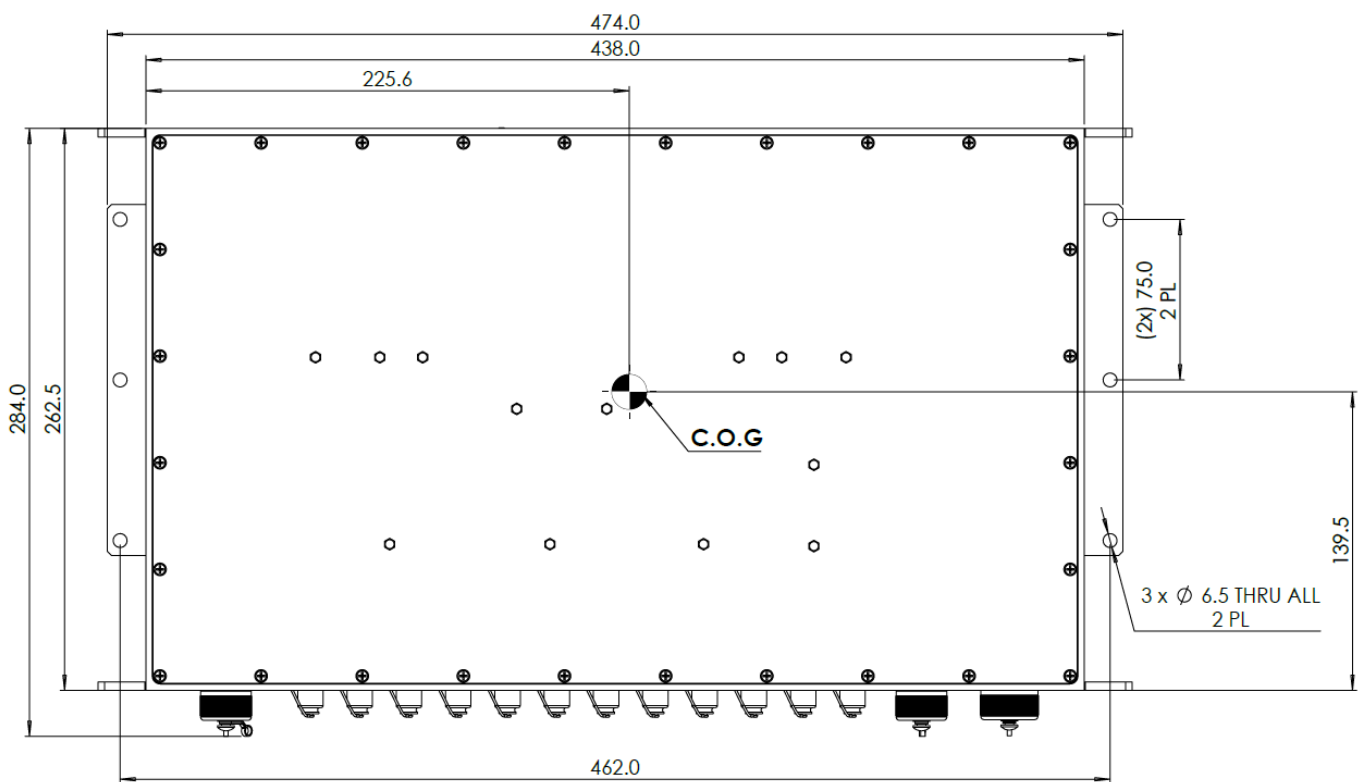
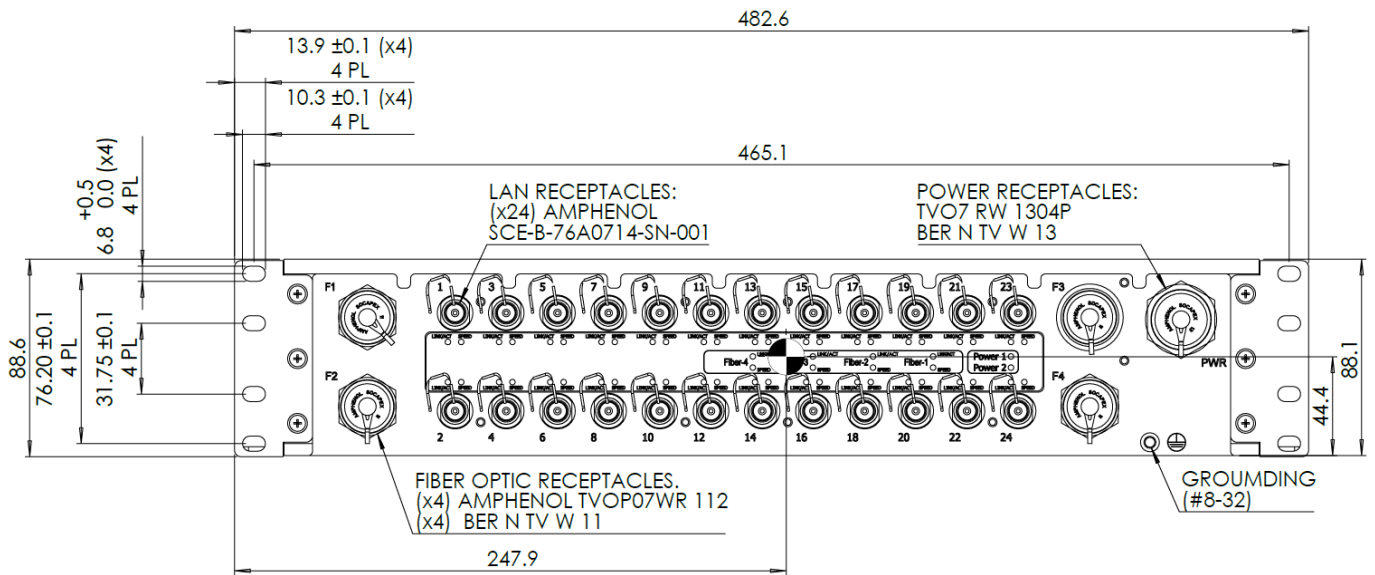
**By default, the Ethernet switch is delivered with Type A brackets.**

- Type B for mounting on any flat surface with fixations from the rear.

6x Screws with flat and spring washer are needed to fix the brackets onto the switch.



*View of a model with 4 fibers optics TVOP ports and Type A +B brackets.*



Drawings of a model with 4 fibers optics TVOP ports and Type A +B brackets.

## Section 4

## Wiring

### Overview

These switches provide connections to Ethernet devices in harsh environment. Typically, a port is used to connect to another Ethernet switch or hub that is connected to the main Ethernet backbone. The other Ethernet ports are then connected to Ethernet devices such as communication systems, Ethernet I/O, or industrial computers. Electrical isolation is provided on the Ethernet ports for increased reliability.

Please follow normal Ethernet wiring practices when installing these switches.

### Power plug wiring

The switches should be powered using mating plugs and backshells compliant with MIL-DTL-38999 series III. We suggest using hereunder accessories. Another backshell can be used but it must ensure a correct sealing protection.

### Power plug part number

Military designation: JD38999/26WC4SN

Amphenol designation: TV06RW1304S

This plug is size 13. It is coming with 4 contacts size 16 (13 A nominal current).

The plug shall be terminated with a suitable backshell and heat shrink.

Example of backshell designation: TV35 13 10 12 014 or TVNSA 13 014.

Heat shrink designation: 804223



### Power plug wiring


Contact	Signal	Suggested Harness Color
A	+24 V	red
B	<i>Not connected</i>	<i>Not connected</i>
C	0 V	black
D	<i>Not connected</i>	<i>Not connected</i>

### Tooling

The plugs are using crimp contacts size 16.

We suggest using hereunder tooling.

Crimping tools		Amphenol No	Military No
	Crimping tool	809857	M22520/1-01
	Positioner	809858	M22520/1-04

Plastic insertion and removal tools	Colour	Amphenol No	Military no
	Blue	809855	M81969/14-03

## Ethernet plug wiring

These switches provide connections to Ethernet devices on the battlefield. Typically, a port is used to connect to another Ethernet switch or hub that is connected to the main Ethernet backbone. The other Ethernet ports are then connected to Ethernet devices such as communication systems, Ethernet I/O, or industrial computers. Electrical isolation is provided on the Ethernet ports for increased reliability.

Please follow normal Ethernet wiring practices when installing these switches.

## Ethernet plug part number

The switches should be connected using mating inline receptacles from SCE Terrapin series.

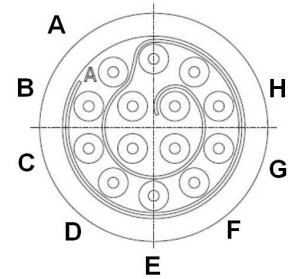
We suggest using the L1K Latch inline receptacle or 01K Snatch inline receptacle.

P/N for the latch inline receptacle: SCE2-B-L1K07-14PN.

Note: A grounding ring is provided with the 985 option.

P/N for the latch inline receptacle with grounding ring: SCE2-B-L1K07-14PN-985.

This plug has size 7. It is coming with 14 contacts 23 AWG with solder termination. Only contacts A to H should be connected following to below wiring.



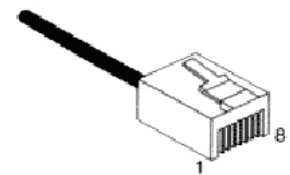
**SCE2-B-L1K07-14PN**  
pinout

- Rear view -

## Ethernet plug pinout

Use data-quality (not voice-quality) twisted pair cable rated category 5e (or better) with standard RJ45 connectors.

Wiring of Ethernet cordsets shall respect following table. (T568B colour code).



SCE2	RJ-45	Signal type	Colour
A	1	Tx 2	White / Orange
B	2	Rx 2	Orange
C	3	Tx 3	White / Green
D	4	Rx 1	Blue
E	5	Tx 1	White / Blue
F	6	Rx 3	Green
G	7	Tx 4	White / Brown
H	8	Rx 4	Brown

## Accessories

Accessories such as heatshrink boots, braid retention strap and metal dust caps can be used. Consult the TERRAPIN catalog for further details.

Here are the heatshrink boots suggested for using with SCE2-B-L1K07-14PN:

Right angled or Straight boot	Amphenol P/N	Raychem Tyco P/N	Hellerman P/N
Straight	123GB-0798-07-S	202K132-25/225	154-44-GW24
Right angled	123GB-0798-07-R	202D132-25/225	1107-4-GW24



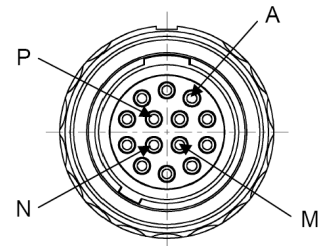
**DB9 plug wiring**

These switches can be accessed with a serial connection.  
 The serial port is available only on **port 1**, shared with LAN1.

**SCE to DB9 cordset**

To access the switch using a serial link, we suggest preparing a cordset SCE to DB9.  
 The DB9 shall be female connector.

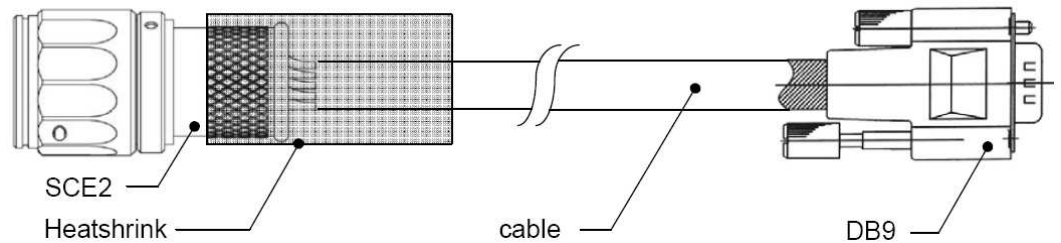
Use a latch inline receptacle for the SCE connector.  
 P/N : SCE2-B-L1K07-14PN.



**SCE2-B-LIK07-14PN pinout**  
 - Rear view -

This plug has size 7. It is coming with 14 contacts 23 AWG with solder termination. Only contacts M, N and P should be connected following to enclosed wiring.

**Suggested cordset**



**Cordset Wiring**

Connector SCE2		Connector DB-9	
SCE2	RS232 Signal type	DB-9	RS232 Signal type
M	Tx	2	Rx
N	Rx	3	Tx
P	GND	5	GND

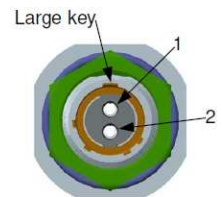
**FIBER OPTIC wiring**

These switches can be equipped with up to 4 fiber optic ports.

The model RESMLAC 28MG 4M TVOP 10G DC comes with 4 fiber optics ports.

The connectors installed onto the switch are jam nut receptacles :

P/N: TVOP 07 W N0 11 2 P7 N



**TVOP 07 pinout**  
 - Rear view -

**TVOP07 wiring**

TVOP 07	Signal
1	Tx
2	Rx

**TVOP plug part number**

The mating cable assembly shall use at least a multimode 50/125 OM3 fiber type.

It shall use a suitable plug compliant with the TVOP receptacle:

P/N : TVOP 06 W xx 11 2 P7 N xx

## Section 5

### Accessing to the switch

## Management

You can access to the switch with 3 ways:

- Web interface
- Hyper Terminal / Console / CLI
- Telnet

Each access method is independent and can be used separately.

After accessing the switch, use the *User manual RESMLAC-28MG CLI (Franchise Ph. 3.5 CLI Commands)* for details regarding management features with CLI.

The web interface comes with an on-line help.

### Web Interface

Web interface access requires that you know the IP address of the switch.

Use any of the 24 ports to connect to your computer.

Change your computer's IP address to the same subnet before trying to access the switch.

- The default IP address of the switch is 192.168.1.111.
- The default subnet mask is 255.255.255.0.
- The default User Name is "admin".
- The default password is *blank/empty* or "admin".

### Serial access

Serial access requires connecting the SCE/DB9 cordset to the **port 1** of the switch.

Open HyperTerminal, Putty or another Serial terminal emulator and configure its properties with:

- Bits per second: 115200
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

## Section 6

### Switching Features

## Features Overview

Here's a brief explanation of some of the features found in these switches documented by this manual.

### ETHERNET PORTS

- 24 x switched 10/100/1000 (Triple speed Ethernet) ports
- 4 Gigabit Combo ports for fiber up to 10G per port

### STANDARDS COMPLIANCE

- IEEE 802.3 10 Mbps 10BASE-T (Ethernet)
- IEEE 802.3u 100BASE-TX 100 Mbps (Fast Ethernet)
- IEEE 802.3x Full Duplex
- IEEE 802.3z 1000BASE-TX (Gigabit Ethernet)
- IEEE 802.1x MAC based Authentication
- IEEE 802.1Q Vlan Tagging
- IEEE 802.1P QoS
- IEEE 802.1S Multiple STP
- IEEE 802.1W Rapid STP
- IEEE 802.1AD Link Aggregation

### EMI AND ENVIRONMENTAL STANDARDS

- RTCA-DO160:
  - ESD, section 25 (15KV, 150pF, 330Ohm)
- MIL-STD-461F:
  - CS-114, Conducted Susceptibility, bulk cable injection, 10kHz to 200MHz
  - CS-115, Conducted Susceptibility, bulk cable injection, Impulse excitation
  - CS-116, Conducted Susceptibility, Damped Sinusoidal Transients, cables and power leads, 10kHz to 100MHz
  - RE-101, Radiated Emissions, Magnetic Field, 30Hz to 100kHz
  - RE-102, Radiated Emissions, Electric Field, 2MHz to 18GHz
  - RS-101, Radiated Susceptibility, Magnetic Field, 30Hz to 100kHz
  - RS-103, Radiated Susceptibility, Electric Field, 2MHz to 18GHz
- MIL-STD-810E :
  - Drip
- MIL-STD-810F
  - Altitude Method 500.4, Procedures I and II
- MIL-STD-810G:
  - Humidity, Method 507.5
  - Operational Temperature, Methods 501.5 & 502.5, Procedure II
  - Storage Temperature, Methods 501.5 & 502.5, Procedure I

Functional shock, Method 516.6, Procedure I

Transportation Vibration, Method 514.6, Category 4 & 10

Salt Fog, Method 509.5

- MIL-STD-167-1A  
Shipboard vibration, Type I
- IP67
- Support up to 50ms holdup time, and 6VDC drops

#### CHASSIS

- Low profile rugged aluminum extrusion
- Conductively cooled w/custom internal heat-sinks
- Ingress protection against sand, dust and moisture
- Anodize Coating, MIL-A-8625, Type II, Class 2

#### PERFORMANCE

- 96.8 Mbps wire speed forwarding rate
- 56 Gbps maximum forwarding bandwidth
- 8K MAC Address

#### NETWORKING - GENERAL

- Wire-speed hardware-based 28 ports gigabit ethernet switch
- Multicasting (IGMP Snooping), GARP, GMRP, MLD and GVRP.
- Multicast groups up to 8K for both IPv4 and IPv6
- Broadcasting and flooding Control up to 8K Groups
- 802.1q Tagged based VLAN up to 4K VLAN groups
- Bridge support for VLAN Q-in-Q
- Link Aggregation 802.3ad, up to 16 members in group
- Link Aggregation mechanism based on L2/ L3/ L4 parameters.
- Jumbo Frame support up to 10K
- WEB, CLI, Telnet Management.

#### NETWORKING – QUALITY OF SERVICE

- QoS Multi-Layer Classifier: 802.1p, EtherType, VLAN-ID, IPv4/6 DSCP/ToS, and UDP/TCP ports & ranges traffic classification.
- Per port WFQ and Strict Queuing scheduling
- DSCP remarking for both IPv4 and IPv6 frames
- Ingress policer and ingress shaper per port with 500Kbps granularity
- Egress shaper per port with 500Kbps granularity
- Full-duplex flow control (IEEE802.3X) and half-duplex backpressure, symmetric and asymmetric

## NETWORKING – SECURITY

- Security via Radius Authentication 802.1x, Port / MAC access control
- Port Security
- Per port ingress and egress port mirroring.
- Mirroring per VLAN and per content awareness match
- Private VLAN support per VLAN (Isolated and Promiscuous ports)
- Content Aware Policers:
  - 128 Content Aware Policers
  - 16 Content Aware rate policers with rates from 1fps to 32 million fps
  - 8 UDP/TCP port range policers
  - Advanced ACL through hardware based match patterns
  - Content Aware Policers for generic MAC, ARP, IPv4, IPv6 protocols
  - No restriction on any mix of entries to Content Aware Policers
  - Content Aware Policers actions are permit/deny, police, count, snoop and mirror
  - Special support for IP fragments, UDP/TCP port ranges and ARP
  - Extensive CPU DoS prevention
  - Surveillance functions by Content Aware Policers counters
  - Multiple ACLs per port for optimal usage of Content Aware Policers
- Storm controllers for flooded broadcast, multicast and Unicast

## NETWORKING – REDUNDANCY AND RING PROTECTION

- Spanning Tree (802.1d), RSTP (802.1w) and multiple Spanning Tree (802.1S) for fast recovery rings
- RPR for up to 30 units per ring with recovery time <50ms hardware based
- 20-Gbps bandwidth for ring topology
- QoS consistency across stack / ring
- Mirroring across stack / ring
- Link aggregation groups spanning multiple switches in stack / ring

## POWER

- Voltage Input: 24Vdc Nominal (18-32V)
- Option for Redundant Power Supply with load sharing, 48VDC and 90~230VAC
- Power Consumption: 20W Typical
- Exceed MIL-STD-1275B and MIL-STD-704A Surge and Spike protection with 50ms holdup time and 6VDC drops
- Chassis grounding

## PHYSICAL

- Dimensions: 438mm (L) x 284 (W) x 88mm (H), including connectors & hardware, 2U, 19'' rack
- Weight: 5.6kg
- 19'' standard mounting ears

## COOLING

- No Moving Parts. Passive Cooling

## OPERATING TEMP

- -40°C to +70°C (-40°F to +158°F) – Cold Start-Up

## STORAGE TEMP

- -46°C to +71°C (-51°F to +160°F)

## Section 7

## Service Information

### Service Information

We sincerely hope that you never experience a problem with any **Amphenol** product. If you do need service, call **Amphenol** at +33(0) 450 89 28 00 and ask for Applications Engineering. A trained specialist will help you to quickly determine the source of the problem. Many problems are easily resolved with a single phone call. If it is necessary to return a unit to us, an RMA (Return Material Authorization) number will be given to you.

**Amphenol** tracks the flow of returned material with our RMA system to ensure speedy service. You must include this RMA number on the outside of the box so that your return can be processed immediately.

The applications engineer you are speaking with will fill out an RMA request for you. If the unit has a serial number, we will not need detailed financial information. Otherwise, be sure to have your original purchase order number and date purchased available.

We suggest that you give us a repair purchase order number in case the repair is not covered under our warranty. You will not be billed if the repair is covered under warranty.

Please supply us with as many details about the problem as you can. The information you supply will be written on the RMA form and supplied to the repair department before your unit arrives. This helps us to provide you with the best service, in the fastest manner. Normally, repairs are completed in two days. Sometimes difficult problems take a little longer to solve.

We apologize for any inconvenience that the need for repair may cause you. We hope that our rapid service meets your needs. If you have any suggestions to help us improve our service, please give us a call. We appreciate your ideas and will respond to them.

#### **For Your Convenience:**

Please fill in the following and keep this manual with your **Amphenol** system for future reference:

P.O. #: \_\_\_\_\_ Date Purchased: \_\_\_\_\_

Purchased From: \_\_\_\_\_

### Product Support

To obtain support for Amphenol products:

Visit our website. [www.amphenol-socapex.com](http://www.amphenol-socapex.com)

Phone: +33(0)4 50 89 28 00

E-mail: [Technicalsupport@amphenol-socapex.fr](mailto:Technicalsupport@amphenol-socapex.fr)

Mailing Address: Amphenol, Promenade de l'Arve, B.P.29, 74311 Thyez Cedex, France