AWK-3131-M12-RCC
Quick Installation Guide

Moxa AirWorks

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Overview

Moxa's new AWK-3131-M12-RCC is a 3-in-1 industrial AP/bridge/client device designed specifically for rail carriage-to-carriage communication and can provide up to 300 Mbps with IEEE 802.11n technology. The AWK-3131-M12-RCC combines two adjacent 20 MHz channels into a single 40 MHz channel to deliver a potent combination of greater reliability and more bandwidth. The two redundant DC power inputs increase the reliability of the power supply, and the AWK-3131-M12-RCC can be powered via PoE to make deployment easier. The AWK-3131-M12-RCC can operate on either the 2.4 or 5 GHz bands and is backward-compatible with existing 802.11a/b/g deployments to future-proof your wireless investments.

Package Checklist

Moxa's AWK-3131-M12-RCC is shipped with the following items. If any of these items is missing or damaged, please contact your customer service representative for assistance.

- AWK-3131-M12-RCC
- Cable holder with one screw
- 2 plastic RJ45 protective caps for Console port
- DIN-rail kit
- Documentation and software CD
- Quick installation guide (printed)
- Warranty card

Installation and Configuration

Before installing the AWK-3131-M12-RCC, 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-3131-M12-RCC 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-3131-M12-RCC can be powered by a DC power input or PoE (Power over Ethernet). The AWK-3131-M12-RCC will use whichever power source you choose.

Step 2: Connect the AWK-3131-M12-RCC to a notebook or PC

Since the AWK-3131-M12-RCC supports MDI/MDI-X auto-sensing, you can use either a straight-through cable or crossover cable to connect the AWK-3131-M12-RCC to a computer. If the LAN LED indicator on the AWK-3131-M12-RCC 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-3131-M12-RCC. Since the AWK-3131-M12-RCC'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 the AWK-3131-M12-RCC

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:

> Username: **admin**
> 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-3131-M12-RCC

By default, the AWK-3131-M12-RCC'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 the Save and Restart button to apply all
> changes.

Step 6: Test communications

We will describe two test methods. Use the first method if you are using
only one AWK-3131-M12-RCC, and use the second method if you are
using two or more AWK-3131-M12-RCCs.

Testing method for one AWK-3131-M12-RCC

If you are only using one AWK-3131-M12-RCC, you will need a second
notebook computer (B) equipped with a WLAN card. Configure the WLAN
card to connect to the AWK-3131-M12-RCC (the default SSID is **MOXA**)
and change the IP address of notebook B so that it is on the same subnet
as the first notebook (A), which is connected to the AWK-3131-M12-RCC.

After configuring the WLAN card, establish a wireless connection with the
AWK-3131-M12-RCC and open a DOS window on notebook B. At the
prompt, type

ping IP address of notebook A

and then press the **Enter** key. A "Reply from IP address …" response
means the communication was successful. A "Request timed out."
response means the communication failed. In this case, recheck the
configuration to make sure the connections are correct.

Testing method for two or more AWK-3131-M12-RCCs

If you have two or more AWK-3131-M12-RCCs, you will need a second notebook computer (B) equipped with an Ethernet port. Use the default settings for the first AWK-3131-M12-RCC connected to notebook A, and change the second or third AWK-3131-M12-RCC connected to notebook B to Client mode and then configure the notebooks and AWK-3131-M12-RCCs properly.

After setting up the testing environment, open a DOS window on notebook B. At the prompt, type

   ping IP address of notebook A

and then press **Enter** key. A "Reply from IP address …" response means the communication was successful. A "Request timed out." response means the communication failed. In this case, recheck the configuration to make sure the connections are correct.

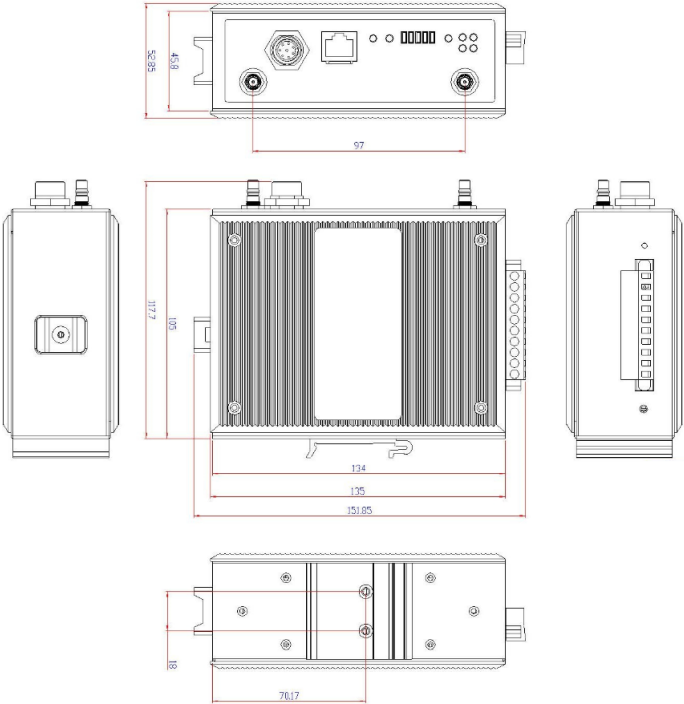## Panel Layout of the AWK-3131-M12-RCC

Top Panel

Front Panel

Back Panel

1. Grounding screw
2. Terminal block for PWR1, PWR2, relay, DI1, and DI2
3. Reset button
4. A antenna connector
5. B antenna connector
6. System LEDs: PWR1, PWR2, PoE, FAULT, and STATE
7. Signal strength indicator
8. WLAN and LAN LEDs
9. RS-232 console port
10. M12 LAN Port: 10/100/1000BaseT(X)
11. Model name
12. Screw holes for wall mounting kit
13. DIN-Rail mounting kit

Mounting Dimensions (unit = mm)

DIN-Rail Mounting

The aluminum DIN-Rail attachment plate should be fixed to the back panel of the AWK-3131-M12-RCC when you take it out of the box. If you need to reattach the DIN-Rail attachment plate to the AWK-3131-M12-RCC, make sure the stiff metal spring is situated towards the top, as shown in the figures below.
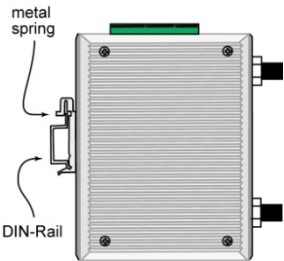
STEP 1:
Insert the top of the DIN-Rail into the slot just below the stiff metal spring.
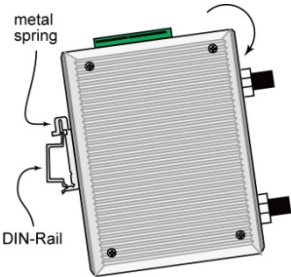
STEP 2:
The DIN-Rail attachment unit will snap into place as shown below.


To remove the AWK-3131-M12-RCC from the DIN-Rail, simply reverse Steps 1 and 2.

Wall Mounting (optional)

For transportation applications that require an EN 50155 certification report, we strongly recommend the purchase of the optional AWK-3131-M12-RCC wallmount kit, which has passed EN 50155 testing. This wallmount kit is also convenient for other applications that require mounting the AWK-3131-M12-RCC to a wall.

STEP 1:

Remove the aluminum DIN-Rail attachment plate from the AWK-3131-M12-RCC, and then attach the wall mount plates with M3 screws, as shown in the adjacent diagrams.
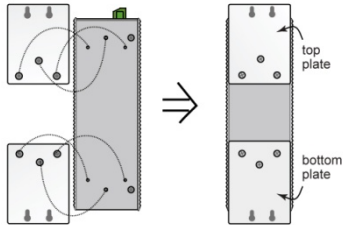
STEP 2:

Mounting the AWK-3131-M12-RCC to a wall requires 3 screws. Use the AWK-3131-M12-RCC device, with wall mount plates attached, as a guide to mark the correct locations of the 3 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.
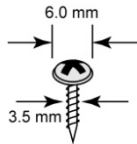
Do not screw the screws in all the way—leave a space of about 2 mm to allow room for sliding the wall mount panel between the wall and the screws.

NOTE Test the screw head and shank size by inserting the screw into one of the keyhole shaped apertures of the Wall Mounting Plates before it is screwed into 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-3131-M12-RCC downwards, as indicated to the right. Tighten the three screws for added stability.
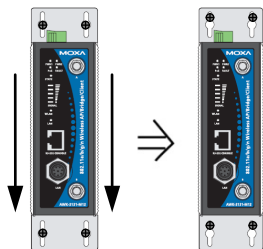
⚠ WARNING

- This equipment is intended to be used in a Restricted Access Location, such as a dedicated computer room. 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 the equipment.
- Access is to be controlled through the use of a lock and key or a security identity system, controlled by the authority responsible for the location. Only authorized, well-trained professionals are allowed to access the restricted access location.
- External metal parts are hot!! Pay special attention or use special protection before handling.

Wiring Requirements

⚠ WARNING

Safety First!
Be sure to disconnect the power cord before installing and/or wiring your Moxa AWK-3131-M12-RCC.

⚠ 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 to 48V), 25°C.

⚠ ATTENTION

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

⚠ ATTENTION

Do not use the PoE Injector. Instead, please use an IEEE802.3af or IEEE802.3at compliant PSE (Power Sourcing Equipment) for PoE (Power over Ethernet) device.

Grounding the Moxa AWK-3131-M12-RCC

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.
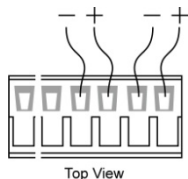
⚠ ATTENTION

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

Wiring the Redundant Power Inputs

The top two pairs of contacts of the 10-contact terminal block connector on the AWK-3131-M12-RCC's top panel are used for the AWK-3131-M12-RCC's two DC inputs. Top and front views of the terminal block connector are shown below.

Top View
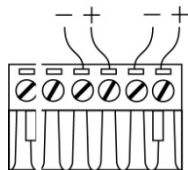
Front View

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-3131-M12-RCC's top panel.

Wiring the Relay Contact

The AWK-3131-M12-RCC has one relay output, which consists of the two contacts of the terminal block on the AWK-3131-M12-RCC'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-3131-M12-RCC has two sets of digital input—DI1 and DI2. Each DI comprises two contacts of the 10-pin terminal block connector on the AWK-3131-M12-RCC'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.
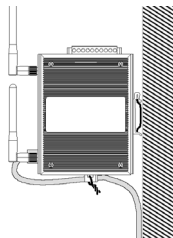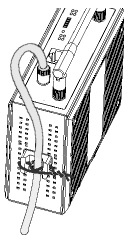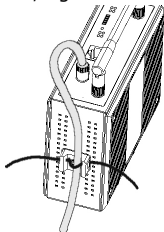
Cable Holder Installation

You can attach the cable holder to the bottom of the AWK-3131-M12-RCC. This helps to keep cabling neat and avoid accidents that result from untidy cables.
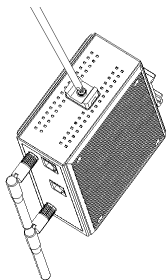
STEP 1: Screw the cable holder onto the bottom of the AWK-3131-M12-RCC.

STEP 2: After mounting the AWK-3131-M12-RCC and plugging in the LAN cable, tighten the cable along the device and wall.
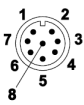
Communication Connections

10/100/1000BaseT(X) Ethernet Port Connection

All AWK-3131-M12-RCCs have a 10/100/1000BaseT(X) Ethernet port (8-pin shielded M12 connector with D coding). The 10/100/1000TX port located on the AWK-3131-M12-RCC 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 10/100/1000BaseT(X) M12 (8-pin) Port

| PIN	Con.
1	TRD3+
2	TRD4+
3	TRD4−
4	TRD1−
5	TRD2+
6	TRD1+
7	TRD3−
8	TRD2−

RS-232 Connection

The AWK-3131-M12-RCC has one RS-232 (8-pin RJ45) console port on the front panel. Use either an RJ45-to-DB9 or RJ45-to-DB25 cable to connect the AWK-3131-M12-RCC console port to your PC's COM port. You may then use a console terminal program to access the AWK-3131-M12-RCC 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	-----	
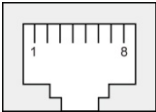
> ⚠️ **ATTENTION**
>
> For railway rolling stock applications, AWK-3131-M12-RCC devices must use a galvanically isolated power supply that is compliant with the EN 50155 standard.

Reset Button

The **RESET** button is located on the top panel of the AWK-3131-RCC. You can reboot the AWK-3131-RCC or reset it to factory default settings by pressing the **RESET** button with a pointed object such as an unfolded paper clip.

• **System reboot**: Hold the RESET button down for under 5 seconds and then release.
• **Reset to factory default**: Hold the RESET button down for over 5 seconds until the **STATE** LED starts blinking green. Release the button to reset the AWK-3131-RCC.

LED Indicators

The front panel of the Moxa AWK-3131-M12-RCC contains several LED indicators:

LED	Color	State	Description
PWR1	Green	On	Power is being supplied from power input 1.
		Off	Power is not being supplied from power input 1.
PWR2	Green	On	Power is being supplied from power input 2.
		Off	Power is not being supplied from power input 2.
PoE	Amber	On	Power is being supplied via PoE.
		Off	Power is not being supplied via PoE.
FAULT	Red	Blinking (slow)	Cannot get an IP address from the DHCP server (interval: 1 sec)
		Blinking (fast)	IP address conflict (interval: 0.5 sec)
		Off	Error condition does not exist.
STATE	Green/Red	Green	Software Ready
		Green Blinking	The AWK has been located by AWK Search Utility. (interval: 1 sec)
		Red	Booting error condition
SIGNAL (5 LEDs)	Green	On	Signal level
		Off	(for Client/Slave mode only)
WLAN	Green/Amber	Amber On	WLAN functions in AP/Master/ACC mode.
		Amber Blinking	WLAN's data communication is run in AP/Master/ACC mode
		Off	WLAN is not in use or not working properly
		Green On	WLAN functions in Client/Slave/ACC mode.
		Green Blinking	WLAN's data communication is run in Client/Slave/ACC mode
LAN	Green/Amber	Amber	LAN port's 10/100 Mbps link is active.
		Amber Blinking	Data is being transmitted at 10/100 Mbps
		Amber Off	LAN port's 10/100 Mbps link is inactive
		Green	LAN port's 1000 Mbps link is active.
		Green Blinking	Data is being transmitted at 1000 Mbps
		Green Off	LAN port's 1000 Mbps link is inactive

Specifications

Standards:
IEEE 802.11a/b/g/n for Wireless LAN
IEEE 802.11i for Wireless Security
IEEE 802.3 for 10BaseT
IEEE 802.3u for 100BaseTX
IEEE 802.3ab for 1000BaseT
IEEE 802.3af for Power-over-Ethernet
IEEE 802.1D for Spanning Tree Protocol
IEEE 802.1Q for VLAN
IEEE 802.1w for Rapid STP

Spread Spectrum and Modulation (typical):
• DSSS with DBPSK, DQPSK, CCK
• OFDM with BPSK, QPSK, 16QAM, 64QAM
• 802.11b: CCK @ 11/5.5 Mbps, DQPSK @ 2 Mbps,
  DBPSK @ 11 Mbps
• 802.11a/g: 64QAM @ 54/48 Mbps, 16QAM @ 36/24 Mbps,
  QPSK @ 18/12 Mbps, BPSK @ 9/6 Mbps
• 802.11n: 64QAM@300 Mbps to BPSK @ 6.5 Mbps (multiple rates
  supported)

Operating Channels (central frequency):
US:
2.412 to 2.462 GHz (11 channels)
5.18 to 5.24 GHz (4 channels)
EU:
2.412 to 2.472 GHz (13 channels)
5.18 to 5.24 GHz (4 channels)

Security:
• SSID broadcast enable/disable
• Firewall for MAC/IP/Protocol/Port-based filtering
• 64-bit and 128-bit WEP encryption, WPA /WPA2-Personal and
Enterprise (IEEE 802.1X/RADIUS, TKIP and AES)

Transmission Rates:
802.11b: 1, 2, 5.5, 11 Mbps
802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
802.11n: 6.5 to 300 Mbps (multiple rates supported)

TX Transmit Power:
802.11b:
1 to 11 Mbps: Typ. 18 dBm (± 1.5 dBm)
802.11g:
6 to 24 Mbps: Typ. 18 dBm (± 1.5 dBm)
36 to 48 Mbps: Typ. 17 dBm (± 1.5 dBm)
54 Mbps: Typ. 15 dBm (± 1.5 dBm)
802.11a:
6 to 24 Mbps: Typ. 17 dBm (± 1.5 dBm)
36 to 48 Mbps: Typ. 16 dBm (± 1.5 dBm)
54 Mbps: Typ. 14 dBm (± 1.5 dBm)

TX Transmit Power MIMO:
802.11a/n (20/40 MHz):
MCS15 20 MHz: Typ. 13 dBm (± 1.5 dBm)
802.11g/n (20 MHz):
MCS15 20 MHz: Typ. 14 dBm (± 1.5 dBm)

RX Sensitivity:
802.11b:
-92 dBm @ 1 Mbps, -90 dBm @ 2 Mbps, -88 dBm @ 5.5 Mbps, -84 dBm @ 11 Mbps
802.11g:
-87 dBm @ 6 Mbps, -86 dBm @ 9 Mbps, -85 dBm @ 12 Mbps, -82 dBm @ 18 Mbps, -80 dBm @ 24 Mbps, -76 dBm @ 36 Mbps, -72 dBm @ 48 Mbps, -70 dBm @ 54 Mbps
802.11a:
-87 dBm @ 6 Mbps, -86 dBm @ 9 Mbps, -85 dBm @ 12 Mbps, -82 dBm @ 18 Mbps,
-80 dBm @ 24 Mbps, -76 dBm @ 36 Mbps, -72 dBm @ 48 Mbps, -70 dBm @ 54 Mbps
RX Sensitivity MIMO:
802.11a/n:
-68 dBm @ MCS15 40 MHz,
-69 dBm @ MCS15 20 MHz,
-70 dBm @ MCS7 40 MHz,
-71 dBm @ MCS7 20 MHz
802.11g/n:
-69 dBm @ MCS15 20 MHz,
-71 dBm @ MCS7 20 MHz

Protocol Support
General Protocols: Proxy ARP, DNS, HTTP, HTTPS, IP, ICMP, SNTP, TCP, UDP, RADIUS, SNMP, PPPoE, DHCP
AP-only Protocols: ARP, BOOTP, DHCP, STP/RSTP (IEEE 802.1D/w)

Interface
Connector for External Antennas:
AWK-3131-M12-RCC: QMA (female)
M12 Ports: 1, 10/100/1000BaseT(X) auto negotiation speed, F/H duplex mode, and auto MDI/MDI-X connection
Console Port: RS-232 (RJ45-type)
LED Indicators: PWR1, PWR2, PoE, FAULT, STATE, signal strength, CLIENT MODE, BRIDGE MODE, WLAN, LAN
Alarm Contact: 1 relay output with current carrying capacity of 1 A @ 24 VDC
Digital Inputs: 2 electrically isolated inputs
• +13 to +30 V for state "1"
• +3 to -30 V for state "0"
• Max. input current: 8 mA

Physical Characteristics
Housing: Metal, providing IP30 protection
Weight: 970 g
Dimensions: 53.6 x 135 x 105 mm (2.11 x 5.31 x 4.13 in)
Installation: DIN-rail mounting (standard), wall mounting (optional kit)

Environmental Limits
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)

Power Requirements

Input Voltage: 12 to 48 VDC, redundant dual DC power inputs or 48 VDC Power-over-Ethernet (IEEE 802.3af compliant)
*Compliant with EN 50155 on 24 VDC
Connector: 10-pin removable terminal block
Power Consumption: 12 to 48 VDC, 700 mA
Reverse Polarity Protection: Present

Standards and Certifications

Safety: UL 60950-1, EN 60950-1
EMC: EN 301 489-1/17;   FCC Part 15, Subpart B; EN 55022/55024
Radio: EN 300 328, EN 301 893
Rail Traffic: EN 50155, EN 50121-1/4
Note: Please check Moxa's website for the most up-to-date certification status.

Reliability

MTBF (mean time between failures):
AWK-3131-M12: 407,416 hrs

Warranty

Warranty Period: 5 years

Details: See www.moxa.com/support/warranty.aspx

⚠️ **ATTENTION**

The AWK-3131-M12-RCC is **NOT** a portable mobile device and should be located at least 20 cm away from the human body. The AWK-3131-M12-RCC is **NOT** designed for the general public. To deploy AWK-3131-M12-RCCs and establish a wireless network safely, a well-trained technician is required for installation.

⚠️ **ATTENTION**

Use the antennas correctly: The 2.4 GHz antennas are needed when the AWK-3131-M12-RCC operates in IEEE 802.11b/g/n. The 5 GHz antennas are needed for IEEE 802.11a/n. Make sure your antenna installation is within a safety area, which is covered by a lightning protection or surge arrest system.