Application Tests of Industrial Ethernet Port and Serial Port to Wireless WiFi Adapter

FS-WF485IE on Various PLCs

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Preface
Ethernet port and serial port to wireless WiFi adapter FS-WF485IE produced by FOURSTAR is a kind of equipment used in industrial automation field to convert Ethernet port or serial port to WiFi wireless communication. It is applicable to sites not suitable for wiring, such as:
- Requirements for controlling mobile or rotary equipments;
- Requirements for signal transmission in areas where are not suitable for laying cables or hazardous;
- Communication of equipments at the two sides of river, channel, road or railway, and equipments at the area with complex terrain;
- Requirements for rapid, simple installation and start-up;
- Quick access to existing control system;

FS-WF485IE adapter is able to realize following conversion functions:
- RS232/RS485/RS422 serial port to WiFi wireless communication;
- Ethernet port to WiFi wireless communication;
- RS232/RS485/RS422 serial port to Ethernet;
- Serial port, Ethernet port and WiFi to each other simultaneously;

It’s important to note that serial port communication of FS-WF485IE transparently transmits data according to UART asynchronous serial port communication protocol, applicable to RS232, RS485, RS422 communication protocols which observe UART asynchronous serial port communication protocol, such as MODBUS protocol, free port communication protocol of Siemens PLC.

As for some field buses, such as PROFIBUS, MPI, PPI, CC-Link, PC-Link, although their physical communication ports are RS485 port, they don’t observe UART asynchronous serial port communication protocol. So, they are inapplicable to this product.

There are lots of applications of FS-WF485IE on PLC and other industrial control equipments, much more than these PLCs already tested. It is impossible for us to test all of them one by one. Users can draw inferences about other cases from one instance based on product’s principles and these test results.

For concise description, we call FS-WF485IE as module for short in the following.

Meaning of symbols in the following figures:
AP SSID: FS-B11_AP Module is set as AP, wireless network name (SSID): FS-B11_AP

STA SSID: FS-B11_AP Module is set as STA, name of wireless network to be connected is FS-B11_AP

LAN IP: 10.10.100.254 IP address of module is 10.10.100.254.

Protocol: TCP Server Module is set as TCP Server.
Port: 8899 Port number of module is 8899.

TCP Client 10.10.100.254: 8899 Module is set as TCP Client, and IP address of Server to be connected is 10.10.100.254, its port number is 8899.

UART: 9600, 8E1 Set serial port parameters of module: Baud rate = 9600bps, data bit = 8, check bit = even parity check (E even parity check, O odd parity check, N no check, M mark check, S space check), stop bit = 1.

VCOMM Virtual serial port software installed on the computer: VCOMM.

1. Wireless Communication of Siemens S7-200 Smart PLC
1.1 Wireless communication between S7-200 Smart PLCs
FS-WF485IE is able to convert Ethernet port of Siemens S7-200 Smart PLC to wireless WiFi. As shown in Figure 1-1, you just need to set one module as AP, set other modules as STA and establish wireless WiFi connection, then the wired connection mode when using Ethernet switch previously can be substituted by wireless mode.
IP addresses of equipments (PLC, PC, HMI) are the IP addresses in previous wired connection. Ports of AP module and STA module are for transparent transmission, not for address conversion. In order to avoid auto assignment of IP address to connected equipments by FS-WF485IE (if connected equipments has been set as “Auto obtain IP address”), you can disable FS-WF485IE’s DHCP Server.

Figure 1-1 Use FS-WF485IE o realize wireless communication between S7-200 Smart PLCs
1.2 Wireless monitoring and communication between computer and S7-200Smart PLC
Set FS-WF485IE connected with Siemens S7-200Smart PLC as AP, and then you can establish wireless connection with laptop’s built-in WiFi, so as to perform uploading, downloading programs, monitoring and other operations.

![Diagram](image)

Figure 2-1 Use FS-WF485IE to realize wireless monitoring and communication between computer and S7-200 Smart PLC

**2. Wireless Communication of Siemens S7-200PLC**

2.1 Wireless communication between computer and S7-200PLC
As shown in Figure 2-1, use STEP7 Micro/WIN programming software or PC Access software on the computer, select “MODEM connection” and “10 bit radio/RF modem mode without check bit” in “Set PG/PC”, so as to realize wireless programming monitoring to S7-200PLC and so on. PLC port is required to connect PLC and FS-WF485IE by PC/PPI+ programming cable, and turn the switch on adapter box of PC/PPI+ to “10 bit” position. FS-WF485IE only supports “10 bit radio/RF modem mode”. PPI, Advanced PPI, and Multiple Master PPI are not supported by it.
Application Tests of Industrial Port and Serial Port to Wireless WiFi Adapter FS-WF485IE on Various PLCs

2.2 Wireless communication between S7-200PLCs:
FS-WF485IE supports RS485 free port communication and MODBUS protocol communication between S7-200PLCs. PPI, Advanced PPI, Multiple Master PPI, MPI, and PROFIBUS protocol are not supported by it.
As shown in Figure 2-2, all data sent by PLC which is as master station can be received by PLC which is as slave station; data sent by every slave PLC can be received by master station PLC; data can’t be transmitted between slave station PLCs.
3. Wireless Communication of Siemens S7-300/400PLC

3.1 Wireless communication between computer and MPI/DP port of S7-300/400PLC

Wireless communication between FS-WF485IE and MPI port or DP port of S7-300/400PLC can be realized by Siemens PC Adapter (or FOURSTAR PC/MPI+, PC Adapter CN), used for PLC uploading, downloading, and monitoring program and data in real time by using STEP7 software and other configuration and monitoring software on the computer. As shown in Figure 3-1, MPI/DP port of PLC after conversion by PC Adapter has already been a RS232 port in line with UART asynchronous communication, so wireless transmission can be established. However, directly connecting RS485 port of module to MPI/DP port of PLC is not supported.
3.2 Wireless communication between computer and Ethernet port of S7-300/400PLC:

Connect port of FS-WF485IE to port of PLC through Ethernet cable, and then establish wireless connection between built-in WiFi of laptop and FS-WF485IE.

Figure 3-2 Use FS-WF485IE to realize wireless communication between computer and Ethernet port of S7-300/400PLC
4. Wireless Communication of Siemens LOGO Controller

Wireless communication between computer and Siemens LOGO! Controller can be realized by FS-WF485IE, used for substituting for programming cable LOGO! PC-CABLE. As shown in Figure 4-1, establish TCP connection with FS-WF485IE by virtual serial port software on the computer.

![Figure 4-1 Wireless communication between computer and Siemens LOGO!](image1)

For LOGO! Controller, communication will be abnormal if it is connected as shown in Figure 4-2.

![Figure 4-2 Connection like this is not supported by LOGO! Controller](image2)
5. Wireless Communication of Schneider NEZA PLC

FOURSTAR FS-WF485IE adapter supports wireless communication of MODBUS ASCII and MODBUS RTU protocol. It is superior to many serial port wireless communication products. There are lots of serial port to wireless products in the market, such as serial port to Bluetooth adapter, serial port to 433MHz RF wireless product. They only support MODBUS ASCII communication, and do not support MODBUS RTU communication. Test method of MODBUS wireless communication by FS-WF485IE on Schneider NEZA PLC is as follows. FS-WF485IE and other serial port to wireless products don’t support Schneider UNI-TELWAY communication protocol.

5.1 MODBUS ASCII communication test:
Open PL707 programming software of NEZA PLC, and upload program to the computer by TSX08PRGCAB programming cable.
Set communication formats in “Configuration\programming port” as follows:

![Configuration Screenshot]

Notes: don’t select ASCII as protocol type. It is free port protocol, rather than MODBUS ASCII protocol.

Set communication formats the same as programming port in “Configuration\extended port”:

![Extended Port Screenshot]
Download programs and settings to the PLC by programming cable TSX08PRGCAB (switch in M position).
Now, PLC has been set as MODBUS ASCII slave station, communication data format: 9600bps, 7O1.

Click MODBUS icon in the taskbar, and set the computer’s MODBUS parameters the same as that of PLC.

Click Drivers Manager icon in control panel of Windows system to enter MODBUS Test, turn the switch on programming cable to S position, click “Connect” and “Start” button, then you can see Request: communication is normal if digits are constantly increasing later.

Finally, set FS-WF485IE as Figure 5-1 and use TSX08PRGCAB programming cable (turn switch to S position) to connect FS-WF485IE to NEZA PLC. Test result is same as the result obtained in the above.
MODBUS ASCII Test

Figure 5-1 MODBUS ASCII communication test

5.2 MODBUS RTU communication test:
Open PL707 programming software of NEZA PLC, and upload program to the computer by TSX08PRGCAB programming cable.
Set communication parameters in “Configuration\programming port” as follows:
Set communication parameters the same as programming port in “Configuration\extended port”:

Download programs and settings to the PLC by programming cable TSX08PRGCAB (switch in M position).
Now, PLC has been set as MODBUS RTU slave station, communication data format: 9600bps, 8E1.
Click MODBUS icon in the taskbar, and set MODBUS parameters of computer the same as that of PLC.
Click Drivers Manager icon in control panel to enter MODBUS Test, turn switch on programming cable to S position, click “Connect” and “Start” button, then you can see Request: communication is normal if digits are constantly increasing later.

Finally, set FS-WF485IE as Figure 5-2 and use TSX08PRGCAB programming cable (turn switch to S position) to connect FS-WF485IE to NEZA PLC. Test result is the same as the result obtained in the above.
6. Wireless Communication of Mitsubishi FX series PLCs

Wireless communication of Mitsubishi FX series PLCs (FX0/FX1N/FX2N/FX3U/FX3G) can be realized by using FS-WF485IE, wireless communication between computer and PLC or wireless communication between PLCs (free port communication protocol). As for Mitsubishi A series PLCs, serial port wireless communication can’t be realized for their communication ports use other control signals. However, it can be realized by using FOURSTAR ULink300+USB-SC09+FS-WF485IE.
Wireless communication between computer and FX series PLCs:
This can be used for wireless programming, monitoring and etc. of FX series PLCs by Mitsubishi GX Developer programming software on the computer. Support all FX series PLCs, such as FX0/FX1N/FX2N/FX3U/FX3G.

Figure 6-1 Wireless communication between computer and FX series PLCs
7. Wireless Communication of Panasonic FP0 PLC

Figure 7-1 Wireless communication between computer and Panasonic FP0 PLC
8. Wireless Communication of Omron CPM2A PLC

Figure 8-1 Wireless communication between computer and Omron CPM2A PLC
9. Wireless Communication of Delta DVP series PLCs

As shown in Figure 9-1, FS-WF485IE supports wireless communication between computer and PLC, and between PLCs. It also supports MODBUS ASCII communication protocol and MODBUS RTU communication protocol.

![Diagram showing wireless communication between computer and Delta PLC](image)

**Figure 9-1 Wireless communication between computer and Delta PLC**
10. Wireless communication of Fuji NB0 PLC

Figure 10-1 Wireless communication between computer and Fuji NB0 PLC

STA SSID: FS-B11_AP
VCOMM: TCP Client 10.10.100.254:8899
Flex PLC Programmer

FS-WF485IE
AP SSID: FS-B11_AP
LAN IP: 10.10.100.254
Protocol: TCP Server
Port: 8899
UART: 19200, 8O1