Maiwe

CAN Converter

User Manual

➢ MW-CANET100

Version: V1.0

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Statement

1.This user manual is suitable for Maiwe MW-CANET100.

2.This manual is a general manual, Different models' interfaces and functions of different are slightly different, and all are subject to the actual model used.

Important Statement

Any information provided by our company in this manual does not represent for corresponding authorization on these information.

Our company attempts to ensure the accuracy and applicability for the information provided in this manual, however our company does not assume any responsibility for the use of these information, and does not assume any joint responsibility for the use of these information. There may be a few technical or typographical errors in the product and manual. The company reserves the right to change all or part of this manual without prior notice.

Version No	Date	Revise record
V1.0	2023.2	Create file

Safe Use Instructions

This product performance is excellent and reliable in the designed range of use, but it's necessary to avoid man-made damage or destroy for the equipment.

- Read the manual carefully and keep this manual for reference if need afterwards.
- Do not put the device close to the water sources or damp places.
- Do not put anything on the power cable, it should be placed out of reach.
- To avoid causing fire, do not knot or wrap the cable.
- Power connector and other device connectors should be firmly connected with each other, frequently inspection is needed.
- Please keep the fiber socket and plug clean. Do not look directly at the fiber section when the equipment is working.
- Please keep the equipment clean and wipe it with a soft cotton cloth if necessary.
- Please do not repair the equipment by yourself, unless there is clear instructions in the manual.

Under the following circumstances, please cut off power immediately and contact us.

- Equipment water damage.
- The equipment is broken or the casing is broken.
- The equipment works abnormally or the performance has completely changed.
- The equipment produces odor, smoke or noise.

Contents

1 Product Introduction

1.1 Brief Introduction

MW-CANET100 is an industrial grade isolated CAN converter with characteristics of lightning resistance, electromagnetic interference resistance, high reliability and performance, suitable for harsh environments. The MW-CANET100 integrates 1 CAN-bus port, 1 RS232/485 port and 1 Ethernet port, which can achieve transparent transmission between CAN-bus and RS232/485. It adopts a wall mounted installation method and can meet the needs of different application sites, further expanding the scope of CAN-bus network.

1.2 Product Features

High performance CPU processing ability

- Using 32-bit Arm Cortex-M7 core CPU
- Up to 400 MHz main frequency

Industrial wide voltage power supply

- Industrial-grade DC9-36V power input
- Anti reverse connection protection

Isolation design

- The CAN/serial port isolation voltage is 2kVAC
- Each port is independent and does not affect each other, and can be configured into different modes and baud rates

High reliability

- External independent hardware watchdog design to prevent crash

Industrial temperature design

- Temperature range -40℃ ~ + 85℃

1.3 Product view

MW-CANET100

1.4 Specification parameters

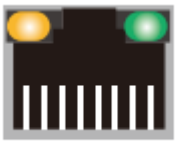
	Model name	MW-CANET100
Power supply	Working voltage	DC9~36V
	Working current	65mA@12V
Ethernet port	Port type	10/100Mbps, supports MDI/MDIX cross connect and dynamic flip
	Isolation	1.5kV isolation

	Model name	MW-CANET100
CAN port	Quantity	One port
	Working method	Normal, loopback, monitoring
	CAN baud rate	5K~1M (bps)
	CAN isolation	2kVAC
	Matching Resistor	Terminal configuration
Serial port	Quantity	One RS232/485
	Isolation	2kVAC
	Baud rate	600~460800(bps)
	Data bit	7,8
	Stop bit	1,2
	Check bit	None,Odd Check,Even Check
Reliability	ESD	±8kV(contact)±15kV(air)
	Surge	Power supply: ± 4kV/common mode, ± 4kV/differential mode CAN port: ± 4kV/common mode, ± 4kV/differential mode Ethernet port: ± 6kV/common mode, ± 4kV/differential mode
	EFT	Power supply: ± 4kV,data port: ± 2kV
Others	Dimension	162x95x29(mm)
	Working environment	-40 ℃~+85 ℃ ,5%~95% RH (no condensation)
	Storage temperature	-40 ℃~+85 ℃ ,5%~95% RH (no condensation)
CAN Bus	CAN ID filtering	Support
	CAN additional functions	CAN to RS232/RS485 conversion
	CAN cache	Sending: 200 complete data packets (per channel); Receive: 200 complete data packets (per channel);
Serial Bus	Serial cache	Sending: 1.5Kbyte; Received: 1.5Kbyte;
	Flow control	Not support
Communication performance	Average transmission delay	<10ms
Network function	Static IP, DHCP	Support
	Network Protocol	ARP,ICMP,UDP,TCP,IP,HTTP,DHCP,DNS
Device management	Button for restoring factory setting	Support
	Firmware upgrade	Support WEB upgrade
	Parameter configuration	Support WEB config

1.5 Interface and indicator light

1.5.1 The Ethernet RJ 45 interface

10Base-T / 100Base-TX adaptive Ethernet RJ 45 interface, supporting automatic MDI / MDI-X connection; the pin distribution refer to the following figure:



The pin number	Signal name
1	Send Data + (TD +)
2	Send Data (-TD-)
3	Receive Data + (RD +)
6	Receive Data -(RD-)
4,5,7,8	Unused

1.5.2 Power interface

Support DC 2.5mm jack port and 2 ways 5.08mm terminals,voltage range DC9∽36V.

DC 2.5mm jack port

2 ways 5.08mm terminals

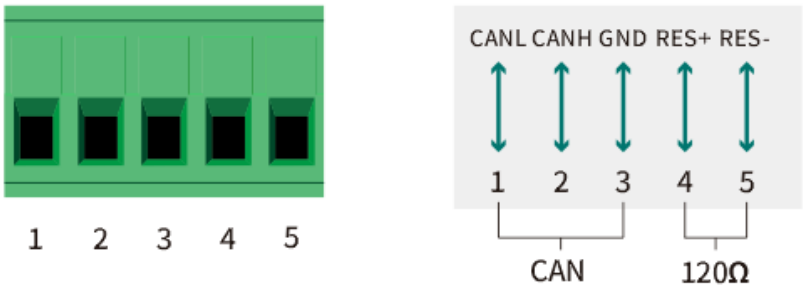
1.5.3 Reboot/Restore Settings Button

Press and release the button within 1 second, the system reboots, the Run light goes out, and the system returns to normal after startup;

Press and hold for more than 5 seconds, and the Run light will flash (every 0.2 seconds). Then release the button, and the parameters will return to original factory settings, and the system will reset;

1.5.4 CAN interface

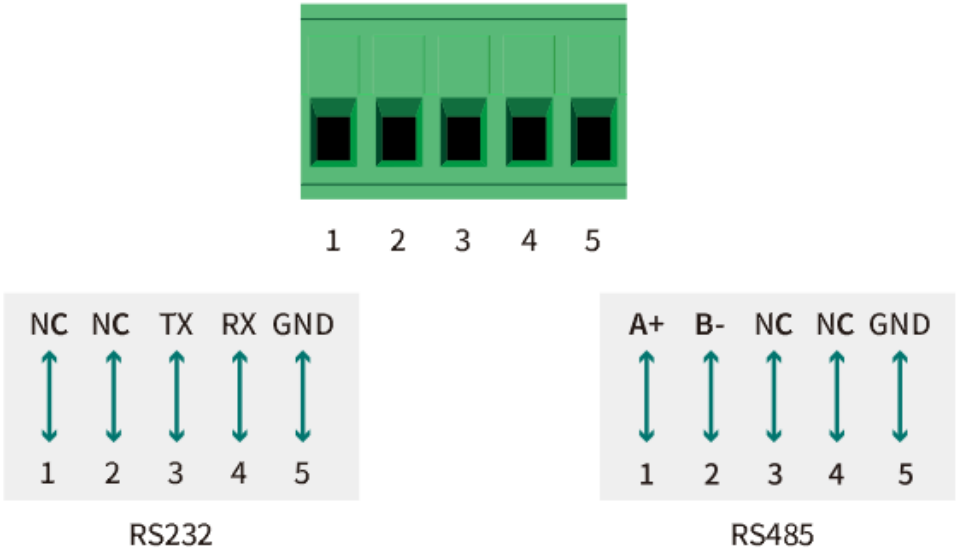
The CAN interface uses 5-way 5.08mm wiring terminals, and the pin distribution refer to the following figure:



By default, the CAN port is not equipped with a terminal matching resistor. When RES+ and RES - are short circuited, this CAN port will be equipped with a 120 ohm terminal matching resistor.

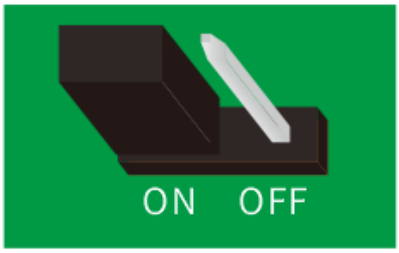
1.5.5 RS232/485 Serial interface

The RS232/485 port uses 5-way 5.08mm wiring terminals, and the pin distribution refer to the following figure:

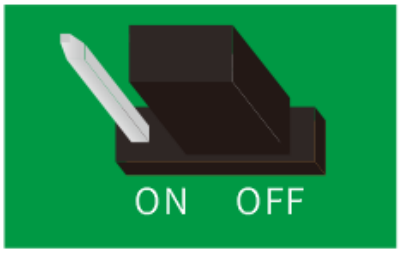


1.5.6 RS485 terminal matching resistor

The terminal matching resistance of 120 Ω was already connected to the RS485 port by factory default. If you need to change the RS485 terminal matching resistance, please open the shell, and the connection status is shown in the following figure.



Resistor is connected



Resistor is not connected

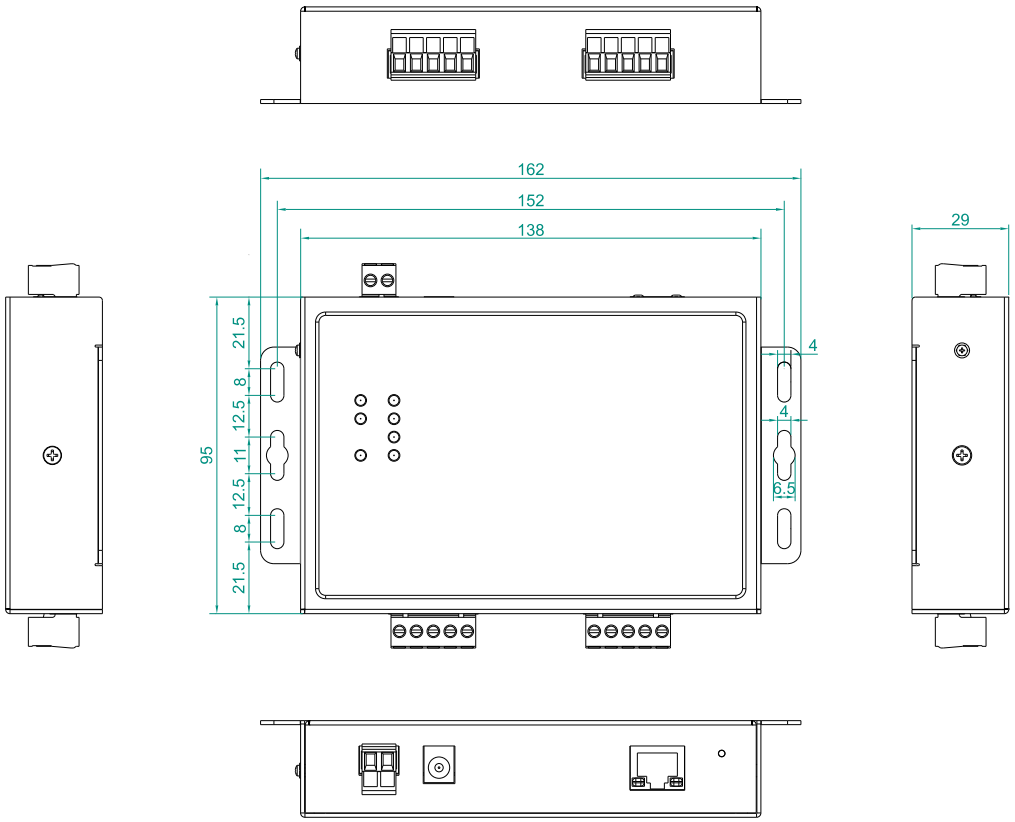
Note:
The matching resistor is connected when jumper cap is inserted on the "ON" side. The matching resistor is not connected when inserted on the "OFF" side.

1.5.7 Indicator light

The detailed status of each indicator light is shown in the following table:

Indicator light	Status	Definition
PWR	On	Power on
	Off	Power off or error
RUN	Blink	The equipment is in normal operation
	On,Off	The equipment is running abnormally
LINK	Blink	The ethernet connection is normal, with data transmission
	On	The ethernet connection is normal and no data transfers
	Off	No ethernet connected, or the connection is abnormal
CAN1	Blink	CAN port is sending and receiving data
	Off	CAN port does not send or receive data
ERR	Blink	CAN communication error
	Off	CAN communication normal
TX	Blink	RS232/485 port is sending data
	Off	No data
RX	Blink	RS232/485 port is receiving data
	Off	No data

1.6 Product Dimension



MW-CANET100 dimension (in mm)

2 Quick Access

The MW-CANET100 CAN converter has a built-in web server, providing a convenient way to access and configure the CAN converter by IE, Firefox, or Google browser.

This chapter is a quick introduction to use the CAN converters. It is recommended that you read this chapter systematically and follow the instructions to gain a basic understanding of the product. For specific functional details and explanations, please refer to subsequent chapters.

2.1 Hardware connection

Figure 2-1 Hardware connection

2.2 Login to WEB

2.2.1 Modifying IP Address

When accessing the CAN converter through the web, the IP addresses of the CAN converter and the PC must be in the same local network, so the IP address of the PC must be modified to ensure that it is in the same local network as the IP of the CAN converter. Please refer to the following steps for Windows:

Start → Control Board → Network and Internet Connection → Network Connection → Local Connection → Properties → Internet Protocol (TCP/IP)

The default IP address of the CAN converter is 192.168.16.253. Set the IP address of the PC to 192.168.16. X (X is any valid value from 2 to 253 except for 253). The specific Windows system operation is shown in Figure 2-2.

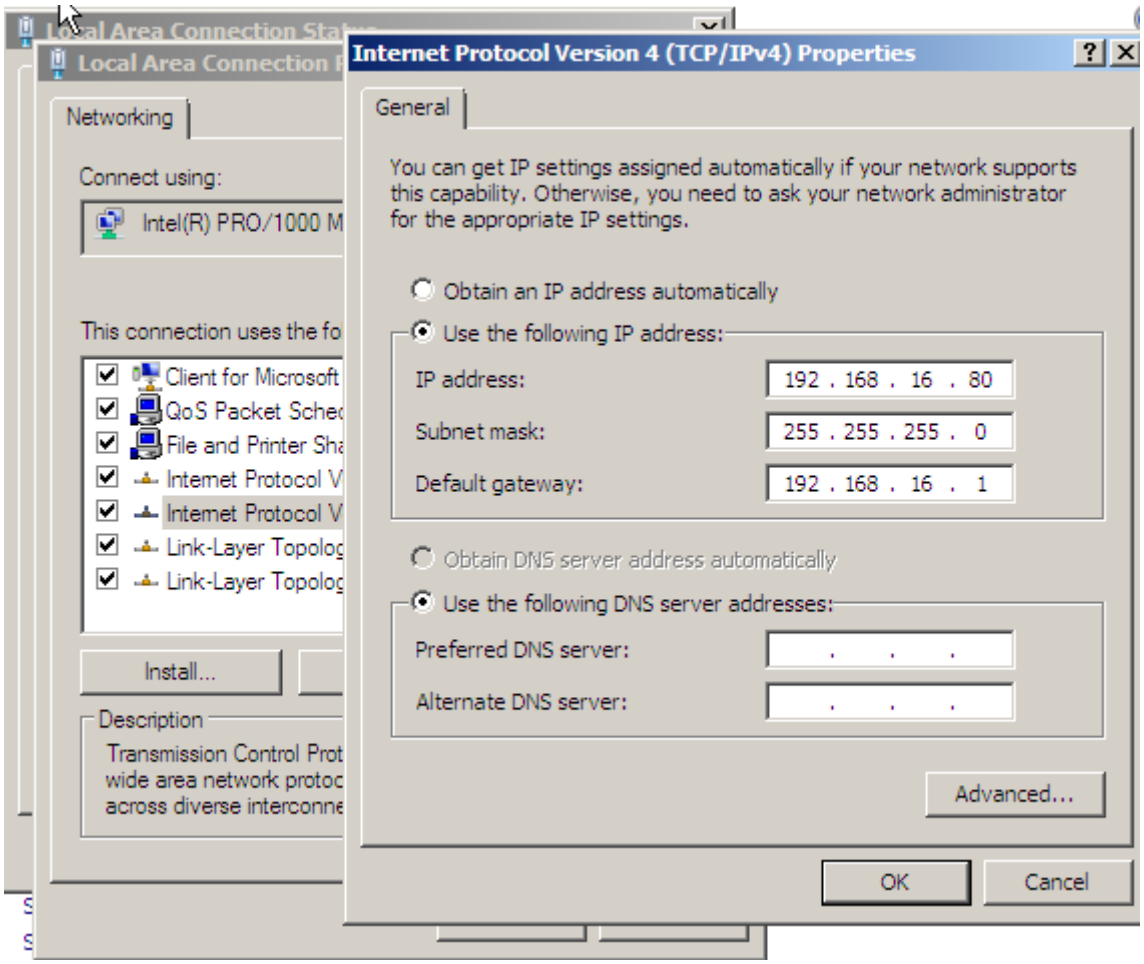


Figure 2-2 IP Setting in Windows

After changing the IP address of the PC, the web page of the CAN converter can be accessed through the default IP address 192.168.16.253, and configuration operations can be performed.

2.2.2 Log in the Web

Open the browser and enter the default IP address of the CAN converter in the address bar, as shown in Figure 2-3.

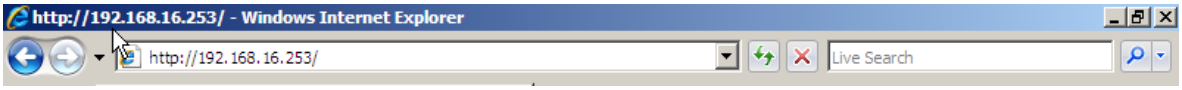


Figure 2-3 Enter the IP address range in the address bar

After clicking the 'return' button, a window will pop up as shown in Figure 2-4, where you can input your username and password.

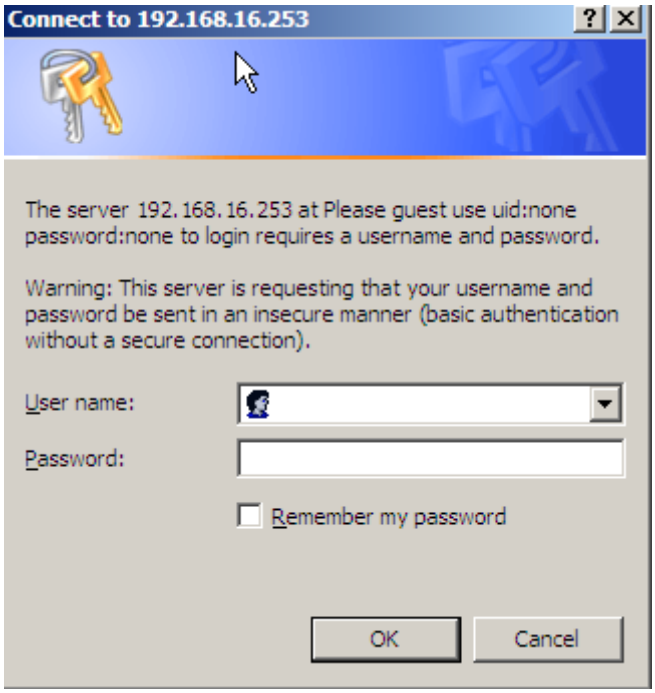


Figure 2-4 Input User Name and Password

There are three types of login users. The first type is a regular username, with both username and initial password of "admin", which is used during normal web access; The second type is a visitor, with a username and password of "none". After logging in, only the current CAN converter configuration can be viewed, and the user cannot enter the configuration; The third type is administrator, with the username "admin" and the password being the last six digits of the MAC address of this CAN converter. When we forget the password of a regular administrator, we can log in to the administrator account and modify the local password.

After entering the username and password, click "OK" and the server will proceed with authentication. Once the authentication is successful, it will enter the main directory of the web server, as shown in Figure 2-5.

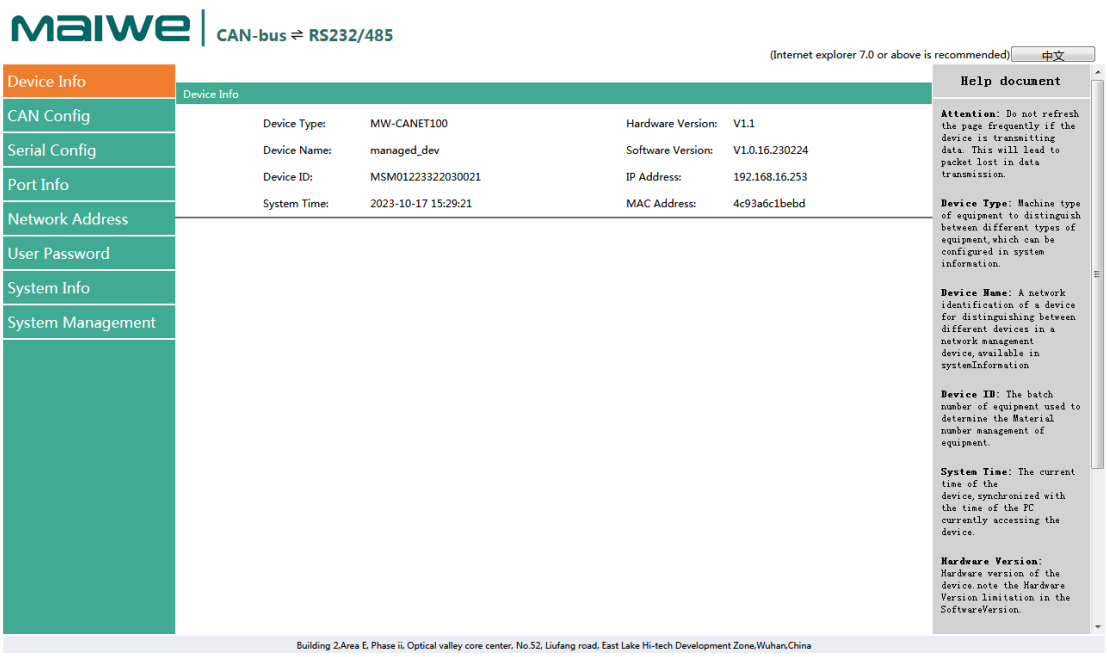


Figure 2-5 Main interface of Web Server

3 Network management function

3.1 Introduction of the main interface

The main interface can be divided into three areas. The upper area displays the logo, the lower left area is the function menu area, the middle area is the main function display area, and the lower right area is the help file area. As shown in Figure 3-1.

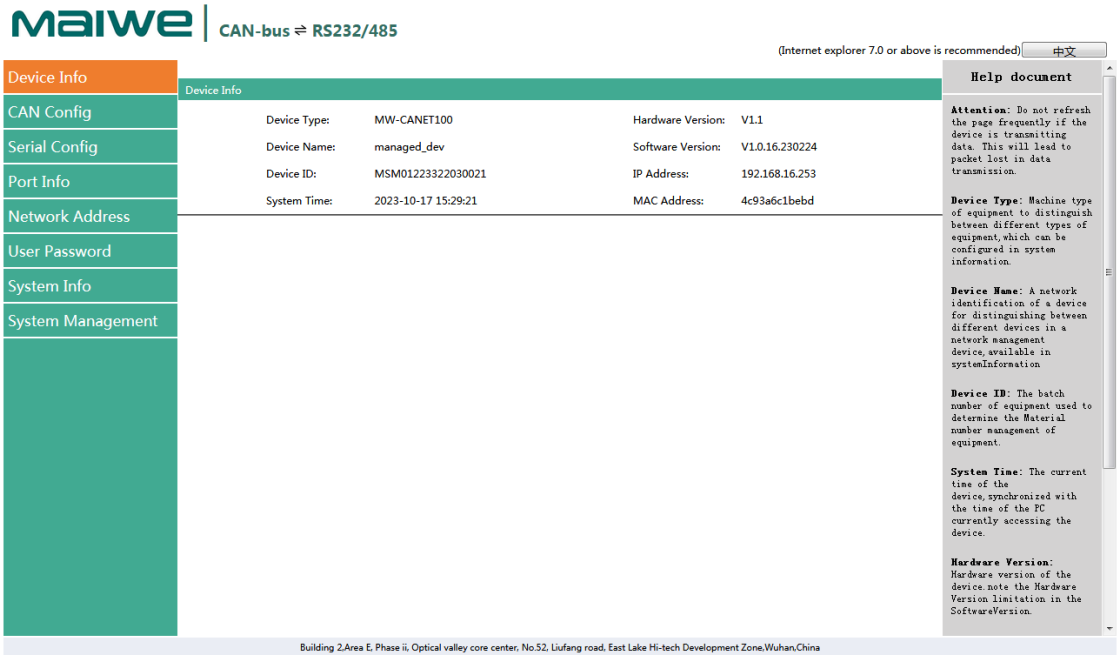


Figure 3-1 Introduction of the Main Interface

3.1.1 Function Menu

On the left side of the screen is the function menu area, which displays all configurable software functions of the CAN converter. The function menus include device information, CAN configuration, serial configuration, terminal port information, network address, user password, system information, and system management. Each function menu contains several sub-functions. As shown in Table 3-1.

Table 3-1 Menu Function Description

Device information	**Device information**	**Display device information, such as name, number, software version, IP address, etc**
CAN configuration	CAN configuration	Configure the basic information of each CAN port, such as the CAN port number

Device information	Device information	Display device information, such as name, number, software version, IP address, etc
	CAN basic parameters	Configure baud rate and CAN mode
Serial port configuration	Serial port configuration	Configure the basic information of each serial port, such as the serial port number
	Serial port parameters	Configure baud rate
Port information	Bus port information	Display the bus port number, and the total number of bus received and sent
Network address	Network address	Configure the method of obtaining IP, IP address, IP mask, default gateway and DNS server address
User and password	User and password	Configure username and password
System information	System information	Configure the device model, device name, etc
System management	Device restart	Device restart function
	Restore factory settings	Restore factory settings function
	Device Upgrade	Device Upgrade function
	Network Records	Transfer logs to a remote UDP server
	Restart the bus port	Soft restart the bus port without restarting the device

3.1.2 Help Files

The area at the bottom right is the help file. Click on the main function file at the bottom left, and the help file will appear in the corresponding lower right functional area of the main file, as shown in Figure 3-2.

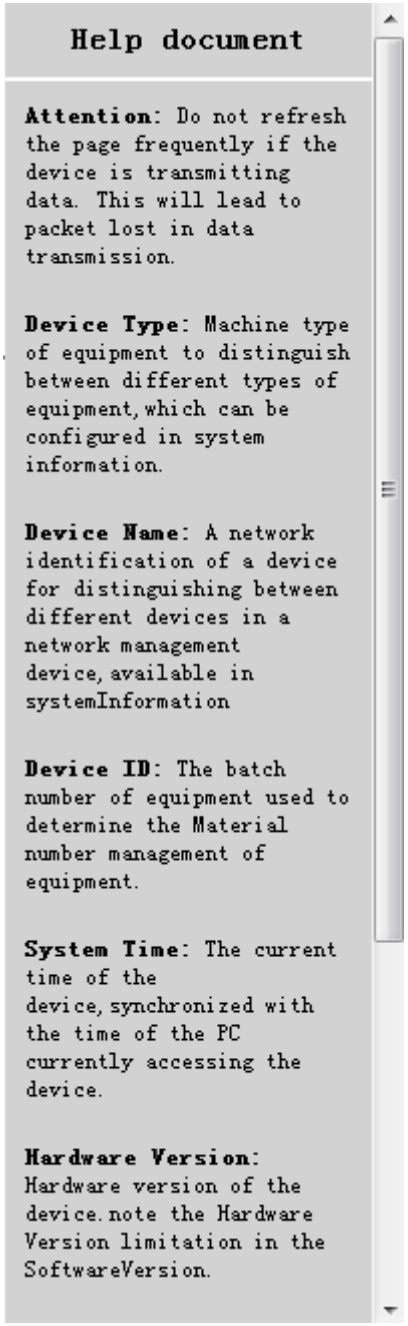


Figure 3-2 Help files

3.2 Device information

The function of the device information section is to display specific information about the current device, including device model, device name, device number, system time, hardware version, software version, IP address, and MAC address. As shown in Figure 3-3.

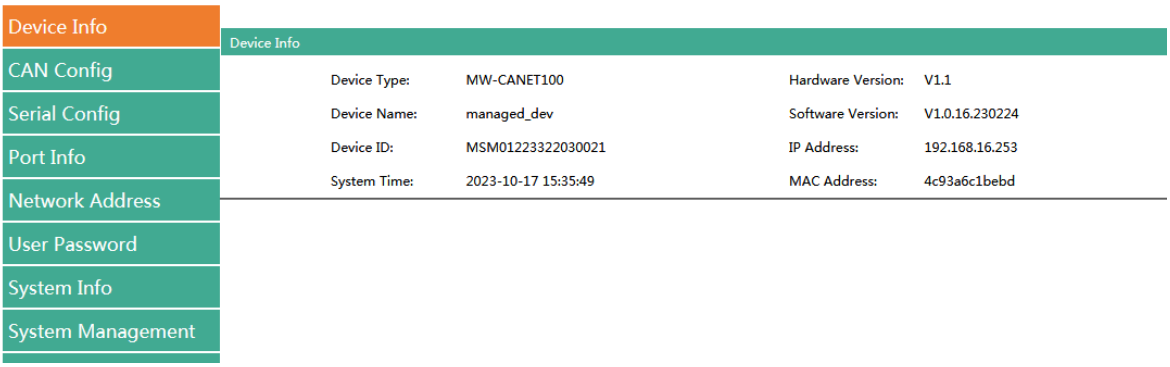
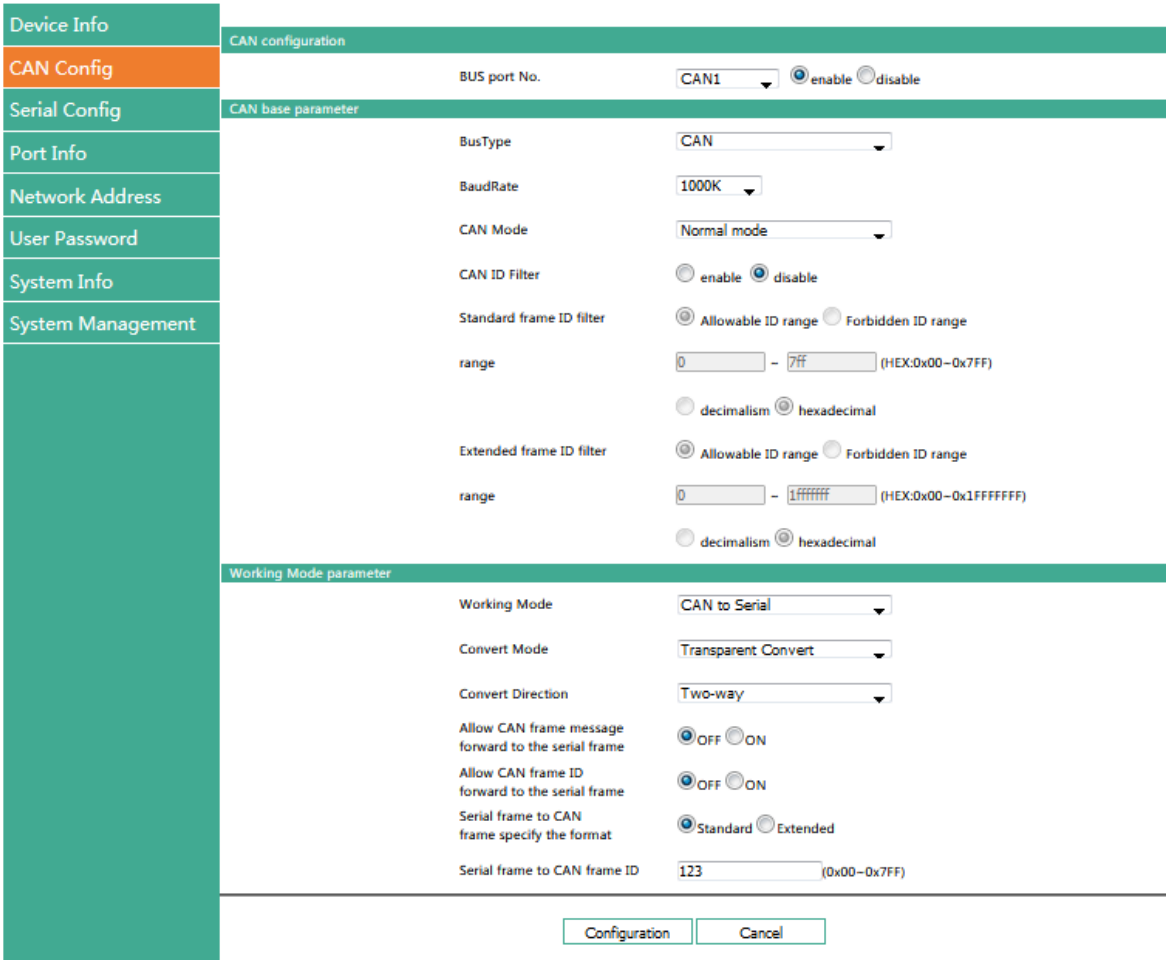


Figure 3-3 Device Information

3.3 Port Configuration

3.3.1 CAN port configuration

The main function of the CAN converter is to convert CAN bus protocol and serial bus data to each other, as shown in Figure 3-4.



The detailed description of the configuration parameters for this domain is shown in Table 3-2.

Table 3-2 Description of the CAN converter configuration parameters

Item	Instruction
Port number	Select the current CAN port to be configured, enable or disable it.
CAN basic parameters	
Bus type	The default is the CAN bus.
Baud rate	The baud rate of CAN communication, in bps, with options such as adaptive, definition, 5K, 10K, 20K, 25K,40K, 50K, 62.5K, 80K, 100K, 125K, 250K, 400K, 500K, 800K, and 1000K. The baud rate of each CAN is independent,setting separately without affecting each other.Support baud rate definition.If the baud rate is not set properly, the device will automatically recover to 1000K.
CAN mode	It is divided into normal mode, loopback mode, and monitoring mode. Normal mode is different from normal communication; Loop back mode and listening mode can be used for bus testing and troubleshooting.
CAN ID filtering	Enable or disable the CAN ID filtering function.
Standard frame ID filtering	The allowed ID range or prohibited ID range, parameter range: 0x00~0x7FF, and web should be filled in hexadecimal format.
Extended Frame ID Filtering	The allowed ID range or prohibited ID range, parameter range: 0x00~0x1FFFFFF, and web should be filled in hexadecimal format.

3.3.2 Serial port Configuration

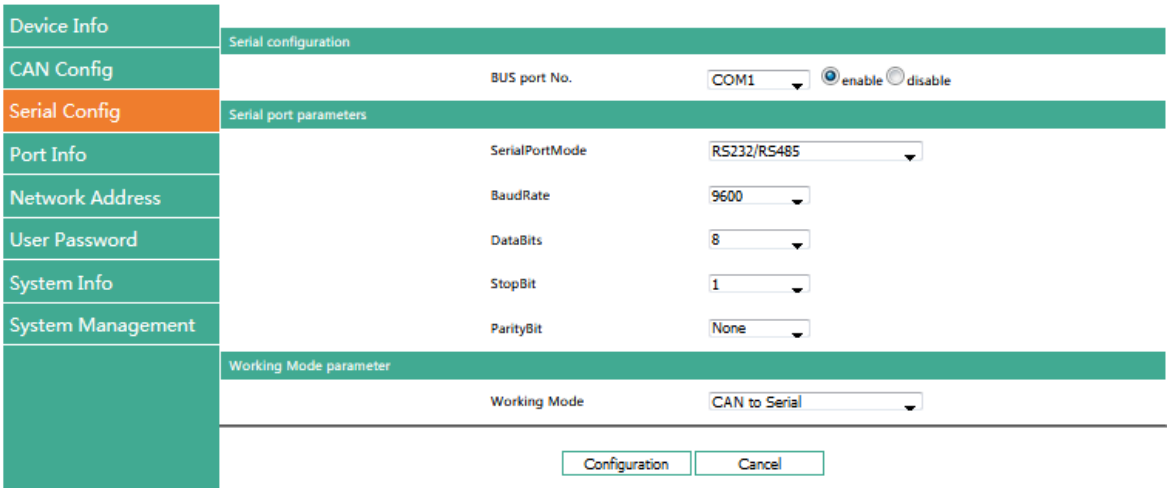


Figure 3-5 Serial port Configuration

The detailed description of configuration parameters is shown in Table 3-3.

Table 3-3 Description of Serial Port Configuration Parameters

Item	Instruction
Serial Port number	Select the current serial port to be configured, enable or disable it.
Serial Port parameters	

Item	Instruction
Serial Port mode	Support RS232/RS485 mode, only one can be selected.
Baud rate	The baud rate of serial communication, in bps, with options of 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400 and 460800.
Verification bit	Choose the verification method, which includes three options: none, odd verification, and even verification. The default setting is none. The verification formulas for each port are also independent, set separately and do not affect each other.
Data bit	Set the effective data bit for serial communication, support 7 and 8 data bits.
Stop bit	Set the stop bit for serial communication, which can be selected as 1 or 2.

3.3.3 CAN Data Format Description

The CAN data format is shown in Figure 3-6.

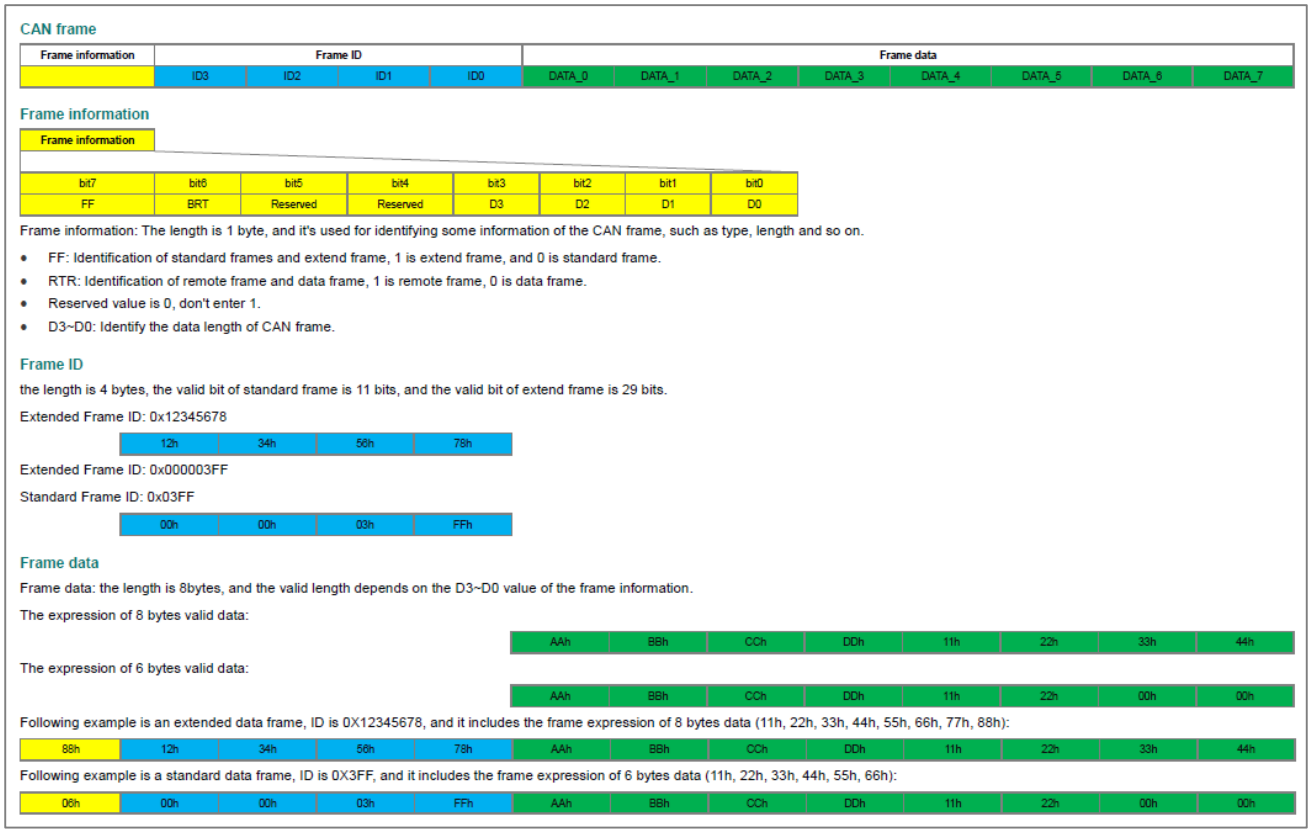


Figure 3-6 CAN Network Data Format

Note:
The fixed 13 bytes in web are transmitted in the format shown in the figure above, and data that does not contain 8 bytes will be supplemented with 0. On the other hand, the variability length in web is the opposite. During transmission, the data is transmitted according to the actual length of data, and there is no need to compensate for 0.

3.3.4 CAN to serial function

The CAN converter provides four conversion modes for selection, including transparent conversion, transparent tape identification conversion, format conversion, and Modbus conversion. When configuring the CAN converter, you can select and set the parameters.

- The meaning of "transparent conversion" is that the CAN converter simply converts bus data from one format to another format without attaching or modifying data. This not only achieves the exchange of data formats without changing the data content, but also makes the CAN converter transparent to the buses at both ends. This method does not increase the communication burden of the system, and it can convert the data in real time as it is, and can handle the transmission of high traffic data.
- "Transparent with identification conversion " is a special method of transparent conversion that does not attach a protocol. This conversion method is based on the common characteristics of common serial frames and CAN messages, allowing these two different bus types to easily form the same communication network. This method can convert the "address" in a serial frame to the frame ID of the CAN message, where the starting position and degree of the serial frame "address" can be configured in the serial frame. Therefore, in this method, the CAN converter can adapt to the definition protocol of the CAN to the maximum extent possible.
- "Format conversion " is the simplest usage mode, with a data format convention of 13 bytes, where a fixed 13 byte frame data corresponds to a CAN message, and the 13 byte content includes CAN information+ID+data. By correctly configuring frame information (the data of the th byte), standard frames, extended frames, and even remote frames can be flexibly sent out. By correctly parsing a 13 byte string frame, the details of standard frames, extended frames, and even remote frames can be obtained.
- The meaning of "Modbus conversion" is to convert the UART data and CAN data of the Modbus protocol. Modbus protocol is a standard application layer protocol that is widely used in various control scenarios. This protocol is open, has strong real-time performance, good communication verification mechanism, and is often suitable for occasions with high communication reliability requirements. The CAN converter uses the standard Modbus RTU protocol format on the serial side, so the CAN converter not only supports the Modbus RTU protocol, but also can directly connect to other devices that support the Modbus RTU protocol. On the CAN side, a simple and easy segmented communication format has been developed to achieve Modbus communication. The CAN converter still plays a role in protocol verification and forwarding, while supporting the transmission of Modbus protocol,but not the master or slave of Modbus.

3.3.4.1 Transparent conversion

In the transparent conversion mode, the CAN converter receives data from one side of the bus and converts it to the other side of the bus. This processing is done in the form of a data stream, which maximizes the speed of the CAN converter and also increases the efficiency of the buffer, as the CAN converter is also converting and sending while receiving, freeing up the buffer that can be received.

(1) Serial frame to CAN message

The entire data of the string frame is sequentially filled into the data domain of the CAN message frame. After the CAN converter detects data on the serial bus, it immediately receives and converts it.

The converted CAN message frame information (frame type part) and frame ID are configured in advance, and the frame type and frame ID remain unchanged during the conversion process. The corresponding format for data conversion is shown in the following figure.

If the frame degree of the received string is equal to or equal to 8 bytes, sequentially fill characters 1 to n (n represents the frame degree of the string) into the data field of the CAN message at positions 1 to n bytes (as shown in Figure 3-7 where n is 7).

If the number of bytes in a string frame is greater than 8, the processor starts with the first character in the string frame and fills the data field of the CAN message with the eighth character in sequence. After sending the data to the CAN bus, convert the remaining string frame data to fill the data field of the CAN message until its data is completely converted.

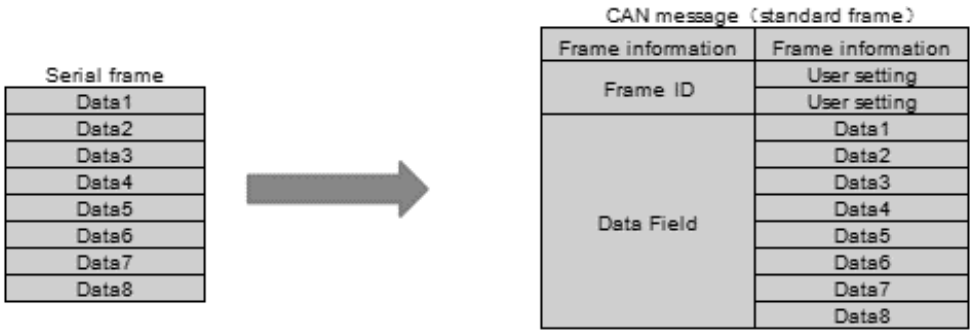


Figure 3-7 Serial Frame to CAN Message (Transparent Conversion)

(2) CAN message to serial frame

For CAN bus messages, they are also forwarded as soon as they receive a frame. The corresponding data format is shown in Figure 3-8.

During conversion, all data in the CAN message data domain is sequentially converted into a string frame. If "Conversion" is selected for the "Frame Information Conversion Enable" option during configuration, the CAN converter will directly fill the "Frame Information" byte of the CAN message into a string of frames. If the "Frame ID Conversion Enable" option is selected as "Conversion", then all the "Frame ID" bytes of the CAN message will also be filled in the corresponding frame.

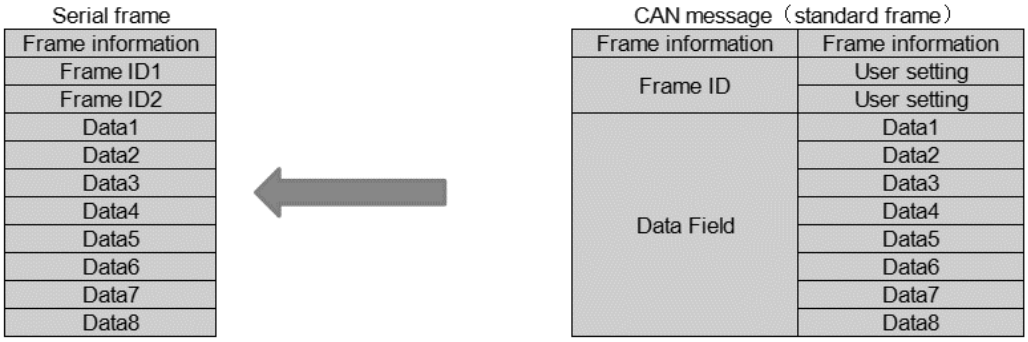


Figure 3-8 CAN message to serial frame (transparent conversion)

Example of conversion

(1) Serial frame to CAN message

Assuming that the configured conversion to CAN message frame information is "standard frame" and frame ID is 0x0060, the conversion format is shown in Figure 3-9.

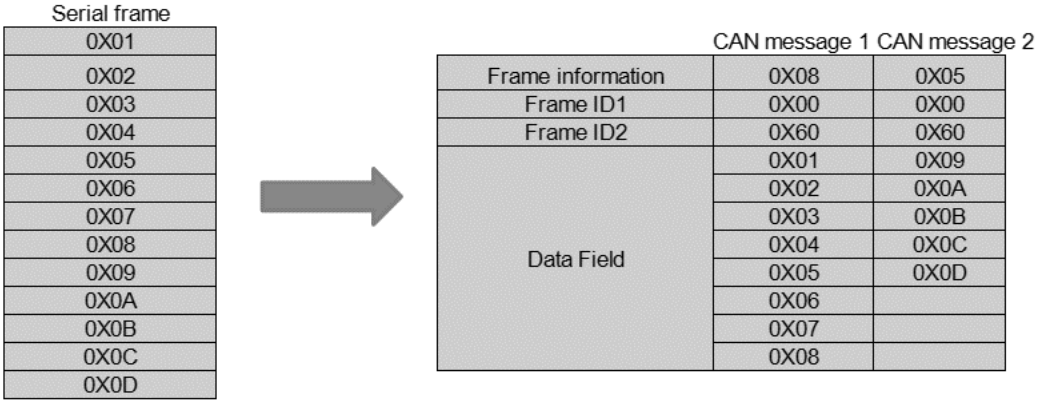


Figure 3-9 Serial Frame to CAN Message (Transparent Conversion)

(2) CAN message to serial frame

Assuming that the configuration is configured for CAN message 'frame information' conversion, 'frame ID' is not converted. The CAN message and converted serial frames are shown in Figure 3-10.

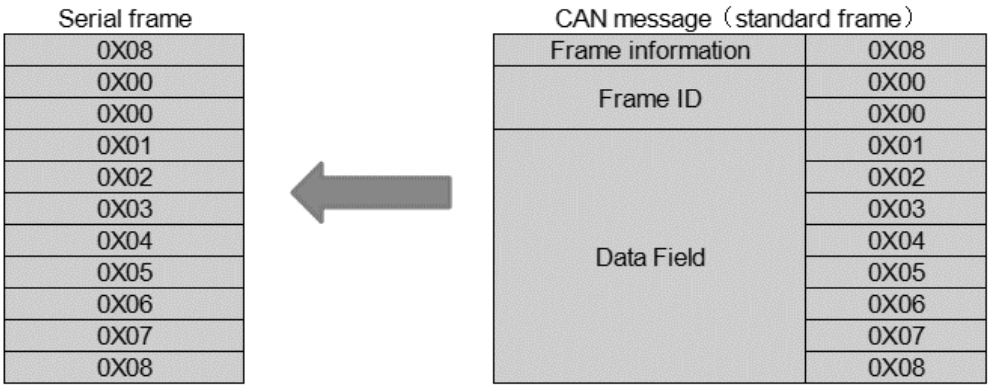


Figure 3-10 CAN message to serial frame (transparent conversion)

3.3.4.2 Transparent with identification conversion

Transparent with identification conversion is a special method of transparent conversion, which is beneficial for users to easily form their own network through CAN converters and use specific protocols. This method dynamically converts the address information in the string frame into the frame ID of the CAN bus. As long as the CAN converter is informed in the configuration of the starting position and degree of the address in the serial frame, the CAN converter extracts this frame ID and fills it in the frame ID field of the CAN message during conversion, as the ID of the CAN message during the forwarding of the serial frame. When converting CAN messages into serial frames, the ID of the CAN message is also converted to the corresponding position in the serial frame.

Note:
In this conversion mode, the "CAN ID" of the "CAN Parameters" item in the configuration software is invalid, as the identifier (frame ID) sent at this time is filled with data from the aforementioned string frames.

1. Serial bus frame

When converting with identification, it is necessary to obtain a complete string data frame, and the CAN converter divides the frames based on the time interval between the two frames. And this interval can be set by the user. The maximum length of a string frame is the length of the buffer: 1500 bytes. The CAN converter detects data in the idle state of the serial bus as characters of the received frame. The time interval between characters in the frame during transmission must be greater than or equal to the time for transmitting n characters (the value of n is pre configured by the upper computer) (the time for transmitting n characters is divided by the corresponding baud rate based on the number of bits contained in the character). If no characters are received by the CAN converter within a transmission time equal to n characters after receiving 12032; characters, the CAN converter considers the transmission of this frame to be completed and takes this character as the last 12032; character of this frame; The characters after n characters do not belong to this frame, but are the content of the next frame. The frame format is shown in Figure 3-11.

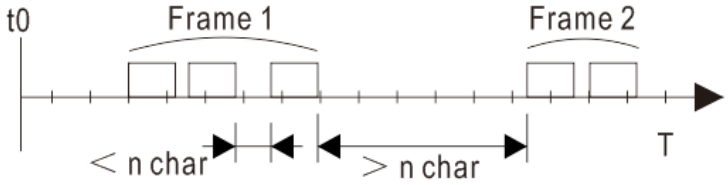


Figure 3-11 Frame Format

2. CAN bus frame

The format of the CAN message remains unchanged, but the corresponding frame ID of the CAN will also be converted into a string frame.

(1) Serial frame to CAN message

The starting address and length of the CAN identification carried in the string frame can be set by configuration. The starting address range is 0-7, and the length range is 1-2 (standard frame) or 1-4 (extended frame).

During conversion, all CAN frame IDs in the string frame are converted into the frame ID field of the CAN message according to the previous configuration (using the method stored on the client end. If the number of frame IDs carried is less than the number of frame IDs in the CAN message, the low byte of the frame ID in the CAN message is filled with 0), and other data is sequentially converted, as shown in Figure 3-12.

If the serial frame data of the CAN message is not fully converted, the same ID will still be used as the frame ID of the CAN message to continue conversion until the serial frame conversion is completed.

Serial frame

Address 0	Data 1
Address 1	Data 2
Address 2	Data 3
Address 3	Data 4 (CAN ID1)
Address 4	Data 5
Address 5	Data 6
Address 6	Data 7
Address 7	Data 8
...	...
Address(n-1)	Data n

	CAN message1	CAN message...	CAN message X
Frame information	User setting	User setting	User setting
Frame ID1	0x00	0x00	0x00
Frame ID2	Data 4 (CAN ID1)	Data 4 (CAN ID1)	Data 4 (CAN ID1)
Data Field	Data 1	Data...	Data n-3
	Data 2	Data...	Data n-2
	Data 3	Data...	Data n-1
	Data 5	Data...	Data n
	Data 6	Data...	
	Data 7	Data...	
	Data 8	Data...	
	Data 9	Data...	

Figure 3-12 CAN message to serial frame (transparent with identification conversion)

(2) CAN message to serial frame

For CAN messages, as soon as a frame is received, it is forwarded. Each time the frame is forwarded, the ID in the received CAN message is also converted based on the position and length of the pre configured CAN frame ID in the string frame. Other data is forwarded in sequence, as shown in Figure 3-13.

Note:
Whether it is a serial frame or a CAN message, its frame format (standard frame or extended frame) should comply with the pre configured frame format requirements when it is applied, otherwise it may cause communication to be unsuccessful.

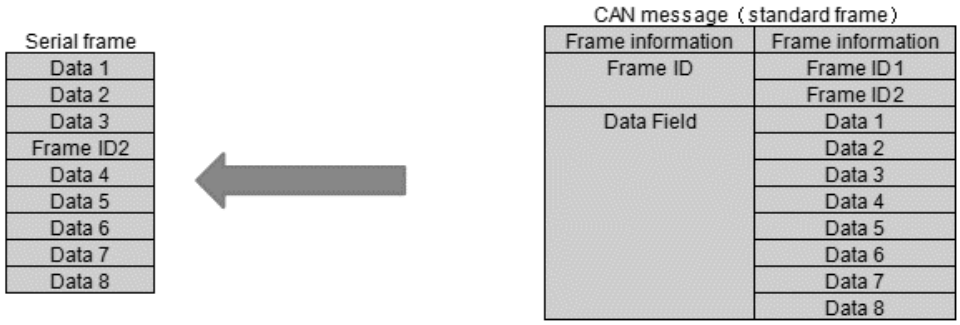


Figure 3-13 CAN message to serial frame (transparent with identification conversion)

Example of conversion:

(1) Serial frame to CAN message

Assuming that the starting address of the CAN identifier in the string frame is 0 and the length is 3 (in the case of extended frames), the string frame is converted into a CAN message as shown in Figure 3-14, where two CAN messages have the same ID for conversion.

Serial Frame:

Address 0	CAN Frame ID1
Address 1	CAN Frame ID2
Address 2	CAN Frame ID3
Address 3	Data 1
Address 4	Data 2
Address 5	Data 3
Address 6	Data 4
Address 7	Data 5
Address 8	Data 6
Address 9	Data 7
Address 10	Data 8
Address 11	Data 9
Address 12	Data 10
Address 13	Data 11
Address 14	Data 12

CAN Message:

	CAN Message 1:	CAN Message 2:
Frame information	0x88	0x85
Frame ID	0x00	0x00
	CAN Frame ID1	CAN Frame ID1
	CAN Frame ID2	CAN Frame ID2
	CAN Frame ID3	CAN Frame ID3
Data Field	Data 1	Data 9
	Data 2	Data 10
	Data 3	Data 11
	Data 4	Data 12
	Data 5	
	Data 6	
	Data 7	
	Data 8	

Figure 3-14 Example of converting serial frames to CAN messages (transparent with identification conversion)

(2) CAN message to serial frame

Assuming that the configured CAN identifier has a starting position of 0 and a length of 3 (in the case of extended frames) in the serial frame, the conversion between CAN messages and serial frames is shown in Figure 3-15.

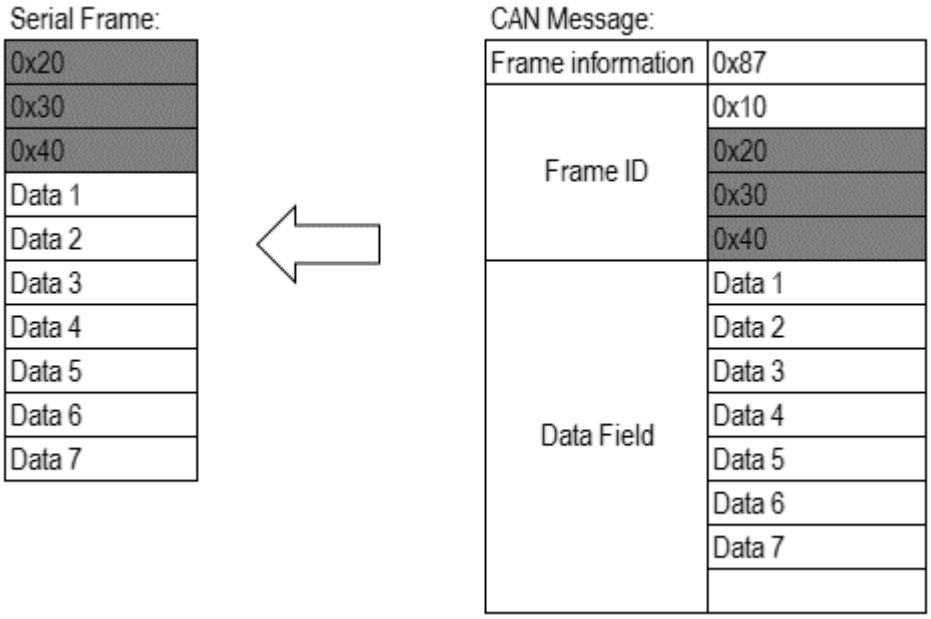


Figure 3-15 Example of CAN message to serial frame conversion (transparent with identification conversion)

3.3.4.3 Format conversion

As stated in "CAN Data Format Description" above, each CAN frame contains 13 bytes, including CAN information+CANID+data.

In this mode, it is important to strictly follow the 13 byte string data format to successfully convert. Firstly, it is necessary to ensure that the frame information is correct, the reserved bit should be 0, and the data accuracy should not exceed 8, otherwise it will not be converted.

Each frame is fixed at 13 bytes, and if not, 0 must be filled in. The string data in the same string data frame with a full 13 byte format corresponds to one CAN message, and the string data frame without a full 13 byte format is not converted. So it is necessary to ensure that the converted string data frame is in 13 bytes.

During the process of converting a string data frame to a CAN message, if a segment of 13 bytes in a string data frame is in an non-standard format, the 13 bytes will not be converted, and then the converted data will be processed. If some CAN messages are found missing after conversion, please check if the 13 byte string data format of the corresponding message conforms to the standard format.

3.3.4.4 Modbus mode

Note:
The Modbus conversion function can only be enabled when the CAN bus device alarm is editable.

Modbus protocol is a standard application layer protocol that is widely used in various control scenarios. This protocol is open, has strong real-time performance, good communication verification mechanism, and is often suitable for occasions with high communication reliability requirements. The CAN converter uses the standard Modbus RTU protocol format on the serial

side, so the CAN converter not only supports the Modbus RTU protocol, but also can be directly connected to other devices that support the Modbus RTU protocol.

On the CAN side, a simple and easy segmented communication format has been developed to achieve Modbus communication. The CAN converter still plays a role in protocol verification and forwarding, and supports the transmission of Modbus protocol. It is not a master or slave of Modbus, but can communicate according to Modbus protocol.

1. Serial bus frame

The serial connection adopts the standard Modbus RTU protocol, so each frame can comply with this protocol. If the transmitted frame does not comply with the Modbus RTU format, the CAN converter will discard the received frame and not convert it. The Modbus RTU transmission format used by the CAN converter is 1 start bit, 8 data bits, and 1 stop bit. The maximum frame size of Modbus RTU is the buffer size: 2048 bytes.

2. CAN bus frame

If the device on the CAN side adopts the Modbus protocol, a reliable transmission format needs to be defined for it. This is achieved using a segmented protocol, which defines a method of segmenting and reassembling information larger than 8 bytes in length. The development of segmented transmission protocol refers to the transmission protocol of segmented messages in DeviceNet. The segmented message format is shown in Table 4.1 (taking extended frames as an example, standard frames only have different degrees of frame ID, and other formats are the same). The transmitted Modbus protocol content can start from "data 2" bytes. If the protocol content is less than 7 bytes, the remaining protocol content will continue to be converted according to this segmented format until the conversion is completed.

The CAN bus frame format is explained as follows:

	7	6	5	4	3	2	1	0
Frame Information	FF	RTR	x	x	DLC (data length)			
Frame ID1	x	x	x	ID.28—ID.24				
Frame ID2	ID.23—ID.16							
Frame ID3	ID.15—ID.8							
Frame ID4	ID.7—ID.0							
Data1	Segmented Identification	Segmented type	Segmented counter					
Data2	Character 1							
Data3	Character 2							
Data4	Character 3							
Data5	Character 4							
Data6	Character 5							
Data7	Character 6							
Data8	Character 7							

Figure 3-16 CAN Bus Frame Format (CAN to Modbus)

- Segment Report Flag: Indicates whether the report is a segmented report. This bit is a separate message from the 0 table, indicating the frame in the segmented message that

belongs to the table. (When the CAN message is a single frame, the framing flag bit value is 0x00)

- Segment Type: Indicates whether it is the first, middle, or last segment. Its definition is shown in Figure 3-17:
- Segment counter: The flag of each segment, the sequence number of that segment in the entire message. If it is the first segment, then the value of the counter is. This way, when receiving, it can verify whether any segments have been lost.

Position	Definition	Note
0	The first one is not segmented	If the segment counter contains value 0, then it is the first segment of this segment series
1	The middle segment	It indicates it is a middle segment
2	The last segment	It indicates it is the last middle segment

Figure 3-17 Segment Type Bit Values

Conversion formula

During the process of serial to side CAN side conversion, the CAN converter will only perform the conversion after receiving the complete and correct Modbus RTU, otherwise it will not operate.

As shown in the figure below, the address domain of the Modbus RTU protocol is converted into ID4 (extended frame) and ID2 (standard frame) of the frame ID in the CAN message, and the identification remains unchanged during the conversion process of this frame. The CRC verification byte is not converted to the CAN message, and the CAN message does not need to have a serial frame verification byte, as the CAN bus already has a good verification mechanism.

The conversion involves the function code and address field of the Modbus RTU protocol, which are sequentially converted into the data field of the CAN message frame (starting from the first data byte, where the second data byte is used by the segmentation protocol). However, the degree of the Modbus RTU frame varies depending on the function code. The CAN message frame can only transmit 7 data, so the CAN converter will segment the larger Modbus RTU frames into CAN messages, which will be sent out using the aforementioned CAN segmentation protocol. When receiving on a CAN node, simply take the function code and data domain for processing.

For the Modbus protocol data of the CAN bus, cyclic redundancy check (CRC16) is required. The CAN converter receives it according to the segmented protocol, and after receiving the frame analysis, it automatically adds cyclic redundancy check, which is converted into Modbus RTU frames and sent to the serial bus.

If the received data does not comply with the segmentation protocol, the set of data will be discarded and not converted.

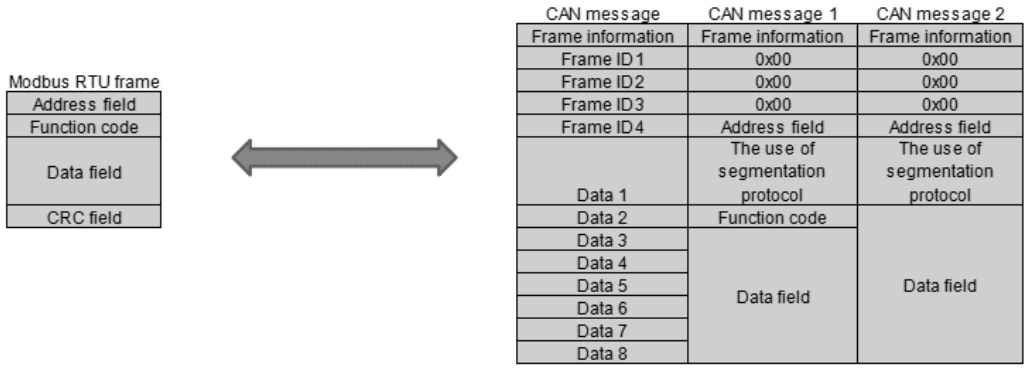


Figure 3-18 CAN to Serial Modbus

Example of conversion:

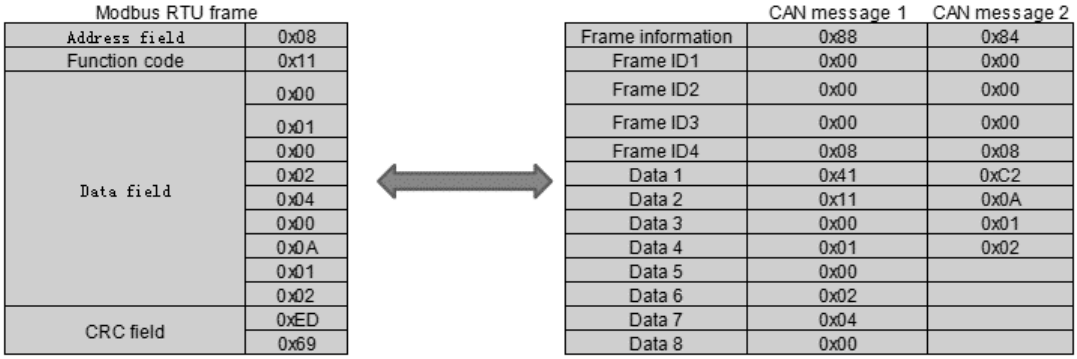


Figure 3-19 Example of CAN to Serial Modbus

3.3.4.5 Conversion direction

1. Bidirectional: The CAN converter converts data from the serial bus to the CAN bus, and also converts data from the CAN bus to the serial bus.
2. Only serial to CAN: Only converts data from the serial bus to the CAN bus, and does not convert data from the CAN bus to the serial bus.
3. Only CAN to serial: Only convert data from CAN bus to serial bus, without converting data from serial bus to CAN bus.

Note:
By selecting the direction of conversion, data interference on the bus side that does not require conversion can be eliminated.

Notice:

- 1. Terminal numbers 80, 4500, 4800, 57050, 57051, 57850, and 57851 have already been enabled by the system. When configuring network terminal numbers, do not use them repeatedly.
- 2. This device and the peer CAN device must have the same baud rate.

- 3. When it is necessary to frequently use frame data or have high requirements for data transmission, please adjust the baud rate and transmission interval appropriately to prevent the phenomenon of garbled code or packet loss caused by slow CAN speed.
- 4. When configuring the device, it should be ensured that the external CAN device stops sending data to the CAN converter to avoid garbled code.
- 5. When in CAN to Serial mode, the baud rates of CAN and serial should match each other. This mode is not suitable for applications with high data volume and fast speed.

3.4 Port information

3.4.1 Bus port information

The bus port information displays the current transmission and reception statistics of the CAN terminal and the serial terminal, as shown in Figure 3-20:

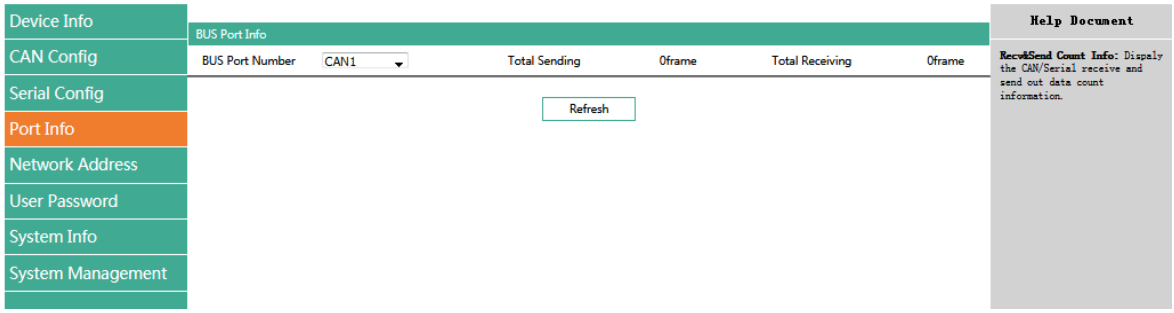


Figure 3-20 Port Information

3.5 Network address

The network address includes: the IP address of the network, network mask, and default gateway.

3.5.1 Network address

The purpose of this function is to assign a specified IP address to the CAN converter. The default IP address for CAN converter output is 192.168.16.253. The network address configuration is shown in Figure 3-21.

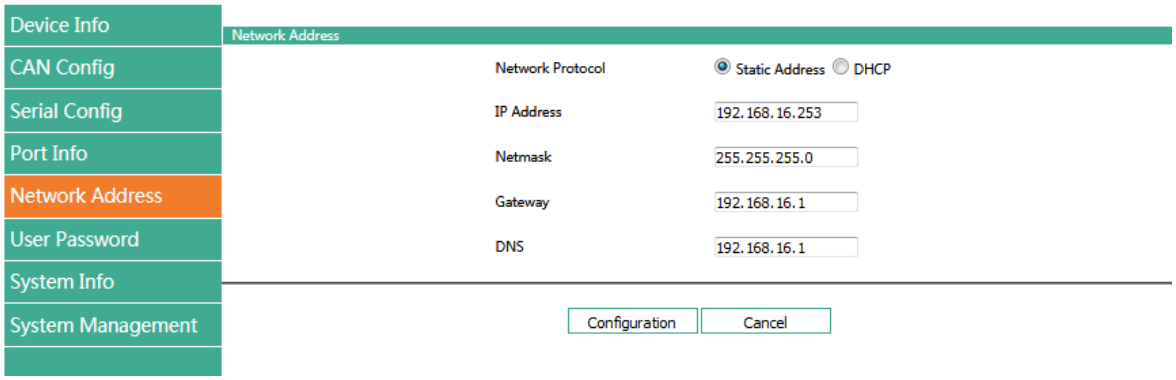


Figure 3-21 Network Address

After modifying the address settings, you need to click the "Configure" button to submit the CAN converter and switch to a waiting state as shown in Figure 3-22.

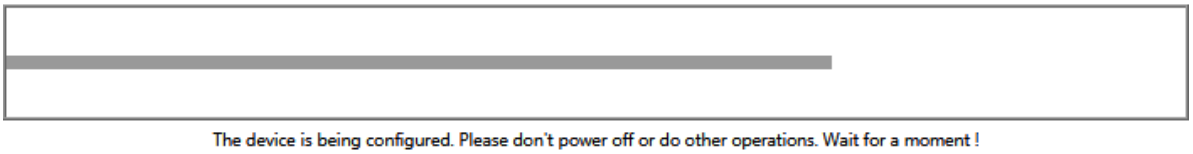


Figure 3-22: Figure of the waiting boundary after modifying the address

After the progress bar in the drawing is completed, the CAN converter restarts the web server and the user needs to log in again.

Notice:

- 1. When waiting for an IP address after configuring it, do not power off or perform other operations to avoid IP address modification failure.
- 2. The configured IP address and default gateway need to be within the same domain.
- 3. If the device uses DHCP to obtain the IP address, after the device restarts, the user needs to use our company's network management assistance to search for the device in order to accurately know the new IP address of the device.

3.6 User password

The password module is mainly used to modify web login passwords.

3.6.1 User password

The CAN converter provides three different permissions. The first type is a visitor, which can only view the current various configurations of the device, but cannot modify the configuration. The username and password are both "none" and cannot be modified; The second type is a regular user, which can configure various functional parameters of the device. The device name is "admin" and cannot be modified. The initial password is "admin" and can be modified locally;

The third type is the administrator, who has the most privileges. At the same time, when forgetting the password of a regular user, the administrator can log in and change the password of the local machine. The user name is fixed to "admin", and the password is the last six digits of the local MAC address. (If you do not know the local MAC address, you can first log in as a guest to view it)

The login password must be legal characters, consisting of 4-12 English characters (case sensitive) and numbers. When changing the password, you need to enter it twice and ensure that

The password entered twice is the same. As shown in Figures 3-23.

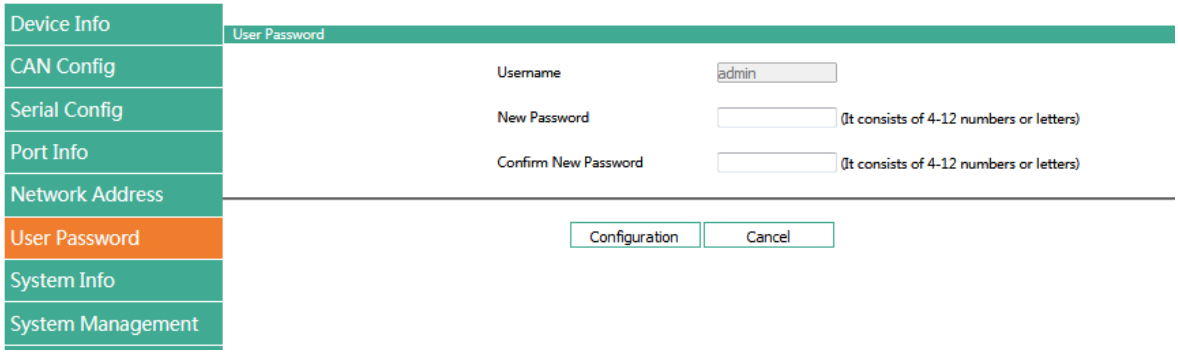


Figure 3-23 User Password

3.7 System information

The system information includes the configurable of model, name, and number of devices, as shown in Figure 3-24.

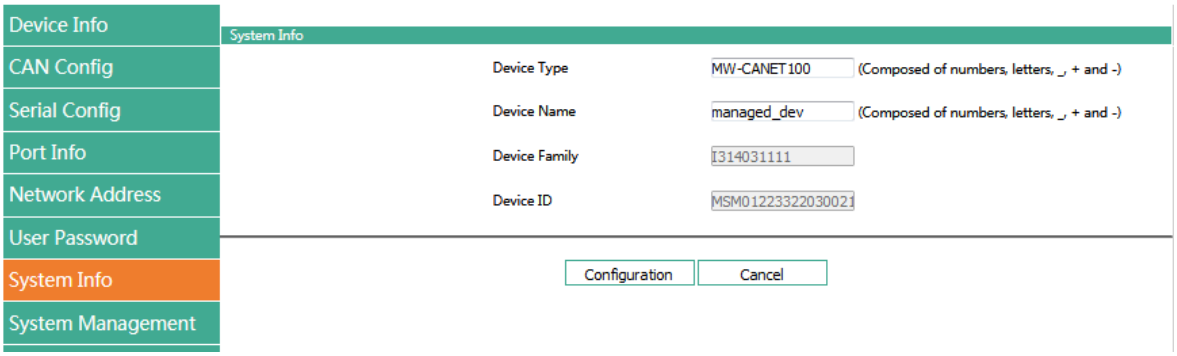


Figure 3-24 System Information

3.8 System management

This manual allows for some system operations on the CAN converter, including device restart, configuration recovery, and device upgrade. It is recommended that users use caution, as improper operation may damage the CAN converter. As shown in Figure 3-25.

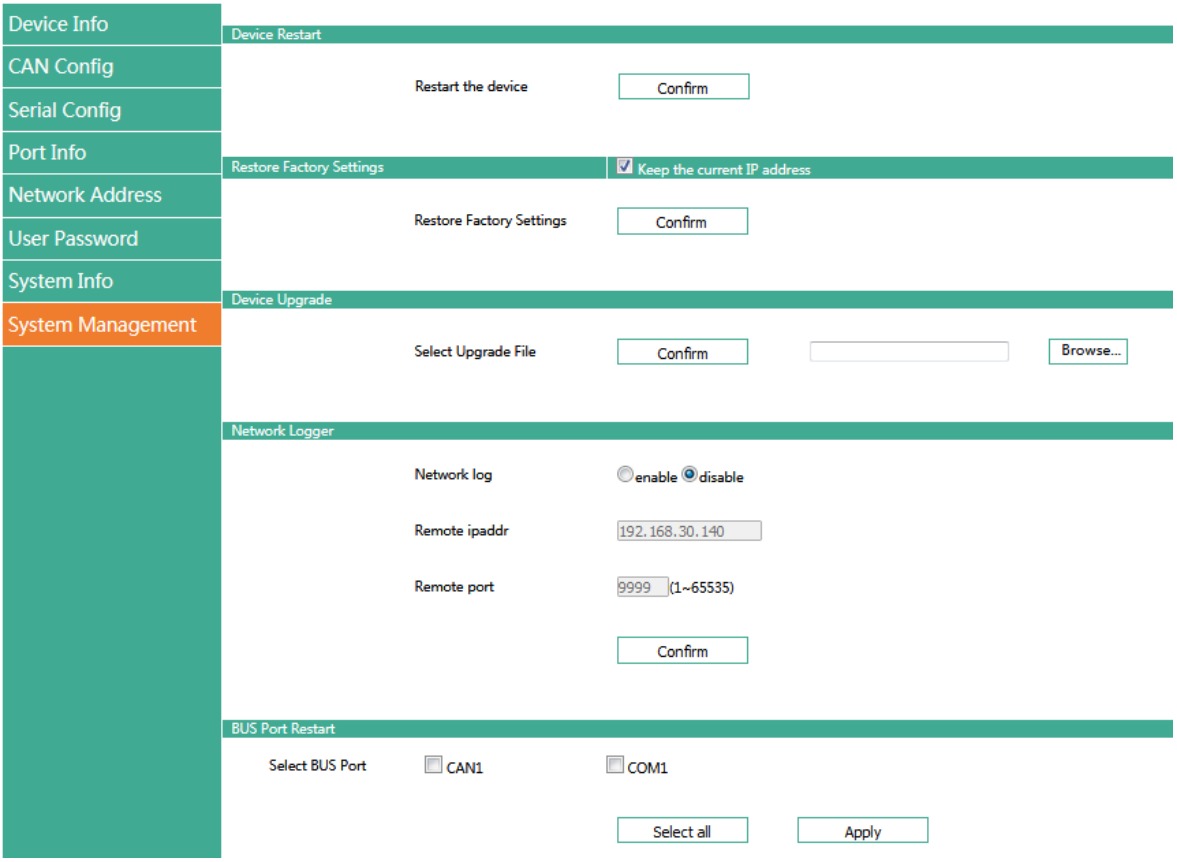


Figure 3-25 System Management

- Device restart: This function is applicable to software restart of the CAN converter. Before the CAN converter is completely restarted, the device will not function and cannot forward any data packets. This restart is different from the hardware reset of power-on restart, only the CAN converter system software reset, just like the "hot start" of the Windows operating system. The most significant benefit of this feature is that it provides a remote restart function for the CAN converter, which can be remotely restarted as long as the CAN converter can be remotely accessed. Click the "OK" button, and a prompt box will pop up, as shown in Figure 3-26. Click "OK" to jump to the screen and wait for the progress bar in the screen to be read. After that, the CAN converter will restart and complete.

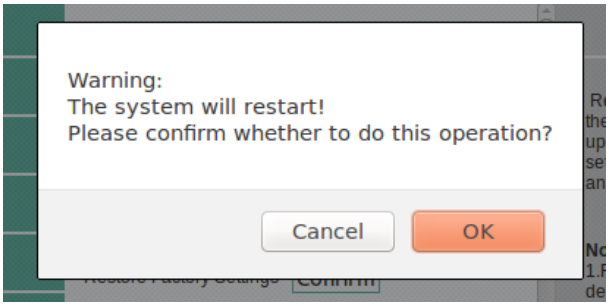


Figure 3-26 Warning message for device restart

- Device restore to factory configuration: This function is used to restore the CAN converter to normal settings, while also manually restarting the CAN converter. Before the CAN

converter is successfully restarted, this CAN converter will not function and cannot forward any data packets. This function is used to restore the default configuration value of the CAN converter to normal operation when an incorrect parameter is set by the user. There is a "Keep Current IP Address" option on the right side. When checked, the current IP address will be retained. If unchecked, the IP address will also be restored to the default address: 192.168.16.253. Click the "OK" button, and a prompt box will pop up, as shown in Figure 3-27. Click "OK" to jump to the screen. Wait for the progress bar in the screen to be read, and the CAN converter will restore its configuration.

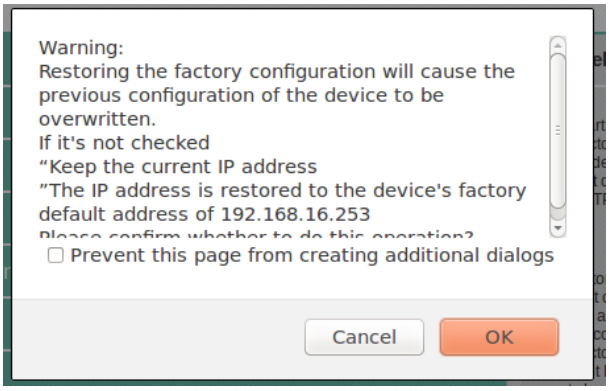


Figure 3-27 Warning message for device recovery configuration

- Device upgrade: This feature is based on a system upgrade of the software for the CAN converter. Users can obtain the upgrade program for the CAN converter through email or our company's website. Please pay attention to the matching of device model and version, as mismatched upgrade programs will result in upgrade failure. After obtaining the upgrade program, click the "Browse" button to select the upgrade program, and then click the "OK" button. A prompt box will pop up, as shown in Figure 3-28. Click "OK" to jump to the screen. Wait for the progress bar in the screen to be read, and the CAN converter software upgrade will be completed.

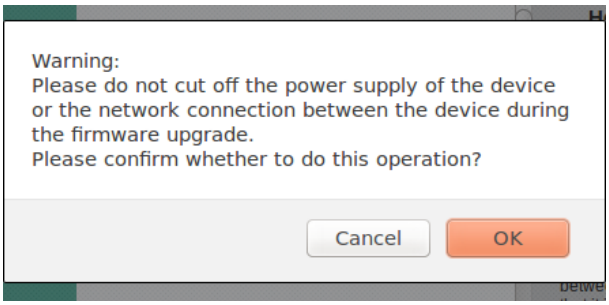


Figure 3-28 Warning message for device system upgrade

- Network log: This function is used to transmit the operation data of the CAN converter to a remote UDP server using the UDP protocol. You need to specify the IP address and remote endpoint of the remote UDP server.
- Restarting the bus port: This function is suitable for soft restarting a single or all ports without restarting the CAN converter device.

Notice:

- 1. Restoring will cause all configurations of the device to be restored to the state they were just released. If you want to retain the IP, please check the "Keep Current IP Address" on the right, otherwise the IP address of the device will also be restored to the default configuration 192.168.16.253.
- 2. Do not upgrade the device casually. When the device needs to be upgraded, it is necessary to first confirm that the upgrade component is correct, otherwise it may damage the software of the device and cause device failure.
- 3. Do not operate the device during the upgrade process. Do not click on the device WEB button. If the upgrade is interrupted due to incorrect operation, please restart the device and try again;
- 4. The entire upgrade process does not allow power outages, which may cause permanent damage to the equipment. If the upgrade is interrupted, please mail the product to our company for possible solutions.
- 5. Setting data device restart parameters should avoid using the Chrome 68 version of the music browser, otherwise there may be issues that cannot be responded.