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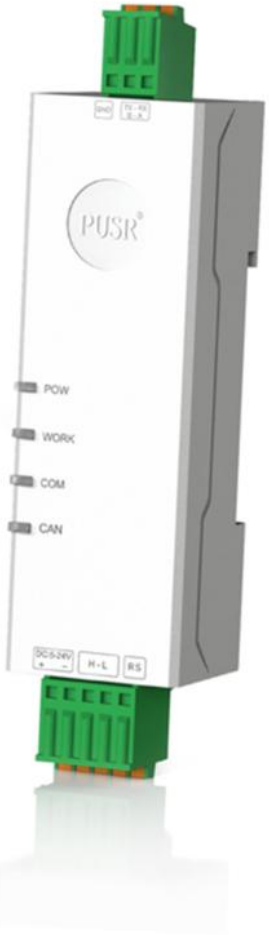
Serial to CAN

USR-CAN114/112

User Manual



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Product Feature

- CAN and RS485/RS232 bidirectional conversion
- CAN2.0A and CAN2.0B standard protocols
- Support transparent conversion, transparent band ID conversion, protocol conversion, MODBUS RTU conversion, custom protocol conversion
- Support extended frame only, standard frame only, custom frame ID reception
- Support 14 groups of custom frame ID filtering to avoid data interference
- Wide baud rate range, CAN baud rate: 5K~1Mbps; serial baud rate: 600~230400bps
- Multi-master and multi-slave functions, replacing multi-channel 485 with single-channel CAN interface
- Support custom baud rate
- SupportPC parameter configuration
- Support serial AT command configuration
- Support PCfirmware upgrade, firmware update is more convenient
- High and low temperature resistance,-40℃~85℃ stable operation
- With 120 ohm termination resistor
- Support 5-24V wide voltage input, with anti-reverse connection protection
- Reliable hardware protection, electrostatic protection, surge, burst protection
- Hardware watchdog function, crash automatic restart, module more stable and reliabl

Directory

1. Product Overview

1.1. Product Introduction

USR-CAN114/112 is an ultra-small rail-type CAN to RS485/RS232 device independently developed by the Internet of Things. This series of products features high speed, low latency, small size and simple use. It supports five data conversion modes: transparent conversion, transparent tape ID conversion, standard protocol conversion, Modbus RTU conversion and custom conversion. It can easily realize the interconnection between CAN devices and serial devices.

This series of products adopt industrial design standard,-40℃~85℃ stable operation. Support 5~24V wide voltage terminal power supply. Wide baud rate range,RS232/RS485 communication mode supports baud rate 600~230400bps, CAN baud rate supports 5K ~1Mbps, support custom baud rate. Support AT commands and PC software configuration parameters, easy to use. The product comes with 120Ω resistor, which can be quickly connected to CAN-bus. The product comes with guide rail (C45 GB) buckle, easy and fast installation.

In order to meet the needs of more customers, there are mainlytwo specifications to choose from.

Table 1 USR-CAN114/112 Specifications

model	versions	specifically described
USR-CAN112	RS232 version	Serial port uses RS232 mode for communication, press-type terminal wiring.
USR-CAN114	RS485version	Serial port uses RS485 mode for communication, press-type terminal wiring.

1.2. Technical Parameters

Table 2 Product basic parameters

classify	parameter	numerical value
Basic parameters	Working Voltage	DC5~24V,Recommended 12V 1A
	Size	74*24*22mm (L * W *H, excluding terminals)
	Installation Method	Rail mounting
	Reload Key	Press and hold to restore factory settings

	Indicator Light	POWER、WORK、COM、CAN
Interface Parameter	CAN port Specification	1-way CAN port, support standard CAN2.0A/B, press terminal wiring
	CAN port Baud Rate	5kbps ~ 1000kbps, support custom
	Terminal Resistance	Built-in CAN bus 120Ω termination resistor
	Serial port Specification	USR-CAN114:1 serial port (RS485), press terminal wiring USR-CAN112:1serial port (RS232), press terminal wiring
	Serial port Baud Rate	600-230.4K（bps）
	Data Bits	7、8
	Stop Bit	1、2
	Parity bit	When the data bit is 7 bits, it supports Odd, Even, Mark and Space; When the data bit is 8 bits, None, Odd and Even are supported.
Work Environment	Operating temperature	-40~85℃
	Storage temperature	-40~105℃
	Operating humidity	5%~95% RH(no condensation)
	Storage humidity	5%~95% RH(no condensation)
	Conversion of	Transparent conversion, Transparent band ID

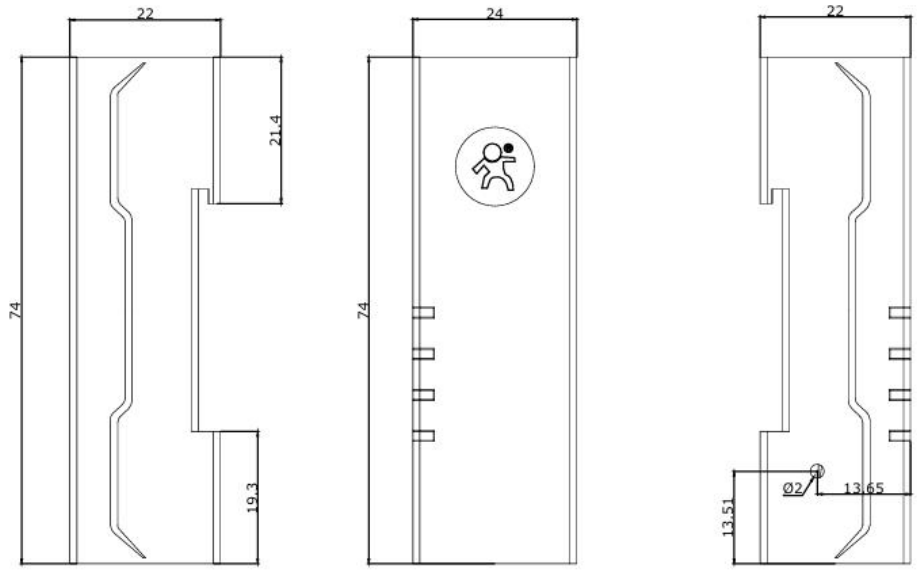
Software Function	mode	conversion, Standard conversion, Modbus conversion, Custom frame header/trailer conversion
	CAN ID	Support standard frame, remote frame
	Frame ID Filtering	Support standard frames only, remote frames only, custom input frame IDs (up to 14 groups)
	Serial packet length	Support custom subcontracting length
	Switch Direction	Support bidirectional conversion, serial to CAN only, CAN to serial only
	Firmware Upgrade	Support firmware upgrade on PC
	Parameter Configuration	AT command, PC software configuration
Protection Parameter	Electrostatic Protection	Air discharge 8kV
	Electrical fast pulse train	Power supply circuit 2kV; serial CAN port circuit 1kV
	Surge interference test	Power supply circuit 1kV;CAN port circuit 2kV

2. Hardware Parameters

2.1. Size Description

Standardsize: 102*24*22mm (L * W * H, including terminals)

74*24*22mm (L * W * H, excludingterminals)



USR-DR114 Standard size diagram

2.2. Interface Description

The USR-CAN 114/112 has two interfaces. One way is CAN-bus interface, one way RS485/RS232 interface. Two interfaces are pressed terminal wiring, convenient and fast. Theconnector pinsare defined as follows.

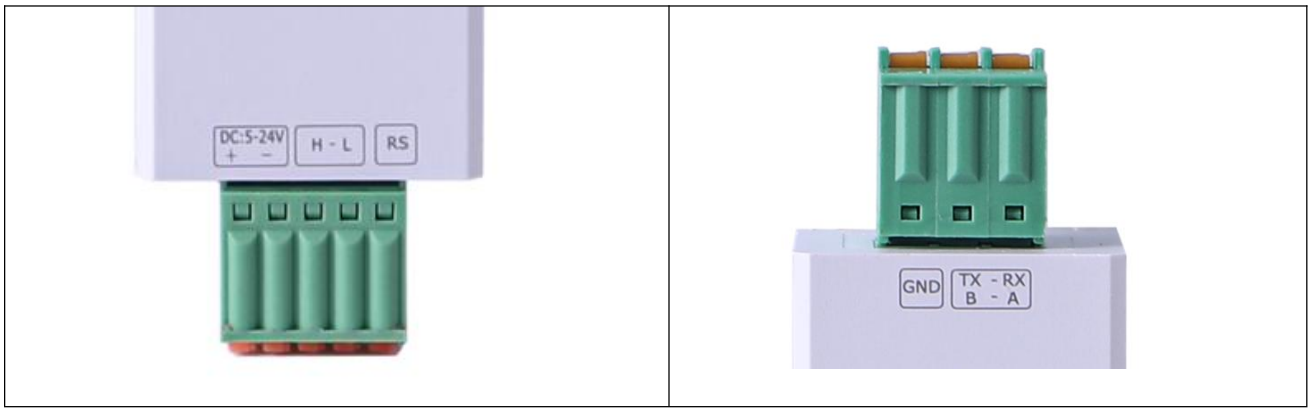


Table 3 Terminal wiring definition

pin	functiondescription
DC 5-24V +	DC 5-24V power supply positive
DC 5-24V -	DC 5-24V power supply cathode
H	CAN_H signal line connection terminal
L	CAN_L signal line connection terminal

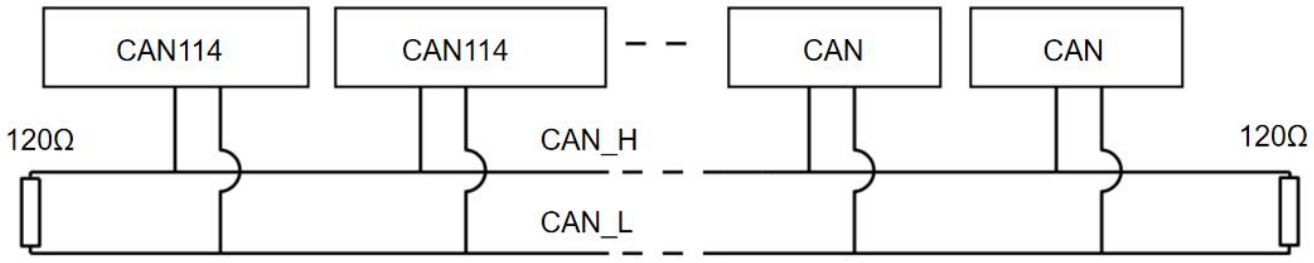
RS	CAN 120Ω termination resistor, RS and L connection, then the module internal 120Ω resistor into the CAN bus
RX/A	RX--RS232 receiver A--RS485 receiver
TX/B	TX--RS232 transmitter B--RS485 transmitter
GND	Digitally

<Description>

When USR-CAN114/112 and CAN bus are connected, CAN_H needs to be connected to CAN_H, CAN_L needs to be connected to CAN_L.

RS is the terminal resistance selection, RS and L are connected with wires, and the 120Ω resistor inside the module is incorporated into the CAN bus; otherwise, the 120Ω resistor is not connected to the bus.

According toISO 11898 specification, in order to enhance the reliability ofCAN-buscommunication, the two terminals ofCAN-busnetwork are usually added with terminal matching resistance (120Ω), as shown in the following figure. The size of the terminal matching resistance is determined by the characteristic impedance of the transmission cable. For example, if the characteristic impedance of twisted pair is120Ω, the two terminals on the bus should also integrate120Ω terminal resistance.



CAN bus connection

2.3. Indicator Description

The USR-CAN114/112 has 4 indicators: POWER, WORK, COM, CAN. The user can easily observe the status of the equipment through the indicator lights, which aredefined as follows.

Table 4 indicator light rule

indicatorlamp	colour	functiondescription
POWER	red	Always on when powered on, off when powered off
WORK	green	Flashing: normal operation of equipment, frequency 1s; Strobe: Enter CAN bus passive error state; Constant light: CAN bus operation abnormal
COM	green	Flashing: indicates that serial port data is being received
CAN	green	Flashing: indicates that CAN port has data being received

3. Product Function

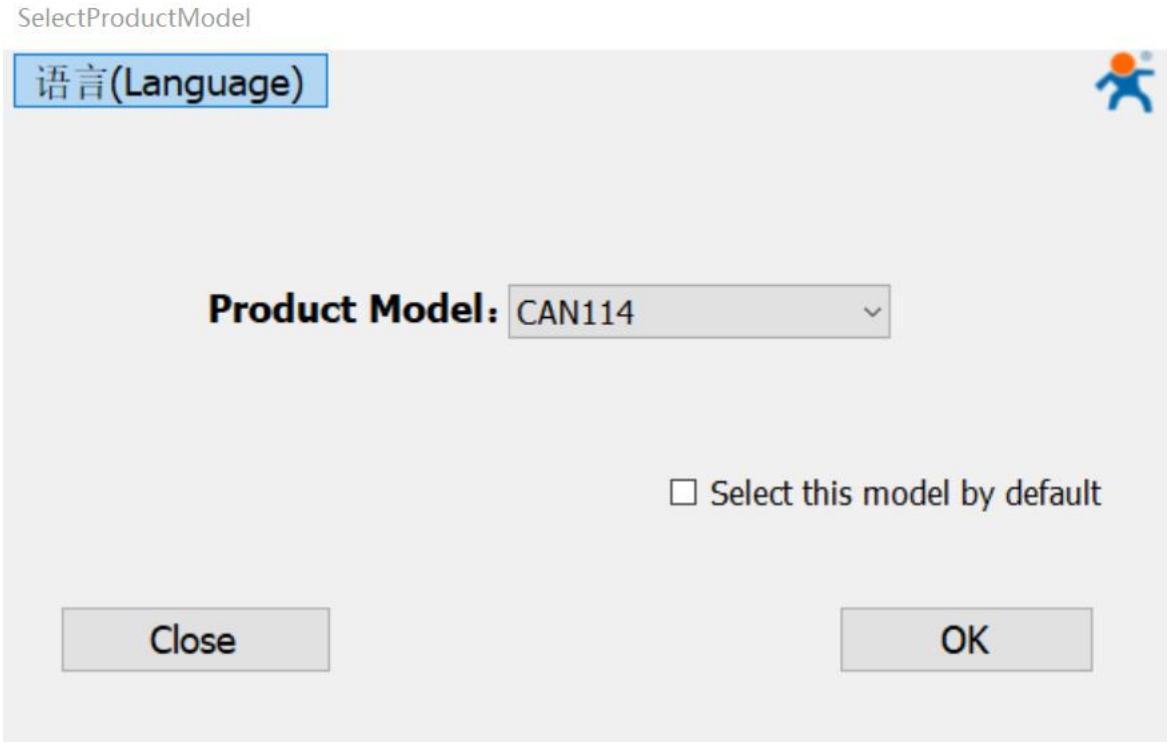
3.1. Description of function configuration

CAN114/112 supports PC configuration parameters and AT command configuration.

Parameters can be configured and queried through AT commands. For details of AT commands, see Lipstick CAN Protocol Converter AT Command Set-USR-CAN114 112.

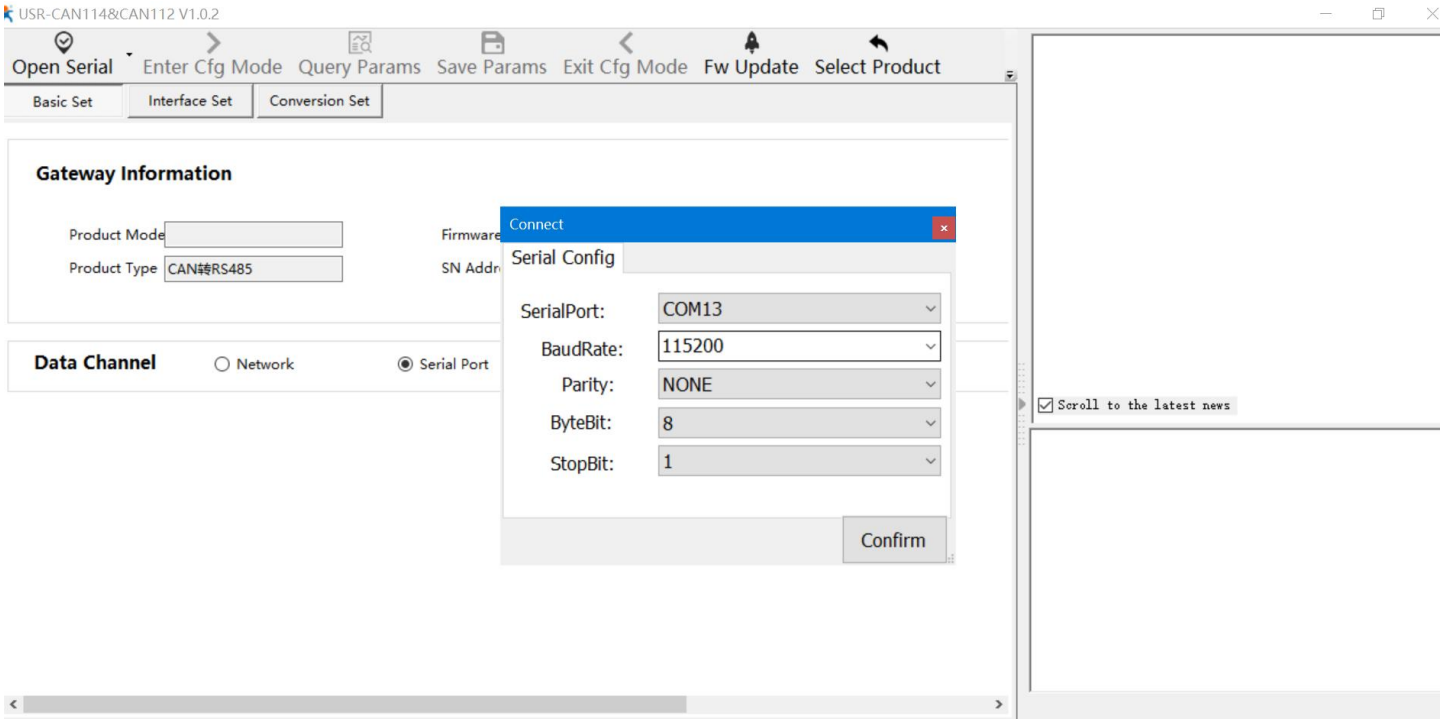
PC configuration operation is simple, convenient and easy to use. The following describes in detail the configuration parameters of the host computer.

Download the host computer from the official website. After opening it, first select the model, such as CAN112. You can check the default login of this model.



Select the model

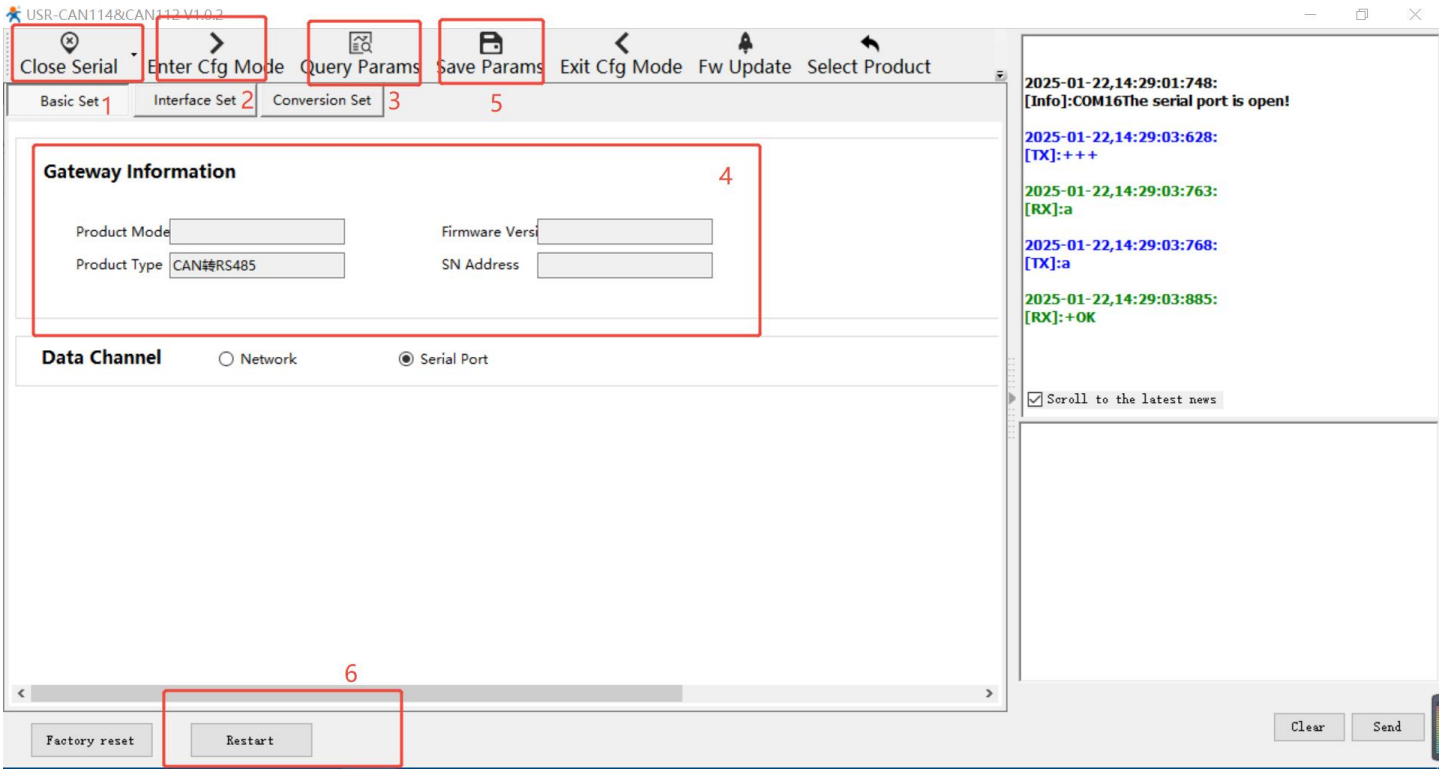
（1）First configure the serial port, click on the arrow on the right side of the serial port, configure the serial port parameters, confirm that the serial port number, baud rate, check bit, data bit and stop bit must be consistent with the serial port equipment connected to CAN114, click OK after configuration.



Serial port parameter configuration

（2）Parameter configuration:

- Open the serial port, and the message interface on the right displays:[Info]: COM16 serial port is open
- Click to enter configuration status
- Click to read parameters
- After reading all the current parameters, configure the parameters
- After configuration, click Set Parameters
- Click Restart and the parameter configuration takes effect.



Parameter Configuration

3.2. CAN Parameters

Frame type: The frame type of CAN message during conversion, with standard frame and extended frame optional.

CAN ID:hexadecimal, hex format. Range: 0~7FF(standard frame) , 0~ 1FFFFF (extended frame)

CAN baud rate:

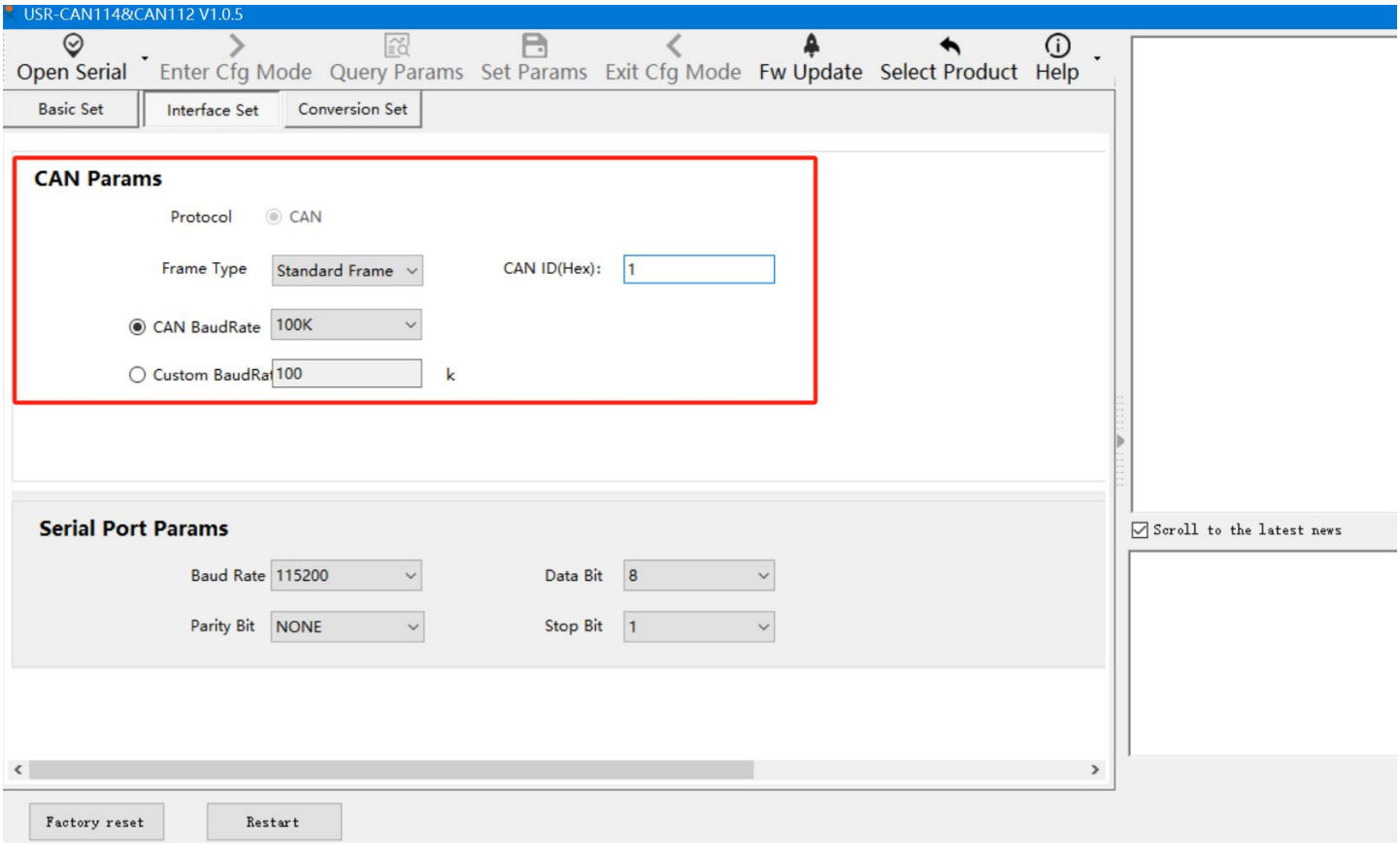
Range 5K~1000K, default 100kbps. Common baud rates can be directly selected: 5K, 10K, 20K, 50K, 100K, 120K, 125K, 150K, 200K, 250K, 400K, 500K, 600K, 750K, 1000K. Baud rate calculation method: Baud rate =60M/[(1+ BS1 + BS2)*BRP]

BS1: Phase buffer section 1, range 1~16

BS2: Phase Buffer 2, Range 1~8

BRP: Frequency division value, range 1~1024

BS1\BS2\BRP is configurable and the device automatically calculates the current baud rate based on these three values.



CAN Parameter Configuration

3.3. Serial Port Parameters

Baud rate:600~230400bps, default 115200bps

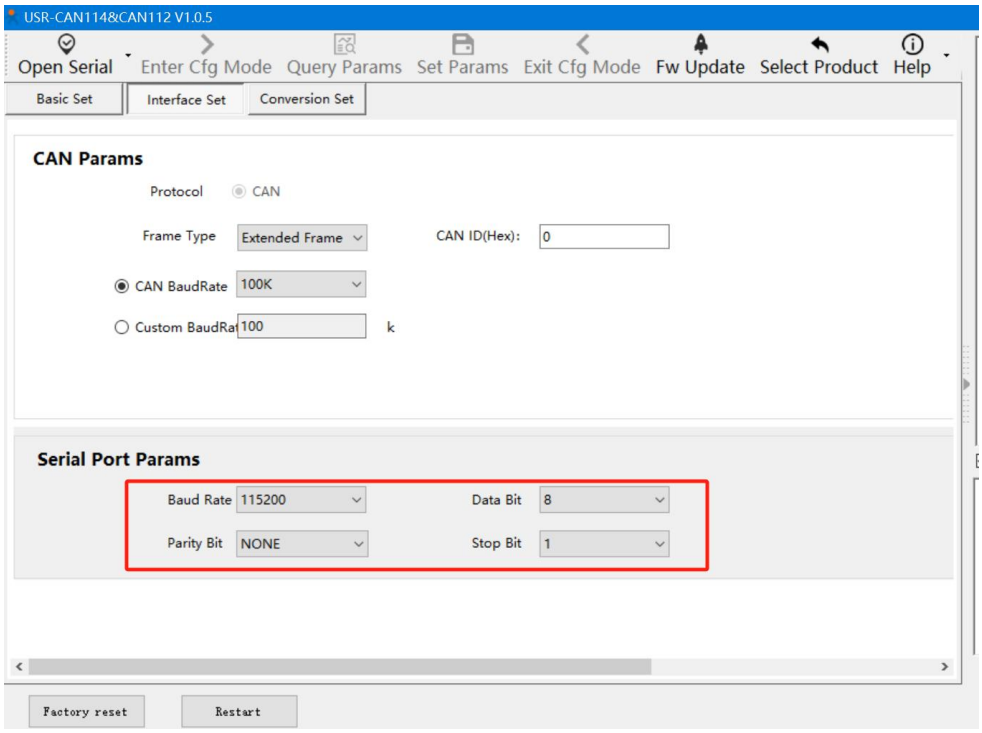
Data bits:7, 8, default 8

Check bit:Default is None

When the data bit is 7 bits, it supports Odd, Even, Mark and Space;

When the data bit is 8 bits, None, Odd and Even are supported.

Stop bit:1, 2, default 1



Serial port parameter configuration

3.4. Transformation Function

3.4.1. Conversion Parameter

Conversion mode:Support transparent conversion, transparent band ID conversion, standard protocol conversion, modbus protocol conversion, custom frame header and frame trailer conversion. Each mode conversion rule is different, and serial frame information and CAN frame information can be converted to each other. See Chapter 4 for a detailed description of conversion patterns.

Direction of conversion:By selecting the direction of conversion, data interference on the bus side that does not require conversion can be excluded. There are three conversion directions:

- Bidirectional: The converter converts data from the serial bus to the CAN bus and also converts data from the CAN bus to the serial bus.
- Serial to CAN only: only converts serial bus data to CAN bus, not CAN bus data.
- CAN to serial only: Only CAN bus data is converted to serial bus, not serial bus data.

Enable Frame Info: Takes effect only in transparent transitions. When this option is selected, the converter operates to add the frame information of CAN messages to the first byte of the serial frame. CAN frame information is not converted when unchecked.

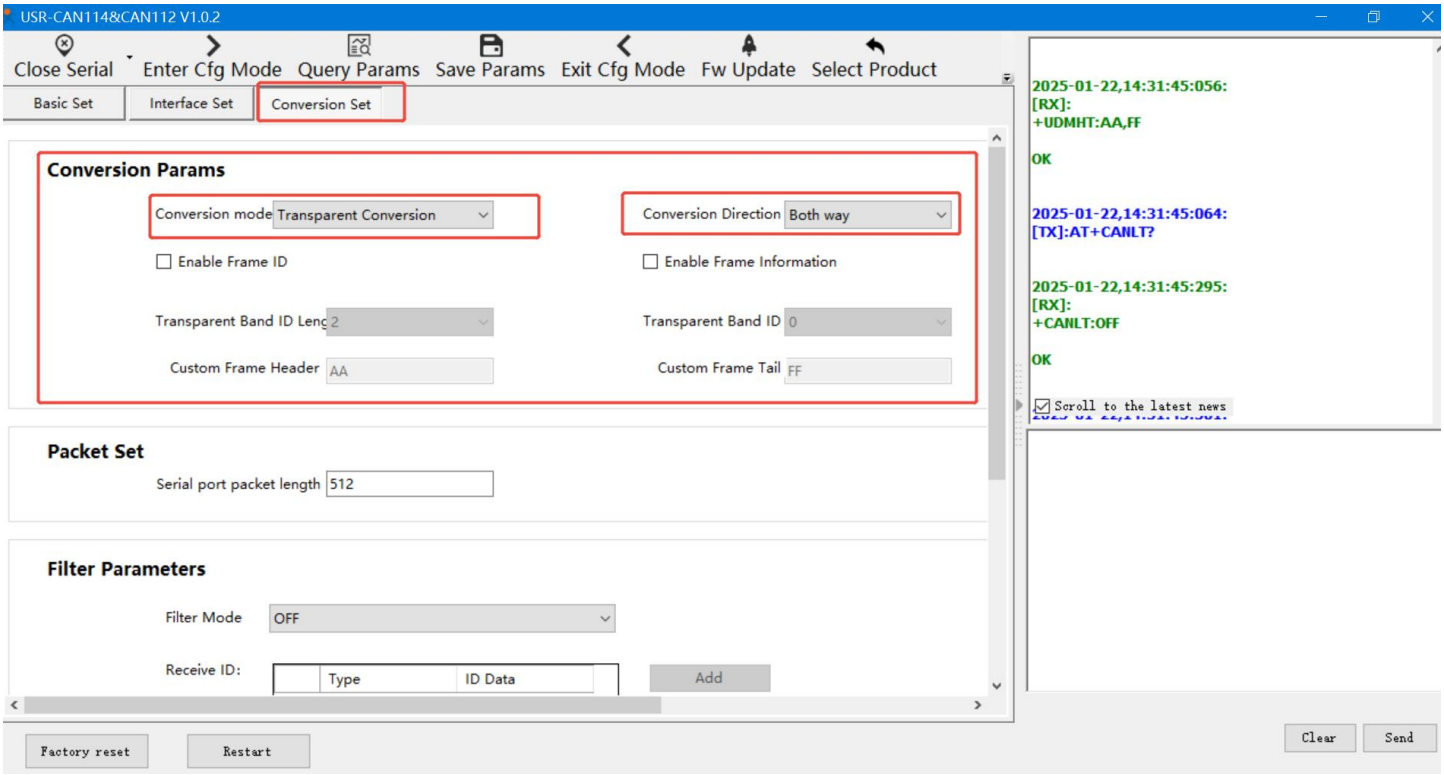
Enable Frame ID: Takes effect only under transparent transitions. When this option is selected, the converter operates by adding the frame ID of the CAN message before the frame data of the serial frame and after the frame information (e.g. enabling frame information). Frame ID of CAN is not converted when unchecked.

Transparency ID Length: Takes effect only under transparency ID conversion. When serial data is converted into CAN message, the length of frame ID in serial frame of CAN message starting byte. The frame ID length can be filled with 1 - 2 bytes in the standard frame, corresponding to ID1 and ID2 of the CAN message respectively, and can be filled with 1 - 4 bytes in the extended frame, corresponding to ID1, ID2, ID3 and ID4 of the CAN message. The ID is 11 bits for standard frames and 29 bits for extended frames.

Transparency ID Position: Takes effect only under Transparency ID conversion. When serial data is converted into CAN message, the offset position of the start byte of frame ID of CAN message in serial frame.

Custom Header: Takes effect only with custom header/trailer transitions. User can customize serial frame header. Length: 1 byte.

Custom frame trailer: Only takes effect under custom frame header and frame trailer conversion. User can customize serial frame trailer. Length: 1 byte.



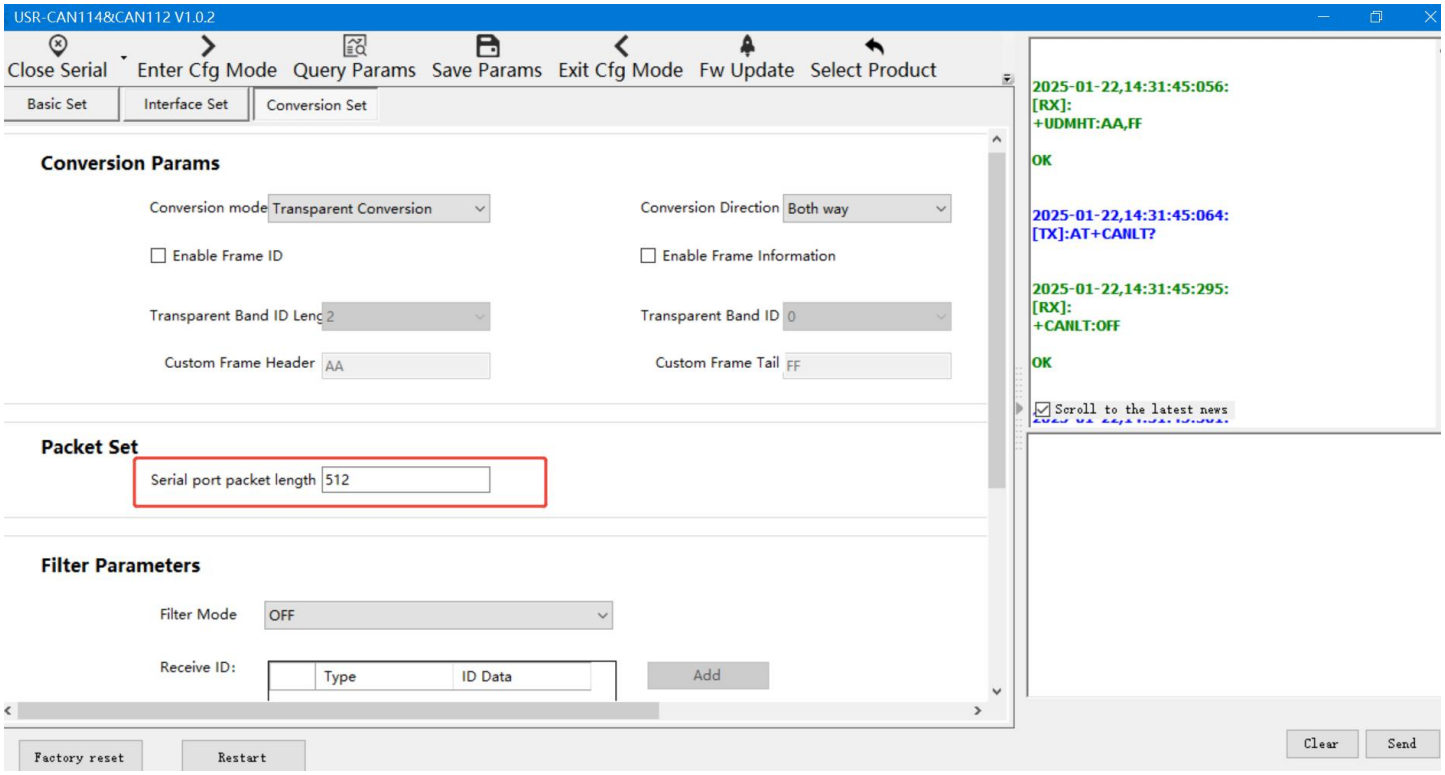
Schematic diagram of conversion parameter configuration

3.4.2. Subcontracting Setup

CAN114/112 supports custom serial packet length. If a packet of serial frame data contains a large amount of data and needs to be forwarded to CAN network, serial frame data can be packetized and sent by custom serial frame packet length. Setting range: 256~512 bytes.

Note: CAN frames must be 13 bytes due to standard protocol conversion regulations. Therefore, when the byte number of a serial frame exceeds 507 bytes, the byte number of the serial packet length must be set to a multiple of 13, otherwise the excess part cannot be transmitted correctly. If the number of bytes in a

packet of serial frames does not exceed 507 bytes, it is sufficient to set the packet length of serial frames to be greater than 507 bytes.



Schematic diagram of subcontracting configuration

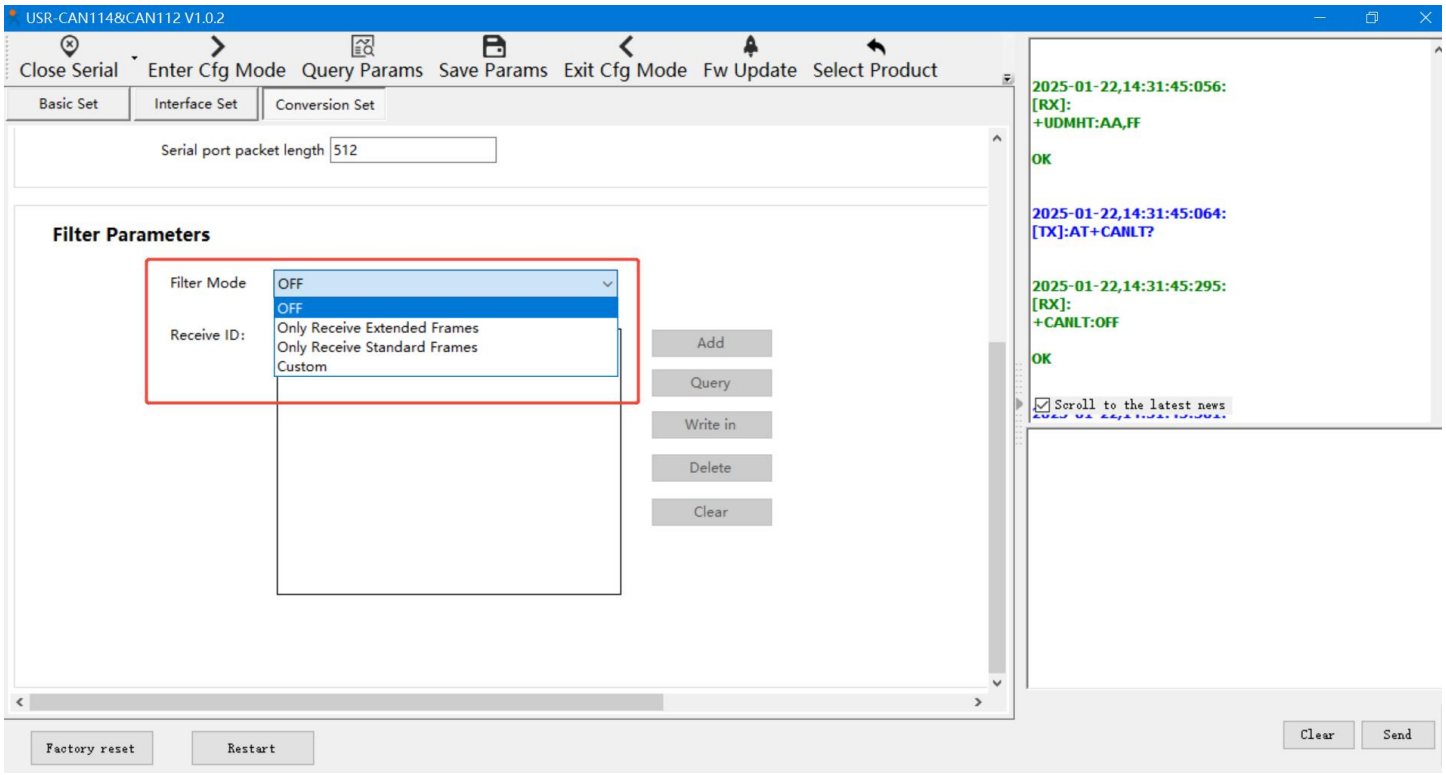
3.4.3. Filtering Function

CAN114/112 has the function of filtering ID, which can filter CAN bus data and selectively receive it. This minimizes network load from the network.

There are three filtering methods:

- Receive only extended frames
- Receive only standard frames
- custom

Only the extended frames and standard frames can be received, and only the configuration can be selected. The configuration mode is as follows:



Filtering Settings

In custom mode, users can add their own IDs to receive, and up to 14 groups can be set.

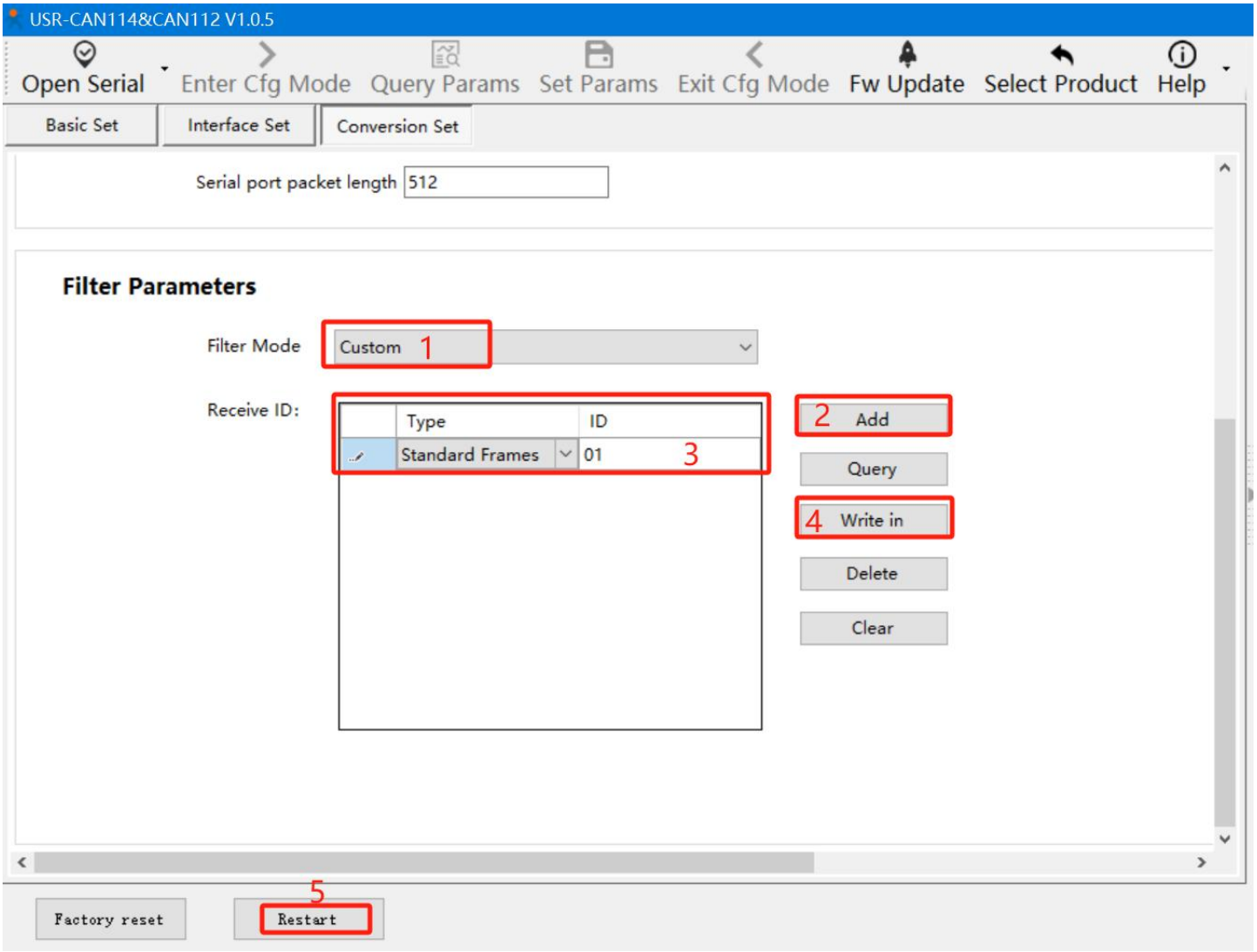
The configuration is as follows:

- The upper computer enters the parameter configuration state, and the filter mode is selected to be customized.
- Click Add Message and enter the ID you want to receive. Each group can select extended frames or standard frames. Standard Frame Range: 0~ 7FF, Extended Frame Range:0~ 1FFFFF
- Click Write to restart and save parameters

Click Query to query all current filter IDs

Click Delete to delete the selected ID

Click Clear List to delete all current IDs

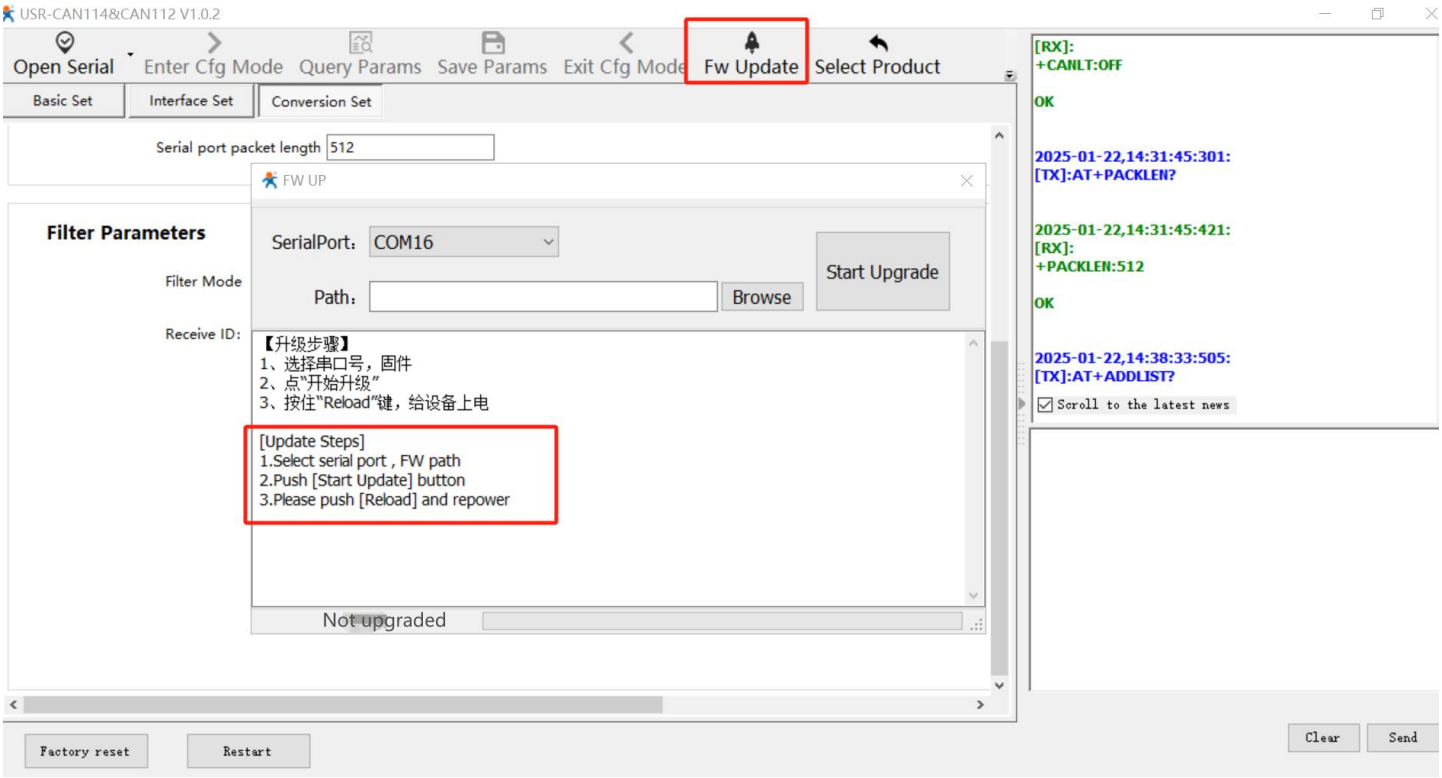


Custom Frame ID Configuration

3.5. Firmware Upgrade

Support easy firmware upgrade of equipment through host computer. The specific operation methods are as follows:

Click Firmware Upgrade--> Select Serial Number--> Click Browse to select firmware to be upgraded--> Click Start Upgrade--> Press reload key for a long time and power on the device again--> The device enters upgrade status, waiting for the progress bar to reach 100%, prompting that firmware transmission is successful and firmware upgrade is complete.



Firmware upgrade diagram

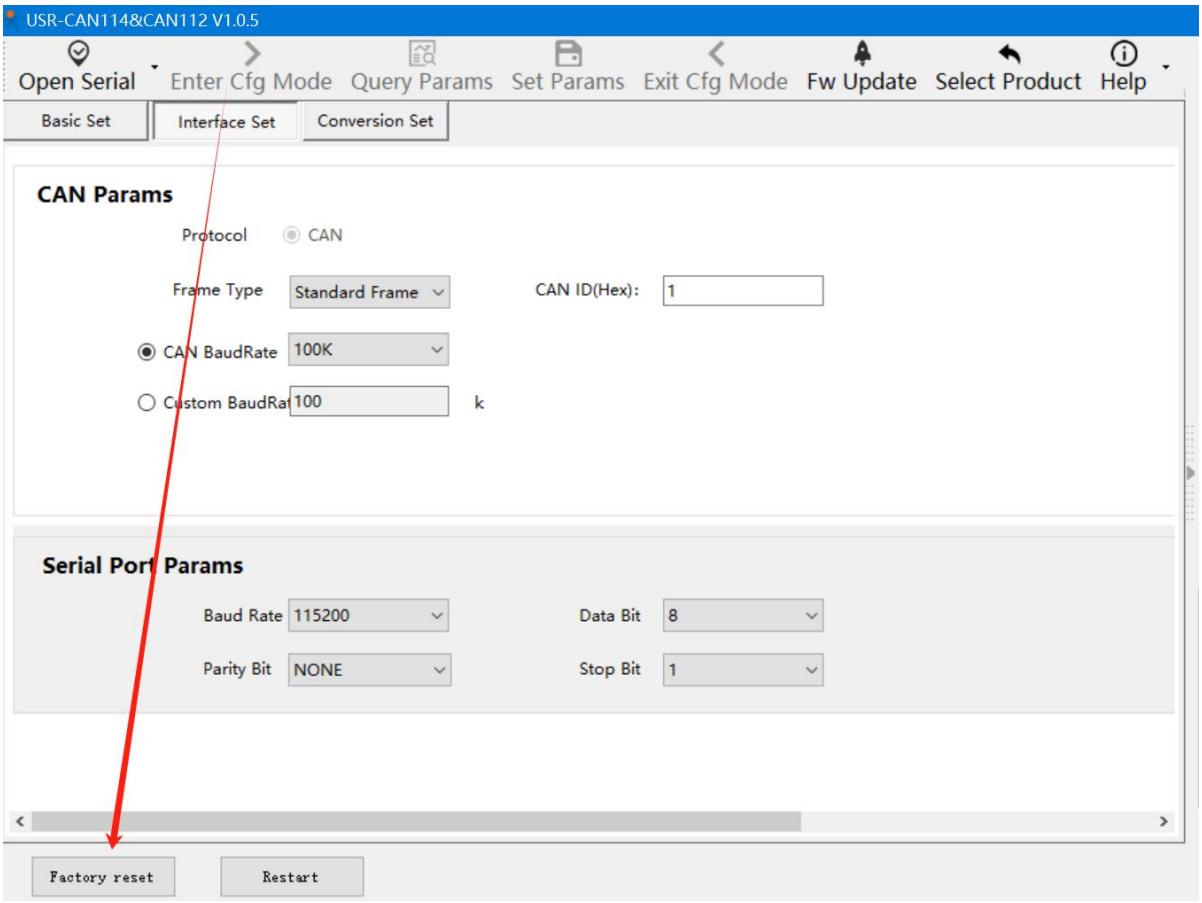
3.6. Restore factory settings

Hardware factory reset: The module can restore the factory settings through hardware. After power-on, press the Reload button, keep the Reload pressed and release it after 3-15s. The hardware factory settings can be restored.

Software factory reset: By setting software, you can restore software factory settings.

AT command to restore factory settings: AT command mode, send command AT+RELD, plus Enter, receive the correct reply +OK, that is, restore factory settings.

Set software settings:



Setup Software Schematic

4. Examples of conversion patterns

4.1. Transparent Conversion

In the transparent conversion mode, CAN114/112 receives data from one bus and immediately converts it to the other bus side without adding data or modifying the data. This enables the exchange of data formats without changing the data content, and the converter is transparent to both ends of the bus.

CAN message frame information (frame type part) and frame ID come from user configuration in advance, and frame type and frame ID remain unchanged during conversion. The user can choose whether to convert the frame information and frame ID.

In this way, the communication burden of users will not be increased, but the data can be converted in real time, and the transmission of large traffic data can be undertaken.

4.1.1. Serial Frame to CAN--Transparent Conversion

Serial frame to CAN message: all data of serial frame are filled into data field of CAN message frame in sequence. The converter receives and converts data as soon as it detects data on the serial bus. The frame information (frame type part) and frame ID are configured in advance.

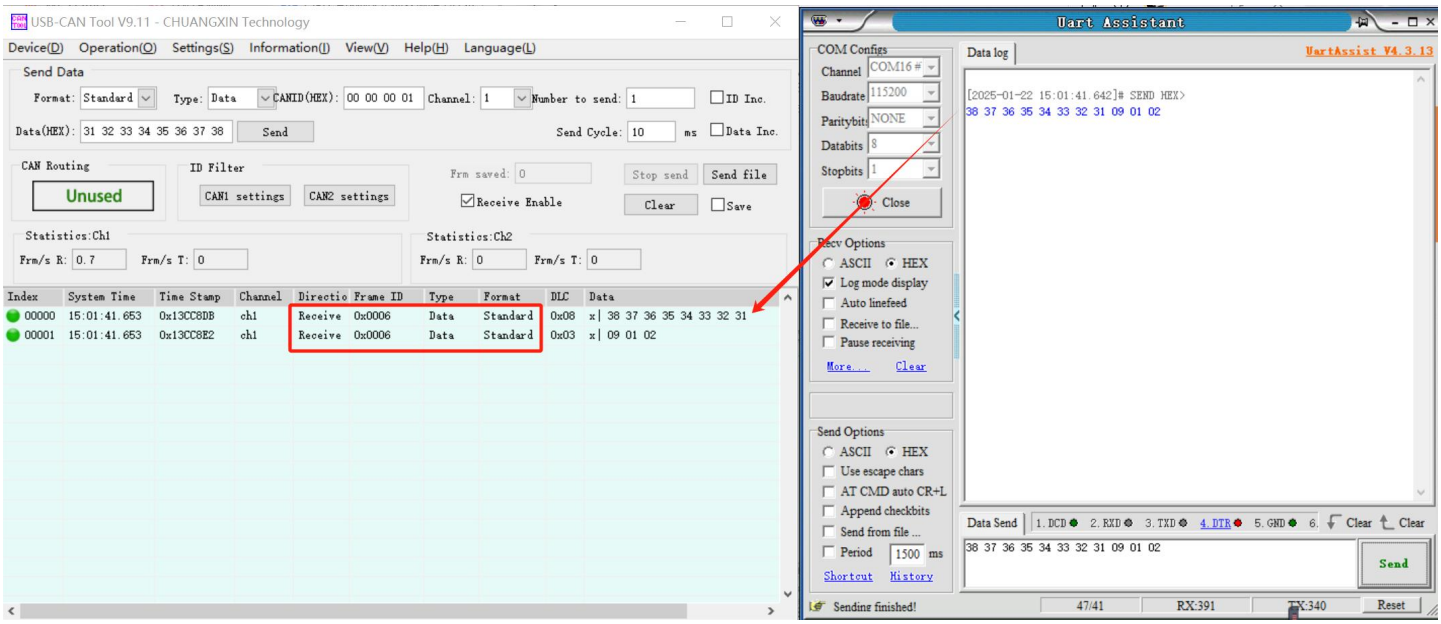
Serial Frame
Data1
Data2
Data3
Data4
Data5
Data6
Data7
Data8
Data9
Data10

CAN Message		
Frame Information	Frame Information	Frame Information
Frame ID	User Configuration	User Configuration
	User Configuration	User Configuration
Data Field	Data1	Data9
	Data2	Data10
	Data3	
	Data4	
	Data5	
	Data6	
	Data7	
	Data8	

Transparent Transmission-Serial Frame to CAN

Examples:

Configure frame ID as standard frame, CAN ID as "0006", conversion as follows:



Transparent Transmission-Serial Frame to CAN Transmission Example

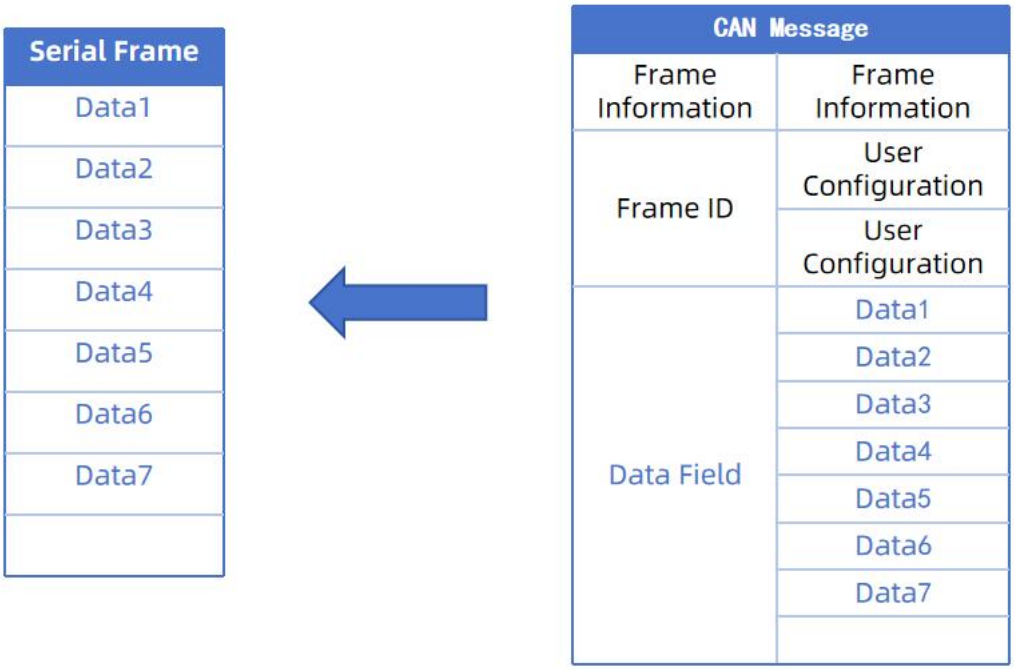
4.1.2. CAN to Serial Frame--Transparent Conversion

For CAN bus messages, upon receiving one frame of CAN message, forward one frame immediately.

If the configuration enables frame information, the converter operates by adding frame information of CAN messages to the first byte of serial frames. CAN frame information is not converted when unchecked.

If enabled frame ID is configured, the converter operates by adding the frame ID of the CAN message

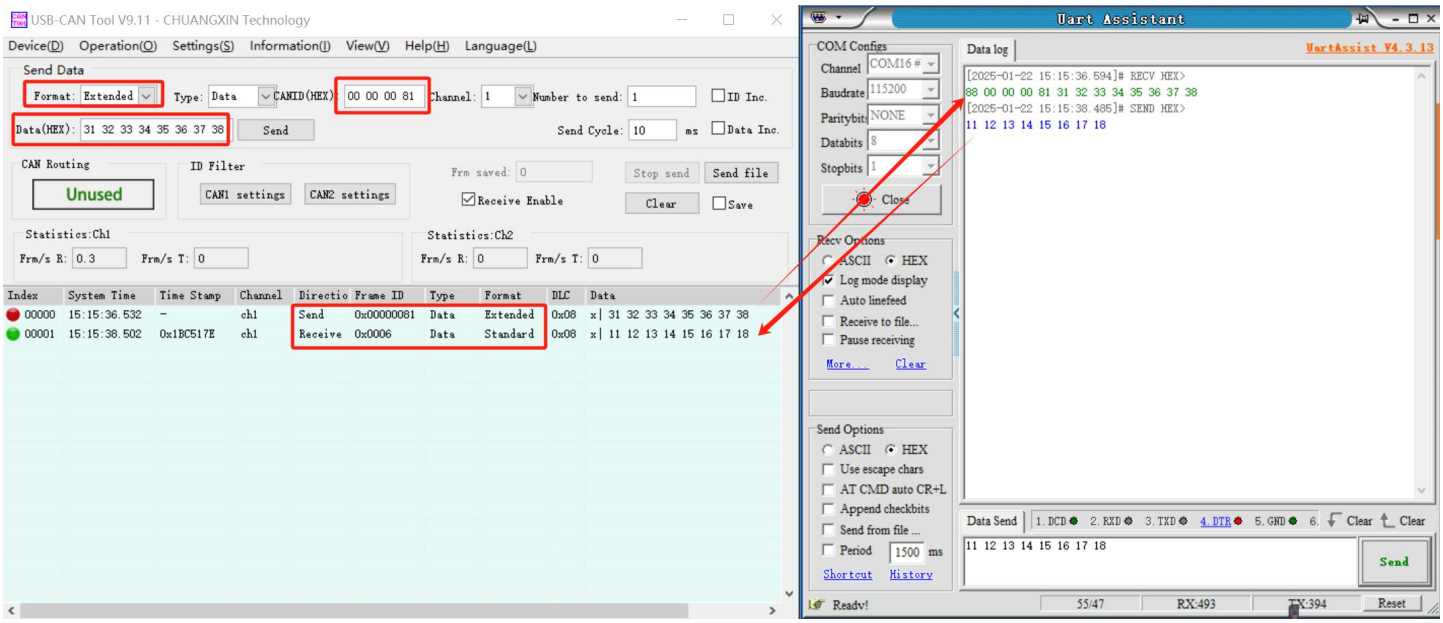
before the frame data of the serial frame and after the frame information (e.g. enabled frame information).



Transparent Transmission--CAN to Serial Frame

Examples:

Configure the enable frame information and enable frame ID as follows:



Transparent Transmission--CAN to Serial Frame Transmission Example

4.2. Transparent zone ID conversion

Transparent band identification transformation is a special use of transparent transformation and has no protocol attached. This method can convert the "address" in the serial frame into the identification field of CAN message, where the starting position and length of serial frame ID in the serial frame can be configured. The converter extracts the frame ID during conversion and fills it in the frame ID field of the CAN message as the ID of the CAN message when the serial frame is forwarded. Similarly, when CAN messages

are converted to serial frames, the ID of CAN messages is also converted to the corresponding position in the serial frame.

In this way, the converter adapts to the user's custom protocol to the maximum extent possible.

Note: In this conversion mode, the CAN ID of the CAN parameter setting item of the configuration software is invalid because the identifier (frame ID) sent is filled with data in the serial frame described above.

4.2.1. Serial Frame to CAN--Transparent Band ID Conversion

Configure the CAN frame type and the start address and length of the Frame ID of the CAN message carried in the serial frame. The range of start address is 0~7; the length range is standard frame: 1~2, extended frame: 1~4.

During conversion, CAN message "frame ID" in serial frame is converted into CAN frame ID field according to prior configuration. If the configured transparent tape ID length is less than the frameID length of the frame type ofthe CANmessage,0 is added to the high byte of the frameIDinthe CANmessage.

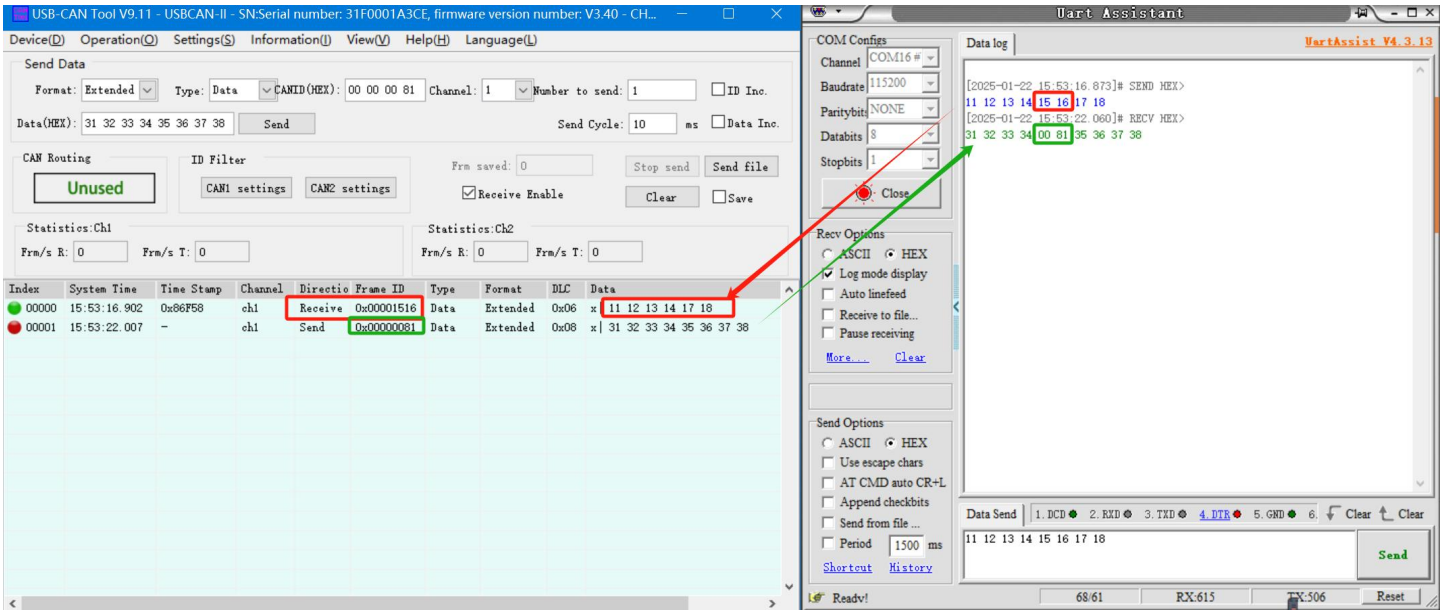
Serial Frame Address	Serial Frame Data
0	Data1
1	Data2 (ID1)
2	Data3 (ID2)
3	Data4
4	Data5
5	Data6
6	Data7
7	Data8
...	...
N-2	Data N-1
N-1	Data N

CAN Message		
Frame Information	Frame Information	Frame Information
Frame ID	ID1 (0x00)	ID1 (0x00)
	ID2 (0x00)	ID2 (0x00)
	Data2 (ID3)	Data2 (ID3)
	Data3 (ID4)	Data3 (ID4)
Data Field	Data1	Data...
	Data4	Data N-1
	Data5	Data N
	Data6	
	Data7	
	Data8	
	Data9	
	Data10	

Transparent tape ID transmission-serial frame to CAN

Examples:

Configuration frame type is extended frame, starting address is 4, length is 2, serial frame to CAN is as follows:

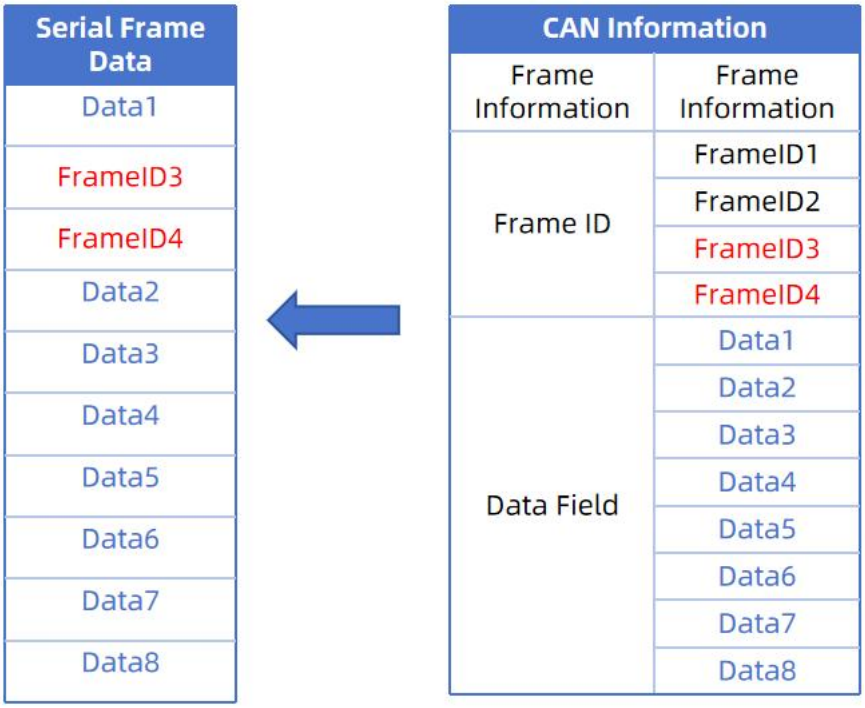


Transparent tape ID transmission-serial frame to CAN example

4.2.2. CAN to Serial Frame--Transparent Band ID Conversion

For CAN messages, a frame is forwarded immediately upon receipt of a frame, and the ID in the received CAN message is converted accordingly according to the position and length of the CAN frame ID configured in advance in the serial frame. Other data are forwarded sequentially.

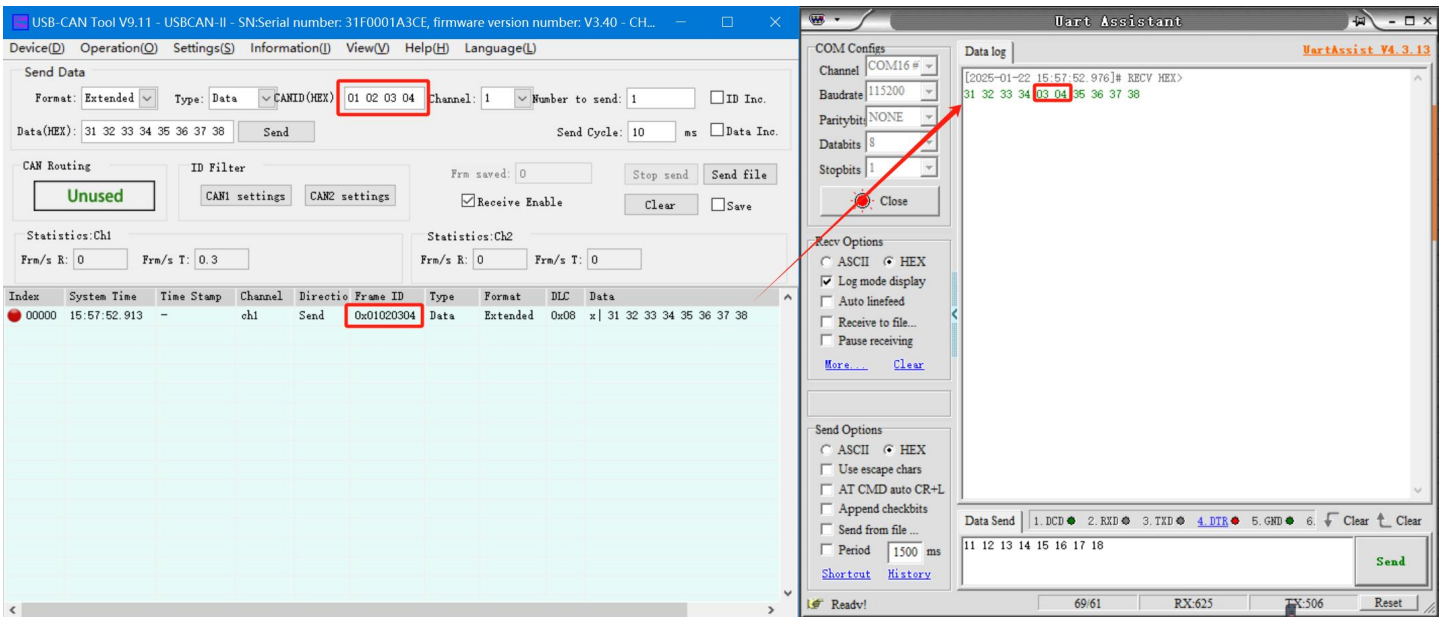
Note: If the CAN frame ID length is greater than the set transparent tape ID length, only the lower byte is converted to the corresponding position of the serial frame. For example: CAN frame ID is 01020304, the set transparent band ID length is 2, then only 0304 will be converted to the corresponding position in the serial frame.



Transparent tape ID transmission--CAN to serial frame

Examples:

Configuration frame type is extended frame, starting address is 4, length is 2, CAN frame transfer serial is as follows:



Transparent tape ID transmission--CAN to serial frame example

4.3. Standard Protocol Conversion

Standard CAN frame format, each CAN frame contains 13 bytes, 13 bytes of content includes CAN frame information + frame ID + data frame.

By configuring the frame information correctly (the first byte of data), you can flexibly send out standard frames, extended frames, and even remote frames. The details of standard frames, extended frames and even remote frames can be obtained by correctly parsing 13-byte serial frames.

Note:

（1）In this conversion mode, the CAN parameter items "CAN ID" and "Frame Type" of the configuration software are invalid, because the frame ID sent at this time is filled with the frame ID data in the 13-byte serial frame described above, and the frame type is determined by the frame information in the 13-byte serial frame.

（2）In this mode, the conversion must be performed in strict accordance with the 13-byte serial data format. First of all, we must ensure that the frame information is correct, the reserved bit must be zero, and the data length cannot be greater than 8, otherwise it will not be converted. Each frame is fixed to be 13 bytes, if insufficient must be filled with 0. Serial data satisfying the format of 13 bytes in the same serial data frame corresponds to a CAN message, and serial data frames less than 13 bytes are not converted, so it is necessary to ensure that the converted serial data frames are aligned with 13 bytes.

（3）If a packet of standard converted serial data frames exceeds 507 bytes, the serial packet length must be set to a multiple of 13 bytes. Otherwise, it cannot be correctly divided into standard CAN frames.

（4）The converted serial data frames are aligned with 13 bytes.

The standard CAN frame format is as follows:

CAN fixed format (1 CAN frame contains 13 bytes)		
Frame Information	Frame ID	Frame data
1Byte	4Byte	8Byte

Frame information: length 1 byte, used to identify frame information: frame type, frame length.

Bit7							Bit0
FF	RTR	Retain	Retain	B3	B2	B1	B0

FF: Identification bit of standard frame and extension frame, 1 is extension frame, 0 is standard frame

RTR: identification bit of remote frame and data frame, 1 is remote frame, 0 is data frame

Reserved: reserved bit must be filled in 0, not 1.

B3-B0: data length bits, identifying the data length of the CAN frame.

Frame ID: Length 4 bytes; high order first, low order last. The standard frame significance bit is 11 bits and the extended frame significance bit is 29 bits.

12h	34h	56h	78h

Extended Frame ID: 0x12345678

00h	00h	01h	23h

This ID canrepresent either an extended frameID or a standard frameID.

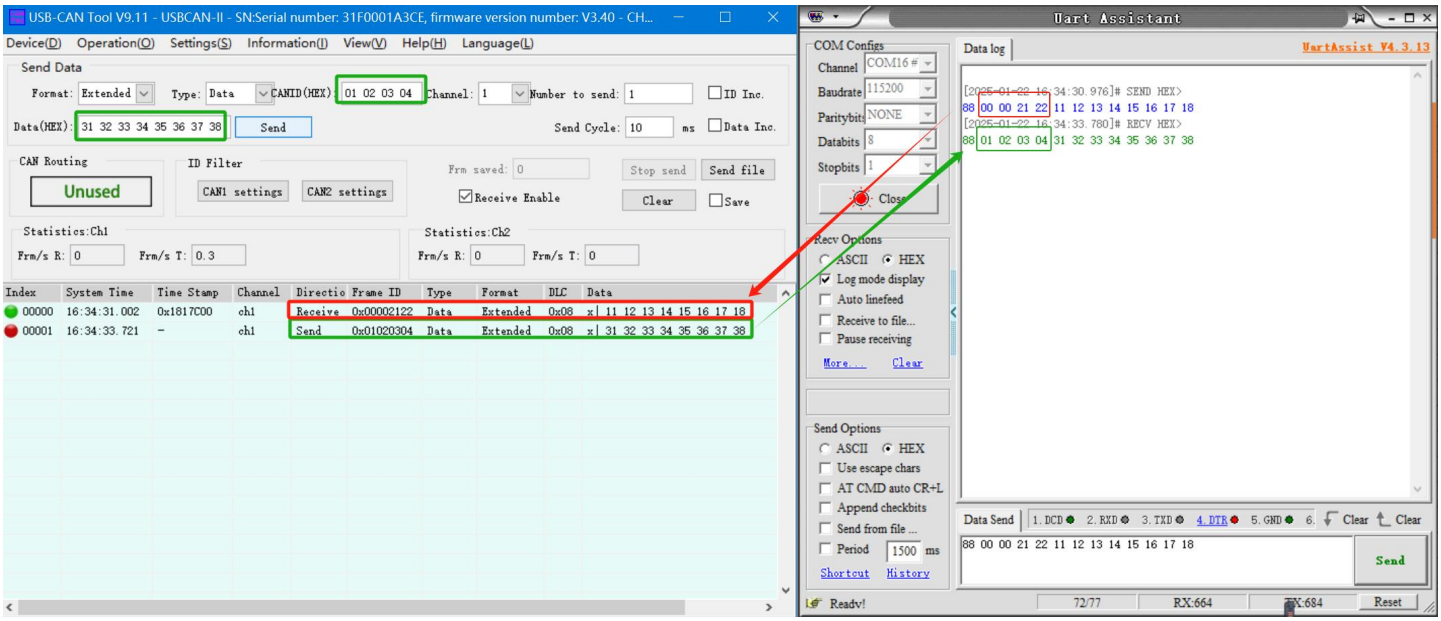
Extended Frame ID: 0x00000123

Standard Frame ID: 0x0123

Extended frames and standard frame IDs are distinguished by frame information

Frame data:length 8 bytes, insufficient must be filled with 00.

Examples:



Standard Protocol Transmission Examples

4.4. Modbus protocol conversion

Modbus protocol conversion can convert the standard Modbus RTU serial data protocol into a specific CAN data format, which generally requires CAN bus device messages to be editable.

The converter uses the standard Modbus RTU protocol format on the serial port side, so the converter not only supports users to use Modbus RTU protocol, but also can be directly connected to other devices that support Modbus RTU protocol.

On the CAN side, a simple and easy-to-use segmented communication format is developed to implement Modbus communication. The converter's role in this is still protocol validation and forwarding. Support Modbus protocol transmission, rather than Modbus master or slave, users can communicate according to Modbus protocol.

Note:

（1）In this conversion mode, the "CAN ID" of the "CAN Parameters" item of the configuration software is invalid because the frame ID sent is filled in by the address field in the Modbus RTU serial frame.

4.4.1. Frame Format

（1）Serial Frame

The serial interface uses the standard Modbus RTU protocol, so the user frame conforms to this protocol. If the transmitted frame does not conform to Modbus RTU format, the converter discards the received frame without converting it.

(2) CAN Frame

CAN side designs a set of segmentation protocol format, which defines a method for segmenting and reassembling information with a length greater than 8 bytes, as shown below.

Bit Number	7	6	5	4	3	2	1	0
Frame Information	FF	FTR	X	X	DLC(Data Length)			
FrameID1	X	X	X	ID.28-ID.24				
FrameID2	ID.23-ID.16							
FrameID3	ID.15-ID.8							
FrameID4	ID.7-ID.0 (Modbus RTU Address Code)							
Data1	Segment Marker	Segment Type	Segment Counte					
Data2	Character1							
Data3	Character2							
Data4	Character3							
Data5	Character4							
Data6	Character5							
Data7	Character6							
Data8	Character7							

Segmented Protocol

CAN frame information (remote frame or data frame; standard frame or extended frame) is set by configuration software. The Modbus protocol content of the transmission can start from the "data 2" byte, if the protocol content is greater than 7 bytes, then the remaining protocol content will continue to be converted according to this segmented format until the conversion is completed.

Data1 is segment control information (1byte,8bits), and its meaning is as follows:

- Fragment mark: occupies 1 bit (Bit7), indicating whether the message is a fragment message. A 0 in this bit indicates an individual message and a 1 in this bit indicates a frame belonging to a segmented message.
- Segment type: 2 bits (Bit6, Bit5), used to indicate the type of the message in the segment message:

Place Value	Meaning
00	The first segment
01	Intermediate segment
10	That last partition

- Segment counter: occupies 5 bits (Bit4~Bit0), indicating the serial number of this segment in the whole message. If it is the number of segments, then the value of the counter is the number. This makes it possible to verify whether segments are missing at reception.

4.4.2. Conversion Mode

(1) Modbus RTU to CAN:

The address field of Modbus RTU protocol is converted into ID4 (extended frame) or ID2 (standard frame) of frame ID in CAN message, and the identification is unchanged during the conversion of this frame.

CRC check bytes are not converted into CAN messages, and CAN messages do not need to have check bytes of serial frames, because CAN bus itself has a good check mechanism.

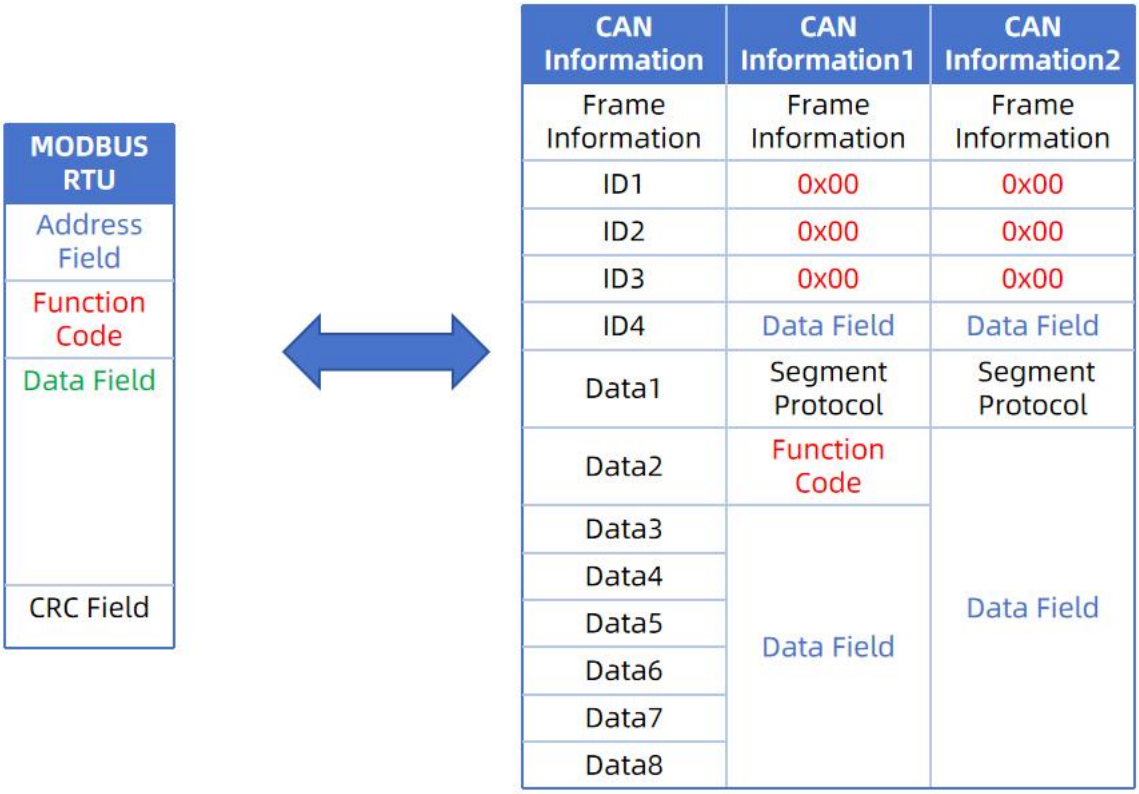
The conversion is the Modbus RTU protocol content-function code and data field, which are converted in turn into the data field of CAN message frame (starting from the second data byte, the first data byte is used by the segmented protocol), because the length of Modbus RTU frame varies according to different function codes. CAN message can only transmit 7 data in one frame, so the converter will convert the long Modbus RTU frame into CAN message segment and send it with the above CAN segment protocol. When the user receives on the CAN node, the function code and the data field can be processed.

Note: In the process of serial port side to CAN side conversion, the converter will only convert when it receives a complete and correct Modbus RTU, otherwise there will be no action.

(2) CAN to Modbus RTU:

For Modbus protocol data of CAN bus, cyclic redundancy check (CRC16) is not required. The converter receives according to the segmented protocol, automatically adds cyclic redundancy check (CRC16) after receiving a frame analysis, and converts it into Modbus RTU frame to send to serial bus.

Note: If the received data does not conform to the segmentation protocol, the data will be discarded without conversion.



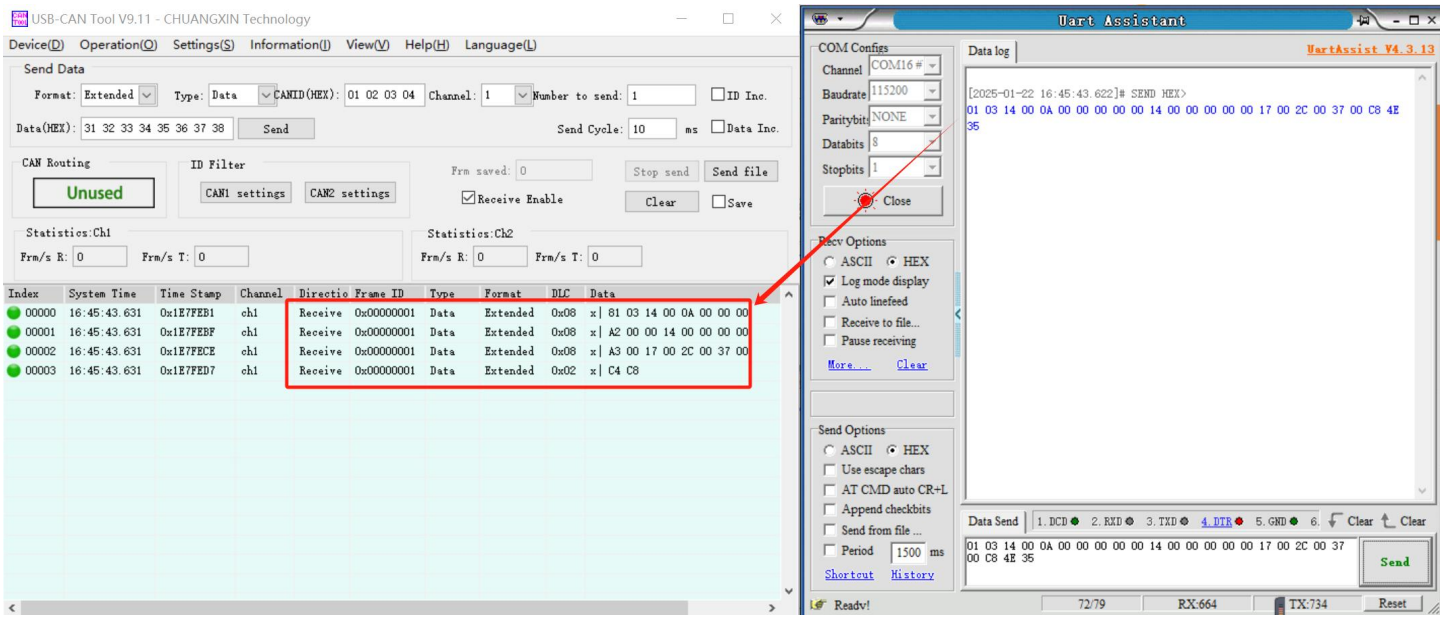
Modbus Protocol Conversion

Examples:

Serial transmission: 01 03 14 00 0A 00 00 00 00 00 14 00 00 00 00 00 17 00 2C 00 37 00 C8 4E 35

01 as Modbus address code, converted to CAN ID.7-ID.0, the last 2 bytes (4E 35) for Modbus RTU CRC check, lost without conversion.

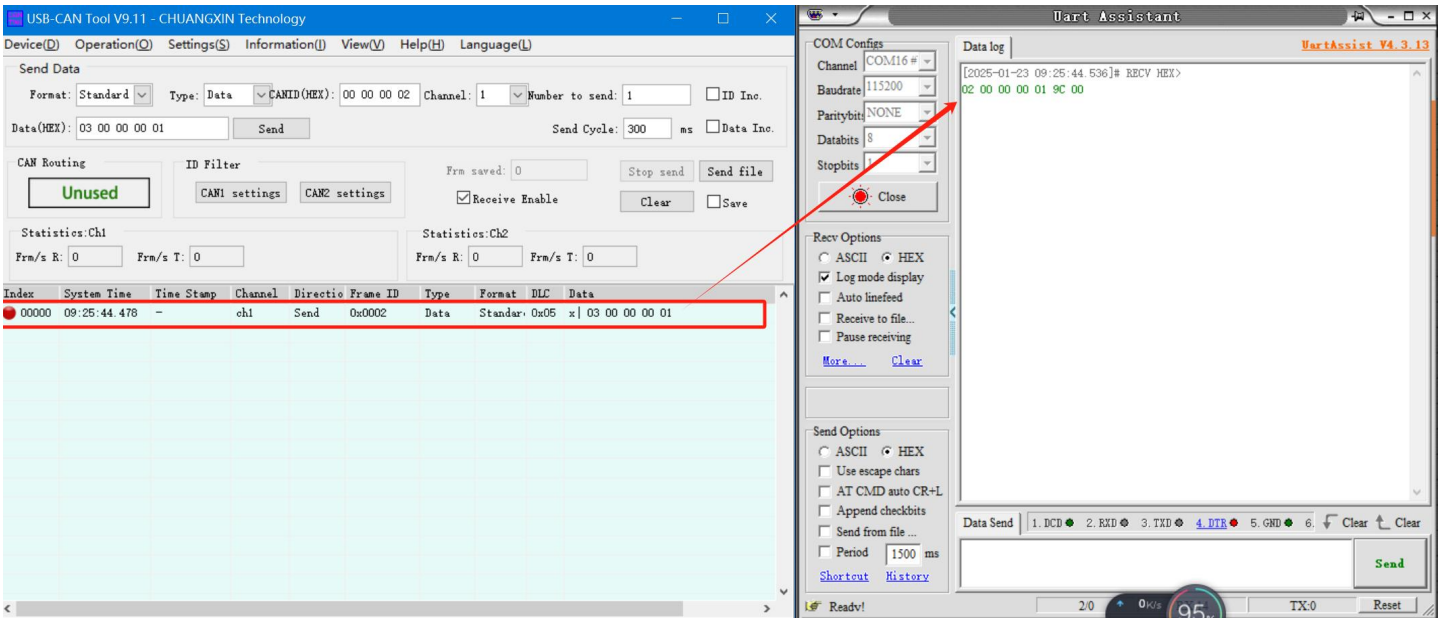
The final effect is as follows:



Modbus RTU to CAN Example

CAN port frame ID set to 00 00 02 02, send: 03 00 00 01

The conversion effect is as follows:



CAN to Modbus RTU Example 1

If multiple frames are to be sent, data forwarding is performed after the last frame is sent according to the packetization rules. If sent:

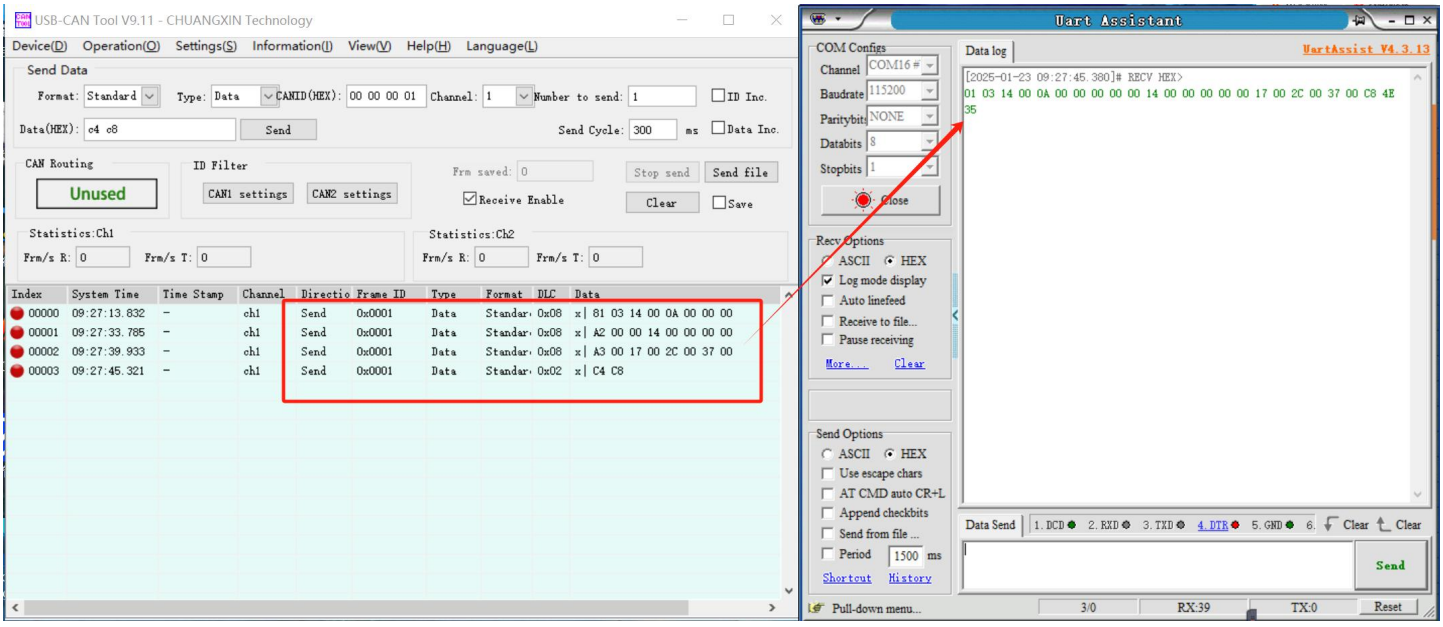
Frame1CAN message:81 03 14 00 0A 00 00 00

Frame2CAN message:a2 00 00 14 00 00 00 00

Frame3CAN message:a3 00 17 00 2C 00 37 00

Frame4CAN message:c4 c8

Frame ID 00 01, the effect is as follows:



CAN to Modbus RTU Example II

4.5. Custom frame header and trailer

In order to make it convenient for users to use CAN-bus, the serial frame format is close to CAN frame format, and the start and end of a frame are specified in the serial frame, namely "frame head" and "frame

tail", which can be configured by users themselves.

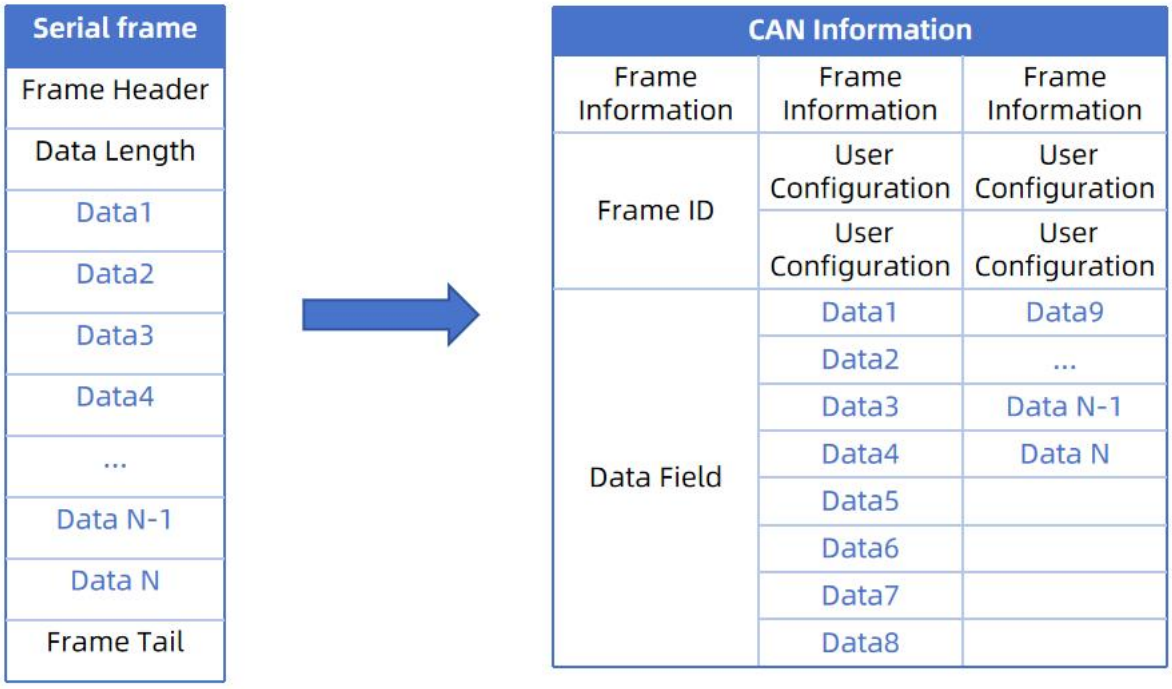
4.5.1. Serial Frame to CAN--Custom Frame Header/Trailer Conversion

Serial frame format must conform to the specified frame format, otherwise it cannot be transmitted correctly. Serial frames must contain: header, data length, data field, trailer.

The frame header and frame trailer are customized by the customer, 1 byte.

Data length refers to the byte length of the data field. The data length and trailer data must match for proper transmission, otherwise discarded. For example, the frame header is configured as AA, and the frame trailer is configured as FF. Serial frame AA 03 01 02 04 FF can be transmitted normally. If a serial frame sends AA 03 01 02 03 04 FF followed by 04 in the data field 01 02 03 instead of FF at the end of the frame, the frame is dropped and cannot be transmitted.

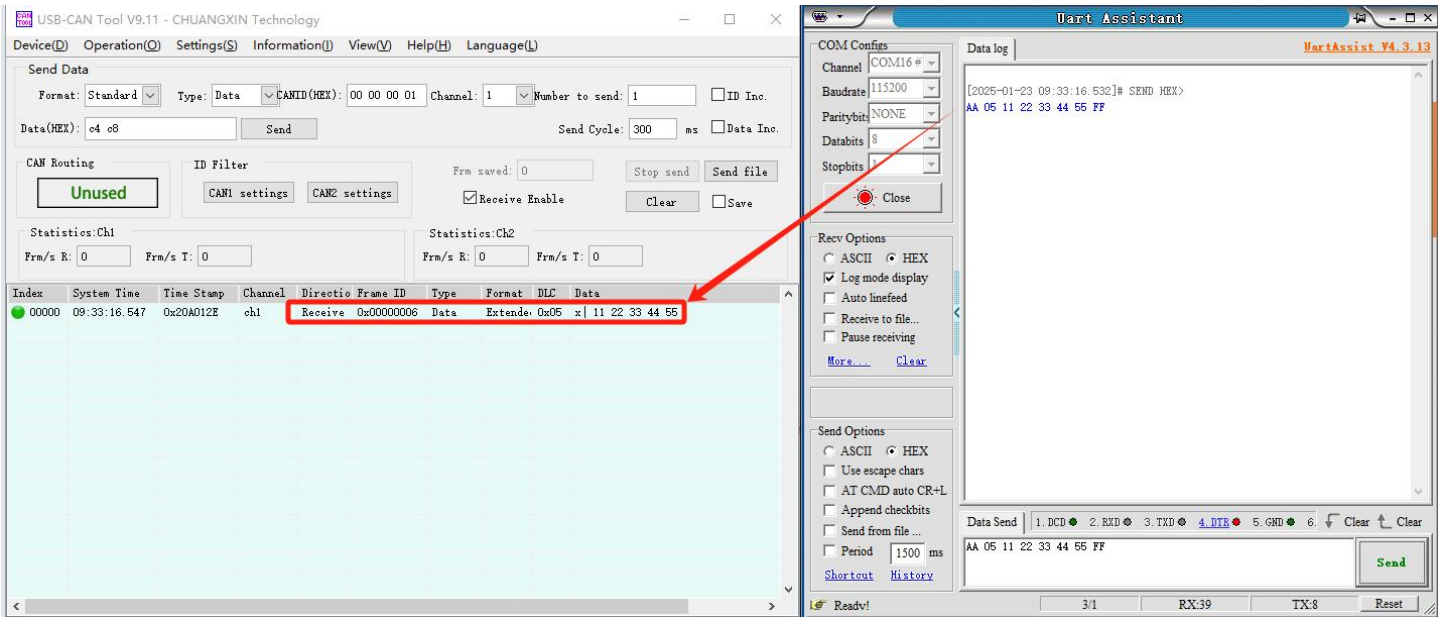
As with transparent conversion, in custom protocol conversion, CAN ID and CAN type need to be configured. Frame header, frame trailer, and data length are not converted to CAN frames.



Custom frame header and frame trailer--serial frame to CAN

Examples:

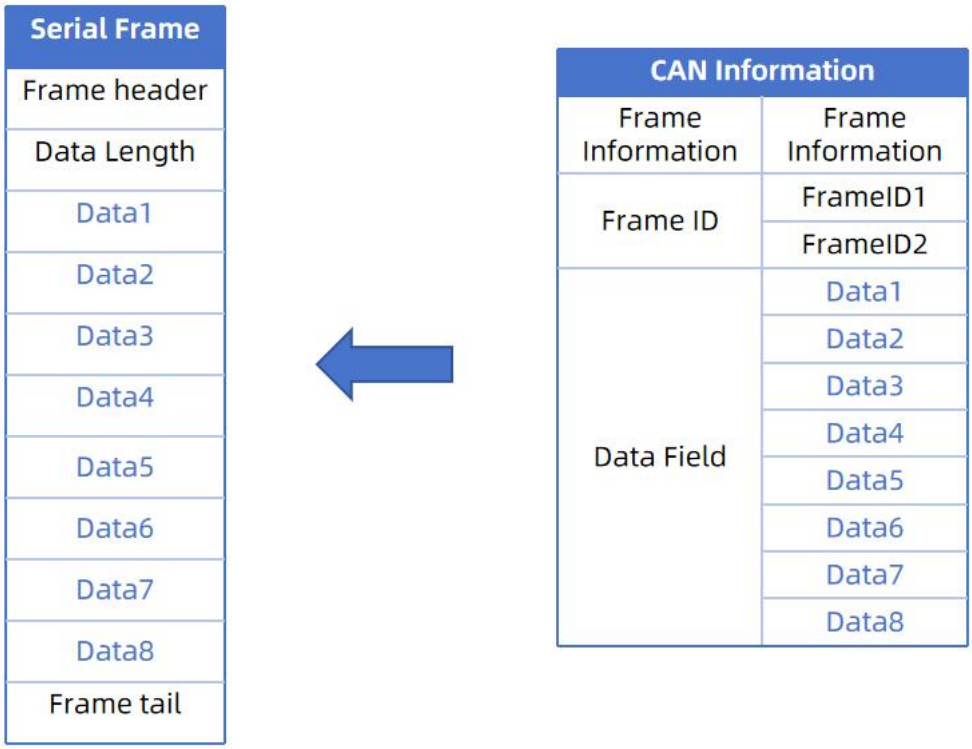
Set the frame header to AA and the frame trailer to FF. Extended frame, frame ID 00 06, data conversion as follows:



Custom Frame Header and Frame Tail--Serial Frame to CAN Example

4.5.2. Serial Frame to CAN--Custom Frame Header/Trailer Conversion

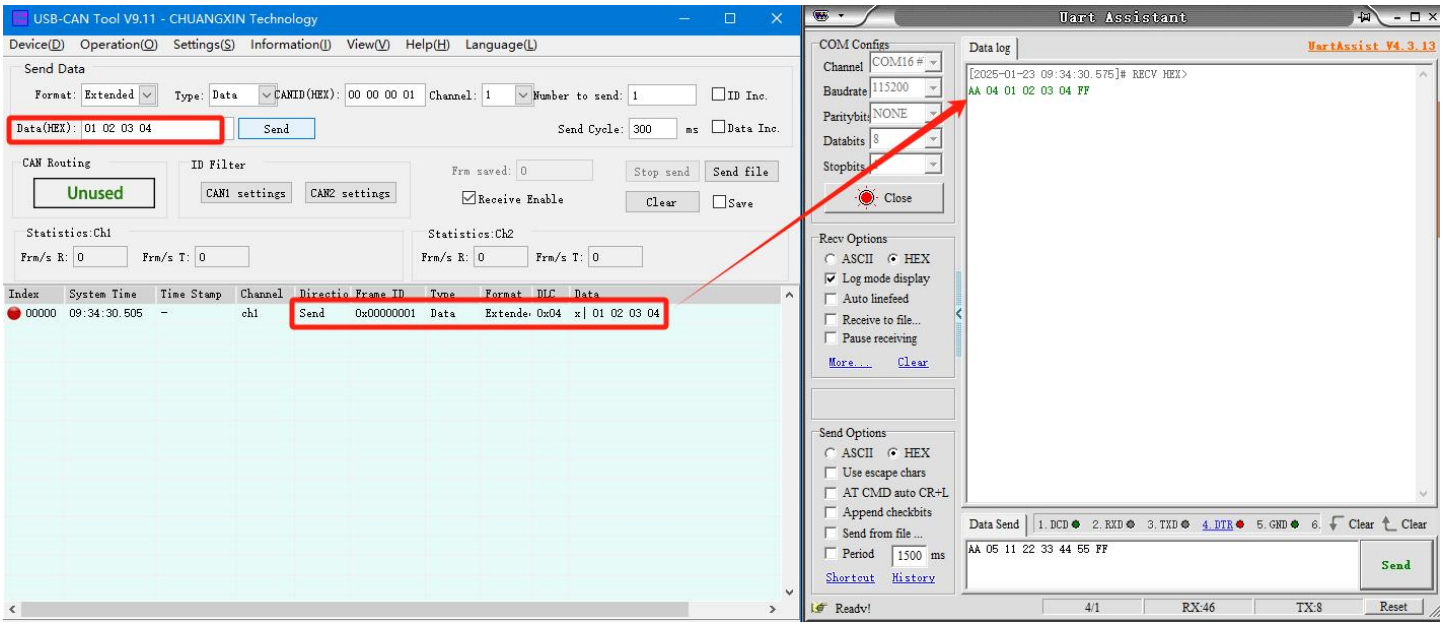
CAN bus message receives a frame and forwards a frame. The module converts the data in the CAN message data field in turn, and automatically adds frame header, frame length, frame information and other data to the serial frame. In fact, it is the reverse form of serial frame to CAN message.



Custom frame header and trailer--CAN to serial frame

Examples:

Set the frame header to AA and the frame trailer to FF. The conversion is as follows:



Custom frame header and trailer--CAN to serial frame example

5. Contact Information

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