User Manual

CANFDNET-200U User Manual

High-Performance Dual-Channel Ethernet to CAN (FD) Converter

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Abstract	Product User Guide

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Contents

1. Product Introduction

1.1 Product Overview

CANFDNET-200U is a high-performance industrial Ethernet and CAN(FD)-bus data converter developed by Guangzhou ZLG Electronics Co., Ltd. It integrates two CAN(FD)-bus interfaces, one Ethernet interface, and one vehicle dual-wire Ethernet interface, and provides a stable TCP/IP protocol stack. It helps users easily interconnect the CAN(FD)-bus network and Ethernet, and further expands the scope of CAN(FD)-bus network.

CANFDNET-200U is an industrial-grade product that supports an operating temperature of -40°C to +85°C. It has one 10M/100M adaptive Ethernet interface, one 100M on-board dual-wire Ethernet interface, and two CAN (FD) ports with a maximum baud rate of 5 Mbps. It has TCP Server, TCP Client, UDP and other work modes. Users can flexibly set configuration parameters by using the configuration software.

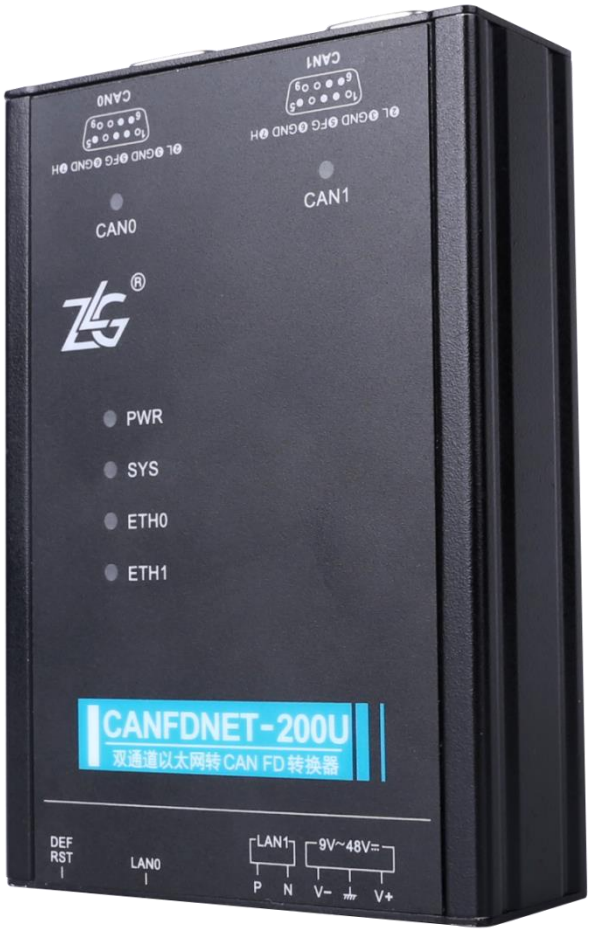


Figure1.1 Product appearance

1.2 Product Features

1.2.1 Powerful Hardware

- High-speed 600MHz main-frequency 32-bit processor;
- 10M/100M self-applicable Ethernet interface, 2 kV electromagnetic isolation;
- Vehicle dual-wire Ethernet, meeting the OPEN Alliance BroadR-Reach specification
- Two CAN (FD) ports, 2.5 kVDC withstand voltage isolation;
- Embedded hardware watchdog;
- Rated power supply voltage range 9V-48V DC;
- Operating temperature: -40°C to +85°C;
- Humidity: 5%-95% RH, no condensation;
- Rugged metal housing, SECC metal (1.1 mm);
- Designed specifically for industrial environments.

1.2.2 Perfect Functions

- CAN(FD) interface functions supported:
  - Support baud rate 40K-5Mbps, baud rate can be set arbitrarily;
  - Support various controller types: CAN, CANFD ISO or CANFD Non-ISO;
  - Support the software terminal resistance switch;
  - Support message filtering;
  - Support millisecond-level message timing sending;
  - Support bus utilization reporting;
  - The message sending buffer can be set, and the user can choose the most suitable balance between real-time and large-capacity buffering;
- Multiple work modes supported:
  - Work modes: TCP Server, TCP Client, UDP;
  - Supports a maximum of 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, support multicast, IP segment and other operations to support 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 TCP/UDP data conversion between vehicle Ethernet and Ethernet;
- Support local system firmware upgrade.

2. Product Specifications

2.1 Electrical Specifications

Table 2.1 Electrical specifications

Item	Conditions	Rating			Unit
		Minimum	Typical Value	Maximum	
Working voltage	DC	9	12	48	V
Power consumption		-	1.5	-	W

2.2 Operating Temperature

Table 2.2 Operating temperature

Item	Rating			Unit
	Minimum	Typical Value	Maximum	
Operating temperature	-40	-	85	℃
Storage Temperature	-40	-	85	℃

2.3 Protection Level

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

Interface	Test Level	Test Voltage (kV)	Test Result	Remarks
Power supply	Level 4	6	Class A	Contact discharge
CAN bus	Level 4	6	Class A	Contact discharge
Ethernet	Level 4	6	Class A	Contact discharge
Buttons, Indicators	Level 4	8	Class A	Air discharge

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

Interface	Test level	Test voltage (kV)	Test Result	Remarks
Power supply	Level 3	2	Class A	Capacitive coupling
CAN bus	Level 3	2	Class A	Capacitive coupling
Ethernet	Level 3	2	Class A	Capacitive coupling

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

Interface	Test Level	Test Voltage (kV)	Test Result	Remarks
Power supply	Level 3	1	Class A	Line-line
	Level 3	1	Class A	Line-ground
CAN bus	Level 3	1	Class A	Line-line
	Level 3	1	Class A	Line-ground
Ethernet	Level 3	1	Class A	Line-line
	Level 3	1	Class A	Line-ground

3. Mechanical Dimensions

The mechanical dimensions are shown in the following figure (unit: mm)

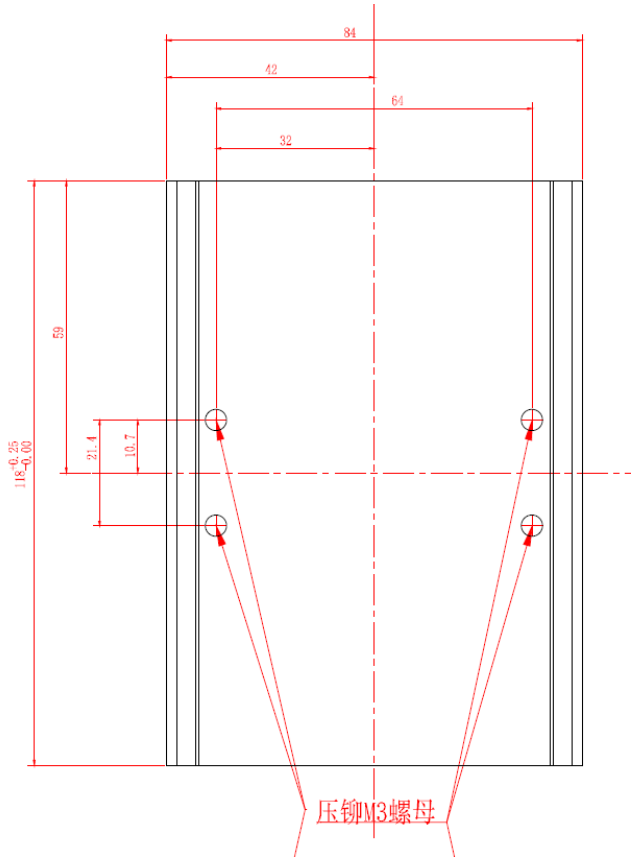


Figure3.1 Host dimensions

4. Hardware Interfaces

This section describes the hardware interfaces of CANFDNET-200U series equipment.

4.1 Panel Layout

Figure 4.1 shows the device panel layout.

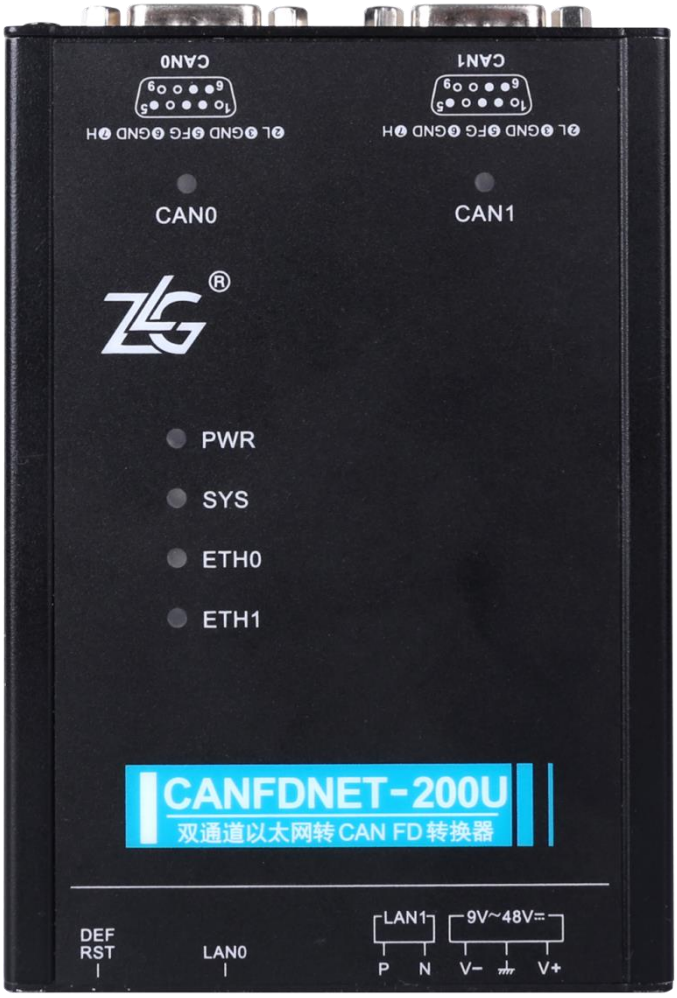


Figure 4.1 Panel layout

4.2 Indicators

Table 4.1 LED indicators

Identification	Function	Status	Description
PWR	Power indicator	Red	The device is powered on properly
		Light off	The device is not powered on
SYS	System indicator	Green flashing	System running
		Red	Device reset and restart
CAN0/CAN1	CAN channel indicator	Green normally on	Channel open
		Green flashing	The CAN channel normally sends and
		Flash in red	CAN bus error

ETH0	Ethernet indicator	Green normally on	Ethernet connected
		Light off	Ethernet no connected
		Green flashing	The application has data transmission and
		Flash in red	Received data parsing error
ETH1	Vehicle Ethernet Indicator	Green normally on	Ethernet connected
		Light off	Ethernet no connected
		Green flashing	The app has data transfer
LAN0	RJ45 interface indicator - yellow indicator	The yellow indicator is on	Ethernet connection, no data transmission
		The yellow indicator blinks	The Ethernet has data transmission and
		Light off	Ethernet no connected
	RJ45 interface indicator - green indicator	The green indicator is on	Ethernet speed 100Mbps
		Light off	Ethernet speed 10Mbps

4.3 Buttons

The device provides the factory settings restoration (DEF)/system reset (Reset) button. 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 voltage of the power input of the equipment is DC 9-48 V, and the shell is marked as "DC 9-48V". The physical form of the interface is 5.08 terminal. Table 4.2 and Table 4.3 show the interface diagram and signal definition.

Table 4.2 Power interface

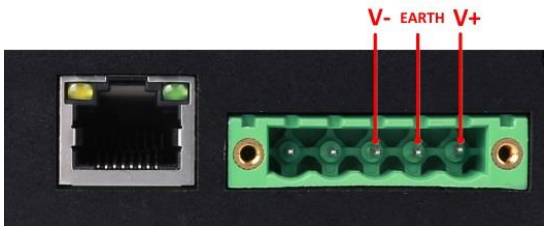
Type	Schematic Diagram
5.08 terminal	

Table 4.3 5.08 terminal signal definition

Function Interface	Signal Definition	Signal Description	Interface Type
			5.08 Interface
Power supply	V+	Positive electrode of power	√
	V-	Negative electrode of power	√
	EARTH	Ground	√

4.5 CAN-bus Interface

The device provides two isolated CAN-Bus interfaces. The shell identification is "CAN0" and "CAN1". The physical form of the interface is DB9 terminal. Table 4.4, Table 4.5, Table 4.6, and Table 4.7 list the interface diagram, signal definition, and interface specifications.

Table 4.4 CAN channel performance

Channel	Transmission Direction	Maximum Rate (unit: frame/s)
CAN0	Receive	6,000 frames/s

CAN1	Send	4,000 frames/s
	Receive	10,000 frames/s
	Send	6,000 frames/s

Table 4.5 Pin definitions

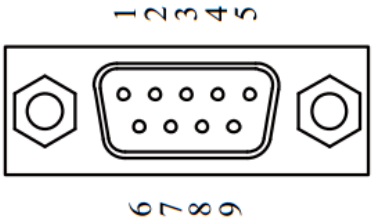
Type	Schematic Diagram
Pin definitions	

Table 4.6 Signal definition

Function Interface	Signal Definition	Signal Description	Pin Number
CAN0~CAN1	CAN_L	CAN data transceiving differential inverted signal	2
	CAN_GND	CAN isolated ground	3, 6
	CAN_H	CAN data sending and receiving differential positive phase signal	7
	CAN_FG	Shielding ground	5
	NC	Not connected	1, 4, 8, 9

Table 4.7 CAN-Bus interface specifications

Item		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)		3500			V

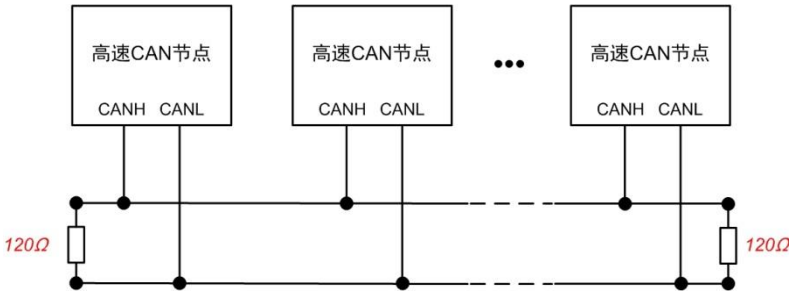


Figure 4.2 Typical high-speed CAN network connection

Balanced transmission is adopted for the CAN bus. According to ISO11898-2: 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 CANFDNET 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 be 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.

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 4.8 lists the interface definition.

Table 4.8 Ethernet interface

Type	Schematic Diagram
RJ45 terminal	

4.7 Vehicle Ethernet Interface

The device provides one vehicle Ethernet interface, which meets the OPEN Alliance BroadR-Reach specification. The physical form of the interface is an OPEN terminal, which realizes vehicle Ethernet communication. This interface meets the 10/100M specification. Table 4.9, Table 4.10, and Figure 4.3 show the interface diagram and signal definition.

Table 4.9 Vehicle Ethernet interface

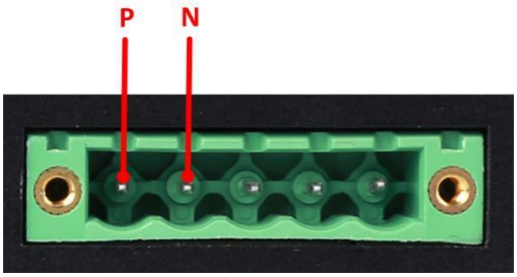
Type	Schematic Diagram
5.08 terminal	

Table 4.10 Signal definition

Function Interface	Signal Definition	Signal Description	Pin Number
LAN1	P	LAN1 data transceiver differential positive phase signal	1
	N	LAN1 data transceiver differential inverted signal	2

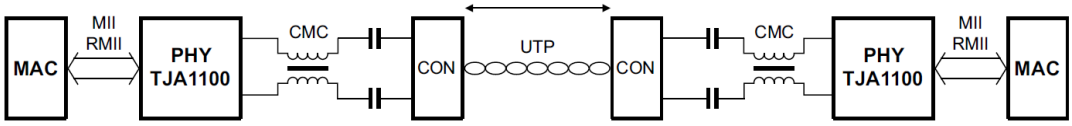


Figure 4.3 Typical network connection of vehicle Ethernet

5. Quick Guide

This chapter introduces the basic usage of CANFDNET-200U. You will quickly master its use and have an intuitive understanding of data forwarding between Ethernet and CAN (FD).

CANFDNET-200U supports three work modes, which can work at the same time. This chapter introduces each work mode.

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.

5.2 Software Installation

Before using the device, install the ZCANPRO (V2.0.39 or above), which can be downloaded from the official website.

5.3 Device Configuration

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

Open 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 5.1. Figure 5.2 shows the configuration software interface.

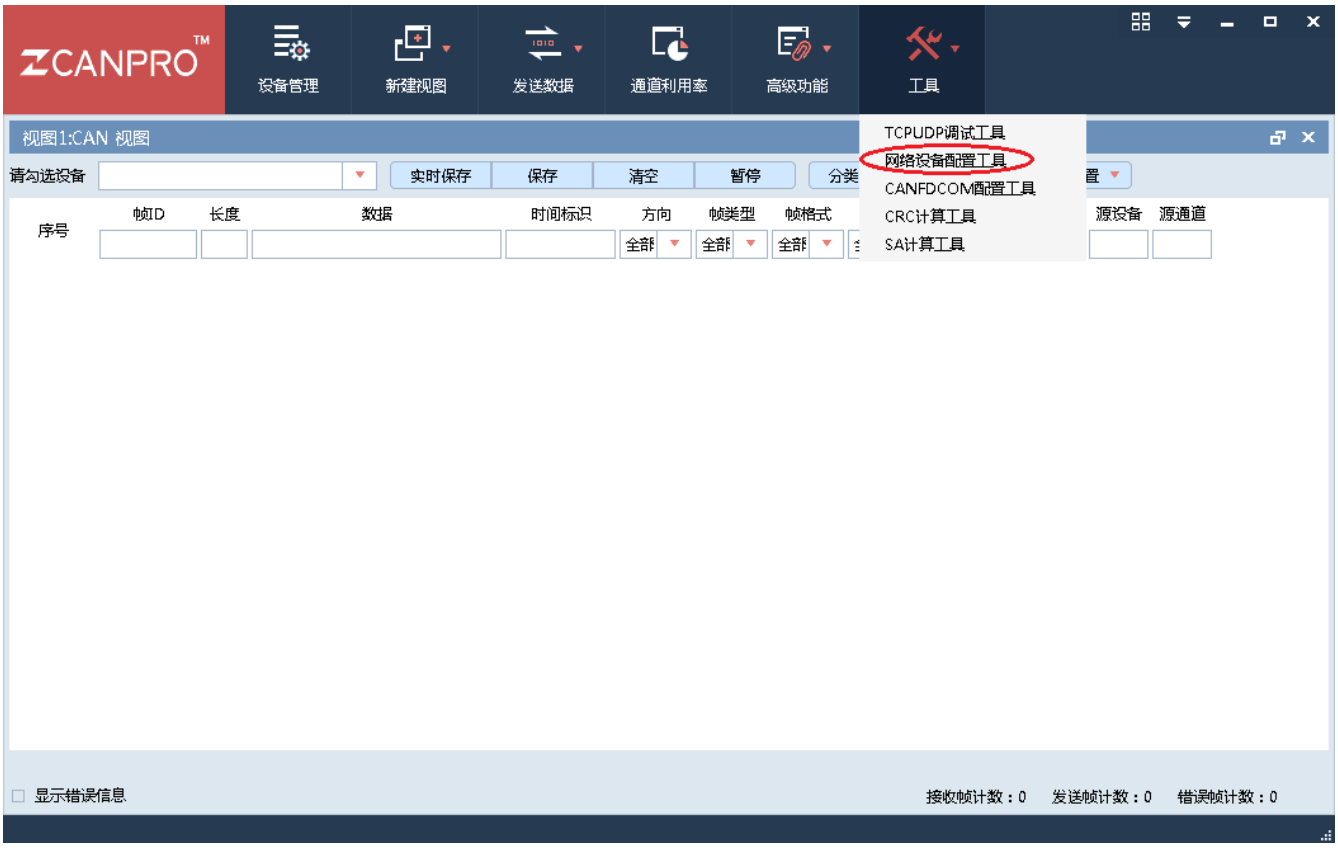


Figure 5.1 Running the network device configuration tool

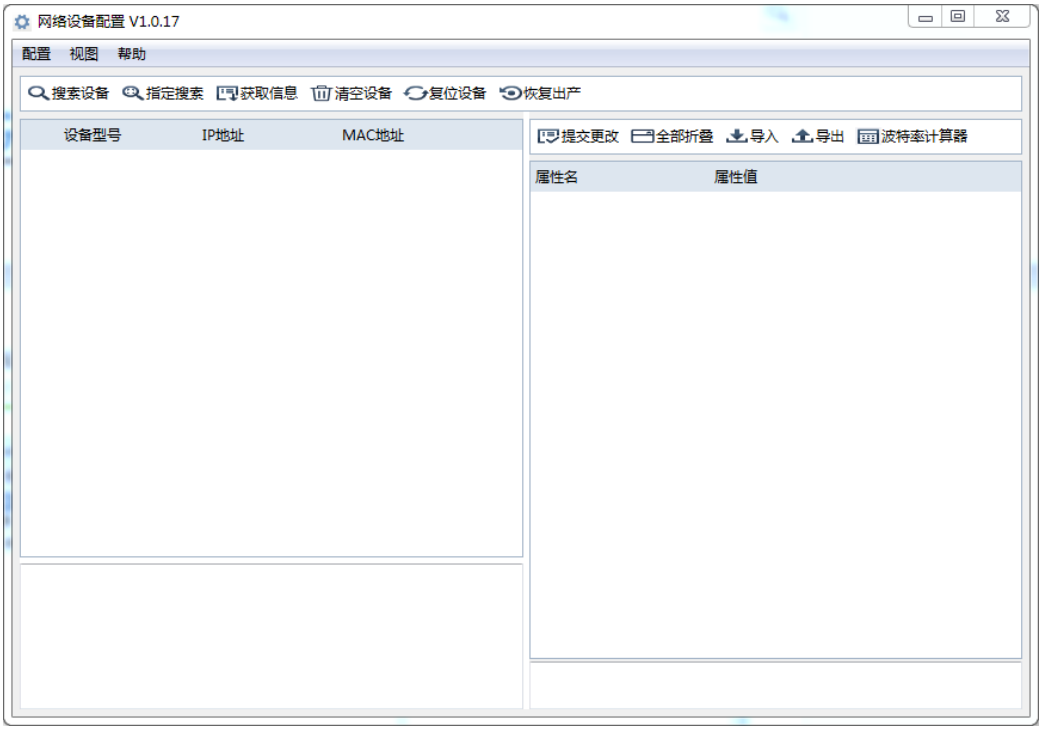


Figure 5.2 Network configuration tool interface

5.3.2 Searching Devices

Click the [Search Device] button in the upper left corner of Figure 5.2 to search for devices in the network. After the device is searched, the interface is displayed as shown in Figure 5.3. Click the red circle in the figure and select the device to obtain information. After obtaining the information, you can view the configuration information on the right interface, as shown in Figure 5.4. For the description of each configuration item, see Configuration parameter description in the appendix.

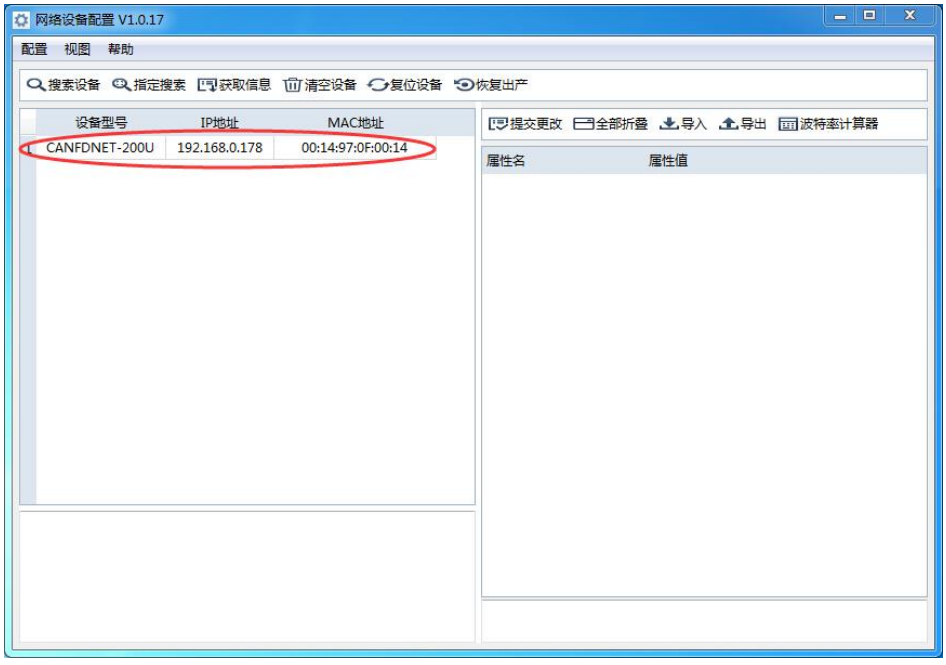


Figure 5.3 Interface displayed after successful search

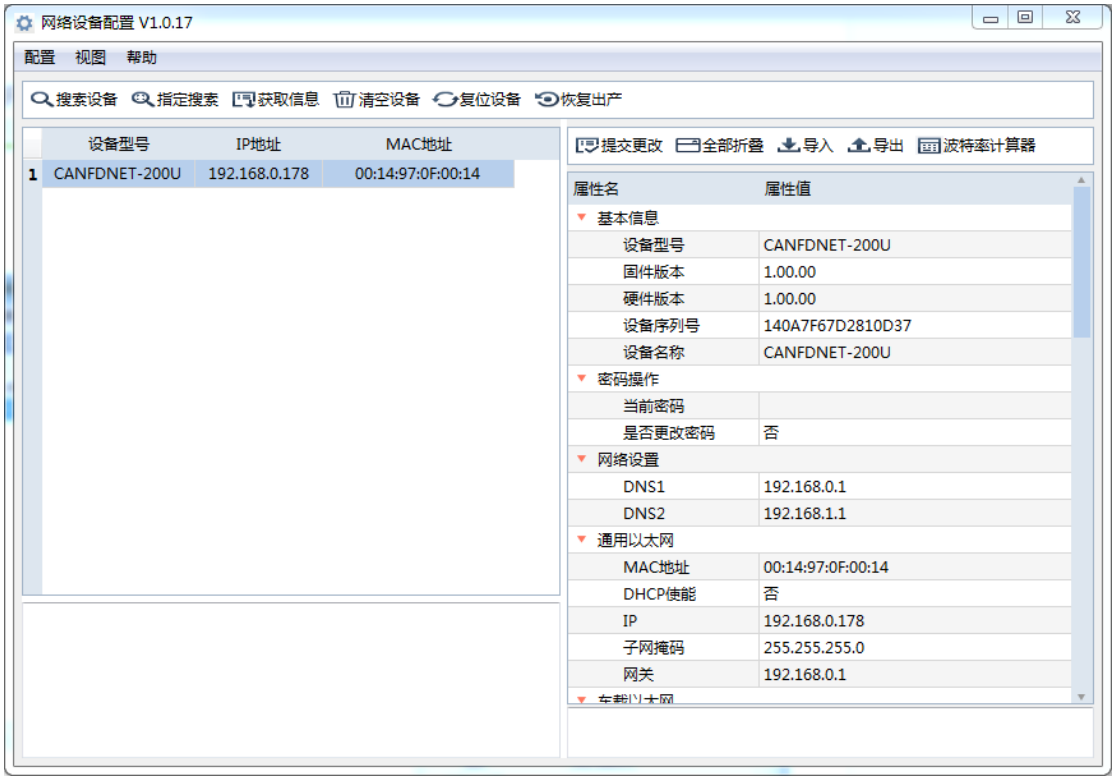


Figure 5.4 Device configuration display

5.3.3 Configuring Parameters

Whether the parameter configuration is correct or not will directly affect the normal communication. The common parameter configurations are described below.

- Network parameters

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 5.5 Same Network Segment Detection Flowchart 5.5.

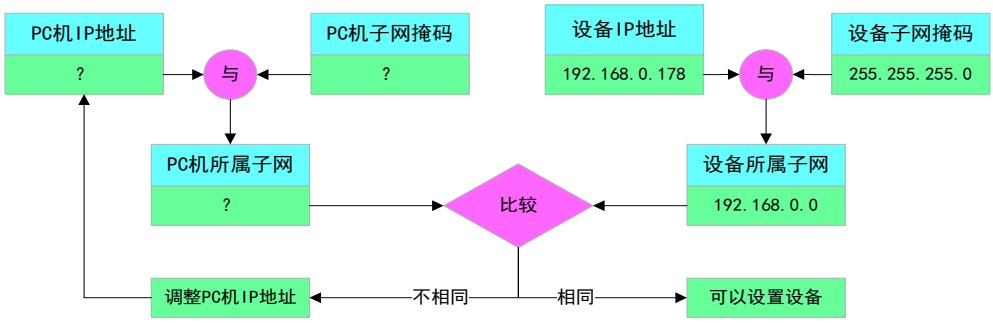


Figure 5.5 Same network segment detection process

There are two methods 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 5.6 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.

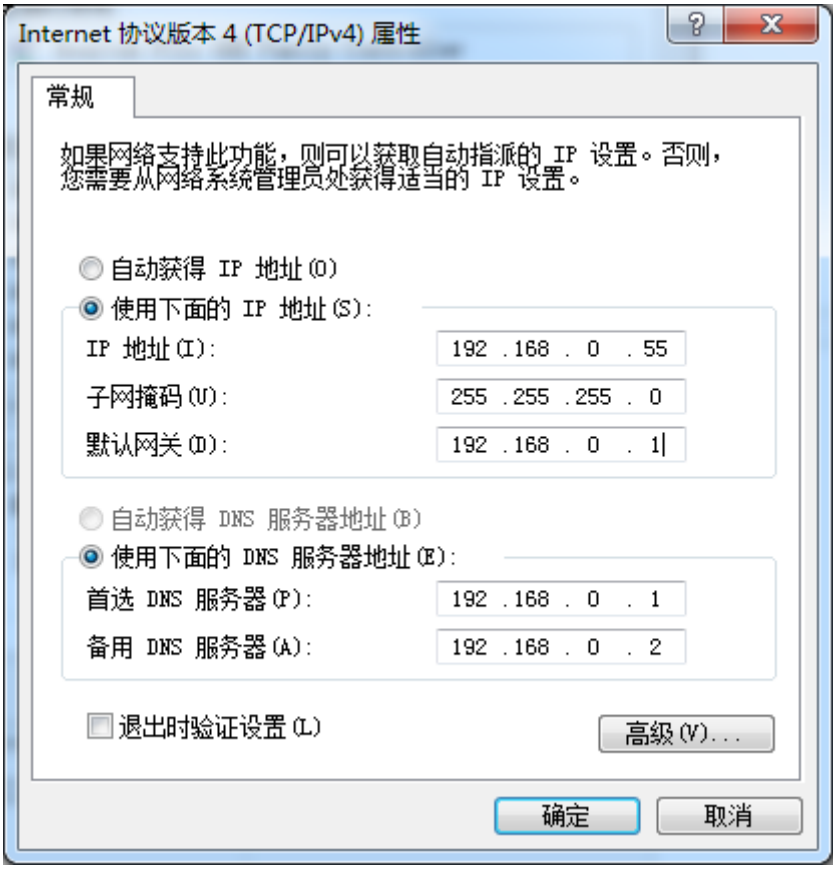


Figure 5.6 TCP/IP properties

The second method is to change the IP address of the device. On the interface in Figure 5.4, change the [IP] item 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 [General Ethernet] to 192.168.7.178, and change the device gateway IP to "192.168.7.1".

- CAN(FD) parameters

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 CAN0/1 configuration on the interface.

- Work mode configuration

The factory work mode of the device is TCP Server mode, the port is 8000, and the network card is universal Ethernet. Click the attribute value of [CAN(FD) to Ethernet] on the interface. On the pop-up interface, view or modify the work mode, as shown in Figure 5.7.

Figure 5.7 Data forwarding (work mode selection) interface

Select [View advanced configuration items] to view more configuration items.

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

5.4 Working Mode Instructions

When the device configuration is completed, the device works in the specific mode. The following describes how to use each work mode based on ZCANPRO software.

5.4.1 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 CANFDNET-TCP as the device type, and start the device.

On the device startup interface (as shown in Figure 5.8), select [Work Mode] as [Client], and enter [IP address] and [working port]. If the current device IP address is "192.168.0.178" and the port is 8000, enter 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 5.8 Starting the CANFDNET-TCP client

After starting the device, you can use ZCANPRO to communicate with the device. To verify whether the device communication is normal, connect CAN0 and CAN1 of the device (the baud rate must be the same) to carry out the message sending and receiving test.

Click the [Send Data] icon on the ZCANPRO interface and select [Normal Send]. On the displayed sending interface, select [Channel] to specify the sending channel, and click [Send Now] to send the message.

As CAN0 is connected to CAN1, the message sent by CAN0 will be received by CAN1. You can see two messages on the main interface. One is the sending message and the other is the receiving message, from CAN0 and CAN1 respectively, as shown in Figure 5.9.

Figure 5.9 Message sending interface

So far, the basic use of CANFDNET equipment has been realized.

5.4.2 TCP Client Mode

In TCP Client mode, the device will actively connect to the preset TCP server. If the connection is unsuccessful, the client will continue to try to establish a connection with the TCP server based on the preset connection conditions. After establishing a TCP connection with the TCP server, two-way data communication can be carried out.

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

On the pop-up startup device interface (as shown in Figure 5.10), 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".

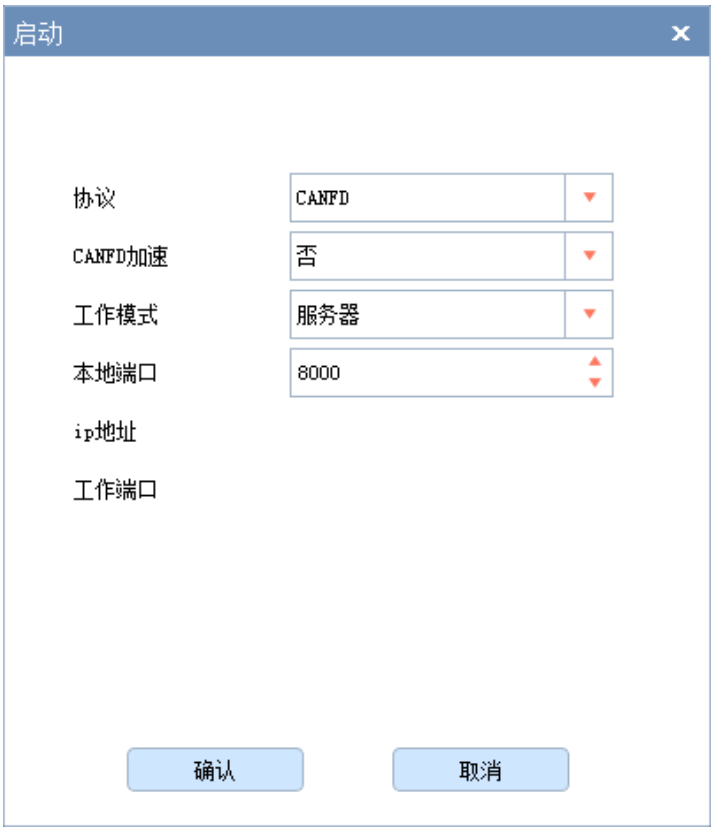


Figure 5.10 Starting the CANFDNET-TCP server

Click [OK]. The device connects to ZCANPRO. The communication with the device is set up. For communication information, see TCP Server mode.

5.4.3 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 [CANFDNET-UDP], and start the device.

On the displayed startup device interface (as shown in Figure 5.11), 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 5.11 Starting CANFDNET-UDP

Click [OK]. The device can communicate with ZCANPRO. For message sending and receiving information, see TCP Server Mode.

6. Other Functions

6.1 Resetting the Device

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 button should be held for 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.

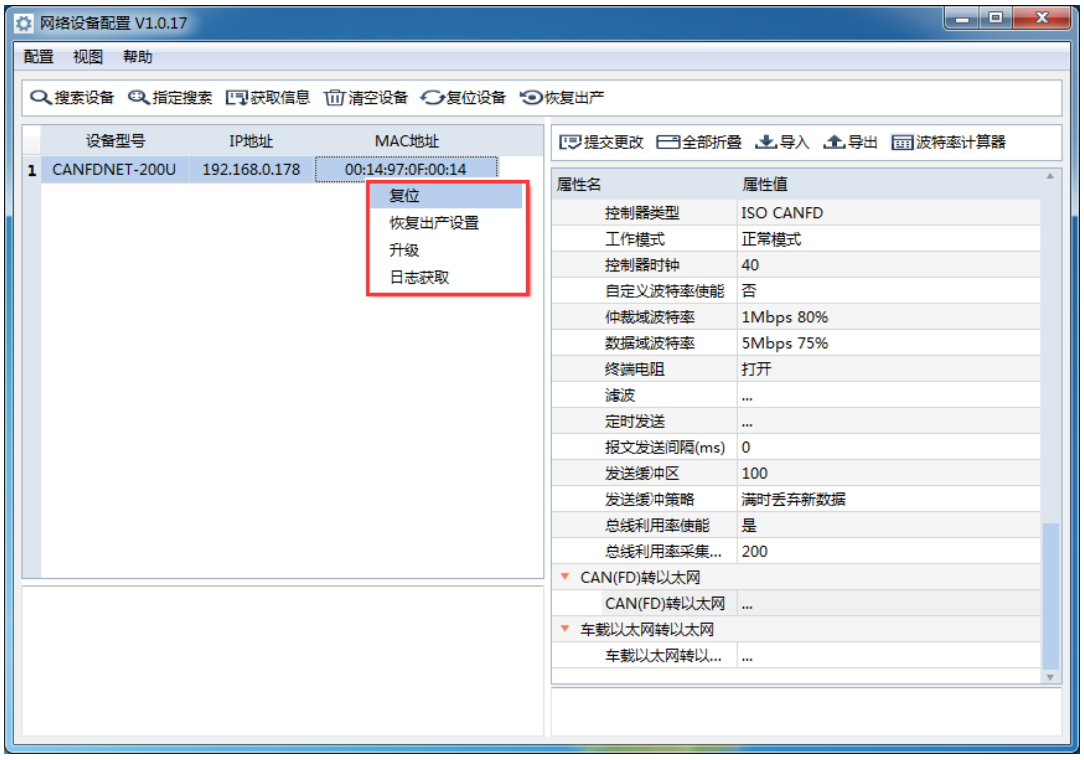


Figure 6.1 Device function display in the network configuration tool

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 Upgrading the Device

There are two ways to upgrade the device: press the button to enter the upgrade mode and upgrade the firmware by using the software.

To press the button to enter the upgrade mode: power off the device, press and hold the button to power on until the SYS indicator blinks slowly, and release the button. The upgrade method is consistent with the direct software 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

7. Appendix

7.1 CANFDNET Network Data Format

CANFDNET defines the network packet format to realize message transmission. Table 7.1 and Table 7.2 list the package format and package parameter definitions respectively.

Table 7.1 Network packet format

Packet Header					Data Area	Check Code
Start Logo	Package Type	Type Parameter	Reserved	Data Length		

Table 7.2 Package parameter description

Package Parameters	Size (Byte)	Description
Start logo	1	Fixed at 0x55;
Package type	1	Indicate the package type. See Table 7.3;
Type parameter	1	Table 7.3 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 7.3 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 7.4). 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 7.4). 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).
Send data packets regularly	0x02	Indicates that the packet is a timed sending data packet, which is used to update/start the timed sending message. The timed sending message will not be saved in case of power failure. The data is in the format of timed sending messages (see Table 7.8). A maximum of 10 timed sending messages can be sent each time; The type parameter is 0, reserved; The data length is n x the length of the timing message (n indicates the number of messages sent regularly)
Bus utilization indicator package	0x03	Indicates that the packet is a CAN bus utilization indicator packet; after the device is configured with the cycle to report the bus utilization, the packet is reported periodically. This package is only uploaded by the device, and the package received by the device is invalid.

		The type parameter is 0, reserved; The data is bus utilization information. Table 7.9 lists the definitions; The data length is the length of bus utilization information

Table 7.4 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 7.5;

[3] The RTR bit should not 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 7.5 Format description of error frame data field

Data area	Description
Byte0	For the definition of the bus status, see Table 7.6
Byte1	Bus error type, valid when the bus status is bus error. For the definition, see Table 7.7
Byte2	Reserved, currently 0x00
Byte3	Receive error count
Byte4	Send error count
Byte5~7	Reserved, currently 0x00

Table 7.6 Bus status definition

Error Type	Error Type Description
0x00	Bus normal
0xE1	Bus error
0xE2	Bus alarm
0xE3	Bus negative
0xE4	Bus off
0xE5	Bus overload

Table 7.7 Bus error value definition

Error Value	Error Description
0x01	Bit error
0x02	Acknowledgment error
0x04	CRC error
0x08	Format error
0x10	Fill error
0x20	Overload error
0x40	Receive buffer full
0x80	Send buffer full

Table 7.8 Format of regular sending message

Parameter	Size (Byte)	Parameter Description
No.	1	Timed sending number. The value is 0-31
Enable	1	Timed sending enable. 1: enable, 0: disable
Period	2	Sending cycle, in ms. The value is 1-60,000 ms
Times	2	Sending times. The value ranges from 0 to 65,535. 0 indicates always sending
Mark	2	Reserved
Message	80	The message is fixed to CANFD format message. For the format, see Table 7.4

Table 7.9 Bus utilization information definition

Parameter	Size (Byte)	Parameter Description
Start timestamp	8	Measurement start timestamp, in us
End timestamp	8	Test end timestamp, in us
Channel number	1	CAN channel for the currently reported bus utilization
Reserved	1	Reserved
Bus utilization	2	Bus utilization rate (%), bus utilization rate *100 display. The value is 0-10,000. For example, 80.50% at 8050
Number of messages sent and received	4	Number of messages sent and received

7.2 Configuration Parameters

Table 7.10 Configuration parameter description

Category	Property Name	Default	Parameter Description
Basic information	Device model	CANFDNET-200U	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 1.00.00.
	Equipment No.	-	Device serial number. Each device has a different device serial number. It is a 16-byte string.
	Equipment name	CANFDNET-200U	Device name. The value can be changed, a maximum of 15 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 password	-	If "Whether to change the password" is "No", the password cannot be changed; Used to confirm the new password. The content must be consistent with the "new password".
Network Settings	DNS1	192.168.0.1	Preferred DNS server address.
	DNS2	192.168.1.1	Alternative DNS server address.
For all Ethernet/Vehicle Ethernet	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 (Universal Ethernet)/ 192.168.1.178 (vehicle Ethernet)	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. In the same network, each IP address and the subnet mask are equal to the obtained value. So, set them correctly "IP address" and "subnet mask".
	Gateway	192.168.0.178 (Universal Ethernet)/ 192.168.1.178 (vehicle Ethernet)	Enter the IP addresses of the gateway or router in this network.

	Master and slave Settings	Slave	Vehicle Ethernet master and slave settings.
CAN0 configuration/CAN1 configuration	Controller type	ISO CANFD	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.
	Work 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. When the controller type is CAN controller, this item indicates the CAN baud rate.
	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	turn on	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. For description of setting items, see Table 7.11.
	Timing sending	-	Timed sending settings. Click the attribute value in this column. The timed sending setting interface appears. For description of setting items, see Table 7.12.
	Message sending interval	0	Message sending interval of each frame. The value is 0-255 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 is much higher than CAN transmission speed, if the amount of data received by Ethernet is too large, CAN needs to buffer transmission. This guarantees that no frames will be dropped, but such a large buffer may lead to poor real-time performance. That is, the data currently sent by the Ethernet can only be sent out from the CAN interface after a certain period of time. In this case, the customer controls the Ethernet transmission speed to match the CAN port transmission speed; or, reduce this buffer and use appropriate frame drop 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. At least 10 frames are discarded each time.
	Bus utilization enable	Yes	The device will report the current bus utilization information based on the "bus utilization rate collection cycle".
	Bus utilization rate collection 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.

CAN (FD) to Ethernet	CAN (FD) to Ethernet	-	CAN (FD) message to Ethernet settings, that is,work mode settings. See Table 7.13. Select View advanced configuration to view more settings
Vehicle Ethernet to Ethernet	Vehicle Ethernet to Ethernet	-	Vehicle Ethernet to Ethernet settings. See Table 7.14

Table 7.11 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

Table 7.12 Description of the setting of timed sending interface

Property Name	Default	Parameter Description
Enable	Disable	Selecting ☑ means enabling.
ID	0	Message ID, expressed in hexadecimal notation.
Sending cycle	1000	Timed sending period, in ms.
Number of Sending	0	The number of times a message is sent. The value ranges from 0 to 65535. When it is 0, it means an unlimited number of sending times.
Frame type	Standard frame	Send message type, standard frame or extended frame.
Frame format	Data frame	Send message format, data frame or remote frame.
Frame protocol	CAN	Send message protocol, CAN or CANFD; When the controller type is CAN, only CAN can be selected.
CANFD acceleration	-	When the frame protocol is CANFD, this item is valid; acceleration or no acceleration can be selected.
Data	-	Send message data, hexadecimal, separated by spaces.

Table 7.13 CAN(FD) to Ethernet interface description

Property Name	Default	Parameter Description
Enable	-	Selecting ☑ indicates enabling; one enable item is selected by default.
Work 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 work mode is TCP Server or UDP mode, the port cannot be set to 0;

Destination address	-	Destination address, which can be a domain name. Valid for TCP client or UDP; When the work mode is UDP, special settings are supported: 1. You can set the target IP address as an IP segment, and use "-" to separate the two IP addresses. For example, you can set 192.168.0.10-192.198.0.20; 2. The target IP address can be set to be empty. The device will not upload data until it confirms the destination IP address after receiving the first UDP packet.
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.
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.
Channel message reporting	CAN0, CAN1	The messages of the specified channel are uploaded All channel messages are uploaded by default.
Error message report	CAN0, CAN1	When an error occurs in the specified channel, whether the error information is transmitted. All channels are uploaded by default.
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 255. 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.
Receive buffer processing method	Connection not cleared	This option is only valid under TCP server or client. It determines whether to clear the message receiving buffer of the CAN port after the connection is established. If it is not cleared, the data in the message receiving buffer will be sent out after the connection is established. If it is cleared, the buffered packets are cleared when the TCP connection is established. The TCP server mode is cleared only when the first connection is established.
Multicast	Disable	The UDP mode is valid. Enter the multicast address after it is enabled.
Multicast address	-	Valid when multicast is enabled. Enter the multicast IP address. The device will receive packets from the multicast address.

Table 7.14 Vehicle Ethernet to Ethernet configuration

Property Name	Default	Parameter Description
Enable	Disable	Selecting ☑ means enabling.
Work modes	-	Network card work mode. The optional work modes are as follows: TCP server, TCP client, UDP
Local port	-	Local working port. The value ranges from 0 to 65535. When it is 0, the system randomly allocates ports. When the work mode is TCP Server or UDP mode, the port cannot be set to 0.
Server address/destination IP address	-	Remote IP address, which can be a domain name. Valid for TCP Client or UDP.
Server port/Destination port	-	Remote port. The value ranges from to 65535. It is valid for TCP Client or UDP. Some ports are occupied by other network protocols.

8. Disclaimer

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