

# **AWK-3121-SSC Quick Installation Guide**

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**Moxa AirWorks**

**Second Edition, March 2012**

**MOXA<sup>®</sup>**

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P/N: 1802031210040

## Overview

Moxa's AWK-3121-SSC Access Point/Bridge/AP 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-SSC 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-SSC a convenient yet reliable solution for any industrial wireless application.

## Package Checklist

Moxa's AWK-3121-SSC 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-SSC
- 2 Swivel-type Antennas (2dBi, RP-SMA, 2.4&5GHz)
- 1 Quick Installation Guide
- 1 Software CD
- 1 Moxa Product Warranty Booklet
- 1 Cable Holder with a Screw
- 3 Protective Caps

## Installation and Configuration

Before installing the AWK-3121-SSC, 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 Fiber port. The AWK-3121-SSC 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-SSC can be powered by a DC power input.

### Step 2: Connect the AWK-3121-SSC to a notebook or PC

Since the AWK-3121-SSC supports 100BaseFX, you can use either a media converter or fiber Ethernet switch to connect the AWK-3121-SSC to the notebook. The 100M LED on the AWK-3121SSC will light up when 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-SSC. Since the AWK-3121-SSC'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-SSC

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: **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-SSC

By default, the AWK-3121-SSC'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.

## Step 6: Test communications

We will describe two test methods. Use the first method if you are using only one AWK-3121-SSC, and use the second method if you are using two or more AWK-3121-SSCs.

### Testing method for one AWK-3121-SSC

If you are only using one AWK-3121-SSC, you will need a second notebook computer (B) equipped with a WLAN card. Configure the WLAN card to connect to the AWK-3121-SSC (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-3121-SSC.

After configuring the WLAN card, establish a wireless connection with the AWK-3121-SSC 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-3121-SSCs

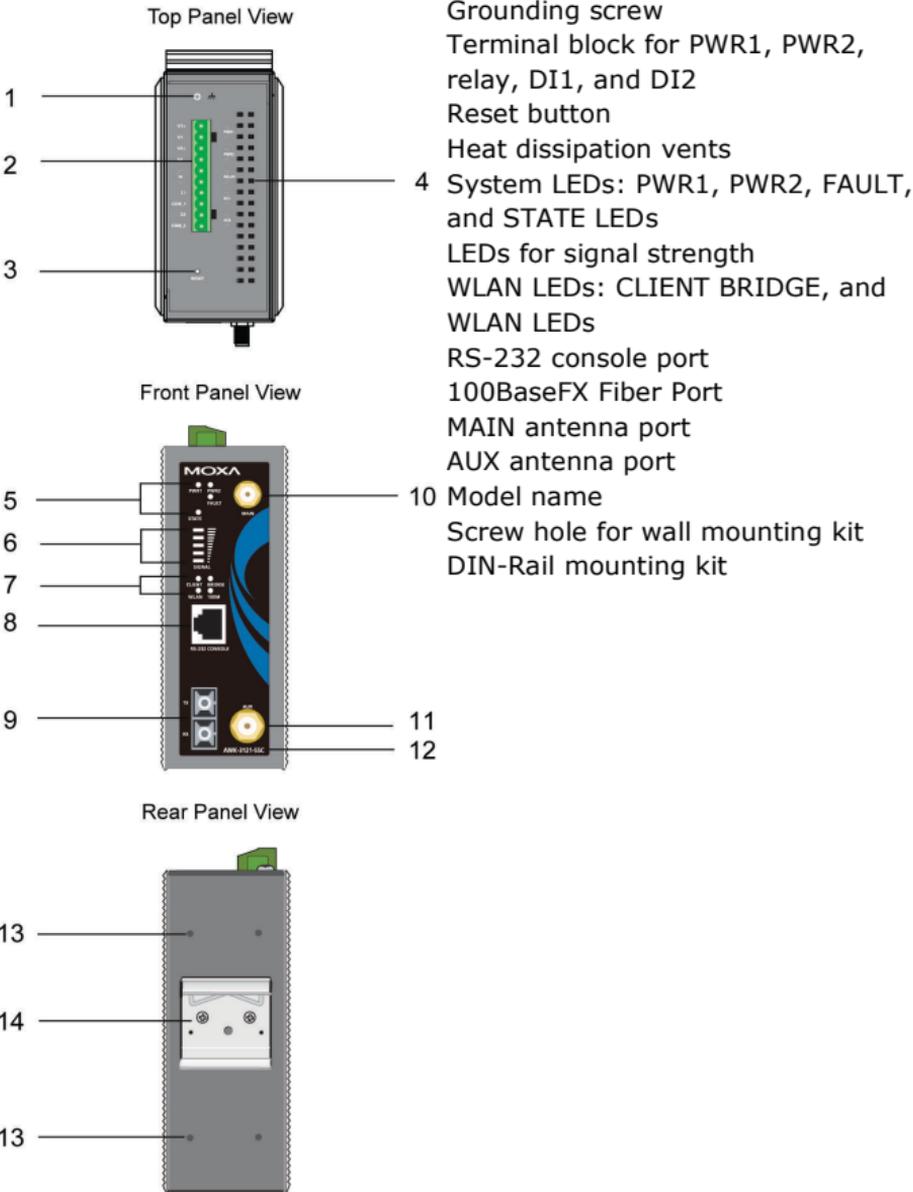
If you have two or more AWK-3121-SSCs, you will need a second notebook computer (B) equipped with an Ethernet port. Use the default settings for the first AWK-3121-SSC connected to notebook A, and change the second or third AWK-3121-SSC connected to notebook B to Client mode and then configure the notebooks and AWK-3121-SSCs properly.

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

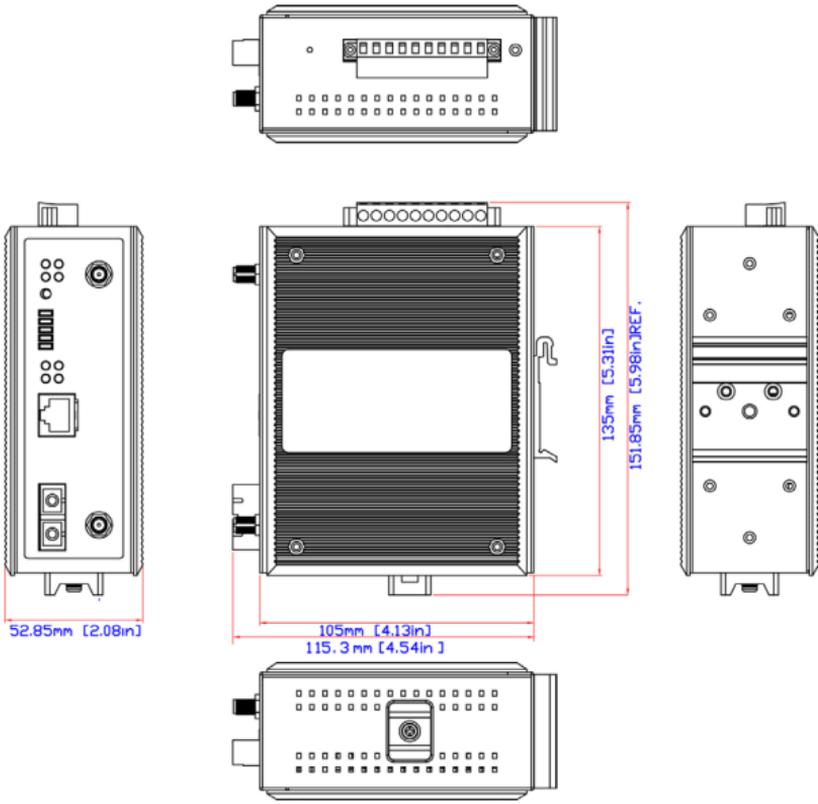
### **ping IP address of notebook A**

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-3121-SSC



## Mounting Dimensions (unit = mm)



## DIN-Rail Mounting

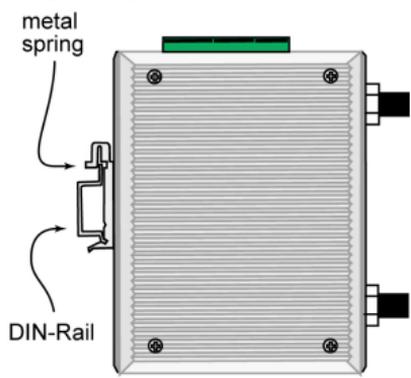
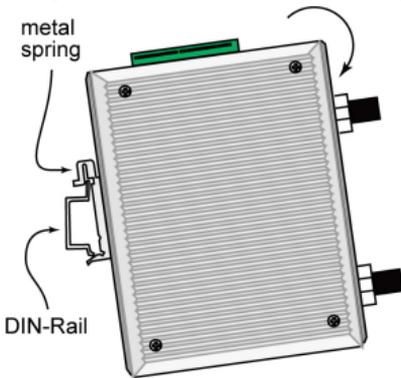
The aluminum DIN-Rail attachment plate should be fixed to the back panel of the AWK-3121-SSC when you take it out of the box. If you need to reattach the DIN-Rail attachment plate to the AWK-3121-SSC, make sure the stiff metal spring is situated towards the top, as shown in the figures below.

### STEP 1:

Insert the top of the DIN-Rail into the The DIN-Rail attachment unit will slot just below the stiff metal spring.

### STEP 2:

The DIN-Rail attachment unit will slot just below the stiff metal spring. snap into place as shown below.



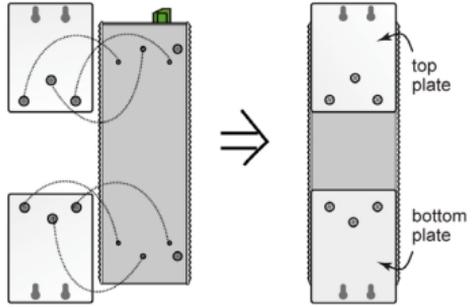
To remove the AWK-3121-SSC from the DIN-Rail, simply reverse Steps 1 and 2.

## Wall Mounting (optional)

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

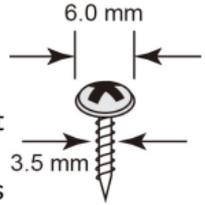
### STEP 1:

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



### STEP 2:

Mounting the AWK-3121-SSC to a wall requires 4 screws. Use the AWK-3121-SSC 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.

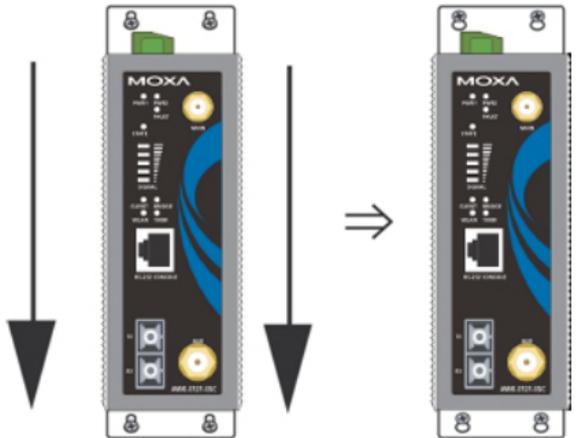


Do not screw the screws in all the way—leave a space of about 2 mm to allow room for sliding the wall mount panel between the wall and the screws.

**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-3121-SSC 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. 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-3121-SSC.



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

## Grounding the Moxa AWK-3121-SSC

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

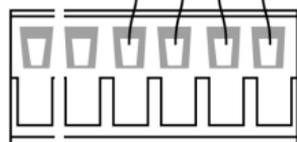
This product is intended to be mounted to a well-grounded mounting surface, such as a metal panel.

## Wiring the Redundant Power Inputs

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

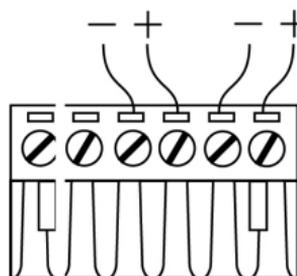


**STEP 1:** Insert the negative/positive DC wires into the V-/V+ terminals.



Top View

**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.



Front View

**STEP 3:** Insert the plastic terminal block connector prongs into the terminal block receptor, which is located on the AWK-3121-SSC's top panel.



## ATTENTION

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

### Wiring the Relay Contact

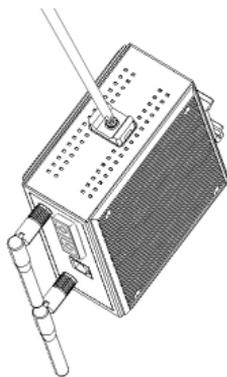
The AWK-3121-SSC has one relay output, which consists of the two contacts of the terminal block on the AWK-3121-SSC's top panel. Refer to the previous section for detailed instructions on how to connect the wires to the terminal block connector, and how to attach the terminal block connector to the terminal 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-SSC 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-SSC'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.

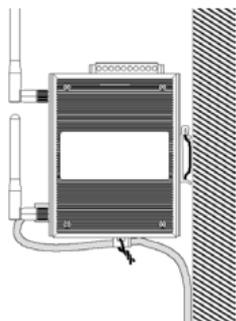
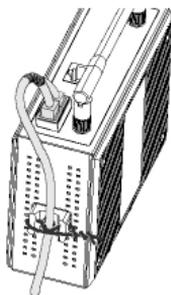
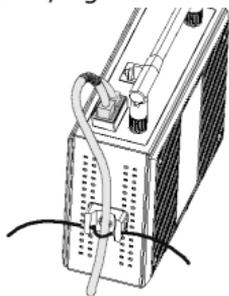
### Cable Holder Installation (Optional)

You can attach the cable holder to the bottom of the AWK-3121-SSC. 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-SSC.

**STEP 2:** After mounting the AWK-3121-SSC and plugging in the fiber cable, tighten the cable along the device and wall.

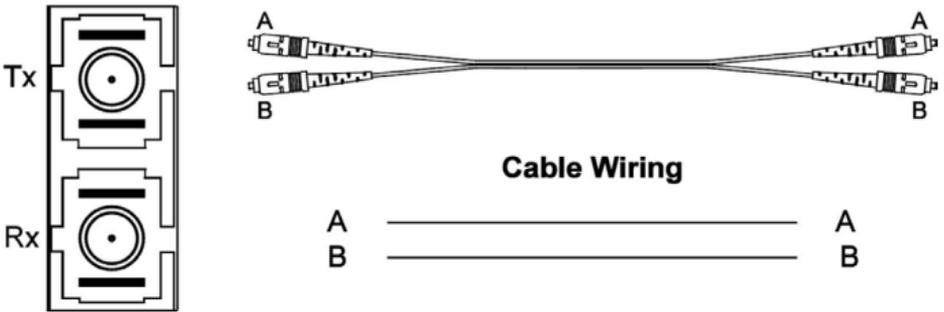


# Communication Connections

## 100BaseFX Fiber Port Connection

The concept behind the SC port and cable is quite straightforward. Suppose you are connecting devices 1 and 2; contrary to electrical signals, optical signals do not need a circuit in order to transmit data. Consequently, one of the optical lines is used to transmit data from device 1 to device 2, and the other optical line is used to transmit data from device 2 to device 1, for full-duplex transmission. Remember to connect the Tx (transmit) port of device 1 to the Rx (receive) port of device 2, and vice versa. If you make your own cable, we suggest labeling the two sides of the same line with the same letter (A-to-A and B-B, as illustrated below, or (A1-to-A1 and B1-to-B2...)).

### SC-Port Pinouts SC-Port to SC-Port Cable Wiring



### ATTENTION

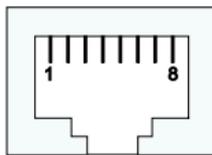
This is a Class 1 Laser/LED product. To avoid causing serious damage to your eyes, do not stare directly into the laser beam.

## RS-232 Connection

The AWK-3121-SSC 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-SSC's console port to your PC's COM port. You may then use a console terminal program to access the AWK-3121-SSC 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	-----	



**NOTE** The pin numbers for male DB9 and DB25 connectors, and hole numbers for female DB9 and DB25 connectors are labeled on the connector. However, the numbers are typically quite small, so you may need to use a magnifying glass to see the numbers clearly.

The pin numbers for both 8-pin and 10-pin RJ45 connectors (and ports) are typically not labeled on the connector (or port). Refer to the Pinout diagram above to see how RJ45 pins are numbered.



## ATTENTION

For railway rolling stock applications, AWK-3121 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-SSC 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>			
<b>PWR1</b>	Green	On	Power is being supplied from power input 1.
		Off	Power is <b>not</b> being supplied from power input 1.
<b>PWR2</b>	Green	On	Power is being supplied from power input 2.
		Off	Power is <b>not</b> being supplied from power input 2.
<b>FAULT</b>	Red	Blink (slow)	Cannot get an IP address from the DHCP server (interval: 1 sec)
		Blink (fast)	IP address conflict (interval: 0.5 sec)
		Off	Error condition does not exist.
<b>STATE</b>	Green/ Red	Green	Software Ready
		Blink	The AWK has been located by AWK Search Utility. (interval: 1sec)
		Red	Bootling error condition
<b>SIGNAL (5 LEDs)</b>	Green	On	Signal level
		Off	(for <b>Client</b> mode only)
<b>BRIDGE MODE</b>	Green	On	AWK functions in <b>Bridge</b> Mode.
		Off	AWK is not in <b>Bridge</b> Mode.
<b>CLIENT MODE</b>	Green	On	AWK functions in <b>Client</b> Mode.
		Off	AWK is not in <b>Client</b> Mode.
<b>WLAN</b>	Amber	On	WLAN is in used
		Off	WLAN is <b>not</b> in use
<b>100M</b>	Green	On	SC port's 100Mbps link is <b>active</b> .
		Blink	Data is being transmitted at 100 Mbps
		Off	SC port's 100Mbps link is <b>inactive</b> .

## Specifications

### 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  
IEEE 802.1D for Spanning Tree Protocol  
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

### 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)

JP:

2.412 to 2.472 GHz (13 channels, OFDM)

2.412 to 2.484 GHz (14 channels, DSSS)

5.18 to 5.24 GHz (4 channels for W52)

### 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

### TX Transmit Power:

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

## 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

## Protocol Support

**General Protocols:** Proxy ARP, DNS, HTTP, HTTPS, IP, ICMP, SNTP, TCP, UDP, RADIUS, SNMP, PPPoE, DHCP

## Interface

**Default Antennas\*:** 2 dual-band omni-directional antennas, 2 dBi, RP-SMA (male)

**\*Only available with the AWK-3121 and AWK-3121-SSC models.**

### Connector for External Antennas:

AWK-3121 and AWK-3121-SSC: RP-SMA (female)

AWK-3121-M12: QMA (female)

**RJ45 Ports:** 1, 10/100BaseT(X) auto negotiation speed, F/H duplex mode, and auto MDI/MDI-X connection (AWK-3121 only)

**Fiber Ports:** 1, 100BaseFX port (SC connector, AWK-3121 only)

**M12 Ports:** 1, 10/100BaseT(X) auto negotiation speed, F/H duplex mode, and auto MDI/MDI-X connection (AWK-3121-M12 only)

**Console Port:** RS-232 (RJ45-type)

**LED Indicators:** PWR1, PWR2, PoE\*, FAULT, STATE, signal strength, CLIENT MODE, BRIDGE MODE, WLAN, 10/100 (TP port), 100M (fiber port), LAN (M12 port)

**\*PoE is only available for the AWK-3121 and AWK-3121-M12**

**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

## Optical Fiber\*

### **100BaseFX Single Mode**

Wavelength	1310 nm
Max. TX	0 dBm
Min. TX	-5 dBm
RX Sensitivity	-34 dBm
Link Budget	29 dB
Typical Distance	40 kma
Saturation	-3 dBm

## Physical Characteristics

**Housing:** Metal, providing IP30 protection

**Weight:** 850 g

**Dimensions:** 53.6 x 135 x 105 mm (2.11 x 5.31 x 4.13 in)

**Installation:** DIN-Rail mounting, wall mounting (with 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**

**\*PoE is only available for the AWK-3121 and AWK-3121-M12**

**Connector:** 10-pin removable terminal block

**Power Consumption:** 12 to 48 VDC, 0.121 to 0.494 A

**Reverse Polarity Protection:** Present

## Standards and Certifications

**Safety:** UL 60950-1, EN 60950-1

**Hazardous Location:** UL/cUL Class I Division 2, ATEX Zone 2 (for AWK-3121 only)

**EMC:** EN 301 489-1/17; FCC Part 15, Subpart B; EN 55022/55024

**Radio:** EN 300 328, EN 301 893, DSPP (Japan)

**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-3121: 392,209 hrs

AWK-3121-M12: 480,831 hrs

AWK-3121-SSC: 445,913 hrs

## Warranty

**Warranty Period:** 5 years

**Details:** See [www.moxa.com/support/warranty.aspx](http://www.moxa.com/support/warranty.aspx)



## **ATTENTION**

The AWK-3121-SSC is **NOT** a portable mobile device and should be located at least 20 cm away from the human body.

The AWK-3121-SSC is **NOT** designed for the general public. To deploy AWK-3121-SSCs 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-3121-SSC operates in IEEE 802.11b/g. 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 arrest system.

### **Technical Support Contact Information** **[www.moxa.com/support](http://www.moxa.com/support)**

#### Moxa Americas:

Toll-free: 1-888-669-2872

Tel: 1-714-528-6777

Fax: 1-714-528-6778

#### Moxa China (Shanghai office):

Toll-free: 800-820-5036

Tel: +86-21-5258-9955

Fax: +86-21-5258-5505

#### Moxa Europe:

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