CANFDWIFI-100U User Manual

Single-Channel CAN(FD) to WIFI Converter

V1.7 Data:2021/08/13

Category	Contents
Keywords	CAN(FD)-BUS forwarding WIFI
Description	Product User Guide

Revision History

Version	Date	Reason
V1.0	March 30, 2019	Created
V1.1	May 20, 2020	1. Updated the hardware description of the product; 2. Added configuration parameters such as "Controller Type" and "Error Notification Port"; 3. Supported the WIFI 5G channel;
V1.2	June 3, 2020	1. Modified the parameter name of "Controller Type" and the corresponding option name; 2. Added the introduction to the CANWIFI-200T protocol format in the appendix;
V1.3	June 18, 2020	1. Added the size limit description of WIFI name and password;
V1.4	June 28, 2020	Modified the description of the firmware upgrade;
V1.5	July 1, 2020	Added description of the multicast function;
V1.6	September 29, 2020	Updated the mechanical dimension drawing
V1.7	August 12, 2021	1. Updated the configuration description 2. Updated the CAN indicator description

Contents

1. Product Introduction

1.1 Product Overview

CANFDWIFI-100U is a high-performance WIFI and CAN(FD)-bus data conversion equipment developed by Guangzhou ZLG Electronics Co., Ltd. It integrates one CAN(FD)-bus interface, one Ethernet interface and 1 WiFi interface, and provides a mature and stable TCP/IP protocol stack. Users can easily complete the interconnection between CAN-bus network and WiFi network, and further expand the scope of CAN-bus network.

CANFDWIFI-100U has 2.4G, 5G WLAN interfaces, compliant with IEEE 802.11a/b/g/n/ac standard. It has one 10M/100M adaptive Ethernet interface and one CAN (FD) port with a maximum baud rate of 5 Mbps. It supports TCP Server, TCP Client, UDP and other working modes. Through the configuration software, users can flexibly set configuration parameters. Figure 1.1 shows a typical application.

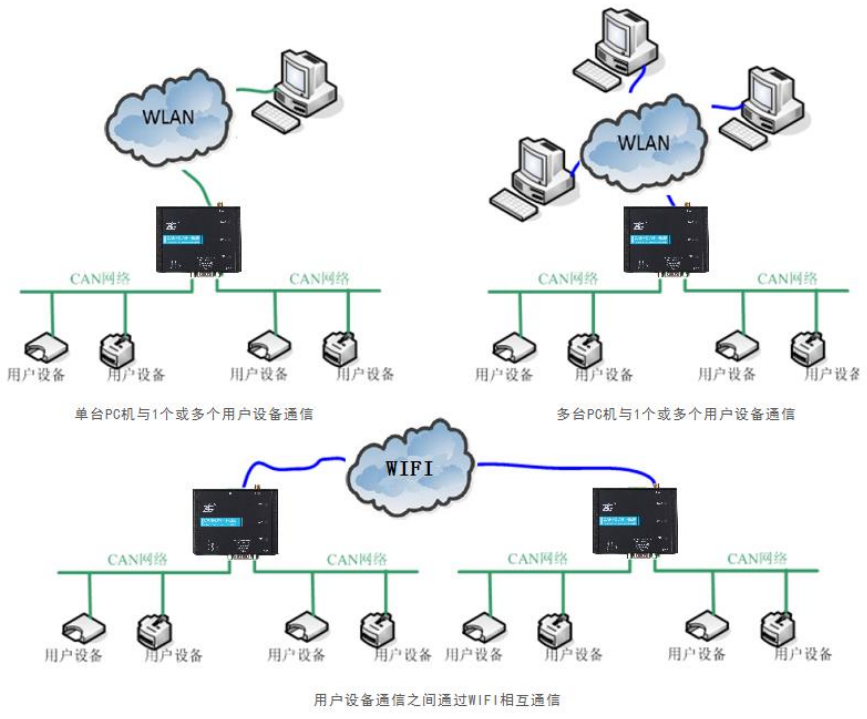


Figure 1.1 CANFDWIFI typical application

1.2 Product Features

1.2.1 Hardware Parameters

- 528 MHz main frequency M7 core processor;
- 10M/100M self-applicable Ethernet interface, 2 kV electromagnetic isolation;

  Integrates 2.4G, 5G WLAN interfaces, and complies with IEEE 802.11a/b/g/n/ac
- Embedded hardware watchdog;
- Rated power supply voltage of 9-48 V DC, with the anti-reverse connection function;
- Operating power: less than 2 W;
- Operating temperature: -20℃ to +75℃;
- Humidity: 5%-95% RH, no condensation;

1.2.2 Functional Parameters

- CAN(FD) interface function supported:
  - Support baud rate 40K-5Mbps, baud rate can be set arbitrarily;
  - Support various controller types: CAN, CANFD ISO or CANFD Non-ISO;
  - Support software to set the CAN (FD) channel 120 ohm terminal resistance switch;
  - Support message filtering;
  - The message sending buffer can be set, and the user can choose the most suitable balance between real-time and large-capacity buffering;
- Multiple working modes supported:
  - Working modes: TCP Server, TCP Client, UDP;
  - Support static or dynamic IP acquisition;
  - Operating port, and destination IP address and target port can be set;
  - Supports two TCP servers, each of each supports a maximum of 16 connections; or supports a maximum of 16 TCP Client or UDP connections;
  - In each mode, you can choose to upload the CAN (FD) channel message and error message, which can be flexibly used in various scenarios;
  - The TCP Server/Client mode connection has a built-in TCP keep-alive mechanism to ensure reliable TCP connections;
  - In TCP Client mode, the network will automatically reconnect after disconnection, and the TCP connection will be established reliably;
  - In UDP mode, multicast operation is supported for multiple users to control multiple CAN (FD) channels at the same time;
  - Supported TCP/IP protocols include IP, ARP, ICMP, UDP, DHCP, DNS, TCP;
  - Flexible CAN (FD) packet settings meet various packet requirements of users;
  - The communication protocol is open, and the secondary development

interface function library is provided (Windows and Linux platforms supported);

- You can configure the working parameters by using the configuration tool, and provide the secondary development interface function library (Windows, Linux platforms supported);
- Support local system firmware upgrade.
- Support the device to connect to the ZWS cloud server, and can remotely upgrade the device, configure the device, and send and receive CANFD messages from the device.

2. Product Specifications

2.1 WLAN

Integrate 2.4G, 5G WLAN interface, comply with IEEE 802.11a/b/g/n/ac standard, and support AP and Station mode.

2.2 LAN

10M/100M Ethernet, RJ45 interface, 2 kV electromagnetic isolation.

2.3 CAN (FD)

- Number of CAN (FD) ports: 1
- Interface type: DB9 terminal
- Signal cable: CANH, CANL
- Baud rate: 40 kbps - 5 Mbps

2.4 Electrical Parameters

Table 1 Electrical parameters

Parameter Name	Conditions	Rating			Unit
		Minimum	Typical value	Maximum	
Operating voltage	DC	9	12	48	V
Power consumption		-	1.5	-	W

2.5 Operating Temperature

Table 2.2 Operating temperature

Parameter Name	Rating			Unit
	Minimum	Typical Value	Maximum	
Operating temperature	-20	-	75	℃
Storage Temperature	-40	-	85	℃

2.6 Protection class

Table 2.3 Protection level-electrostatic discharge immunity test (IEC61000-4-2)

Interface	Test Level	Test Voltage (kV)	Remarks
Power supply	Class B	±4	Contact discharge
CAN bus	Class B	±4	Contact discharge
WIFI	Class B	±4	Contact discharge

Ethernet	Class B	±4	Contact discharge
Buttons, Indicators	Class B	±8	Air discharge

Table 2.4 Protection level-electrical fast transient pulse group immunity test (IEC61000-4-4)

Interface	Test Level	Test Voltage (kV)	Remarks
Power supply	Class B	±1	Capacitive coupling
CAN bus	Class B	±1	Capacitive coupling
Ethernet	Class B	±1	Capacitive coupling

Table 2.5 Protection level-surge (impact) test (IEC61000-4-5)

Interface	Test Level	Test Voltage (kV)	Remarks
Power supply	Class B	±1	Line-line
	Class B	±1	Line-ground
CAN bus	Class B	±1	Line-line
	Class B	±1	Line-ground
Ethernet	Class B	±1	Line-line
	Class B	±1	Line-ground
WIFI	Class B	±1	Line-line
	Class B	±1	Line-ground

3. Mechanical Installation Dimensions

The following figure shows the mechanical installation dimensions (unit: mm)

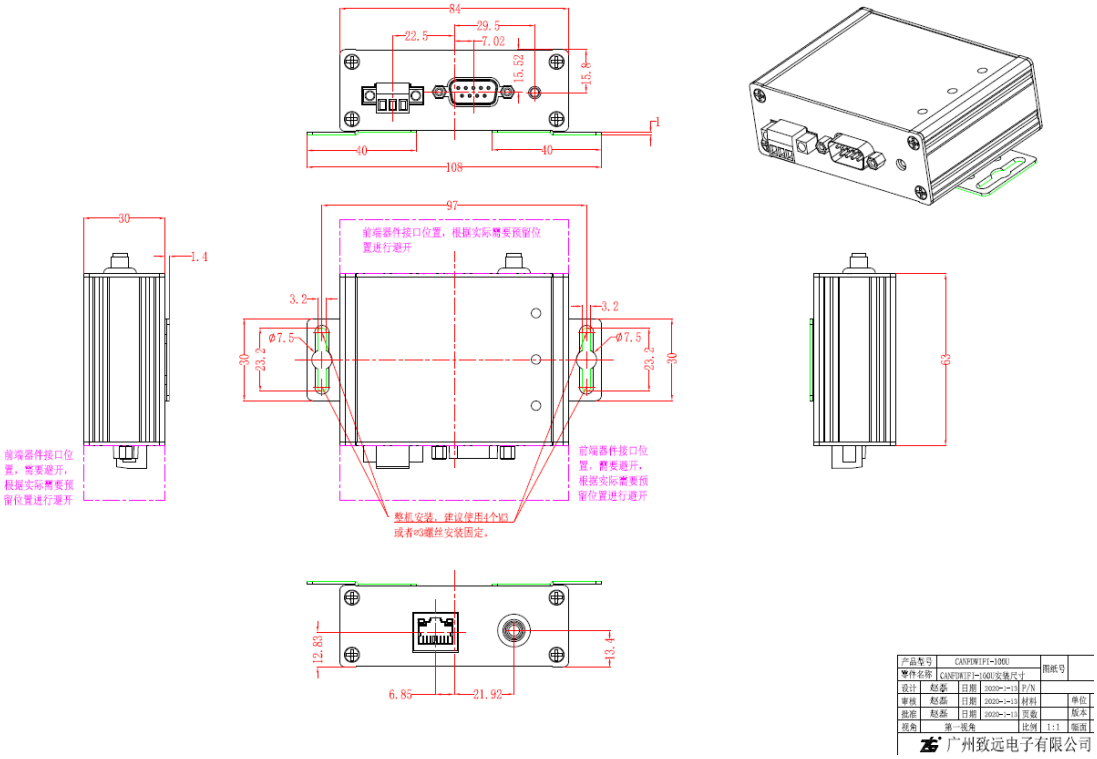


Figure 3.1 Host dimensions

4. Hardware Interfaces

This section describes the hardware interfaces of the CANFDWIFI-100U device.

4.1 Panel Layout

Figure 4.1 shows the device panel layout.

Figure 4.1 Panel layout

4.2 Indicators

Table 4.1 LED indicator

Identification	Function	STATUS	Description
SYS	System indicator	Green flashing	System running
		Light off	The device is not powered on, or the system is not running
CAN	CAN channel indicator	Green normally on	Channel open
		Green flashing	The CAN channel normally sends and receives data
		Flash in red	CAN bus error
WIFI	WIFI indicator	Green normally on	WIFI AP has been created successfully, or STATION is successfully connected to the

			target AP
		Continuous red light	Ethernet connected
		Light off	No connection to WIFI and Ethernet

4.3 Button

The device provides a system reset/factory reset button (RST). After pressing the button, release it within 2 seconds to reset the device; if you press and hold (5 seconds) the button until the system indicator SYS turns red, the device restores its factory settings automatically.

4.4 Power Interface

The rated input voltage of the equipment power supply is 9-48 V DC. The shell is marked as "DC 9-48V". The physical form of the interface is 3.81 terminal. Table 4.2 shows the interface diagram and signal definition.

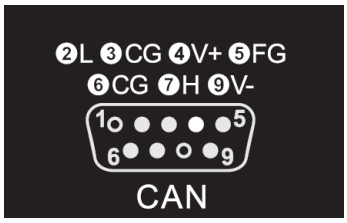
Table 4.2 Power interface

Type	Schematic Diagram	Pin definitions	Pin description
OPEN3		1: 9V-48V	Power input positive
		2: EARTH	Ground
		3: GND	Power input negative

4.5 CAN(FD) Communication Interface

The device provides one isolated CAN-Bus interface. The shell is identified as "CAN". The physical form of the interface is a DB9 terminal. Table 4.3 lists the interface diagrams, signal definitions, and interface specification.

Table 4.3 Pin definitions

Type	Schematic Diagram	Pin definitions	Pin description
DB9 socket		1. 8: NC	Dangling
		2: CAN_L	CAN data transceiving differential inverted signal
		3, 6: CAN_GND	CAN isolated ground
		4: V+	Power input positive
		5: FG	Shielding ground

		7: CAN_H	CAN data sending and receiving differential positive phase signal
		9: V-	Power input negative

4.6 Ethernet Interface

The device provides one Ethernet interface. The physical form of the interface is RJ45, which realizes the communication between the device and the PC. Table 4.4 lists the interface definition.

Table 4.4 Ethernet interface

Type	Schematic Diagram
RJ45 terminal	

4.7 CAN Bus Connection

The physical layer mainly transmits inter-device signals, converts various information into transmittable physical signals (usually electrical or optical signals), and transmits these signals to other target devices. For this purpose, CAN-bus has made detailed regulations on signal levels, cables and connectors used for communication.

Two standards are released after CAN-bus was standardized by ISO, namely ISO11898-2 (125kbps-1Mbps high-speed communication standard) and ISO11898-3 (low-speed communication standard less than 125 kbps).

The CAN transceiver determines the bus level based on the voltage difference between the two cables. This transmission method is called differential transmission. There are only two possibilities for the level signal transmitted on the cable, namely the dominant level and the recessive level. The dominant level indicates logic 0, and the recessive level indicates logic 1. Table 4.5 lists the high-speed CAN electrical characteristics.

Table 4.5 CAN-Bus interface specifications

parameter		Minimum	Typical value	Maximum	Unit
Communication baud rate		40k		5M	bps
Number of nodes				110	pcs
Dominant level (logic 0)	CANH	2.75	3.5	4.5	V
	CANL	0.5	1.5	2	
Recessive level (logic 1)	CANH	2	2.5	3	
	CANL	2	2.5	3	
Differential level	Dominant (logic 0)	1.2	2	3.1	

	Recessive (logic 1)	-0.5	0	0.05	
Maximum withstand voltage of the bus pin		-18		18	
Instantaneous voltage of the bus		-100		+100	
Isolation voltage (DC)		1500			V

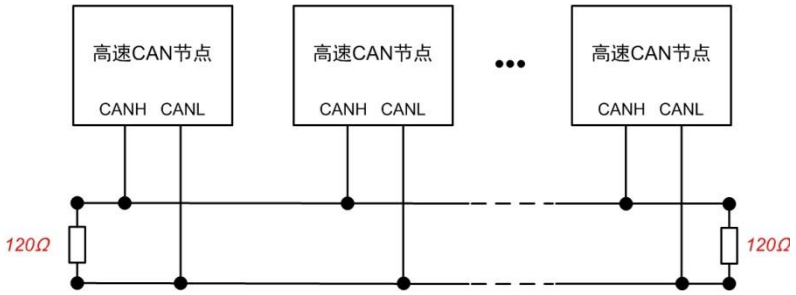


Figure 4.2 Typical high-speed CAN network connection

The CAN bus adopts balanced transmission. ISO11898-2 stipulates: In the high-speed CAN, a 120 ohm terminal resistor needs to be connected to the network terminal node to eliminate signal reflection on the bus and avoid signal distortion. Figure 4.2 shows the high-speed CAN network topology.

The device has a built-in 120 ohm terminal resistance, which can be configured to turn on or off by using the CANFDWIFI-100U configuration tool.

Note: The bus communication distance and communication rate are related to the field application and can be designed according to the actual application and related standards. The CAN-Bus cable can use ordinary twisted pair, shielded twisted pair or standard bus communication cable. In long-distance communication, the terminal resistance value needs to be selected according to the communication distance, cable impedance and number of nodes.

5. Quick Instructions

This chapter describes the basic usage of CANFDWIFI-100U and the installation settings of related software and hardware. You will quickly grasp how to use the product, and have an intuitive understanding of the communication between the network and CAN devices.

Before using the CANFDWIFI-100U device, learn about the network parameters such as the IP address of the device. The CANFDWIFI-100U device supports two IP acquisition methods: "static acquisition" and "dynamic acquisition". "Static acquisition" indicates that the device uses the "IP address", "subnet mask" and "gateway" specified by the user; "Dynamic acquisition" indicates that the device obtains the IP address, subnet mask, and gateway information from the DHCP server on the network over DHCP.

5.1 Hardware Connection

Connect the device to a 9-48 V DC power supply, and use a crossover cable to connect the LAN port of the device to the network port of the PC. Or, when the wireless WLAN of CANWIFI-100U is running in AP mode and the LAN port is not connected, the device "CANFDWIFI100U" can be searched through the wireless network card of the PC, as shown in Figure 5.1. The wireless network card of the PC is set to obtain the IP address automatically, and you can connect by entering the wireless password of "12345678".

Figure 5.1 Finding CANFDWIFI100U in wireless manner

5.2 Software Installation

Before using the device, install the supporting software ZCANPRO. The software can be downloaded from the official website of ZLG Electronics http://www.zlg.cn.

5.3 Configuring the Device

When the device IP address is forgotten or the device uses DHCP to obtain the IP address automatically, the current IP address of the device can be obtained by using the network device configuration tool software.

Before using the device, configure the device IP address, CAN port baud rate and other parameters. Configure the device by using the network device configuration tool in ZCANPRO. The procedure is as follows:

5.3.1 Running the Configuration Tool

Run the ZCANPRO software, click [Tools] in the upper part of the software, and select [Network Device Configuration Tool], as shown in the red circle in Figure 5.2. Figure 5.3 shows the configuration software interface.

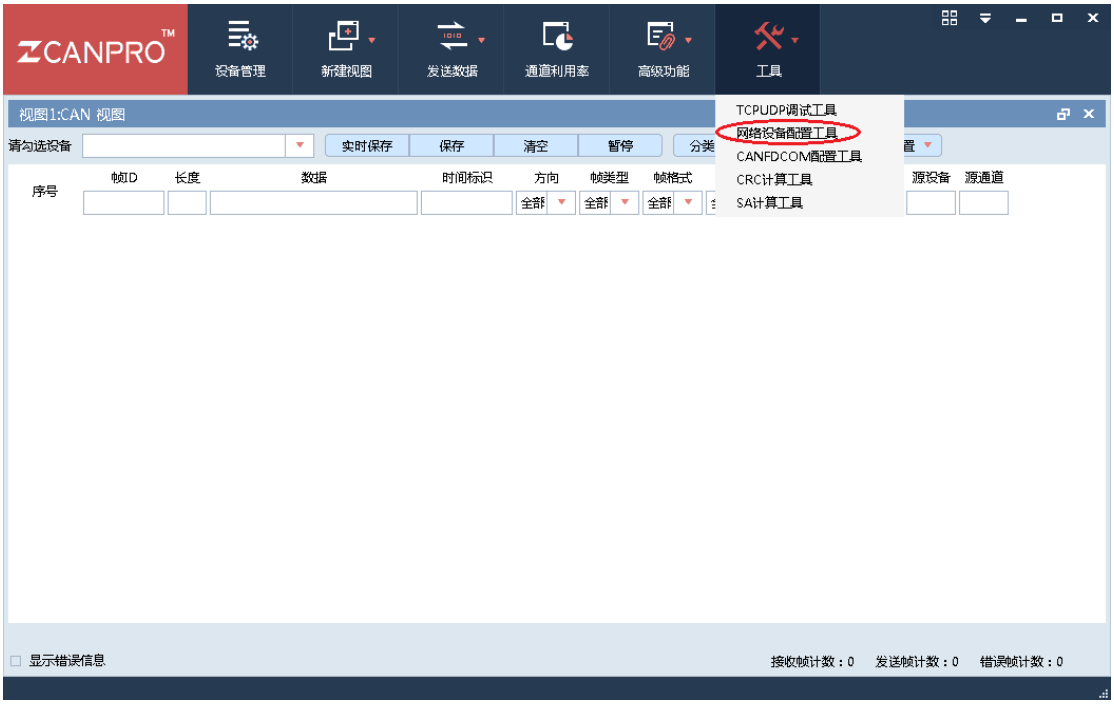


Figure 5.2 Running the network device configuration tool

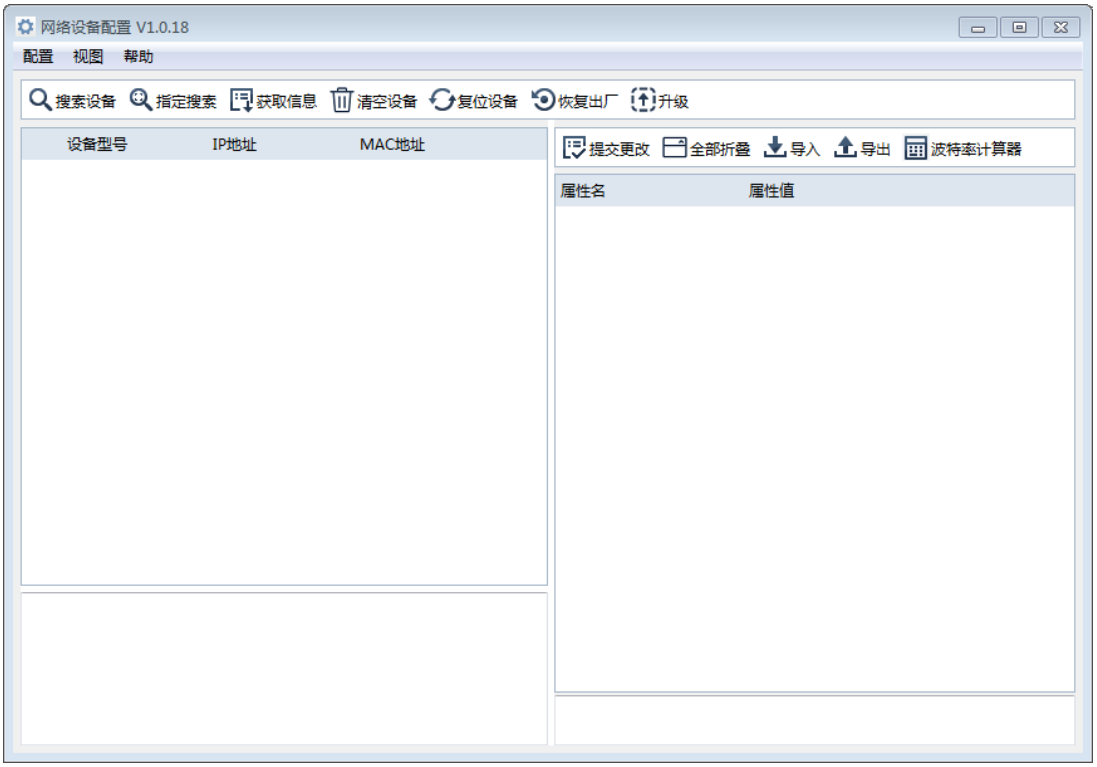


Figure 5.3 Network configuration tool interface

5.3.2 Searching for Devices

Click the [Search Device] button in the upper left corner of Figure 5.3 to search for devices in the network. After the device is searched, the interface is displayed as shown in Figure 5.4.

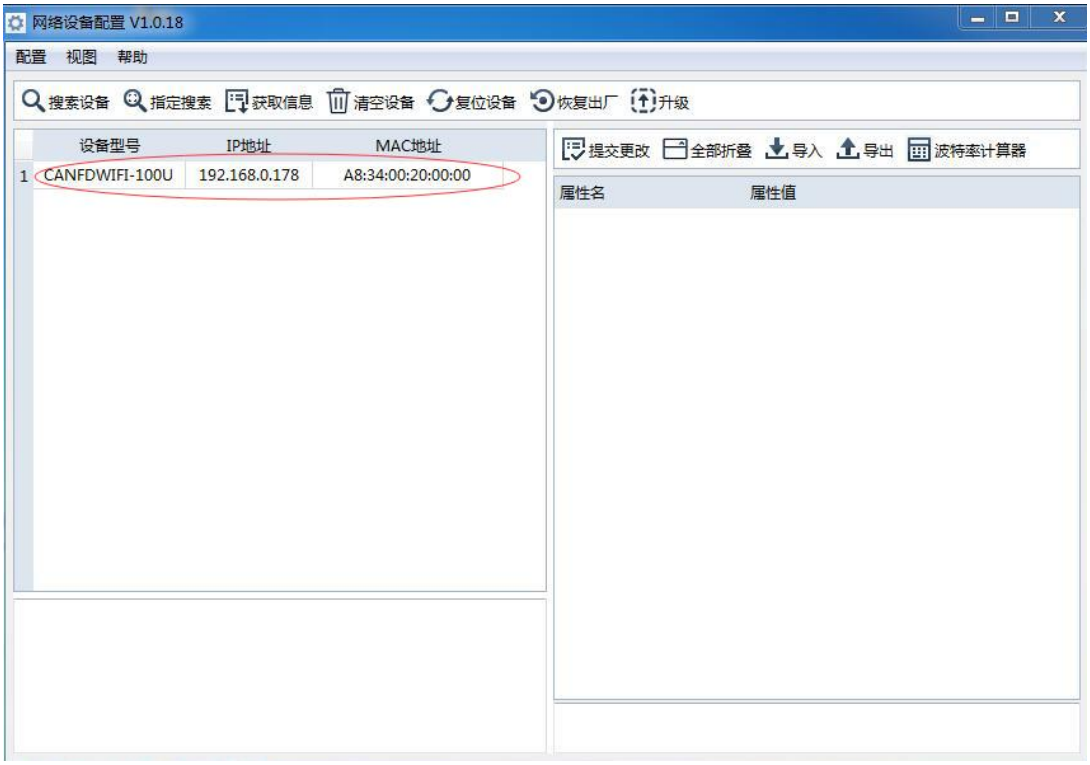


Figure 5.4 Interface displayed after successful search

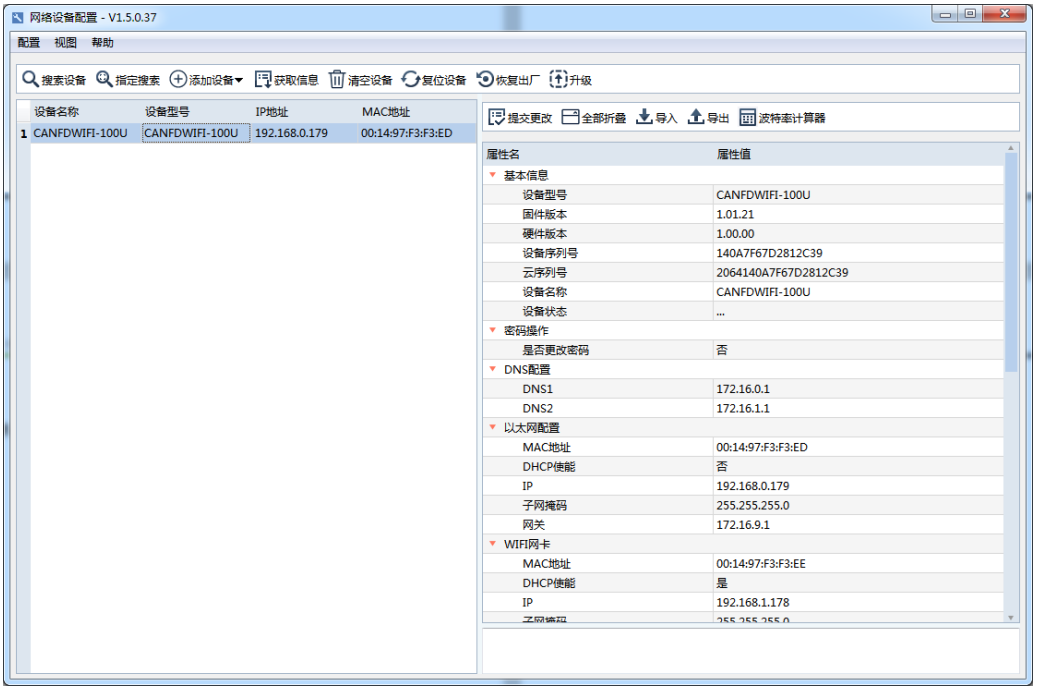


Figure 5.5 Device configuration display

5.3.3 Configuring Parameters

Whether the parameter configuration is correct or not will directly affect the normal communication. The following describes common parameter configurations.

- NIC configuration

Before using the PC to communicate with the CANFDWIFI-100U device, ensure that there is an Ethernet card in the PC, and the PC and the CANFDWIFI-100U device must be in the same network segment.

Before using the PC to communicate with the device, ensure that an Ethernet card is installed on the user's PC, and the PC and the device must be in the same network segment. The device is set with a default IP address (192.168.0.178) and network mask (255.255.255.0) when it leaves the factory. Check whether the device is in the same network segment as the user's PC according to the process shown in Figure 5.6 Same Network Segment Detection Flowchart.

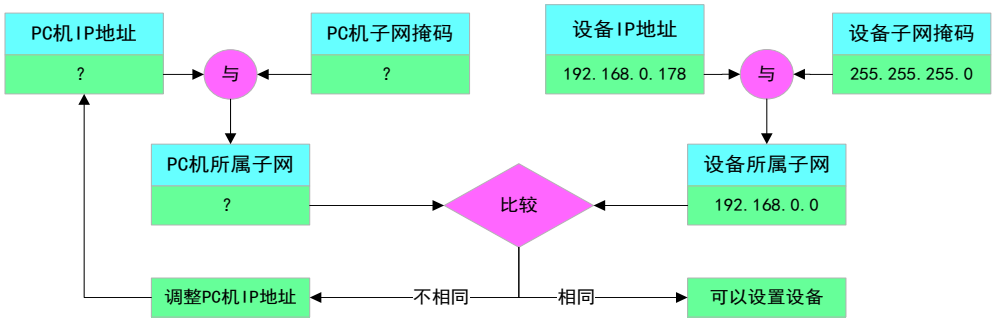


Figure 5.6 Detection process on the same network segment

There are two ways to keep the user's PC and device in the same network segment.

The first method is to change the IP address of the PC. Open [Control Panel] on the PC, double-click the [Network Connection] icon, click to select the [Local Area Connection] corresponding to the network card of the connected device, right-click and choose [Properties]. Double-click on the pop-up page to select [Internet Protocol Version 4 (TCP/IPv4)]. The page as shown in Figure 5.7 appears. Select [Use the following IP address], and enter the IP address 192.168.0.55, the subnet mask 255.255.255.0, and the default gateway 192.168.0.1 (the DNS part can be left blank). Click [OK] on this page and on the "Local Area Connection Properties" page, and wait until the system configuration is complete.

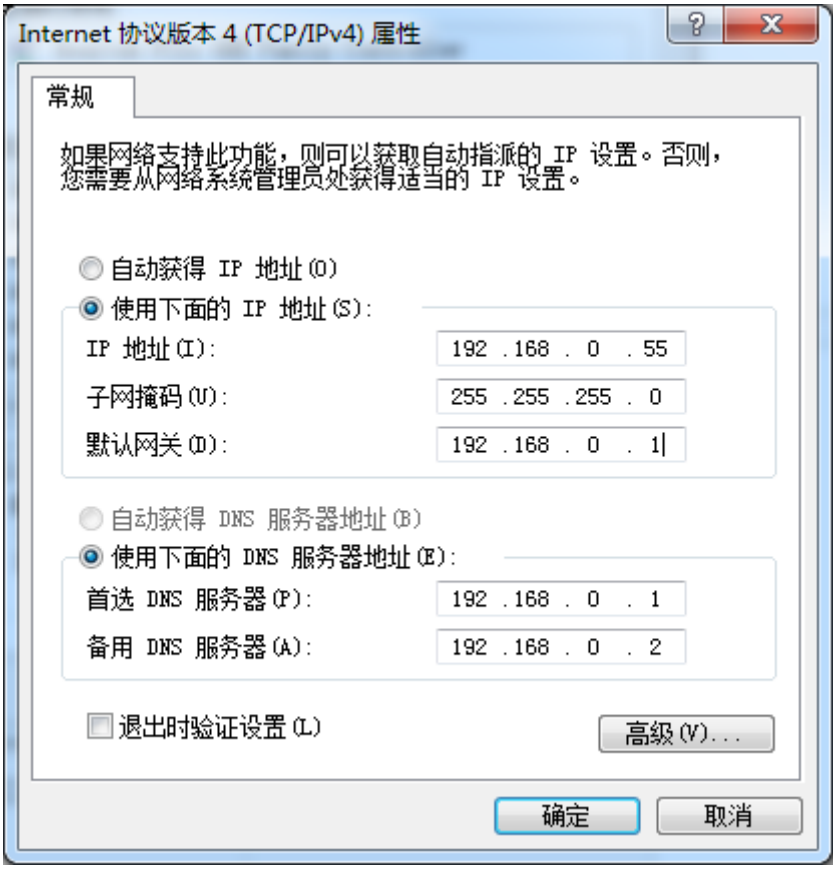


Figure 5.7 TCP/IP properties

The second method is to change the IP address of the device. On the interface shown in Figure 5.4, change [IP] in [General Ethernet] to the IP address of the same network segment as the PC. For example, if the IP address of the PC is 192.168.7.115, the subnet mask is 255.255.255.0, and the default gateway is 192.168.0.1, change [IP] of [NIC Configuration] to 192.168.7.178, and change the device gateway IP to "192.168.7.1".

- CAN(FD) configuration

For CAN(FD) normal communication, set the CAN(FD) baud rate to be consistent with that on the CAN-Bus network. The device is configured as an ISO CANFD controller by default. The baud rate of the arbitration domain is 1 Mbps, and the baud rate of the data domain is 5 Mbps. To modify the data, adjust the arbitration domain baud rate and data domain baud rate in the CAN configuration on the interface.

- Working mode configuration

The default working mode of the device is TCP Server mode, the port is 8000, and the network card is universal Ethernet. Click the attribute value of [Network Forwarding] on the interface. On the pop-up interface, view or modify the working mode, as shown in Figure 5.8.

Figure 5.8 CAN(FD) to network configuration interface

After all configuration changes are completed, enter "88888" in the attribute value of [Current Password] in [Password Operation], and click [Submit Changes].

5.4 CANFDWIFI-100U Communicating with the USBCANFD-200U

We need a device equipped with a CAN port to demonstrate how the CANFDWIFI-100U device realizes bidirectional transparent conversion of CAN network data and Ethernet data. Here, select the USBCANFD-200U interface card, which is convenient to use. Its related information is available at http://www.zlg.cn.

First, use a network cable to connect the CANFDWIFI-100U device to the PC, and use a twisted pair to connect the CAN port of the CANFDWIFI-100U device to the CAN0 of the USBCANFD-200U interface card (CANH is connected; CANL is connected; configure a 120 ohm terminal resistance). Connect the USBCANFD-200U interface card to the PC with a USB cable. Connect the USBCANFD-200U interface card to the CANFDWIFI-100U device. Start the ZCANPRO host computer on the PC. Select USBCANFD-200U as the device type, as shown in Figure 5.9:

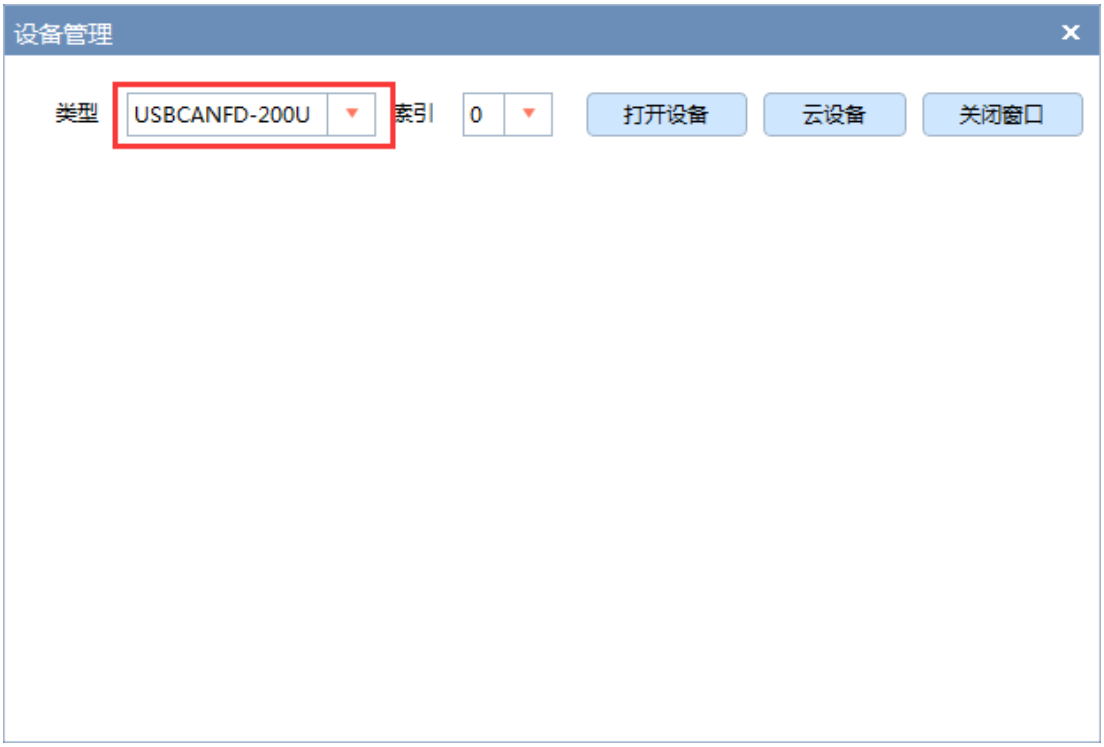


Figure 5.9 Starting ZCANPRO and selecting the USBCANFD-200U

Select [Start Device], as shown in Figure 5.10:

Figure 5.10 Starting the device

Because the CAN0 port of USBCANFD-200U is connected to the CAN port of CANFDWIFI-100U, you only need to enable channel 0. Click [Start] of channel 0. Use

default parameter configurations, and enable the terminal resistance, as shown in Figure 5.11:

Figure 5.11 Default startup parameters of USBCANFD-200U

Click [OK]. If the device is connected properly, the start button will be disabled, and there will be no prompt. If the connection is abnormal, an error message appears.

Reselect the device type CANFDWIFI-100U-TCP, as shown in Figure 5.12:

Figure 5.12 Selecting the CANFDWIFI-TCP device type

Click [Open Device]. The startup option of CANFDWIFI-TCP is added on the interface, as shown in Figure 5.13:

Figure 5.13 Adding the CANFDWIFI-TCP startup option

Click the [Start] button of channel 0. The startup parameter setting interface appears. Because the default working mode of the device is TCP Server mode, the IP address is 192.168.0.178, and the working port is 8000, enter 192.168.0.178 and 8000 in the device IP address and device port number respectively, and select the client mode as the working mode, as shown in Figure 5.14:

Figure 5.14 CANFDWIFI-TCP startup parameter selection

Click [OK]. If the device is connected properly, the start button will be disabled, and there will be no prompt. If the connection is abnormal, an error message appears. Figure 5.15 shows the result:

Figure 5.15 Two devices starting simultaneously

Select [Close Window] to return to the main interface. Select two devices in the view, as shown in Figure 5.16:

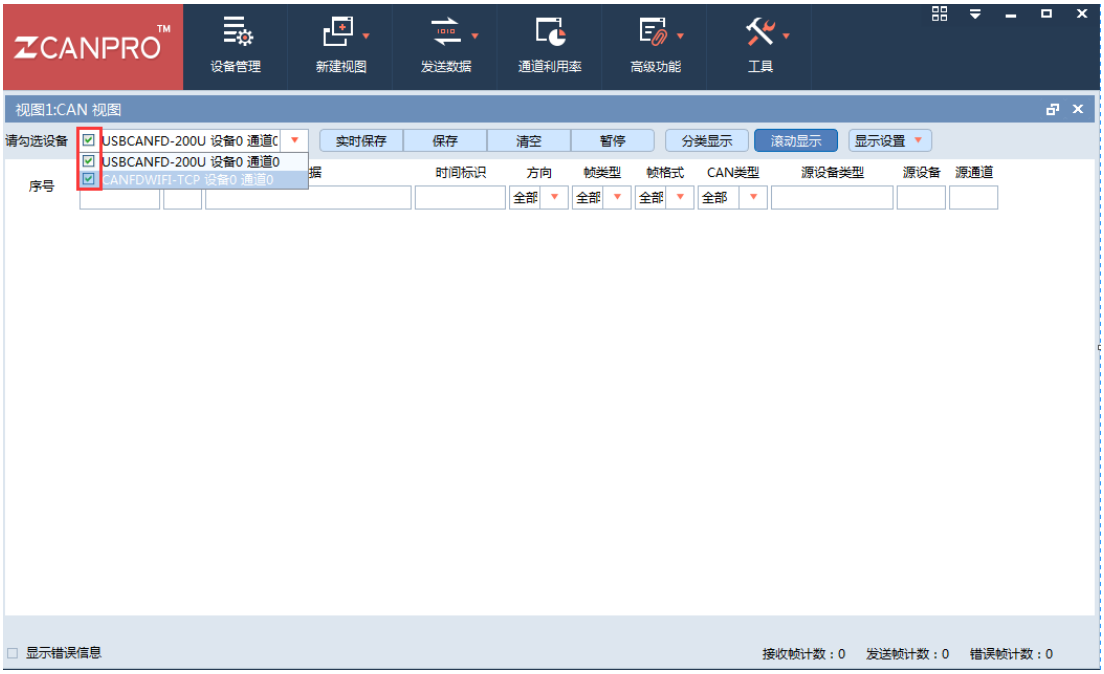


Figure 5.16 Main interface

Select [Send Data] and then [Normal Send]. The sending window is displayed, as shown in Figure 5.17:

Figure 5.17 Opening the send interface

Figure 5.18 shows the sending interface

Figure 5.18 Send interface

Select the sending device by switching the channel. At present, we only open channel 0 of USBCANFD-200U device 0 and channel 0 of CANFDWIFI-TCP device 0, as shown in Figure 5.19.

Figure 5.19 Switching the channel

On the sending interface, the data frame information to be sent can be set. For example, [Frame Type] can be a CAN frame or CANFD frame; [Frame Format] can be a data frame or a remote frame; [Frame ID: 0x] can be a frame ID; [Data length] data length of the CAN/CANFD data field of the corresponding frame. The length of the CAN frame data is a maximum of 8 bytes, and the data length of the CANFD frame is a maximum of 64 bytes; 【Data: 0x】can be the data to be sent.

First, select the channel of USBCANFD-200U. Figure 5.20 shows the sending interface settings:

Figure 5.20 USBCANFD-200U sending settings

Select [Send Now]. On the main interface, it is observed that USBCANFD-200U sent a frame of CAN message and CANFDWIFI-TCP received the same frame. See Figure 5.21:

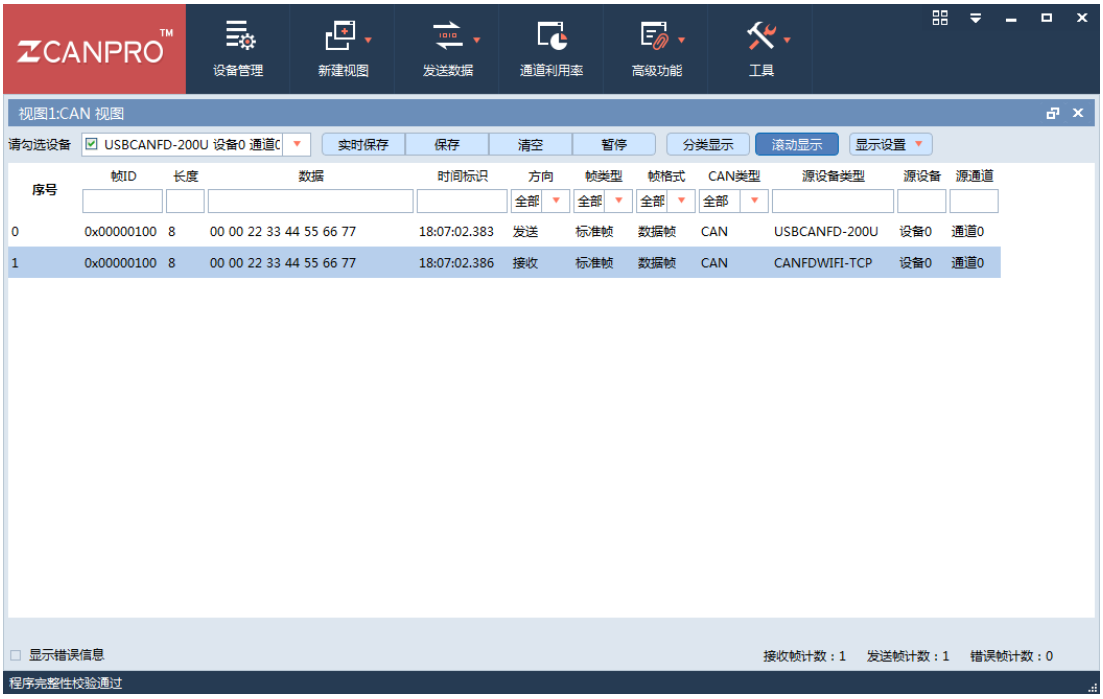


Figure 5.21 USBCANFD-200U sending result

Switch the sending channel to CANFDWIFI-TCP, send a frame, and observe the main interface. It can be found that CANFDWIFI-TCP sent a frame of CAN message, and USBCANFD-200U received the same frame. See Figure 5.22:

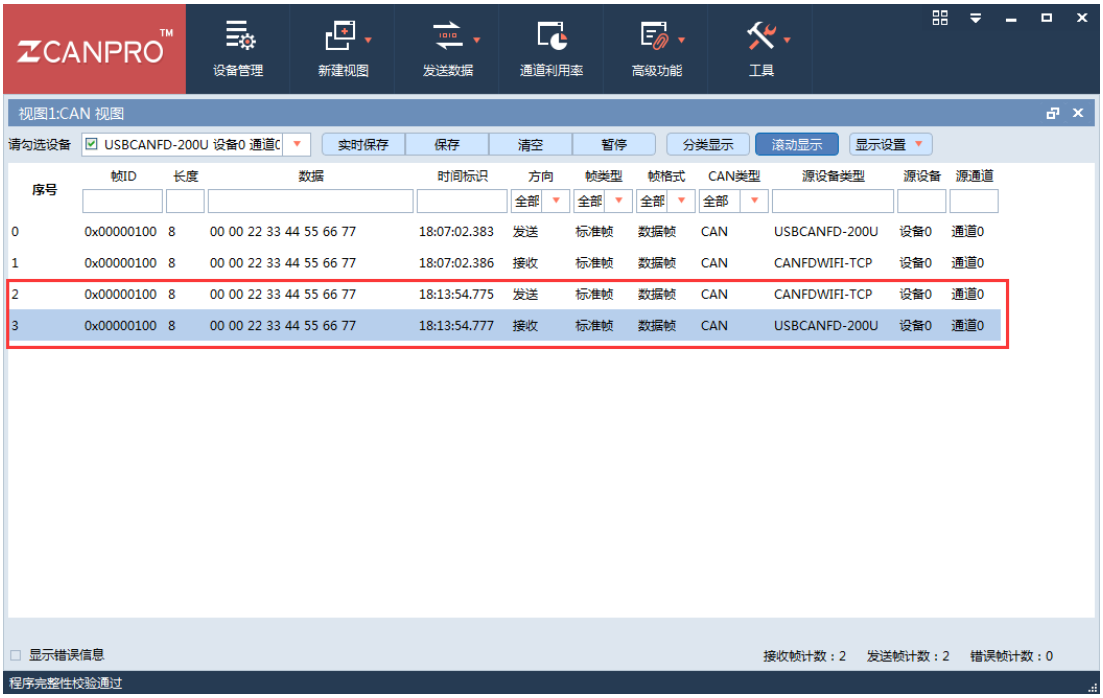


Figure 5.22 CANFDWIFI-TCP send result

You can also change the configuration sent for other tests. No specific demonstration is made here. Through the preceding simple operation introduction, you can basically master the simple operations of CANFDWIFI-100U, or you can continue to read and learn more about CANFDWIFI-100U.

5.5 Wireless Connection Mode

When configuring the wireless connection mode, you are advised to use an Ethernet wired connection to ensure that the device configuration can be reliably searched (it can also be configured through a WIFI connection). Connect the device to a 9-48 V DC power supply. Use a crossover cable to connect the device's LAN port to the PC's network port. We briefly introduced how to configure the device through the host computer. For detailed configurations, see **错误!未找到引用源。**.

5.5.1 AP Hotspot Mode

AP mode refers to the mode in which CANFDWIFI-100U acts as a wireless hotspot and accepts connections from other WIFI devices, just like a wireless router. This mode can be configured by using the configuration software. Run the configuration software to view the WIFI configuration column, as shown in Figure 5.23:

WIFI信息	
WIFI模式	AP
SSID	CANFDWIFI100U
密码	●●●●●●●●
频段	2.4G
2.4G信道	7
加密方式	wpa2_aes

Figure 5.23 WIFI information

[WIFI Mode] Select AP;

[SSID] is the hotspot name that can be searched;

[Password] is the password to join the hotspot;

[Frequency] The default value is 2.4G. It can be changed to 5G;

[2.4G channel] ranges from 1 to 13;

[5G channel] is 149, 153, 157, 161 or 165.

After the settings are changed, restart the device. In normal operation, the SSID broadcast "CANFDWIFI100U" of CANFDWIFI-100U can be searched on the PC or other WIFI devices, as shown in Figure 5.24.

Figure 5.24 Setting the AP hotspot mode

5.5.2 Station Client Mode

Station mode means that CANFDWIFI-100U connects to AP hotspots such as

wireless routers as a client to realize wireless access to the network. To use this function, you must first know the wireless network name (SSID) of the connected router or other AP hotspot, wireless channel, encryption method and key (if there is no encryption, no password is required), wireless channel, encryption method and key (if there is no encryption, no password required). Figure 5.25 shows the wireless configuration of a wireless router.

Figure 5.25 Wireless router configuration

We can configure CANFDWIFI-100U by configuring the host computer. As shown in Figure 5.26, enter the wireless information of the router in the corresponding window. After the settings are changed, restart the device. When working normally, CANFDWIFI-100U can actively connect to the router with the SSID "USBCAN".

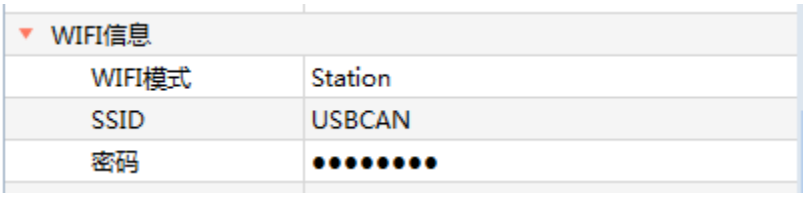


Figure 5.26 Configuring the Station mode

5.6 Working Mode

Configure the device into different working modes by configuring the host computer, as shown in Figure 5.27:

Figure 5.27 Different working modes

When the device configuration is completed, the device works in the specific mode. The following describes how to use the working modes.

5.6.1 TCP Server Mode

In TCP Server mode, the device will not actively connect with other devices. It always waits for the connection of the client (TCP Client), and can carry out two-way data communication after establishing a TCP connection with the client.

When the device acts as a TCP server, the PC should act as a TCP client. Open the [Device Management] interface of ZCANPRO, select CANFDWIFI-TCP as the device type, open the device, and start the device.

On the startup device interface (as shown in Figure 5.28), select [Client] as [Working Mode], and enter [IP Address] and [Working Port]. If the current device IP address is "192.168.0.178" and the port is 4001, set this parameter.

[Protocol] is determined by the [controller type] of CAN configuration. If it is configured as a CAN controller, select CAN; if it is configured as ISO/Non-ISO CANFD, select CANFD.

[CANFD acceleration] is determined by the user. When [No] is selected, all CANFD messages sent are not accelerated; otherwise, they are all accelerated.

Click [OK].ZCANPRO will connect to the device.

Figure 5.28 Starting the CANFDWIFI-TCP client

5.6.2 TCP Client Mode

In TCP Client mode, the device will actively connect to the preset TCP server. If the connection fails, the client continuously tries to establish a connection with the TCP server based on the preset connection conditions. After the device establishes a connection with the TCP server, two-way data communication can be performed.

When the device acts as a TCP Client, the PC should act as a TCP server. Open the [Device Management] interface of ZCANPRO, select CANFDWIFI-TCP as the device type, open the device, and start the device.

On the startup device interface (as shown in Figure 5.29), set [Work Mode] to [Server], and enter [Local Port]. For example, the current device IP address is "192.168.0.178", the target IP address of the client connection is "192.168.0.55", and the target port is 8000. On the ZCANPRO startup interface, set [local port] to 8000, and change the IP address of the PC to "192.168.0.55".

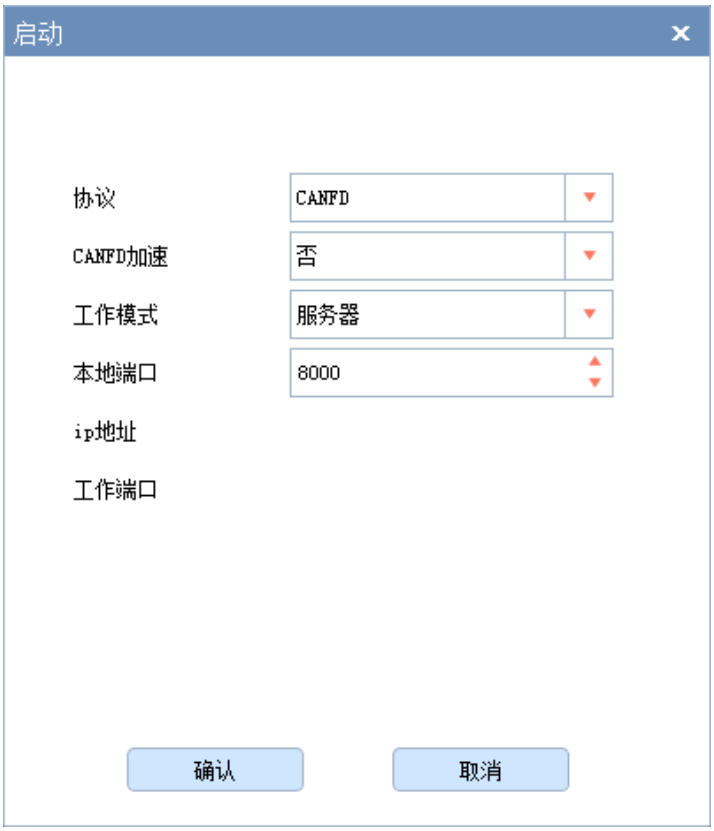


Figure 5.29 Starting the CANFDNET-TCP server

Click [OK]. The device connects to ZCANPRO.

5.6.3 UDP Mode

In UDP mode, the UDP protocol is used for data communication. UDP is a non-connection-based communication method. It cannot guarantee that the data packets sent to the target host will be received correctly. Therefore, in the scenarios with high reliability requirements, the upper-layer communication protocol must be used to ensure that the data is correct; however, because UDP is a simple communication method, it will not increase too much additional communication volume, and can provide a higher communication speed than the TCP method to ensure the real-time transmission of data packets. In fact, when the network environment is simple and the network communication load is not too large, the UDP working method is not error prone. The devices working in this mode are equal, and there is no server and client.

When the device is in UDP mode, the PC should also work in UDP mode. On the [Device Management] interface of ZCANPRO, set the device type to [CANFDWIFI-UDP], and start the device.

On the displayed startup device interface (as shown in Figure 5.30), set [local port], [IP address], and [working port]. For example, if the current device IP address is

"192.168.0.178", the connection target IP address is "192.168.0.55", the target port is 8000, and the local port is 4001, set [Local Port] to the device target port 8000, [IP Address] to the device IP address "192.168.0.178", and [Working Port] to the device local port 4001.

Figure 5.30 Starting CANFDNET-UDP

Click [OK]. The device can communicate with ZCANPRO.

6. Other Function Description

6.1 Device Reset

There are two ways to reset the device: key reset and software reset.

The button is reset after the user presses the device button and releases it. The pressing time is less than 2s.

After searching for the device, right-click the device, select [Reset] on the pop-up interface, and enter the password to complete the reset, as shown in the red box in Figure 6.1. After the device is reset, search again to view the device.

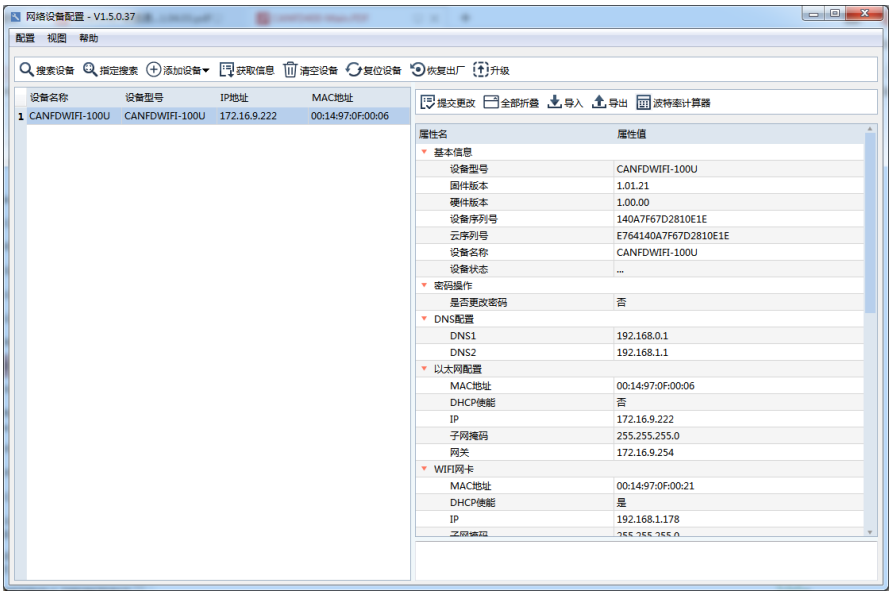


Figure 6.1 Device function display in the network configuration tool

6.2 Restoring Factory Settings

There are two ways to restore factory settings: key and software

After pressing the button for 5 seconds, release the button to restore factory settings.

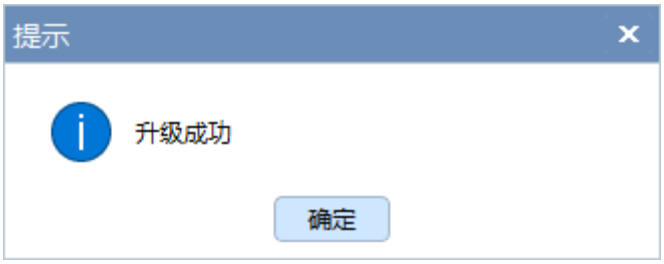
After the device is searched, right-click the device, select [Restore Factory Settings] on the pop-up interface, enter the password, and complete the factory restoration, as shown in the red box in Figure 6.1. Search again to view the device.

6.3 Device Upgrade

Software upgrade firmware: After searching for the device, right-click the device and choose [Upgrade] on the pop-up interface (as shown in the red box in Figure 6.1). Load the upgrade firmware on the pop-up interface (as shown in Figure 6.2), and click [Upgrade].

Figure 6.2 Device upgrade interface

After the upgrade firmware is successfully transferred, we can see the following interface:



The device receives the firmware and starts to back up the firmware. The three indicators (SYS, CAN, WIFI) of the device start flashing green at the same time. When the SYS indicator flashes again, the entire firmware upgrade process is complete.

Note: During the device upgrade, do not restart the device or disconnect the power.

6.4 Device Logs

Device logs are used to analyze device operation. After searching for the device, right-click the device and choose [Device Log] to obtain the logs. See Figure 6.3.

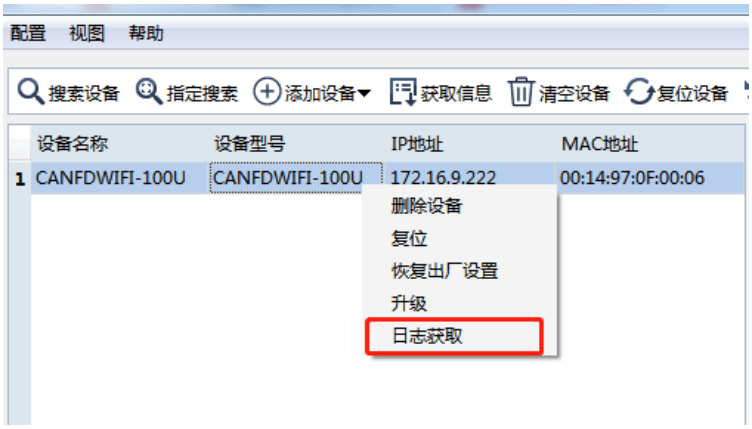


Figure 6.3 Obtaining device logs

7. Appendix

7.1 Configuring Parameters

Table 7.1 Description of configuration parameters

Category	Property Name	Default	Parameter Description
Basic information	Device model	CANFDWIFI-100U	This item cannot be changed.
	Firmware version	-	Current firmware version of the device, such as 1.00.00.
	Hardware version	-	Current hardware version of the device, such as 1.00.
	Equipment No.	-	Device serial number. Each device has a different device serial number. It is a 16-byte string.
	Cloud serial number	-	Device cloud serial number, which is inconsistent for each device. Used when adding to a cloud server.
	Equipment name	CANFDWIFI-100U	Device name. This value can be changed. It contains a maximum of 31 characters. ASCII characters can be used. Modifying this value is very useful for users to identify multiple devices on the same network.
Password operation	Current password	88888	Before changing other items, you must enter the correct password. Use ASCII characters as the password. The password can contain a maximum of 9 characters.
	Whether to change the password	No	Only when you select "Yes", you can enter "New Password" and "Confirm Password".
	New password	-	If "Whether to change the password" is "No", the password cannot be changed. Used to enter a new password. The maximum length of the password is 9 characters. For the character range, see "Current Password" .
	Confirm the new	-	If "Whether to change the password" is "No",

	password		the password cannot be changed; Used to confirm the new password. The content must be consistent with the "new password".
Ethernet configuration/WIFI network card	MAC address	-	The MAC address is different for different devices. It can be changed. The default MAC address can be restored.
	DHCP enable	No	After being enabled, the device will obtain information such as the IP address, subnet mask, and gateway from the network. If it is disabled, the user sets the IP address, subnet mask, and gateway. Note: After confirming that there is a DHCP server on the network, DHCP can be enabled. Normally, the router also has the DHCP server function.
	IP	192.168.0.178	Do not enter X.X.X.0 or X.X.X.255. An IP address is an address on a network assigned to a network device, and it is unique on the same network.
	Subnet mask	255.255.255.0	The subnet mask is very important for the network. Within the same network, the values obtained by adding the IP addresses and subnet masks are equal. Therefore, set the "IP Address" and "Subnet Mask" correctly.
	Gateway	192.168.0.1	Enter the IP addresses of the gateway or router in this network.
DNS	DNS1	192.168.1.1	Preferred DNS server address.
	DNS2	192.168.1.2	Alternative DNS server address.
WiFi information	WIFI mode	“AP”	AP: hotspot, which can be connected by other wireless devices; Station: device, connected to a router or hotspot.
	SSID	CANFDWIFI100U	When the device is in AP hotspot mode, it is the name of its wireless device, which can be searched when the SSID is broadcast; when the device is in Station client mode, it is the name of the wireless AP or router. The

			name contains a maximum of 31 characters.
	Password	“12345678”	When setting the module as an AP, other devices require the password; when setting the module as a Station, use the password for connecting to the AP or router. The password contains 8 to 63 characters.
	Frequency band	“2.4G”	The value is 2.4G or 5G. The value is valid in AP mode.
	2.4G channel	6	2.4G frequency band working channel; range: 1 to 13. Valid in AP mode.
	5G channel	149	5G frequency band working channel. Its value can be 149, 153, 157, 161 or 165. Valid in AP mode.
	Encryption mode	“wpa2_aes”	Encryption mode: wpa2_aes, wpa2, open (not encrypted). Valid in AP mode.
CAN configuration	Controller type	CANFD ISO	CAN: When the bus is only CAN messages, select CAN; ISO CANFD: The CANFD standard specified by ISO; Non-ISO CANFD: Non-ISO CANFD standard.
	Working mode	Normal mode	Normal mode: The CAN port can send and receive messages properly; Listen only mode: The CAN port is only used for monitoring and does not answer.
	Controller clock	40	The controller clock is fixed at 40MHz, which cannot be changed.
	Customize baud rate enable	No	Enable (Yes): The baud rate calculator appears. In the calculator, select the baud rate and copy it to the "custom baud rate"; Disable (No): Use "arbitration domain baud rate" and "data domain baud rate" as the controller baud rate.
	Custom baud rate	-	After customization is enabled, paste the customized baud rate copied in the baud rate calculation tool.

	Arbitration domain baud rate	1Mbps 80%	The default arbitration domain baud rate is 1 Mbps, and the sampling point is 80%. You can select the baud rate in the drop-down box.
	Data domain baud rate	5Mbps 75%	The default data domain baud rate is 5 Mbps, and the sampling point is 75%; you can select the baud rate in the drop-down box. When the controller type is CAN controller, this item is invalid.
	Terminal resistance	Closed	Turn on or turn off the 120 ohm terminal resistance; only when the CAN node is a terminal node, the terminal resistance needs to be turned on.
	Filtering	-	Message filtering settings. Click the attribute value in this column. The filter setting interface appears. Table 7.2 lists configuration descriptions
	Message sending interval	0	Interval for sending packets per frame, ranging from 0 ms to 255 ms.
	Send buffer	100	Send message buffer. The unit is 10 frames, and the value ranges from 10 to 1000. That is, 100-1000 frames;You can set the size of this buffer to adjust the balance between the real-time performance of the CAN port and the large-capacity buffer. Because the speed of Ethernet/WIFI is generally higher than the transmission speed of CAN, the CAN needs to buffer transmission if the amount of data received by the network is too large. This ensures that no frames are dropped, but such a large buffer may lead to poor real-time performance. That is, the data currently sent by the Ethernet needs to wait for a certain period of time to be sent out from the CAN interface. In this case, either the client controls the transmission speed of the Ethernet to match the transmission speed of the CAN port; or the buffer is changed to a

			smaller size and the frame is dropped appropriately to ensure real-time performance.
	Cache sending policy	Discard new data when full	Policy when the sending buffer is full: Discard new data when full: When the buffer is full, the message cannot be written; Discard old data when full: When the buffer is full, discard the old data in the send buffer.
	Bus utilization enable	No	After it is enabled, the device calculates the current CAN bus utilization rate, rate and other information cycles, and uploads them to the preset connection.
	Bus utilization Acquisition cycle	200	The reporting period of the bus utilization rate is 200-2,000 ms; it is valid when the bus utilization rate is enabled.
Network forwarding	Working mode	TCP Server	TCP Server: The device acts as a server and waits for client connections; TCP Client: The device as a client actively connects to the target server; UDP: The device uses UDP for communication and does not need to establish a connection.
	Local port	8000	Local working port. The value ranges from 0 to 65535. When it is 0, the system randomly allocates ports. When the working mode is TCP Server or UDP mode, the port cannot be set to 0.
	Destination address	-	In UDP/TCP client mode, the destination address of the connection can be an IP address or a domain name.
	Destination port	-	Destination port, which is valid for TCP client or UDP. The value ranges from 1 to 65535. Some ports are occupied by other network protocols.
	NIC selection	Auto	Used to select the NIC used for the current connection. If the value is automatic, the NIC is automatically selected by the device.

			Optional: Auto, Ethernet, WIFI.
	Heartbeat time (s)	20	The value is: 0-60. This option only makes sense when you use TCP for communication. When the TCP connection is established, a "heartbeat packet" (non-application data will not be forwarded to the working port) will be sent every interval of this item. If the other party does not respond to three consecutive heartbeat packets, CANFDWIFI-100U will disconnect the connection. "0" indicates that "heartbeat packets" will not be sent.
	Channel message upload	-	It is used to select whether to upload data after the device receives the CAN(FD) message.
	Error message upload	-	Used to select whether to upload error messages after the device receives error messages. By default, channel error packets are not uploaded.
	Timeout disconnect time	0	The available values are 0 and 100-65525. This item is meaningful only when a TCP client or server is used. Time (in 10 ms) that the CAN or Ethernet interface delays from receiving the last data after the TCP connection is established. If no data is received before the timeout period expires, the TCP connection is disconnected. "0" indicates it will not be disconnected all the time.
	Packet frame number	18	The available value is 1-18. When the CAN port continuously receives data (the interval is less than the sub-packet interval) and the number of received CAN frames reaches the "number of packet frames", the received data is encapsulated into an Ethernet packet and sent to the network port. The number of packet frames refers to the maximum number of frames in the packet.If the number of sub-packaging frames is not reached during the receiving process, and the frame interval exceeds the timeout

			packet interval, the received data is also encapsulated into an Ethernet packet and sent. If the number of packet frames is set to 1, each CAN frame is sent separately as an Ethernet packet. At this time, the real-time performance is the strongest, but the network load is the highest; If the number of sub-packet frames is set to 18, the channel traffic is the largest and the network load is the smallest.
	Timeout packet time	1	The value ranges from 1 to 254. When the CAN port does not receive a new data frame within the time defined by the "packaging time interval" (unit: ms), and the number of packet frames has not been reached, all data frames that have been received and have not been sent will be encapsulated into an Ethernet packet and sent to the network port.
	Classic CANWIFI protocol	Disable	Protocol used by the current connection. If it is enabled, the CANWIFI-200T protocol is used to forward CAN messages.
Cloud configuration	Access cloud enabled	Disable	Whether to connect to cloud server
	Cloud server address	can.zlgcloud.com	ZWS cloud server address
	Cloud server port	8143	Cloud server port
	CAN(FD) message delivery enable	-	Delivery is not enabled by default
	CAN(FD) message upload enable	-	All CAN (FD) channel data is upload by default
	Data upload mode	Stream-saving mode	CAN(FD) data upload mode: Stream-saving mode: The data is

			compressed and uploaded after the data reaches the maximum compression value or times out. Real-time mode: Upload the data immediately after receiving the data (not recommended)
	Compression upload threshold	128kB	Compression upload threshold. When CAN (FD) data reaches this threshold, it will be uploaded to the server after compression.
	Compression upload timeout	1000	If the size of the cached data does not reach the threshold, the data will be compressed and uploaded when the receiving time reaches this value. The unit is ms.

Table 7.2 Filter setting description

Property Name	Default	Parameter Description
Filter conditions	Within the specified ID range (whitelist)	Within the specified ID range (whitelist): Frames within the preset ID range will be received; Beyond the specified ID range (blacklist): Frames within the preset ID range will not be received.
Enable	Disable	Select the corresponding item to enable.
Frame type	Standard frame	Standard frame: Set the filter message type to standard frame; Extended frame: Set the filter message type to extended frame.
Start ID	0	Start ID of the filtered message, expressed in hexadecimal notation
End ID	0	End ID of the filtered message, expressed in hexadecimal notation

7.2 CANFDWIFI-100U Network Data Format

CANFDWIFI defines the network packet format to realize message transmission. Table 7.3 lists the packet format, and Table 7.4 lists the packet parameter definitions.

This manual only describes the current basic packet format. The detailed data format can be obtained from the relevant staff of ZLG Electronics.

Table 7.3 Network packet format

Packet header					Data area	Check code
Start logo	Package type	Type parameter	Reserved	Data length		

Table 7.4 Package parameter description

Package parameters	Size (Byte)	Description
Start logo	1	Fixed at 0x55;
Package type	1	Indicates the package type. See Table 7.5;
Type parameter	1	Table 7.5 lists the corresponding parameters of the package type;
Reserved	1	The default value is 0;
Data length	2	Indicates the length of the data area;
Data area	Uncertain	Various package types have different data;
Check code	1	Using BCC (exclusive-or check method), the check range starts from the start mark to the byte before the check code.

Note: If there is no special description in the packet format, all data will be transmitted in big-endian format.

Table 7.5 Package type description

Package type	Type value	Description
CAN data packet	0x00	Indicates that the packet is a CAN data packet, and the data area is a CAN format message (see Table 7.6). When the device uploads a message, the maximum number of messages is set, and the network sends a maximum of 50 CAN messages each time; The type parameter is 0, reserved; The data length is n x the length of the CAN message (n indicates the number of messages, and the length of the CAN message is 24 bytes).
CAN FD data packet	0x01	Indicates that the packet is a CAN FD data packet. The data area is a CAN FD format message (see Table 7.6). When the device uploads a message, the maximum number of messages is configured, and the network sends a maximum of 18 CANFD messages each time; The type parameter is 0, reserved;

		The data length is n x CAN FD message length (n indicates the number of messages. The CAN FD message length is 80 bytes).

Table 7.6 CAN/CAN FD message format

parameter	Size (Byte)	Description
Time stamp	8	Current message receiving/sending time, in us;
Message ID	4	Standard/extended frame ID, 11 bits for a standard frame, 29 bits for an extended frame;
Message information	2	Message ID: [bit15:10]: reserved; [bit9]: ESI[1], 1-passive error, 0-active error; [bit8]: BRS[1], 1-CANFD acceleration, 0-no acceleration (CANFD is valid); [bit7]: ERR, 1-error message[2], 0-normal message (receive valid); [bit6]: EXT, 1-extended frame, 0-standard frame; [bit5]: RTR[3], 1-remote frame, 0-data frame; [bit4] : FD[1]， 1-CANFD，0-CAN； [bit3]: ECHO[4], 1- send echo, 0- send no echo [bit2]: TX[4], 1- send message, 0- receive message [bit1:0]: Transmission type (only valid for transmission, 0 for reception); 0: send properly; 1: Single transmission (CANFDNET-200U does not support); 2: Spontaneously send and receive;
Message channel	1	CAN (FD) channel, starting from 0, the value of CANFDNET-200 is 0-1; When sending a message, if the channel number is -1, the message is sent to all CAN channels.
Data length	1	Length of the message data; the values are as follows: CAN message: 0-8; CANFD message: 0-8, 12, 16, 20, 24, 32, 48, 64
Data	8/64[5]	Message data; CAN: The message data length is 8 bytes; CAN FD: The message data length is 64 bytes;

Note: [1] The FD bit is valid when the controller type is CANFD 1. ESI is only valid for CANFD reception, and the BRS bit is valid when FD is 1;

[2] When the ERR bit is 1, the frame is an error frame, the frame ID is invalid, and the data length is 8 bytes. For the definition of the data field, see Table 7.7;

[3] The RTR bit should not be be set to 1 when the FD bit is 1;

[4] The ECHO bit is valid when sending, and the TX bit is valid when receiving; when the ECHO bit is 1, TX is 1 when the message is successfully sent back;

[5] CAN and CAN FD message formats only differ in the length of the message data field.

Table 7.7 Format description of error frame data fields

Data area	Description
Byte0	For the definition of the bus status, see Table 7.8.
Byte1	Bus error type, valid when the bus state is bus error. For the definition, see Note: [1] Bus error is not a bus state; only errors on the current bus are prompted. [2] Reserved, no longer used; [3] CAN controller error. When this error occurs, the receiving and sending error counts are invalid. The specific error value is defined by the BYTE2 byte. See Table 7.10 for details; [4] Other errors. The errors specific to the end device are defined by the terminal application. When this error occurs, the receiving and sending error counts are invalid; the specific error value is defined by the BYTE2 byte. See Table 7.11 for details. Table 7.9
Byte2	Reserved, currently 0x00
Byte3	Receive error count
Byte4	Send error count
Byte5~7	Reserved, currently 0x00

Table 7.8 Bus status definition

Error type	Error type description
0x00	Bus normal
0xE1	Bus error[1]
0xE2	Bus alarm
0xE3	Bus negative
0xE4	Bus off

0xE5	Bus overload[2]
0xE6	Controller error[3]
0xE7	Other error states[4]

Note: [1] Bus error is not a bus state; only errors on the current bus are prompted.

[2] Reserved, no longer used;

[3] CAN controller error. When this error occurs, the receiving and sending error counts are invalid. The specific error value is defined by the BYTE2 byte. See Table 7.10 for details;

[4] Other errors. The errors specific to the end device are defined by the terminal application. When this error occurs, the receiving and sending error counts are invalid; the specific error value is defined by the BYTE2 byte. See Table 7.11 for details.

Table 7.9 Definition of bus error values

Error value	Error description
0x01	Bit error
0x02	Acknowledgment error
0x04	CRC error
0x08	Format error
0x10	Fill error
0x20	Overload error

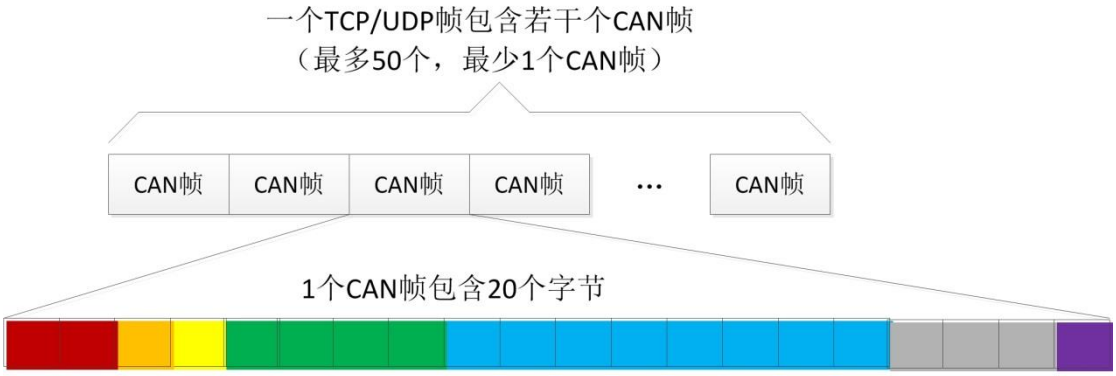
Table 7.10 Controller error definitions

Error value	Error description
0x01	The controller receives FIFO overflow
0x02	The driver receives buffer overflow
0x03	Send buffer overflow
0x04	Invalid message sent
0x05	Controller internal error

Table 7.11 Other error definitions

Error value	Error description
0x01	Terminal application receive buffer overflow
0x02	Terminal application send buffer overflow

7.3 1002100310071009



帧头：长度2个字节，标示一个帧的开始，固定为0xFE 0xFD

发送模式：长度1个字节，0x00为正常发送，0x01为自发自收

帧信息：长度1个字节，用于标识该CAN帧的一些信息，如类型、长度等

Bit7							Bit0
FF	RTR	保留	保留	D3	D2	D1	D0

FF: 标准帧和扩展帧的标识，1为扩展帧，0为标准帧。
RTR: 远程帧和数据帧的标识，1为远程帧，0为数据帧。
保留值为0，不可写入1。
D3～D0：标识该CAN帧的数据长度，如二进制0100，表示本CAN帧为4字节数据段

帧ID：长度4个字节，靠右对齐，标准帧有效位是11位，扩展帧有效位是29位。

高字节			低字节
12h	34h	56h	78h

如上为扩展帧ID号
0x12345678的表示方式

高字节			低字节
00h	00h	03h	FFh

如上为标准帧ID号
0x3FF的表示方式

帧数据：长度8个字节，有效长度由帧信息的D3～D0的值决定。

DATA1							DATA8
11h	22h	33h	44h	55h	66h	77h	88h

如上为8个字节有效数据
的表示方式

DATA1							DATA8
11h	22h	33h	44h	55h	66h	00h	00h

如上为6个字节有效数据
的表示方式，无效的补零

帧接收时间戳：单位（ms），含3个字节，从上电开始计时，溢出后归0,继续计时。高位先发。

校验字节：1个字节，为从帧头到保留位所有字节的异或值：byte0^byte1^……^byte18

The following example is a standard data frame with ID 0x0001 and contains 8 bytes

of data:

(0x00,0x01,0x02,0x03,0x04,0x05,0x06,0x07) expression:

0xfe 0xfd 0x00 0x08 0x00 0x00 0x00 0x01 0x000x01 0x02 0x03 0x04 0x05 0x06 0x07 0x00 0x00 0x00 0x0a

When users use PC to send CAN frames, they need to calculate. CAN frames cannot exceed the fastest sending traffic on the CAN side. For example, if the baud rate of 1000Kbps sends standard data frames, the fastest CAN is 10000 frames/s. If the PC sends too fast, the CAN cannot send so fast. Although there is a large buffer inside the device, overflow will occur. CANWIFI-200T also needs to consider the transmission capacity of WIFI. Therefore, it is recommended that the CAN frame sent by each CAN channel per second should not exceed 5,800 frames.

8. Disclaimer

Based on the principle of providing better service for users, Guangzhou ZLG Electronics Co., Ltd. ("ZLG Electronics") will try to present detailed and accurate product information in this manual. However, due to the effectiveness of this manual within a particular period of time, ZLG Electronics does not guarantee the applicability of this document at any time. ZLG Electronics shall reserve the right to update this manual without prior notice. To get the latest version, please visit the official website of ZLG Electronics regularly or contact ZLG Electronics. Thank you!

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