

# AWK-3121-M12-RTG

## Quick Installation Guide

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Moxa AirWorks

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## Overview

Moxa's AWK-3121-M12-RTG access point/client is ideal for applications that are hard to wire, too expensive to wire, or use mobile equipment that connects over a TCP/IP network. The AWK-3121-M12-RTG is rated to operate at temperatures ranging from -25 to 60°C for standard models and -40 to 75°C for extended temperature models, and is rugged enough for any harsh industrial environment. Installation is easy, with either DIN-rail mounting or distribution boxes. The DIN-rail mounting ability, wide operating temperature range, and IP30 housing with LED indicators make the AWK-3121-M12-RTG a convenient yet reliable solution for any industrial wireless application.

## Package Checklist

Moxa's AWK-3121-M12-RTG is shipped with the following items. If any of these items is missing or damaged, please contact your customer service representative for assistance.

- 1 AWK-3121-M12-RTG
- 2 protective caps
- 1 cable holder with a screw
- Quick installation guide (printed)
- Warranty card

**NOTE** Antennas are not included and should be purchased separately. The AWK is certified with 2dBi omni-directional antennas with QMA to RP-SMA adapters.

## Installation and Configuration

Before installing the AWK-3121-M12-RTG, make sure that all items in the Package Checklist are in the box. In addition, you will need access to a notebook computer or PC equipped with an Ethernet port. The AWK-3121-M12-RTG has a default IP address that you must use when connecting to the device for the first time.

### Step 1: Select the power source

The AWK-3121-M12-RTG can be powered by a DC power input or PoE. (Hardware Rev. 3.0.0 supports PoE; hardware Rev. 2.0.0 does not support PoE.) The AWK-3121-M12-RTG will use whichever power source you choose.

### Step 2: Connect the AWK-3121-M12-RTG to a notebook or

#### PC

Since the AWK-3121-M12-RTG supports MDI/MDI-X auto-sensing, you can use either a straight-through cable or crossover cable to connect the AWK-3121-M12-RTG to a computer. If the LED indicator on the AWK-3121-M12-RTG's LAN port lights up, it means the connection is established.

### Step 3: Set up the computer's IP address

Set an IP address on the same subnet as the AWK-3121-M12-RTG. Since the AWK-3121-M12-RTG's default IP address is 192.168.127.253, and the subnet mask is 255.255.255.0, you should set the IP address of the computer to 192.168.127.xxx and subnet mask to 255.255.255.0.

### Step 4: Use the web-based manager to configure

#### AWK-3121-M12-RTG

Open your computer's web browser and then type

**http://192.168.127.253** in the address field to access the homepage of the web-based management. Before the homepage opens, you will need to enter the user name and password. For first-time configuration, enter the default user name and password and then click on the **Login** button:

User name: **admin**

Password: **moxa**

**NOTE** Firmware Version 1.6 password: moxa  
Firmware Versions 1.0 to 1.5 password: root



#### ATTENTION

For security reasons, we strongly recommend changing the password. To do so, select **Maintenance** → **Password**, and then follow the on-screen instructions.

### Step 5: Select the operation mode for the

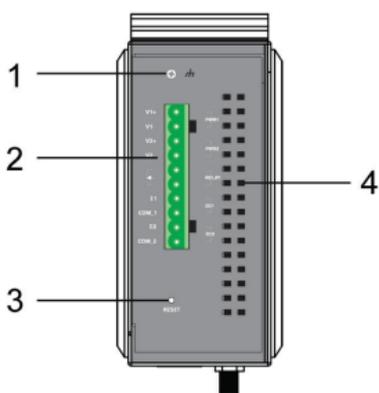
#### AWK-3121-M12-RTG

By default, the AWK-3121-M12-RTG's operation mode is set to AP. You can change the setting in **Wireless Settings** → **Basic Wireless Settings** if you would like to use the client mode.

**NOTE** To make the change effective, you must click Save Configuration to save the change or Restart (Save and Restart button to apply all changes).

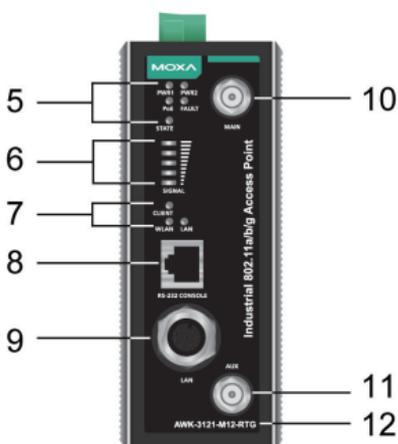
# Panel Layout of the AWK-3121-M12-RTG

Top Panel View

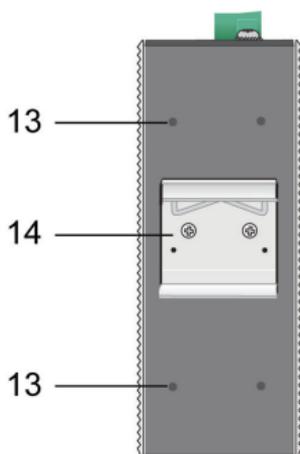


1. Grounding screw (M3)
2. Terminal block for PWR1, PWR2, relay, DI1, and DI2
3. Reset button
4. Heat dissipation orifices
5. System LEDs: PWR1, PWR2, PoE (Hardware Rev. 3.0.0 supports PoE; hardware Rev. 2.0.0 does not support PoE.), FAULT, and STATE LEDs
6. LEDs for signal strength
7. WLAN LEDs: CLIENT, WLAN, and LAN LEDs
8. RS-232 console port
9. 10/100BaseT(X) M12 Port
10. MAIN antenna port
11. AUX antenna port
12. Model name
13. Screw hole for wall-mounting kit
14. DIN-rail mounting kit

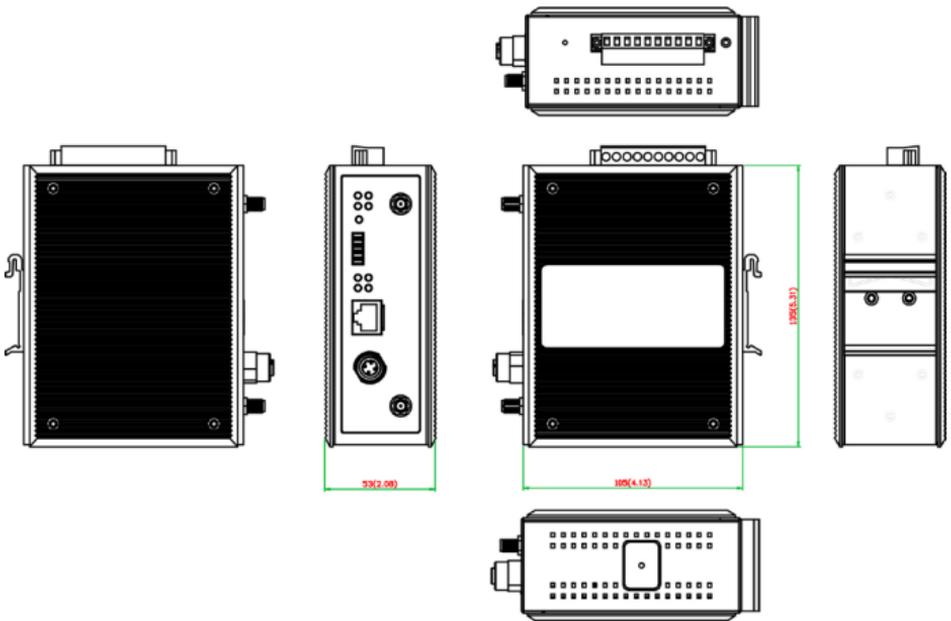
Front Panel View



Rear Panel View



## Mounting Dimensions (unit = mm)

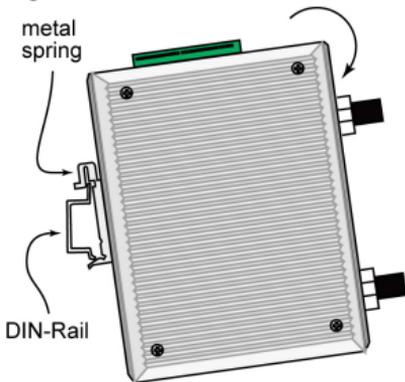


## DIN-Rail Mounting

The aluminum DIN-rail attachment plate should be fixed to the back panel of the AWK-3121-M12-RTG when you take it out of the box. If you need to reattach the DIN-rail attachment plate to the AWK-3121-M12-RTG, make sure the stiff metal spring is situated towards the top, as shown in the figures below.

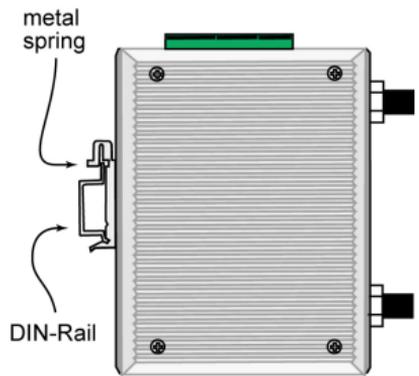
### STEP 1:

Insert the top of the DIN rail into the slot just below the stiff metal spring.



### STEP 2:

The DIN-rail attachment unit will snap into place as shown below.



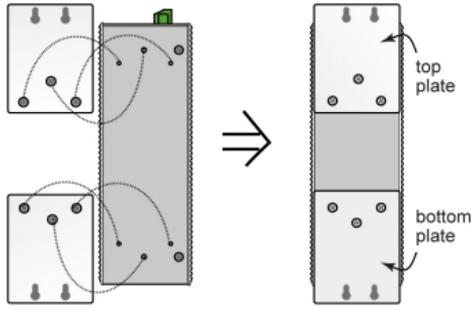
To remove the AWK-3121-M12-RTG from the DIN rail, simply reverse Steps 1 and 2.

## Wall Mounting (optional)

For some applications, it may be more convenient to mount the AWK-3121-M12-RTG to a wall, as illustrated below.

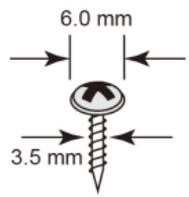
### STEP 1:

Remove the aluminum DIN-rail attachment plate from the AWK-3121-M12-RTG, and then attach the wall mount plates with M3 screws, as shown in the adjacent diagrams.



### STEP 2:

Mounting the AWK-3121-M12-RTG to a wall requires 4 screws. Use the AWK-3121-M12-RTG device, with wall mount plates attached, as a guide to mark the correct locations of the 4 screws. The heads of the screws should be less than 6.0 mm in diameter, and the shafts should be less than 3.5 mm in diameter, as shown in the figure at the right.

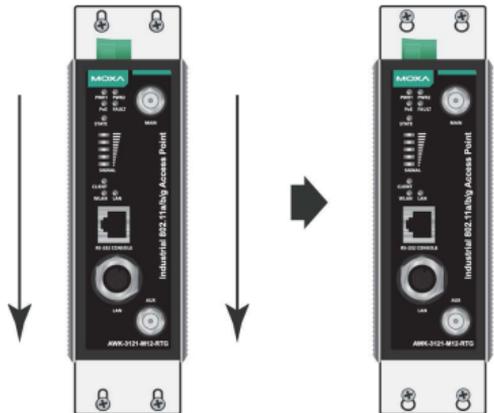


Do not drive the screws in all the way into the wall—leave a space of about 2 mm to allow room for sliding the wall-mount panel between the wall and the screws.

**NOTE** Test the screw head and shank size by inserting the screws into one of the keyhole shaped apertures of the wall-mounting plates before attaching the plates to the wall.

### STEP 3:

Once the screws are fixed into the wall, insert the four screw heads through the large opening of the keyhole-shaped apertures, and then slide the AWK-3121-M12-RTG downwards, as indicated to the right. Tighten the four screws for added stability.





## WARNING

- This equipment is intended to be used in a Restricted Access Location, such as a dedicated computer room, where access can only be gained by SERVICE PERSONS or by USERS who have been instructed about the fact that the metal chassis of the equipment is extremely hot and may cause burns.
- Service persons or users have to pay special attention and take special precaution before handling this equipment.
- Only authorized, well-trained professionals should be allowed to access the restricted access location. Access should be controlled by the authority responsible for the location with lock and key or a security identity system
- **External metal parts are hot!!** Pay special attention or use special protection before handling this equipment.

## Wiring Requirements



### WARNING

#### **Safety First!**

Be sure to disconnect the power cord before installing and/or wiring your Moxa AWK-3121-M12-RTG.



### WARNING

#### **Safety First!**

Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowed for each wire size.

If the current goes above the maximum ratings, the wiring could overheat, causing serious damage to your equipment.

You should also pay attention to the following items:

Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, make sure the wires are perpendicular at the intersection point.

**NOTE** Do not run signal or communications wiring and power wiring in the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.

- You can use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring with similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separate.
- It is strongly advised that you label wiring to all devices in the system when necessary.



## ATTENTION

This product is intended to be supplied by a Listed Power Unit marked "Class 2" or "LPS" and rated O/P: 12 to 48 VDC, minimum 6 W (12 V/0.494 A to 48V/0.121 A), 25°C.



## ATTENTION

Make sure the external power adapter (includes power cords and plug assemblies) provided with the unit is certified and suitable for use in your country.

## Grounding the Moxa AWK-3121-M12-RTG

Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Run the ground connection from the ground screw to the grounding surface prior to connecting devices.

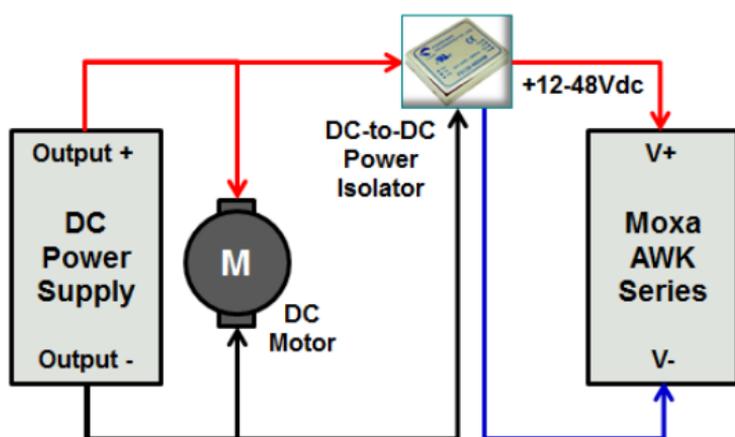


## ATTENTION

This product is intended to be mounted to a well-grounded mounting surface, such as a metal panel.

## Installations with Unstable Power Inputs

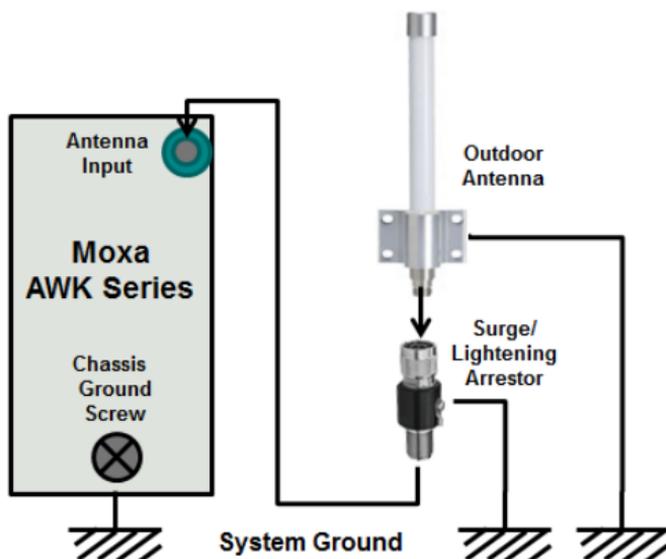
There are cases where the device has to be wired to the same power source as other equipment. In such cases if equipment such as motors that are connected in the circuit draw a large amount of current during operation, the transient voltage drop could potentially cause the AWK to become unstable. Installing a DC/DC power isolator in between the two equipment is recommended to isolate the transient effect and to ensure a stable power input for the AWK.



## Installations with Cable Extended Antennas for Outdoor

### Applications

If the antenna or the AWK device is installed outdoors or in an open-air setting, proper lightning protection is required to prevent direct lightning strikes on the AWK device. In order to prevent coupling currents from nearby lightning strikes, a lightning arrester should be installed as part of your antenna system. Ground the device, antenna, as well as the arrester properly to provide maximum outdoor protection for the device.

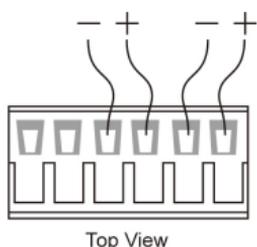


### Arrester Accessories

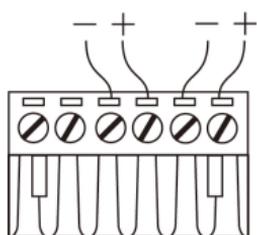
- **SA-NMNF-01:** Surge arrester, N-type (male) to N-type (female)
- **SA-NFNF-01:** Surge arrester, N-type (female) to N-type (female)

### Wiring the Redundant Power Inputs

The top two pairs of contacts of the 10-contact terminal block connector on the AWK-3121-M12-RTG's top panel are used for the AWK-3121-M12-RTG's two DC inputs. The top and front views of the terminal block connector is shown below:



Top View



Front View

#### STEP 1:

Insert the negative/positive DC wires into the V-/V+ terminals.

#### STEP 2:

To keep the DC wires from pulling loose, use a small flat-blade screwdriver to tighten the wire-clamp screws on the front of the terminal block connector.

#### STEP 3:

Insert the plastic terminal block connector prongs into the terminal block receptor, which is located on the AWK-3121-M12-RTG's top panel.



## ATTENTION

Before connecting the AWK-3121-M12-RTG to the DC power inputs, make sure the DC power source voltage is stable.

## Wiring the Relay Contact

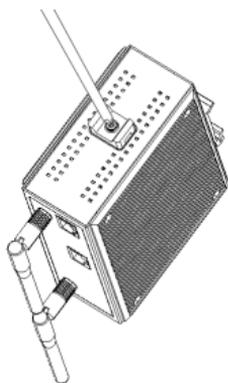
The AWK-3121-M12-RTG has one relay output, which consists of the two contacts of the terminal block on the AWK-3121-M12-RTG's top panel. Refer to the previous section for detailed instructions on how to connect the wires to the terminal block connector, and how to attach the terminal block connector to the terminal block receptor. These relay contacts are used to indicate user-configured events. The two wires attached to the relay contacts form an open circuit when a user-configured event is triggered. If a user-configured event does not occur, the relay circuit will be closed.

## Wiring the Digital Inputs

The AWK-3121-M12-RTG has two sets of digital input—DI1 and DI2. Each DI comprises two contacts of the 10-pin terminal block connector on the AWK-3121-M12-RTG's top panel. You can refer to the "Wiring the Redundant Power Inputs" section for detailed instructions on how to connect the wires to the terminal block connector, and how to attach the terminal block connector to the terminal block receptor.

## Cable Holder Installation (Optional)

You can attach the cable holder to the bottom of the AWK-3121-M12-RTG. This helps to keep cabling neat and avoid accidents that result from untidy cables.

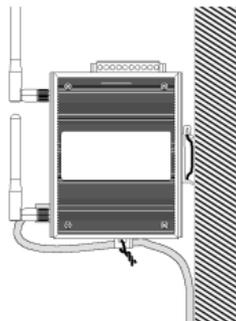
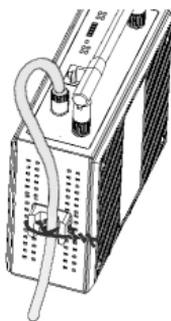
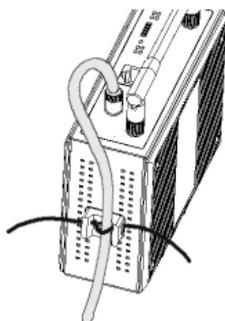


### STEP 1:

Screw the cable holder onto the bottom of the AWK-3121-M12-RTG.

### STEP 2:

After mounting the AWK-3121-M12-RTG and plugging in the LAN cable, tighten the cable along the device and wall.



## Communication Connections

### 10/100BaseT(X) Ethernet Port Connection

All AWK-3121-M12-RTGs have a 10/100BaseT(X) Ethernet port (4-pin shielded M12 connector with D coding). The 10/100TX port located on the AWK-3121-M12-RTG front panel is used to connect to Ethernet-enabled devices. Most users configure this port for Auto MDI/MDI-X mode, in which case the port's pinouts are adjusted automatically depending on the type of Ethernet cable used (straight-through or cross-over), and the type of device (NIC-type or HUB/Switch-type) connected to the port.

#### Pinouts for the 10/100BaseT(X) Port

PIN	TX	
1	TD+	
2	RD+	
3	TD-	
4	RD-	

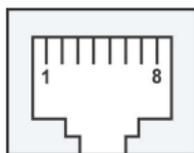
Housing: shield

### RS-232 Connection

The AWK-3121-M12-RTG has one RS-232 (8-pin RJ45) console port located on the front panel. Use either an RJ45-to-DB9 or RJ45-to-DB25 cable to connect the Moxa AWK-3121-M12-RTG's console port to your PC's COM port. You may then use a console terminal program to access the AWK-3121-M12-RTG for console configuration.

#### Console Pinouts for 10-pin or 8-pin RJ45

10-Pin	Description	8-Pin
1	–	
2	DSR	1
3	RTS	2
4	GND	3
5	TxD	4
6	RxD	5
7	DCD	6
8	CTS	7
9	DTR	8
10	–	



#### ATTENTION

For railway rolling stock applications, AWK-3121-M12-RTG devices must use a galvanically isolated power supply that is compliant with the EN 50155 standard.

## LED Indicators

The front panel of the Moxa AWK-3121-M12-RTG contains several LED indicators. The function of each LED is described in the table below.

LED	Color	State	Description
<b>Front Panel LED Indicators (System)</b>			
PWR1	Green	On	Power is being supplied from power input 1
		Off	Power is <b>not</b> being supplied from power input 1
PWR2	Green	On	Power is being supplied from power input 2
		Off	Power is <b>not</b> being supplied from power input 2
PoE (Hardware Rev. 3.0.0 supports PoE; hardware Rev. 2.0.0 does not support PoE.)	Amber	On	Power is being supplied via PoE
		Off	Power is <b>not</b> being supplied via PoE
FAULT	Red	Blinking (slow at 1-second intervals)	Cannot get an IP address from the DHCP server
		Blinking (fast at 0.5-second intervals)	IP address conflict
		Off	No error condition exist
STATE	Green/Red	Green	System startup is complete and the system is in operation
		Green (blinking at 1-second intervals)	The device has been located by the Wireless Search Utility.
		Red	Bootling error condition
SIGNAL (5 LEDs)	Green	On	Signal level (for <b>client and client-router</b> mode only)
		Off	
CLIENT MODE	Green	On	AWK functions in <b>client and client-router</b> Mode.
		Off	AWK is not in <b>client and client-router</b> Mode.
WLAN	Amber	On	WLAN is in used
		Off	WLAN is <b>not</b> in use
LAN	Green	On	TP port's 100 Mbps link is <b>active</b> .
		Blinking	Data is being transmitted at 100 Mbps
		Off	TP port's 100 Mbps link is <b>inactive</b> .
	Yellow	On	TP port's 10 Mbps link is <b>active</b> .
		Blinking	Data is being transmitted at 10 Mbps
		Off	TP port's 10 Mbps link is <b>inactive</b> .

## Specifications

WLAN Interface	
Standards	IEEE 802.11a/b/g for Wireless LAN IEEE 802.11i for Wireless Security IEEE 802.3 for 10BaseT IEEE 802.3u for 100BaseTX IEEE 802.3af for Power-over-Ethernet*
*Hardware Rev. 3.0.0 supports PoE; hardware Rev. 2.0.0 does not support PoE.	
Spread Spectrum and Modulation (typical)	<ul style="list-style-type: none"> <li>• DSSS with DBPSK, DQPSK, CCK</li> <li>• OFDM with BPSK, QPSK, 16QAM, 64QAM</li> <li>• 802.11b: CCK @ 11/5.5 Mbps, DQPSK @ 2 Mbps, DBPSK @ 1 Mbps</li> <li>• 802.11a/g: 64QAM @ 54/48 Mbps, 16QAM @ 36/24 Mbps, QPSK @ 18/12 Mbps, BPSK @ 9/6 Mbps</li> </ul>
Operating Channels (central frequency)	US: 2.412 to 2.462 GHz (11 channels) 5.18 to 5.24 GHz (4 channels) 5.26 to 5.825 GHz (optional) EU: 2.412 to 2.472 GHz (13 channels) 5.18 to 5.24 GHz (4 channels) 5.26 to 5.825 GHz (optional)
*Special bands, such as 5.9 GHz, are customizable.	
Security	<ul style="list-style-type: none"> <li>• SSID broadcast enable/disable</li> <li>• Firewall for MAC/IP/Protocol/Port-based filtering</li> <li>• 64-bit and 128-bit WEP encryption, WPA /WPA2-Personal and Enterprise (IEEE 802.1X/RADIUS, TKIP, and AES)</li> </ul>
Transmission Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
TX Transmit Power	AWK-3121-M12-RTG and AWK-3121-SSC-RTG: 802.11b: Typ. 23±1.5 dBm @ 1 to 11 Mbps 802.11g: Typ. 20±1.5 dBm @ 6 to 24 Mbps, Typ. 19±1.5 dBm @ 36 Mbps, Typ. 18±1.5 dBm @ 48 Mbps, Typ. 17±1.5 dBm @ 54 Mbps 802.11a: Typ. 18±1.5 dBm @ 6 to 24 Mbps, Typ. 16±1.5 dBm @ 36 to 48 Mbps, Typ. 15±1.5 dBm @ 54 Mbps AWK-3121-M12-HP-RTG: 802.11b: Typ. 26±1.5 dBm @ 1 to 11 Mbps 802.11g: Typ. 26±1.5 dBm @ 6 to 24 Mbps, Typ. 25±1.5 dBm @ 36 Mbps, Typ. 24±1.5 dBm @ 48 Mbps, Typ. 23±1.5 dBm @ 54 Mbps 802.11a: Typ. 26±1.5 dBm @ 6 to 24 Mbps,

	Typ. 25±1.5 dBm @ 36 Mbps, Typ. 24±1.5 dBm @ 48 Mbps, Typ. 23±1.5 dBm @ 54 Mbps
RX Sensitivity	802.11b: -97 dBm @ 1 Mbps, -94 dBm @ 2 Mbps, -92 dBm @ 5.5 Mbps, -90 dBm @ 11 Mbps 802.11g: -93 dBm @ 6 Mbps, -91 dBm @ 9 Mbps, -90 dBm @ 12 Mbps, -88 dBm @ 18 Mbps, -84 dBm @ 24 Mbps, -80 dBm @ 36 Mbps, -76 dBm @ 48 Mbps, -74 dBm @ 54 Mbps 802.11a: -90 dBm @ 6 Mbps, -89 dBm @ 9 Mbps, -89 dBm @ 12 Mbps, -85 dBm @ 18 Mbps, -83 dBm @ 24 Mbps, -79 dBm @ 36 Mbps, -75 dBm @ 48 Mbps, -74 dBm @ 54 Mbps
<b>Protocol Support</b>	
General Protocols	Proxy ARP, DNS, HTTP, HTTPS, IP, ICMP, SNTP, TCP, UDP, RADIUS, SNMP, PPPoE, DHCP
<b>Interface</b>	
Default Antennas*	2 dual-band omni-directional antennas, 2 dBi, RP-SMA (male)
<b>*Only available with the AWK-3121-SSC-RTG models.</b>	
Connector for External Antennas	AWK-3121-SSC-RTG: RP-SMA (female) AWK-3121-M12-RTG and AWK-3121-M12-HP-RTG: QMA (female)
Fiber Ports	1, 100BaseFX port (SC connector, AWK-3121-SSC-RTG only)
M12 Ports	1, 10/100BaseT(X) auto negotiation speed, F/H duplex mode, and auto MDI/MDI-X connection (AWK-3121-M12-RTG and AWK-3121-M12-HP-RTG only)
Console Port	RS-232 (RJ45-type)
LED Indicators	PWR1, PWR2, PoE (Hardware Rev. 3.0.0 supports PoE; hardware Rev. 2.0.0 does not support PoE.), FAULT, STATE, signal strength, CLIENT MODE, WLAN, 10/100 (M12 port), 100M (fiber port)
Alarm Contact	1 relay output with current carrying capacity of 1 A @ 24 VDC
Digital Inputs	2 electrically isolated inputs <ul style="list-style-type: none"> <li>• +13 to +30 V for state "1"</li> <li>• +3 to -30 V for state "0"</li> <li>• Max. input current: 8 mA</li> </ul>
<b>Optical Fiber*</b>	
	<b>100BaseFX</b>
	<b>Single Mode</b>
Wavelength	1310 nm
Max. TX	0 dBm
Min. TX	-5 dBm
RX Sensitivity	-34 dBm
Link Budget	29 dB
Typical Distance	40 km
Saturation	-3 dBm

<b>*Only available for AWK-3121-SSC models</b>	
<b>Physical Characteristics</b>	
Housing	Metal, providing IP30 protection
Weight	850 g (1.87 lb)
Dimensions	53.6 x 135 x 105 mm (2.11 x 5.31 x 4.13 in)
Installation	DIN-rail mounting, wall mounting (optional)
<b>Environmental Limits</b>	
Operating Temperature	Standard Models: -25 to 60°C (-13 to 140°F) Wide Temp. Models: -40 to 75°C (-40 to 167°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Ambient Relative Humidity	5% to 95% (non-condensing)
<b>Power Requirements</b>	
Input Voltage	12 to 48 VDC, redundant dual DC power inputs or 48 VDC Power-over-Ethernet (IEEE 802.3af compliant)*
<b>*Hardware Rev. 3.0.0 supports PoE; hardware Rev. 2.0.0 does not support PoE.</b>	
Connector	10-pin removable terminal block
Power Consumption	12 to 48 VDC, 0.121 to 0.494 A (max.) AWK-3121-M12-RTG: Maximum 7.9 watts AWK-3121-M12-HP-RTG: Maximum 7.9 watts AWK-3121-SSC-RTG: Maximum 8.1 watts
Reverse Polarity Protection	Present
<b>Standards and Certifications</b>	
Safety	UL 60950-1, EN 60950-1(CB)
EMC	EN 55032/55024
EMI	CISPR 32, FCC Part 15B Class B
EMS	IEC 61000-4-2 ESD: Contact: 8 kV; Air: 15 kV IEC 61000-4-3 RS: 80 MHz to 1 GHz: 20 V/m IEC 61000-4-4 EFT: Power: 2 kV; Signal: 2 kV IEC 61000-4-5 Surge: Power: 2 kV; Signal: 2 kV IEC 61000-4-6 CS: 10 V IEC 61000-4-8
Radio	EN 301 489-1/17, EN 300 328, EN 301 893, FCC ID SLE-WAPA003 (AWK-3121-M12-RTG), FCC ID SLE-WAPA004 (AWK-3121-M12-HP-RTG)
Rail Traffic	EN 50155*, EN45545-2, EN 50121-4
<b>*Complies with a portion of EN 50155 specifications. Please contact Moxa or a Moxa distributor for details.</b>	
<b>Reliability</b>	
MTBF (mean time between failures)	AWK-3121-M12-RTG: 480,831 hrs. AWK-3121-M12-HP-RTG: 447,861 hrs. AWK-3121-SSC-RTG: 445,913 hrs. Standard: Telcordia SR332
<b>Warranty</b>	
Warranty Period	5 years
Details	See <a href="http://www.moxa.com/warranty">www.moxa.com/warranty</a>



## ATTENTION

The AWK-3121-M12-RTG is **NOT** a portable mobile device and should be located at least 20 cm away from the human body. The AWK-3121-M12-RTG is **NOT** designed for the general public. A well-trained technician is required to deploy the AWK-3121-M12-RTG units and safely establish a wireless network.



## ATTENTION

### **Use the antennas correctly!**

The 2.4-GHz antennas are needed when the AWK-3121-M12-RTG operates in IEEE 802.11b/g and the 5-GHz antennas are needed for IEEE 802.11a. Make sure your antenna installation is within a safety area, which is covered by a lightning protection or surge arrester system.