Chapter 1 Product Overview

With a rugged design and flexible platform, the RAM-6021 industrial secure router provides the ability to remotely connect, monitor and control assets across a variety of industrial applications. The RAM-6021's web based event engine can be customized to trigger I/O or email alerts, to quickly notify personnel of critical events based on operational data. Add in robust security features, which include a stateful firewall, NAT translations and VPN connections, and the RAM-6021 delivers a compact all-in-one solution that seamlessly connects to existing Ethernet infrastructures, including networks with Modbus and DNP3 enabled devices.

The router is also available as a RAM-6021M12 industrial secure model with an IP67 rating.

The RAM-6021M12 industrial LAN router offers secure routing, VPN tunneling and NAT (network address translation) for secure LAN to LAN and LAN to WAN communication. Housed in a rugged IP67, dust-proof and water resistant metal enclosure, the RAM-6021M12 is designed to withstand harsh industrial environments including temporary immersion in water, exposure to low/high pressure water jets, and extreme shock and vibration levels, making it ideal for industries where hardened products are required.

1.1 Product Highlights

1.1.1 RAM® 6021/ RAM® 6021M12

- Secure network routing and communication
- LAN-to-LAN or LAN-to-WAN connectivity
- Integrated security firewall provides intrusion protection
- NAT support for 1-to-1 and 1-many translations
- Native support for DNP3 and Modbus protocols
- Powerful event engine to trigger I/O or send email alerts based on real-time operational data.
- Rugged industrial design in a compact package
- IP67 rated, dust-proof and water resistant, hardened metal enclosure*
- Bulkhead mountable*

* Denotes RAM-6021M12 only

1.2 RAM-6021

All specifications are subject to change. Consult the Red Lion Controls website for more information.

1.2.1 RAM-6021 Features and Benefits

Features and Benefits

Built-in security and routing protects against unwanted intrusion

- Intrusion protection and secure data access
- Stateful firewall
- Access Control List (ACL)
- IPsec and SSL VPN tunnels
- Port forwarding
- Packet filtering

Flexible all-in-one platform reduces complexity

- Remote TCP/IP based capabilities
- Integrated switching and routing
- Serial-to-IP conversion
- Access IP and serial devises simultaneously

Redundant power inputs (8-30 VDC)

Rugged, compact design deploys easily in space-constrained locations

- -40 to 70 °C operating temperature range
- Ingress IP30 protection
- DIN-rail mounting

Remote monitoring and control eliminates site visits

- Instant access to SCADA data
- Modbus and DNP3 (serial and IP protocol support
- Simple integration for complex configurations

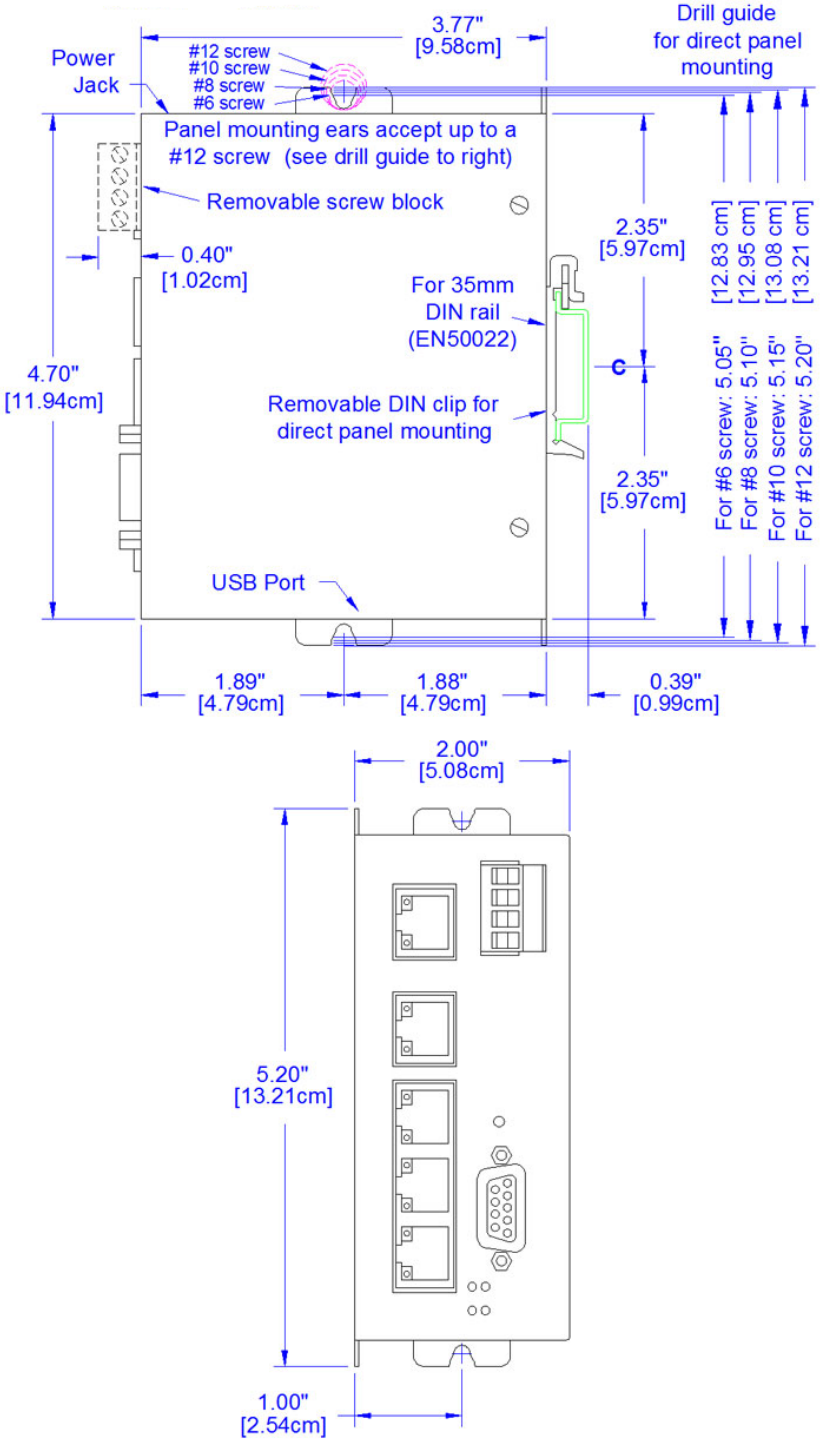
Intuitive web-based interface simplifies management and configuration

- Syslog
- Built-in data capture for enhanced troubleshooting
- Key metric reporting
- RAMQTT for cloud connectivity

1.2.2 RAM-6021 Specifications

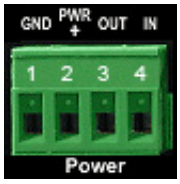
Mechanical				
Height	**Width**	**Depth**	**Weight**	**Mount**
4.70" (11.94 cm)	2.00" (5.08 cm)	3.77" (9.58 cm)	1.2 lbs (0.544 kg)	35mm DIN-Rail
Power Input				
Input Voltage	**Steady Input Current**	**Power Consumption**	**Redundant Power Input**	
8-30 VDC	150 mA @30 VDC	4.5W typical max.with all ports linked	4-pin screw terminal Side mounted 2.5 mm barrel connector • 8-30 VDC (nominal) • Input current (max): 150mA	
Environmental				
Operating Temperature	**Storage Temperature**	**Operating Humidity**		**Operating Altitude**
-40 to 70 °C	-40 to 85 °C	5% to 95% (non condensing)		Up to 2000 m per IEC61010-1
Shock and Vibration / Reliability				
Shock	**Vibration**	**MTBF**		
IEC 60068-2-27	IEC 60068-2-6	1,832K Hours GB @ 40˚C per MIL-HNDBK-217F2		
Network Media				
10Base-T	≥CAT3 Cable			
100Base-TX	≥CAT5 Cable			
Recommended Minimum Wiring Clearance				
Front	4” (10.16 cm)			
Interfaces / Connectors				
Ethernet 10/100 Auto-Sensing	**Serial**	**USB**	**I/O**	
5x RJ45 (port 5 – WAN/LAN capability)	1x RS-232 Serial DB9 115200bps	1x USB 2.0 mini configuration port	1x digital output 1x digital/analog input (one active)	
Switch Properties				
IP	**Protocol Gateway**	**Tunneling**	**Data Throughput**	
NAT, port forwarding, dynamic DNS, DHCP Stateful inspection firewall, IP transparency Routing Protocols: OSPF, BGP, RIP, VRRP Encapsulation Protocols: GRE	Modbus RTU/TCP/ ASCII RTU DNP3 - slave	IPsec and SSL	LAN ports: 100 Mbps WAN port: 45 Mbps	

1.2.3 RAM-6021 Dimensions



All specifications are subject to change. Consult the company website for more information.

1.2.4 RAM-6021 Power Connectors and Pin-Outs

Power Input Connectors / Pin-outs			
Model / Connector	**Pin**	**Name**	**Description**
RAM-6021  4-Pin Screw Connector	1	GND	Ground
	2	PWR+	Power supply input (8 to 30 VDC) (500mA@12VDC)
	3	OUT	Digital output
	4	IN	Digital and analog input
 DC 2.5mm Barrel Connector	Sleeve	GND	Ground
	Tip	PWR+	Power supply input (8 to 30 VDC)

WARNING – DC 2.5mm Barrel Connector shall not be used in hazardous locations.
AVERTISSEMENT - Connecteur 2.5mm DC ne doit pas être utilisé dans des endroits dangereux.

1.2.5 RAM-6021 Power Specifications

Power input to the router is protected against reverse polarity and power surges over 33VDC. The routers are equipped with an internal 3 Amp fuse.

The router's power consumption is:

MODEL	DRAW IN MA (AT 12 VDC)		
	STANDBY	TRANSMITTING	PEAKS
RAM-6021	115	360	531

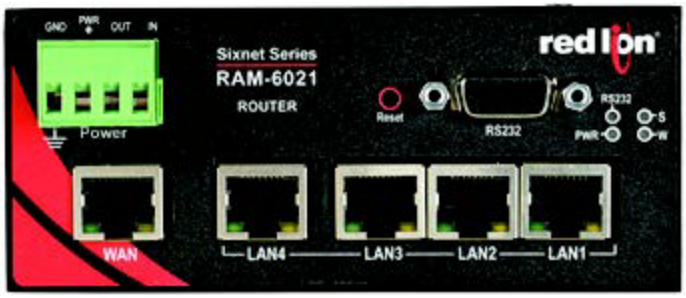
Note: Wiring instructions are provided in Chapter 2.

Note: To meet UL requirements, a "Class 2 Source" power supply is required.

1.2.6 RAM-6021 Electrical Specifications

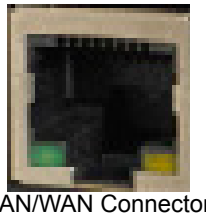
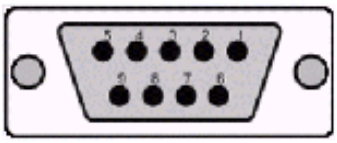
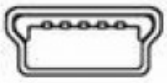
1x Digital Output (DOUT)	
Configuration	Open collector, reference to ground
Absolute Maximum IDC	500mADC (Vce = 750mVDC)
Absolute Maximum VDC	30VDC (open circuit)
Absolute Minimum VDC	-0.4VDC (open circuit)
1x Digital Input (DIN)	
Configuration	Un-isolated level detection, reference to ground
Active level	1.6VDC to 30VDC
Inactive level	0VDC to 1.3VDC
Absolute Minimum VDC	-0.3VDC
Absolute Maximum VDC	33VDC
Leakage IDC at 5VDC	150uADC
1x Analog Input (Shared with Digital Input) (DIN/AI1)	
Configuration	Un-isolated input, reference to ground
Resolution	1024 (ADC 10-bit)
VDC per step	4.8875855mVDC
Full scale level	5VDC
Zero level	0VDC
Absolute Minimum VDC	-0.3VDC
Absolute Maximum VDC	8.3VDC
Leakage IDC at 5VDC	265.96uADC TYPE

1.2.7 RAM-6021 Front View



RAM-6021

1.2.8 RAM-6021 Input and Output Connectors

Input/Output Ports			
Model / Connector	**Connector Type**	**Name**	**Description**
RAM-6021  LAN/WAN Connector	RJ45	Ethernet port	The router's 10/100Mbps Ethernet port is compliant with the EIA-568 standard. The router's ports are auto-sensing so they can be used with either a straight or crossover RJ45 cable to connect to host ports
RAM-6021  RS232 Connector	DB9	Serial port	The router's serial port is an RS232 DCE, compliant with EIA-232 standard. The connector used is DB9 female. 
RAM-6021  USB Connector	Mini B	USB 2.0 interface port	This is a USB 2.0 Device interface on a Mini B connector. It offers Ethernet-over-USB functionality using the RNDIS driver for Windows XP and Windows Vista Operating systems only. The BlueTree RNDIS driver must be installed before the USB interface can be used. The driver and instructions can be obtained at www.redlion.net. **Note:** With firmware version 4.17 and later, standard Windows RNDS drivers are used and no additional driver is required from www.redlion.net

1.2.9 RAM-6021 Indicators

LED	STATUS	CORRESPONDING STATE
Power	ON	Router is powered on.
	OFF	Router is powered off.
	FLASH	Firmware error
W (Reset)		View section 1.2.8 for further details.
RS232	ON	Link established with serial device but no data activity.
	OFF	Connection is not established.
	*FLASH	Data transmitted/received (* Depends on serial application)
Ethernet Link/ Activity	ON	Link established with Ethernet device.
	OFF	Connection is not established.
	FLASH	Data transmitted/received.

1.2.10 RAM-6021 RESET Button

MODE	PATTERN	DESCRIPTION
Hard reset	Press and hold for less than 3 seconds	Standard reboot
Factory restore	Press and hold between 3 and 10 seconds RS232 LED flashes quickly	To restore default settings for older versions, rerun the SN Reflashing procedure found at www.redlion.net
FW upgrade	Press and hold between 10 and 15 seconds W LED flashes quickly	Puts the router in advanced firmware upgrade mode by restarting the router and running the boot loader only. Do not use this mode unless instructed to by Red Lion Technical Support