# Operation Manual of EX9486C-W

Serial to Wi-Fi converter



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# Introduction

Serial to Wi-Fi converter is provided new ways of connecting serial devices to a Wireless LAN (Wi-Fi 802.11 b/g). Serial to Wi-Fi Converter is designed to operate serial ports through wireless (Wi-Fi 802.11 b/g). The data is transmitted via TCP/IP protocol. Therefore control is available via Ethernet, Intranet and Internet. Serial to Wi-Fi Converter is packaged in a case well suited for industrial environments. All serial ports operate in common RS-232 mode, industrial RS-422 and RS-485 modes configuration.

With the maturity of Wi-Fi technology of 802.11b/g, delivering cost effective becomes increasingly important. Model EX-9486C-W of Serial to Wi-Fi converter product is a more competitive price by careful selecting high quality with competitive prices components in the world, the product design is adopted ARM single-chip, made network connectivity possible with affordable cost for virtually all kinds of devices. This user manual will guide you step by step for setting the various functions of model EX-9486C-W product.

The following topics are covered in this chapter:

- † Overview
- † Dackage Checklist
- † Product Features
- † Product Specifications

# **Overview**

Serial to Wi-Fi Converter is provided a perfect solution to make your industrial serial devices Internet ready instantly via wireless LAN. Model EX-9486C-W with ARM chipset, Serial to Wi-Fi Converter makes them the ideal choice for connecting your RS-232 or RS-422/485 serial devices such as PLCs, meters, and sensors to an IP-based Wi-Fi / Ethernet LAN, making it possible for your software to access serial devices anywhere and anytime over a wireless local LAN or the Internet. For RS-232 pin assignment of ARM Series, it just provides TxD, RxD and GND pins only without others like TXRTS, CTS, DTR, DSR and DCD.

Serial to Wi-Fi Converter support manual configuration via the handy web browser console and many protocols including TCP, IP, UDP, HTTP, DHCP, ICMP, and ARP. They are the best solution to network your serial devices.

# Package Check List

Serial to Wi-Fi Converter product is shipped with the following items:

- 1 unit of Serial to Wi-Fi Converter
- □ 1 unit of dipole antenna(2.0dBi)
- □ 1 unit CD(Operation Manual & Utility)
- Din Rail Mounting Kit & Power Adaptor :Optional

NOTE: Notify your sales representative if any of the above items is missing or damaged.



# **Product Features**

## Data Conversion between RS-232/422/485 and Wireless Lan

**C**onvert serial device (RS-232, RS-422, RS-485) data/signal into the TCP/IP package data/signal and send them out with the Ethernet DataStream via Wi-Fi wireless; or convert the TCP/IP package data/signal into serial device data/signal.

#### Wi-Fi Wireless LAN(802.11 b/g)

It based on the latest industry standard Wi-Fi Certified IEEE 802.11b / g specification; it offers maximum channel speeds of up to 54 Mbps. The Wi-Fi function maintains interoperability within the  $2.3 \sim 2.5$  GHz frequency band, offering full compatibility with 802.11b / g networks. This integrated wireless solution of Serial to Ethernet Converter is widely deployed in business environments and is the standard for wireless access in public places. It also supports key security features like Wi-Fi Protected Access (WPA), WEP and 802.1x.

# **Dynamic IP Configuration**

Support DHCP client mode, simplifying network address configuration and management.

#### Server / Client Dual Modes

**S**eries can be configured as network server or network client. In the client mode, it can be installed in network which is protected by NAT router or firewall, without the need of a real IP address.

#### Web-based Setup

Parameters setup is based on HTTPS protocol by using standard browsers (IE and Netscape). No special software would be required. To use https to enter Web-Server of converter (For example https : //192.168.1.100)

#### **Built-in Security Control**

It is protected by both setup password and access password to prevent intruders.

#### **Remote updated**

Firmware can be reprogrammed directly via Ethernet network to keep up with latest network standards.



# **Product Specifications**

# Hardware specification

# WLAN

Standard Compliance : IEEE 802.11 b / g Spread Spectrum Technology: DSSS, OFDM Tx Power 11b: Maximum 19 dBm Tx Power 11g/n: Maximum 16 dBm Rx Sensitivity: -73 dBm @ 54Mbps, -86dBm @ 11Mbps Transmission Rate: 54 Mbps (max.) with auto fallback (54,48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, 1 Mbps) Transmission distance: Up to 100 meters (@ 12 Mbps, in open areas) Security: WEP 64-bit/128-bit data encryption, AES, WPA2, WPS2.0, WAPI Antenna Connector: Reverse SMA, 2 dbi Antenna Network Mode: Infrastructure, Ad-Hoc, Soft AP(Setup) Setup: HTTP Browser Setup(IE, Chrome, Firefox) Security: Login Password

# **Serial Communication Parameters**

No. of ports : 1 \* RS-232/422/485 port, Male DB9/ 4-pin Terminal Block, S/W selectable RS-232 Signals : TxD, RxD and GND only RS-422 Signal : Tx+ , Tx- , Rx+ , Rx – RS-485 Signal : Data+ , Data-Serial Line Protection : 15 KV ESD for all signals Parity: None, Even, Odd, Space, Mark Data bits: 5, 6, 7, 8 Stop bits: 1, 1.5, 2 Flow control: XON/XOFF Speed: 110 bps to 115.2+ Kbps Built-in: RTC(Real Time Clock)

# **Reset Button**

If by any chance, you forget the setup password, or have incorrect settings making converter inoperable. First, turn on the power. Second, use any point tip to push this button and hold it about 5 seconds All the parameters will be reset to the factory default(software AP mode).

# **Power Requirements**

Power input : 9~24V, 200mA@12 VDC note: pin assignment of Power Supply if you select the Terminal Block



# Environmental

Operating Temperature : -10 to 65°C , 10 to 95% RH Storage Temperature : -20 to 70°C (-4 to 185°F), 5 to 95%RH Regulatory Approvals RoHS FCC, CE



#### **Software Features**

Protocols : ARP, IP, ICMP, UDP, TCP, HTTP, DHCP, ICMP Mode : TCP Server / TCP Client / UDP Client / Virtual COM / Pairing Utilities : Windows 2000/2003/VISTA/WIN7/WIN8/WIN10

# **Wiring Architecture**

#### **RS-232 Wiring Architecture**



#### RS-422/RS-485 Wiring Architecture



When you finish the steps mentioned above and the LED indicators are as shown, the converter is installed correctly. You can use the Utility Setup CD to setup the IP Address. To proceed the advanced parameter setup, please use a web browser (IE or Netscape) to continue the detailed settings.



# **EX9486C-W Wi-Fi Converter Configuration**

# Installation of IP Search Tool

- 1. Please copy EX9486C-W.exe to your PC. You can find the file in the CD ROM.
- 2. Double click EX9486C-W.exe. The program will be extracted and installed in PC.
- 3. After successful installation, the shortcut of WiFi-Module Utility.exe will be on the desktop

🖳 WiFi-Module Utility				Statements of the local division of the loca	_ <b>D</b> X
Update Device FileName		Product :		Select Updat Update To	e File V1.0.5
Device List : IP	DeviceName	Version	Update Status		
IP Search(Ping)	Broadcast Update	Update All	Goto		Close

#### **Connection and Configuration**

Please prepare a PC/NB with Wireless adapter, a Wireless Access Point and EX9486C-W.

#### 1. Connecting EX9486C-W Gateway

#### Note: EX9486C-W has no Ethernet port and is default as a Soft AP.

1-1. EX9486C-W Gateway is default as a "Soft AP" when first connected to power. Its broadcast SSID is AJ+MAC address

1.2. Please use PC/NB (with Wi-Fi adapter) to conduct SSID site survey. Looking for a SSID shown as MAC address. (ie. AJ:XX:XX:XX:XX:XX:XX) Then Click Connect





# 1-3. Key in Soft AP password. Default is 12345678

🔮 Connect to a Net	work	×
Type the netwo	rk security key	
Security key:	12345678	
	Hide characters	
		OK Cancel

1-4. Connecting to EX9486C-W Gateway





# EX9486C-W Manual

-	Home network
-1	If all the computers on this network are at your home, and you recognize them, this is a trusted home network. Don't choose this for public places such as coffee shops or airports.
J <sub>Q</sub>	Work network If all the computers on this network are at your workplace, and you recognize them, this is a trusted work network. Don't choose this for public places such as coffee shops or airports.
<b>H</b>	Public network If you don't recognize all the computers on the network (for example, you're in a coffee shop or airport, or you have mobile broadband), this is a public network and is not trusted.



Now you have successfully connect to EX9486C-W



# 2. Searching & Configuring EX9486C-W Gateway

#### 2-1. IP Searching

2-1-1. WiFi-Module Utility.exe Double Click on to execute IP search tool

#### 2-1-2. Click on "IP Search" or "Broadcast". WiFi-Module Utility will start to scan the network.

🖳 WiFi-Modu	ile Utility			
Update Devi	ice			
FileN	Name		Select Updat	e File
Versi	ion :	Product :	Update To	V1.0.5
Device List :				
IP	Device Name	Version Undate Status		×
	IP Searching		Search Time : 5 sec.	
	ERR: IP (192.168	1.1.1) doesn't exists!		
		Stop		
IP Search	(Ping) Broadcast Update	e Update All Goto	<b>EXPERT</b> <sub>DAQ</sub>	Close

# 2-1-3. Device found

🚽 WiFi-Module Utility					- 0 ×
Update Device FileName Version :		Product :		Select Upda Update To	te File V1.0.5
Device List : IP	DeviceName	Version	Update Status		
192.168.1.100	EX9486C-W	1.0.10			
IP Search(Ping) B	Broadcast	Update All	Goto	<b>EXPERT</b> <sub>DAQ</sub>	Close



2-1-4. Single click on device IP address. Then click "Goto" to open browser.

🖳 WiFi-Module Utility					
Update Device					
FileName				Select Updat	e File
Version :		Product :		Update To	V1.0.5
Device List :					
IP	DeviceName	Version	Update Status		
☑ 192.168.1.101	EX9486C-W	1.0.10			
IP Search(Ping) B	roadcast Update	Update All	Goto	<b>E PERT</b> DAQ	Close
Broadcast 192.168.1.255 192.168.1.101 return ip :	192.168.1.101				

2-1-5. Login page is shown. Please input ID and Password. (default ID: admin; password: admin).

C Index Html x		
← → X ▲ □ 192.168.1.100		ም 🏠 🥝 🛅 🍓 🔘 🚍
	Authentication Required     ×       The server http://192.168.1100:80 requires a username and password. The server says: Web Server Authentication.       User Name:     admin       Password:     *****       Log In     Cancel	

Now you have successfully searched the device



# 2-2. Configuring

# 2-2-1. Serial Over Wi-Fi Index Page

	Serial Over W	/i-Fi		Log o
System	Network		Serial wifi	
Status				
IP Address :	192.168.1.100			
Subnet Mask :	255.255.255.0			
Gateway :	0.0.0.0			
MAC address:	9C:65:F9:13:16:E2			
System				
Admin. Password :				
Password Confirm:				
Auto reset (minutes):	0			
Device Name :	EX9486C-W			
Description :	Serial to wifi			
NTP				
Enabled:		Enabled		0
NTP Server :	clock.stdtime.gov.tw			
Time Offset :	l	JTC+8:00		0
Serial				
Baud Rate:		115200		0
		Odd		0
Parity :				0
Parity : Data Bits :		7		
Parity : Data Bits : Stop Bits :		7		۲
Parity : Data Bits : Stop Bits : Flow Control :		7 2 None		0
Parity : Data Bits : Stop Bits : Flow Control : RxDelay(ms) :	0	7 2 None		0

# 2-2-2. System Setup Page

2-2-2-1. System

Where you can change Password and set up reset time period.



# 2-2-2-2. NTP

Enable/Disable NTP function; setup NTP server and choose Time zone.

UTC-11:00		
UTC-10:00		
UTC-9:00		
UTC-8:00		
UTC-7:00		
UTC-6:00		
UTC-5:00		
UTC-4:00		
UTC-3:00		
UTC-2:00		
UTC-1:00		
UTC		
UTC+1:00		
UTC+2:00		
UTC+3:00		
UTC+4:00		
UTC+5:00		
UTC+6:00		
UTC+7:00		
UTC+8:00		-
	UTC+8:00	0

# 2-2-2-3. Serial

Setup Serial device parameters - Baud Rate, Parity, Data Bits and Stop Bits. Then click "Save" to save the Settings.

Serial		
Baud Rate:	9600	$\odot$
Parity :	Nano	
Fundy.	None	
Data Bits :	8	$\odot$
Stop Bits :	1	$\odot$

# 2-2-3. Network Setup Page

# There is Network Type configuration

		Serial Over Wi-Fi			Log out ver : 1.0.1
System		Network		Serial wifi	
Wi-Fi					]
Network Type:		Soft AP			0
SSID :	AJ_9C_65_F9	9_13_16_E2			
Auth Mode:		WPA2-PS	к		Ø
Auth Password :	12345678				
Encrypt :		AES			0

WiFi Configuration



# 2-2-3-1.Network Type

There are 2 network types: Infrastructure / Soft AP.

	S	erial Over Wi-Fi			Log ver : "
System		Network		Se	rial wifi
Wi-Fi					
Network Type:		Soft AP			Ø
SSID :	Infrastructure Soft AP				
Auth Mode:		WPA2-PS	к		O
Auth Password :	12345678				
Encrypt:		AES			۲

A. "Soft AP" mode – This is factory default mode. Device acts as an Access Point which is allow to be connected by various PC /NB /Smart Phone/ PAD. Support DHCP server function. Soft AP broadcasts its SSID "AJ\_XX\_XX\_XX\_XX\_XX\_XX\_XX". PC /NB /Smart Phone is requested to connect to this SSID for device setup.

	Serial Over Wi-Fi			Log ou ver : 1.0.1
System	Network	S	erial wifi	
Wi-Fi				
Network Type :	Infrastructure			Ø
SSID : Scan				
Auth Mode :	WPA2-PSK			0
Auth Password :				
Encrypt :	AES			O

B. "Infrastructure" mode – Choose this mode for connecting to other Access Point.



# 2-2-3-2. SSID Scan

Click "Scan" for existing Access Point site survey. Choose a suitable SSID, Authentication and Encryption. Then key in password for AP

→ C n [] 192.168.1	100/sys/network.ntml		ਪ 💟 🖬 🕷 (
		Modbus Gateway	Log ver:1
System	n	Network	GateWay
Ni-Fi			
Network Type :		Infrastructure	0
SSID : Scan			
Auth Mode :		WPA2-PSK	0
Auth Password :			
Encrypt :		AES Data Query	0
Network			
Network Mode :		Fixed Address	0
P address :	192.168.1.100		
Mask :	255.255.255.0		
Gateway :	0.0.0.0		
ONS :	168.95.1.1		

- C II [] 152.100.1.	1007 sys/network.nenn#dear-s	tate-dialog			
		Modbus Gate	way		Log ou ver : 1.0.
System		Network		GateWay	
Wi-Fi					
Network Type :		Infrast	tructure		0
SSID : scan					
Auth Mode:		WI-FI LISt	-PSK		0
Auth Password :		TOPSCCC-Dlink (WPAPSK) INT (WPA2PSK)			
Encrypt :		Protal_tp (WPA2PSK) WONWONNPR (WPA2PSK) MERCURY (OPEN) ATTW-OFFICE (WPAPSK)	:s		0
Network		TOPSCCC-Vigor (WPA2PSK) Smartech (WPAPSK)			
Network Mode :		Fixed	Address		0
P address :	192.168.1.100				
Mask :	255.255.255.0				
Gateway :	0.0.0				
DNS :	168.95.1.1				



#### 2-2-3-3. Authentication

#### There are 4 authentication Modes

Auth Mode :	WPA2-PS	к 📀
Auth Password :	Open Shared WPA-PSK	
Encrypt :	WPA2-PSK	<u> </u>

# 2-2-3-4. Encryption

#### Choose suitable cipher suite

Encrypt :	AES	0
	WEP TKIP	
Network	AES	

# 2-2-3-5. Password

Key in password for selected AP

Auth Password :	topscccexpert	
Encrypt :	AES	٢

# 2-2-3-6. IP Address Mode

Configure IP Address Mode – Suggest choosing "DHCP" – Let AP to assign IP address to Modbus Gateway. You can also choose "Fixed Address" to input fixed IP address, Subnet Mask, Gateway address.

Network		
Network Mode:	Fixed Address	0
IP address:	Fixed address DHCP	

# Fixed Address parameters setting

Network		
Network Mode:	Fixed Address	0
IP address:	192.168.1.100	
Mask:	255.255.255.0	
Gateway.	192.168.1.1	
	Save Save and back Home	-

Now, Network Setup is successfully configured.



# Please click "Save" to keep the settings in memory.

System Message		
Data saved, All settings will be applying!	[Reboot]	after
Close		

# DHCP Mode

		Modbus Gateway	Log out ver: 1.0.0
System		Network	GateWay
Wi-Fi			
Network Type:		Infrastructure	$\odot$
SSID: Scan	edimax_2.4G_ksh		
Auth Mode:		WPA2-PSK	
Auth Password:			
Encrypt.		AES	
Network			
Network Mode:		DHCP	$\odot$

# 2-2-4. Mode Setup

There are 3 modes for selection, TCP server / TCP client / UDP

System		Network		Serial wifi	
Serial over Wi-Fi	_				
Mode :	700.0	TCP	Server		O
Port :	TCP Server TCP Client UDP				
TCP invalid timeout (Min.s):	10				



# EX9486C-W

Manual

2-2-4-1. TCP Server (TCP protocol, passive open, to be connected from the TCP clients.)

	Se	erial Over Wi-	F1		ver : 1
System		Network		Serial w	ifi
Serial over Wi-Fi					
Mode :		TCP	Server		٢
Port :	100				
TCP invalid timeout (Min.s):	10				

The port number is depend on your requirement. (Exp. Open socket port as 100)

	Serial	Over Wi-Fi		Log ver :
System		Network	Serial wifi	
Serial over Wi-Fi				
Mode :		TCP Client		O
Destination address :				
Destination Port :				
TCP invalid timeout (Min.s) :	10			

2-2-4-2. TCP Client (TCP protocol, active open, connect to the TCP server)

Destination address & port: would be connected in TCP Client mode for a certain serial port.



#### 2-2-4-3. UDP (UDP protocol, connectionless)

	18	Serial Over Wi-Fi	Lo ver:
System		Network	Serial wifi
Serial over Wi-Fi			
Mode :		UDP	C
Port :	100		
Destination address :			
Destination Port :			

Destination address & port: would be connected in UDP Client mode for a certain serial port.

Now, Converter Setup is successfully configured.

Please click "Save" to keep the settings in memory.

2-2-5. Click "Home". Go to home page. Then click "Reboot" to re-start Modbus Gateway.

	Reboot Reply to factory settings	Version : 1.0.0
<u>January and a state of the sta</u>		
System Message		

System Message	
You sure you want to restart?	
YES NO	Click ves to reboot system

2-2-6. After device reboot, the original wireless connection will be disconnect.





# 2-3. Reconnect to EX9486C-W

## 2-3-1. Search the selected AP which EX9486C-W connect with

Not connected	47	^
Connections are available		
Wireless Network Connection 3	^	
TOPSCCC-Dlink	hu.	=
TOPSCCC-Vigor	Ju.	-
Connect automatically	iect	
AndroidAP4BA9	he.	
MERCURY	.ul	
AndroidAP123	.all	
tatung	.11	
King	all	Ŧ
Open Network and Sharing Cer	nter	

## 2-3-2. Key in password

2-3-3. Execute WiFi-Module Utility to search device

WiFi-Module Utility				COLUMN TWO IS NOT	
Update Device FileName				Select Updat	te File
Version :		Product		Update To	V1.0.5
Device List :					
IP	DeviceName	Version	Update Status		
☑ 192.168.1.100	EX9486C-W	1.0.10			
IP Search(Ping) Br	roadcast Update	Update All	Goto	EXPERT <sub>DAQ</sub>	Close



2-3-4. Single click device IP address then click "Goto" Device login page will be shown

http://192.168.1.100/sys × System SetU	p ×		Æ	jii ji			×
← → C ⋒ □ 192.168.1.101		53	0	<u>.</u>	٠	٢	Ξ
	Authentication Required       ×         The server http://192.168.88.120:80 requires a username and password. The server says: Web Server Authentication.         User Name:       admin         Password:       *****         Log In       Cancel						*

You have successfully re-connected to EX9486C-W



# Testing procedure of data transmission

# 1. Open the Hyper Terminal

Connection Description	? 🔀
New Connection	
Enter a name and choose an ico	n for the connection:
Name:	
loon:	
<	Þ
(	OK Cancel

2. Key in a name for connection (ex. test) and then press OK

- Y - 💌
n icon for the connection:
•
OK Cancel
n icon for the connection:

3. You will see following page. Choose TCP/IP, then press OK

Connect To	7 💌
test	
Enter details for t	he phone number that you want to dial:
Country/region:	Taiwan (886)
Area code:	02
Phone number:	
Connect using:	COM1  COM1 TCP/IP (Winsock) OK Cancel

4. Key in the Converter IP address and Socket port and then press OK



Connect To	7 💌	Connect To	? 💌
test		lest	
Enter details for	the host that you want to call:	Enter details for	the host that you want to call:
Host address:	[]	Host address:	192.168.0.100
Port number:	23	Port number:	100
Connect using:	TCP/IP (Winsock)	Connect using:	TCP/IP (Winsock)
	OK Cancel		OK Cancel

# 5. You will see HyperTerminal window

test - HyperTerminal     File Edit View Call Transfer Help	
D 📽 🐵 💲 🚥 😭	
Connecting Auto detect TCP/IP SCROLL CAPS NUM Capture Print echo	A

# 5-1. Echo Loop Test

Please short DB9 NO. 2 pin and NO.3 pin circuit, (in green Terminal Block - T+ connect to R+, T- connect to R- or TX connect to RX.)

5-2. Key in characters. the converter will echo back of the characters and shown on the screen



									Manual
📧 test - HyperTerminal								ж	
File Edit View Call Transfer H	felp								
D 🛩 🗇 🕉 🛍 🗃 😭									
thewjhviwhqwoir									
Connected 0:00:10 Auto detect	TCP/IP	SCROLL	CAPS	NUM	Capture	Print echo			

Congratulation. You had successfully set up the converter and start to use it

EX9486C-W



# Pin outs and Cable Wiring

DC Power outlet



□ RS-232 Pin Assignment

The pin assignment scheme for a 9-pin male connector on a DTE is given below.



PIN 9 : X (DC+5V Power Output- For Option)

RS-422 Pin Assignment

The pin assignment scheme for a 4-pin RS-422 is given below.

PIN 1 : R- PIN 2 : R+ PIN 3 : T- PIN 4 : T+

RS-485 Pin Assignment

The pin assignment scheme for a 4-pin RS-485 is given below.

PIN 1 : X PIN 2 : X PIN 3 : D- PIN 4 : D+

# RS-422 Wiring Diagram

Serial Device

EX9486C-W Converter

<u>R-</u>	3	- 1
R+	4	T+
<u>T-</u>	1	R-
<u>T+</u>	2	R+

# RS-485 Wiring Diagram

Serial Device	EX9486C-W Converter				
D	1 D-				
_D+	<u>2</u> D				