MVB-Gateway

Datasheet

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yacer 亚册
Building Blocks of Communication

Foreword

Notational Conventions

The following categorized signal words with defined meaning might appear in the manual.

Signal Words	Meaning
 DANGER	Indicates a high potential hazard which, if not avoided, will result in death or serious injury.
 CAUTION	Indicates a potential risk which, if not avoided, could result in property damage, data loss, lower performance, or unpredictable result.
 ANTISTATIC	Indicates static sensitive equipment.
 DANGER! ELECTRIC SHOCK	Indicates High voltage danger.
 TIPS	Provides methods to help you solve a problem or save you time.
 NOTE	Provides additional information as the emphasis and supplement to the text.

Table of Contents

1 Overview

1.1 Introduction

Yacer MVB-Gateway Train Protocol Conversion Gateway provides MVB interface, one 100M Ethernet interface, one serial port, one CAN bus interface, which realizes protocol conversion between MVB, serial port, CAN bus interface, and Ethernet interface.

Industrial wide temperature, complete isolation and protection, compact size, suitable for train communication network.

1.2 Applications

- Protocol conversion between MVB and Ethernet interface;
- Protocol conversion between MVB and serial port;
- Protocol conversion between MVB and CAN bus;
- Train Control and Management System (TCMS);
- Train Communication Network (TCN);
- Embedded application and development.

1.3 Features

- MVB redundant interface, supports EMD media interface standard;
- Conform to IEC61375 standard;
- One 10/100M Ethernet interface;
- X3 extended interface: optional RS-232, RS-422 or RS-485 serial port;

- X4 extended interface: CAN bus interface;
- Perfect isolation and protection, industrial wide temperature.

1.4 Order Information

MVB-Gateway -	M	3	6	U	-LV	
MVB Type:						
● EMD	**M**					
Extended Interface X3 Definition:						
● None		**0**				
● Full-duplex RS-232 serial port		**3**				
● Full-duplex RS-422 serial port		**4**				
● Half-duplex RS-485 serial port		**5**				
Extended Interface X4 Definition:						
● CAN Bus interface			**6**			
Ethernet Protocol:						
● Ethernet support for UDP protocol				**U**		
Supply voltage range:						
● Nominal 24V, tolerance 9 ~ 36VDC					-LV	
● Nominal 36V, 48V, tolerance 18 ~ 75VDC					-MV	
● Nominal 72V, 96V, 110V, tolerance 40 ~ 160VDC					-HV	
MVB Connector Bolt Specifications:						
● Metric M3						**<empty>**
● Imperial UNC4-40						**-UNC**

1.5 Technical Specifications

Item	Parameters	Details
MVB Interface	Connector	1 x male D-Sub 9 (X20) + 1 x female D-Sub 9 (X21)
	Media type	EMD
	Device class	Class 1
	Device capabilities	Device_Status, Process_Data(PD)

Item	Parameters	Details
	Number of PD ports	32
	Isolation	2.5 kVrms
Serial Port	Connector	1 x male D-Sub 9 (X3)
	Interface type (Three-in-one)	● RS-232 full-duplex serial port ● RS-422 full-duplex isolated serial port ● RS-485 half-duplex isolated serial port
	Baud rate	≤ 921.6 kbps
	Isolation	2.5 kVrms
CAN Interface	Connector	1 x male D-Sub 9 (X4)
	Interface type	CAN bus isolation interface (CAN 2.0A, CAN 2.0B, ISO 11898)
	Baud rate	50 Kbps ~ 1 Mbps
	Isolation	2.5 kVrms
Ethernet Interface	Connector	1 x M12 with D-coding
	Rate	10/100 Mbps adaptive
	Network protocol	TCP/IP
	Programming interface	UDP Server, UDP Client Support Unicast/Multicast/Broadcast
	Isolation	1.5 kVrms
Configuration Software	Configuration tool	yacer-DMS configuration management software
	Configuration interface	Ethernet interface
Power	Power supply	LV: Nominal 24V, tolerance 9 ~ 36VDC MV: Nominal 36V, 48V, tolerance 18 ~ 75VDC HV: Nominal 72V, 96V, 110V, tolerance 40 ~ 160VDC
	Isolation protection	>1.5 kVrms, supporting Anti-reverse protection
	Power consumption	< 3W
	Power connector	3 pin connector with 5mm pitch (Phoenix Contact MSTB 2,5 / 3-GF or equivalent)

Item	Parameters	Details
Mechanical Characteristics	Dimensions	H x W x D: 124 x 36 x 104 mm
	Weight	500g
Operating Environment	Operating temperature	-40 ~ +70℃
	Storage temperature	-40 ~ +85℃
	Operating humidity	5 ~ 95% RH (no condensation)

2 Hardware and Physical Interfaces

2.1 Appearance

2.2 LED Indicators

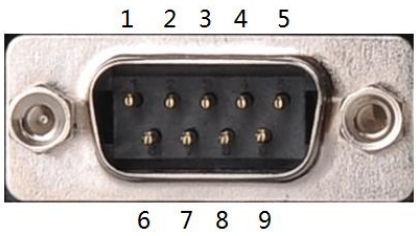
Item	Description
ALARM	Alarm indicator, on when the device is not ready or fails, and constantly off during normal operation
RUN	Running indicator, green light flashes during normal operation
MVB TX	MVB interface transmission indication
MVB RX	MVB interface reception indication
HOST TX	Serial port and CAN interface transmission instruction
HOST RX	Serial port and CAN interface reception instruction
UDP	UDP reception/transmission indication
ETH	Link/ACT indication of the Ethernet interfaces

2.3 Ethernet Interface (X10)

The X10 is a 10/100M Ethernet interface with an M12 (D-coding) connector.

X10 Pin	Description
1	TD +
2	RD +
3	TD -
4	RD -

2.4 MVB Interface (X20, X21)

X20 (Male D-Sub 9 connector)	X21 (Female D-Sub 9 connector)
	

2.4.1 EMD Pin Definition

Pin	X20 (Male) Signal Name	X21 (Female) Signal Name	Description
1	A.Data_P		Line A positive (+)
2	A.Data_N		Line A negative (-)
3			
4	B.Data_P		Line B positive (+)
5	B.Data_N		Line B negative (-)
6	A.Term_P		Line A matching resistor positive (+)
7	A.Term_N		Line A matching resistor negative (-)
8	B.Term_P		Line B matching resistor positive (+)
9	B.Term_N		Line B matching resistor negative (-)

2.5 Serial Port (X3)

2.5.1 Function Description

X3 is an extended serial port, and users can choose one of the following types when ordering:

- RS-232 full-duplex
- RS-422 full-duplex with isolation
- RS-485 half-duplex with isolation

2.5.2 Pin Definition

X3 uses the male D-sub 9 connector, pin defined as follows:

PIN	RS-232 Full-duplex	RS-422 Full-duplex	RS-485 Half-duplex
1			
2	RxD		
3	TxD	ISO_GND	ISO_GND
4		TxD +	Data +
5	GND	TxD -	Data -
6			
7			
8		RxD +	Term +
9		RxD -	Term -

2.5.3 Terminator RS-485

In RS-485 mode, 8-9 short enable terminal matching with a matching resistance of 120 ohms.

2.6 CAN Interface (X4)

2.6.1 Function Description

X4 is the CAN bus interface.

2.6.2 Pin Definition

PIN	CAN
1	Term +
2	CAN_L
3	ISO_GND
4	
5	
6	Term -
7	CAN_H
8	
9	

2.6.3 Terminator CAN bus

In CAN interface mode, 1-6 short enable terminal matching with a matching resistance of 120 ohms.

2.7 Power Interface (X5)

2.7.1 Function Description

MVB-Gateway is powered by DC power supply, supports isolation protection and surge protection, and provides anti-inverse protection.

Depending on the factory configuration, the power input range is as follows:

Model	Nominal Value	Minimum Value	Maximum Value
LV	24V	9V	36V
MV	36V, 48V	18V	75V
HV	72V, 96V, 110V	40V	160V

2.7.2 Pin Definition

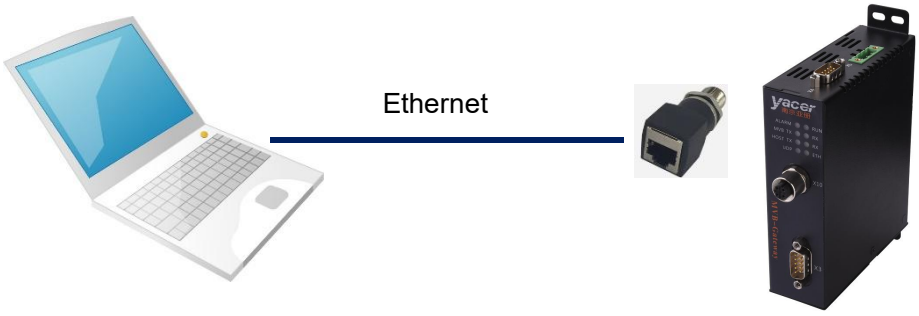
The X5 uses a 3-pos 5mm terminal connector (Phoenix Contact MSTB 2,5 / 3-GF compatible).

Pin	Signal Name	Description
1	V +	Power +
2	FG	Protection ground
3	V -	Power -

3 Building Configuration Environment

3.1 Connect Configuration Computer to MVB-Gateway

Connect the management computer with any Ethernet interface port of MVB-Gateway through network cable, and run yacer-DMS configuration management software on the computer to configure the parameters and monitor the state of MVB-Gateway.



3.2 Get yacer-DMS Configuration Management Software

The user can obtain a compressed package yacer-DMS.zip of configuration management software in the following ways:

- In the “tools” directory of the accompanied U disk of MVB-Gateway;
- Software channel on the official website (https://www.yacer.com.cn).

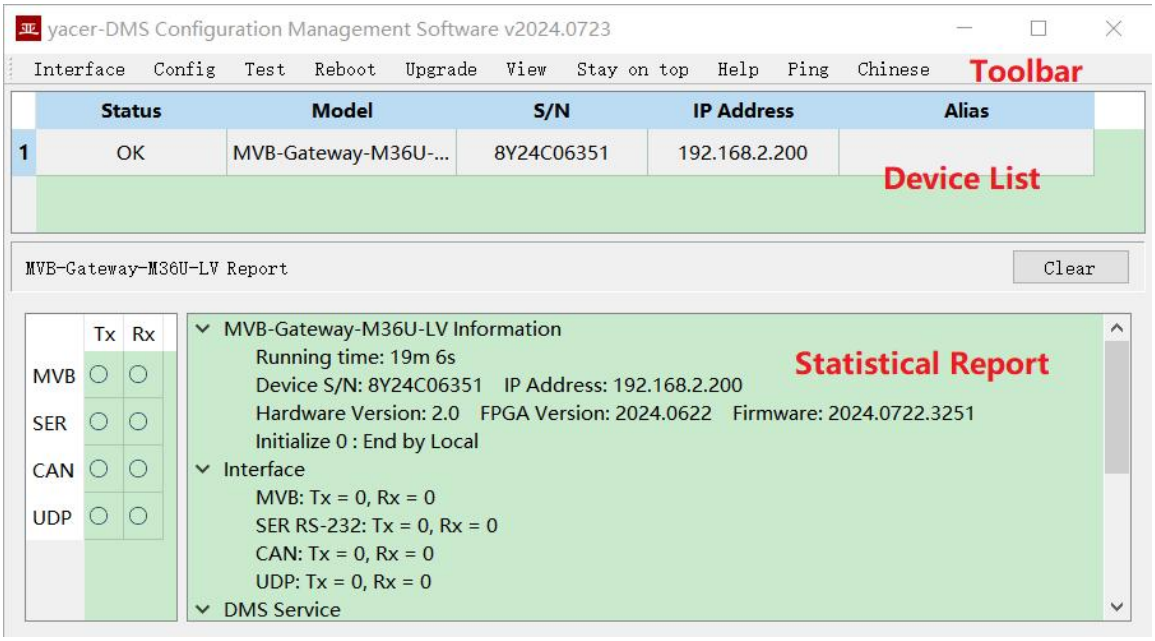
3.3 Run yacer-DMS software

The yacer-DMS is a free installation application software, unzip yacer-DMS.zip, enter the working directory and double click the file yacer-DMS.exe to run.

3.4 Main Window of yacer-DMS

The following figure is the main interface of the configuration management software, which can be divided into three parts:

- Toolbar: Functional operation buttons;
- Device List: Displaying the basic information and operation status of devices;
- Statistical Report: Displaying the receive/transmit indication & statistics, and device details.



3.5 Statistical Report

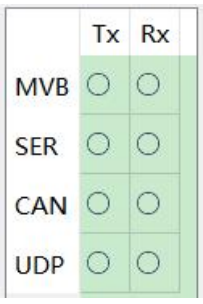
The statistical report has three panels: control panel, receive/transmit indication panel and information panel.

3.5.1 Control Panel

The statistics report is refreshed once per second and the statistics can be cleared by clicking the “Clear” button.

3.5.2 Receive/Transmit Indication Panel

- Tx: The interface sends a frame of data, corresponding Tx indicator blinks once;
- Rx: The interface receives a frame of data, corresponding Rx indicator blinks once.



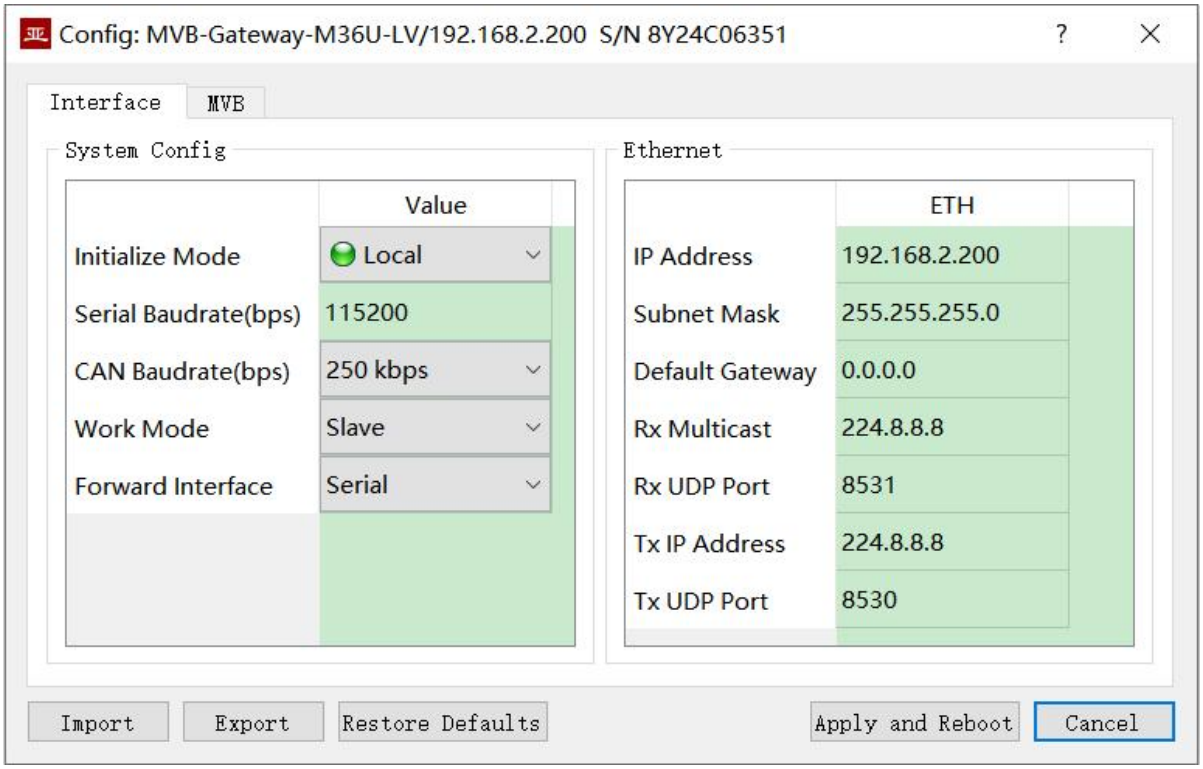
3.5.3 Information Panel

The right side of the statistical report is the information panel, which can display the following contents:

- Device information: Running time, S/N number, version number;
- Interface：MVB, Serial port, CAN interfaces receive/transmit statistics;
- DMS Service: DMS message receive/transmit statistics.

3.6 Configure Device

Click on the “Config” button on the toolbar or double-click the selected device in the device list, yacer-DMS pops up the configuration dialog. According to the interface and function, the dialog divides the configuration items into several configuration pages.

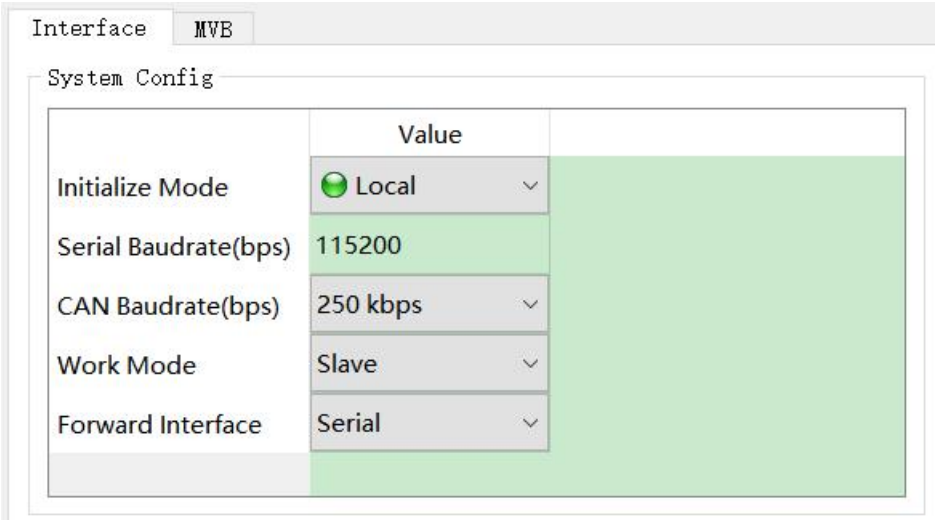


The following operation buttons are located at the bottom of the dialog:

Button	Function
Import	Open the configuration file, read the configuration parameters refresh the configuration dialog
Export	Export configuration parameters from the configuration dialog to a file for saving
Restore Defaults	Refresh the contents of the dialog box with the device's factory default configuration
Apply and Reboot	Write the configuration parameters in the dialog to the deivce, and reboot the device to make the configuration take effect
Cancel	Cancel current configuration operation

4 Function and Configuration

4.1 System Configuration



4.1.1 Initialization Method

Configure the initialization method of the module, the factory default is Host method.

4.1.2 Serial Port Baud Rate

Configure the serial port baud rate.

Other serial port parameters are: data bit 8bit, stop bit 1bit, no parity.

4.1.3 CAN Baud Rate

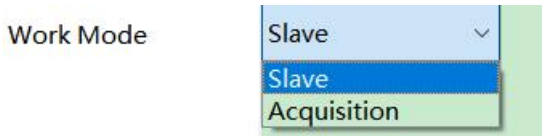
CAN bus interface baud rate.

4.1.4 MVB Operating Mode

Module MVB has two modes of operation:

- Slave mode: MVB slave PD bidirectional communication mode;

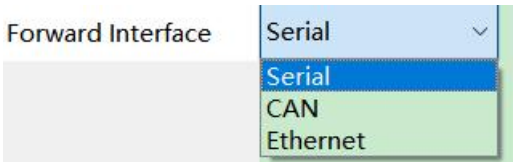
- Acquisition Mode: Receive all PD data from the MVB bus. The module works in pure reception mode and will not output all frames including device status and PD to the MVB bus.



4.1.5 MVB Forwarding Interface

This configuration is valid in Local initialization mode.

Host mode indicates the current host interface.



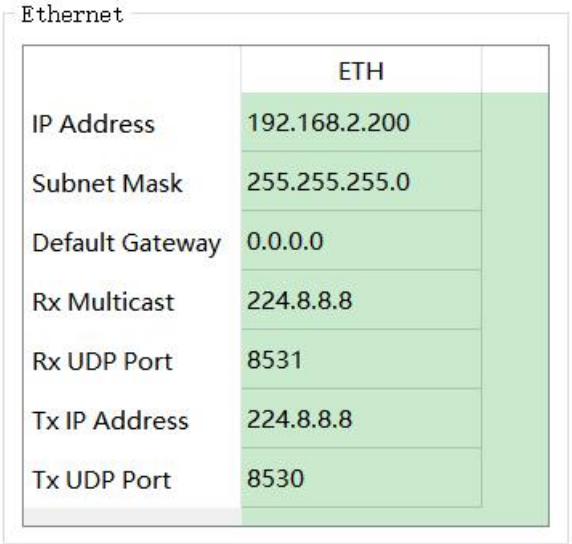
Forwarding interfaces include:

- Serial: Protocol conversion between MVB, serial port;
- CAN: Protocol conversion between MVB, CAN interface;
- Ethernet: Protocol conversion between MVB, UDP.

4.2 Ethernet Interface Configuration

The configuration includes the following:

- IP address, subnet mask, and default gateway for the Ethernet interface;
- UDP receive port and multicast address;
- Destination IP address and destination UDP port for UDP transmission.

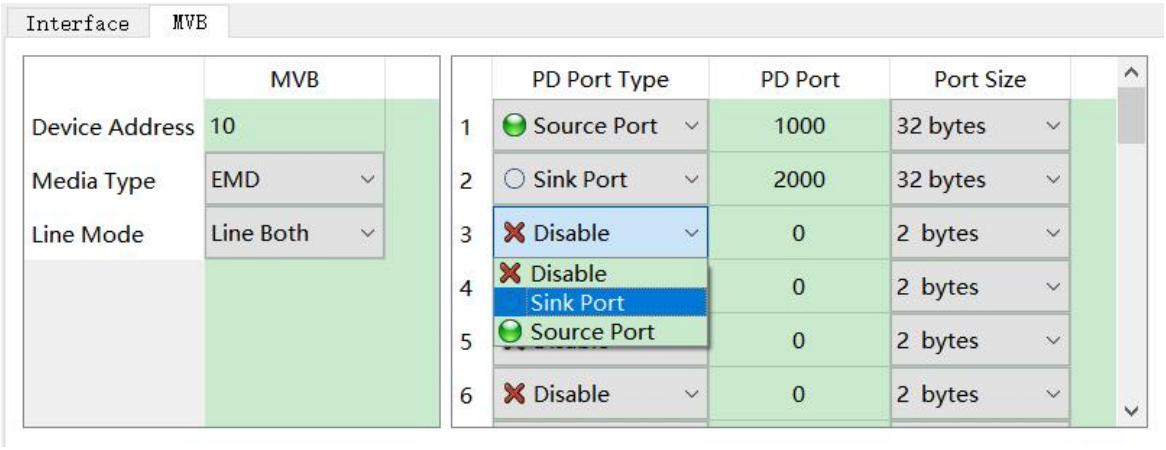


4.3 MVB Configuration

The MVB configuration page is shown below, with the MVB interface configuration on the left, and the PD port configuration table on the right.

In Local initialization mode, the module initializes the MVB interface with this configuration.

In Host initialization mode, this page shows the configuration parameters from the host computer.

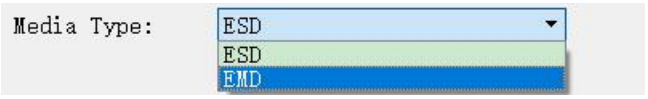


4.3.1 Device Address

Users configure device address in the range of 0 to 4095 according to field requirements.

4.3.2 Media Type

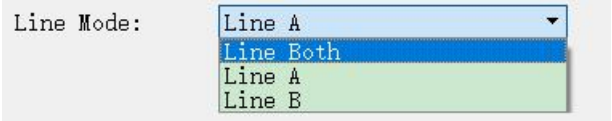
The MVB-Gateway should select the EMD media type.



4.3.3 Line Mode

Users can choose:

- Line Both: Dual-line redundancy;
- Line A: Line A single line mode;
- Line B: Line B single line mode.



4.3.4 PD Port Configuration Table

The default version of the MVB-Gateway supports up to 32 process data ports with the following parameters included for each PD port item:

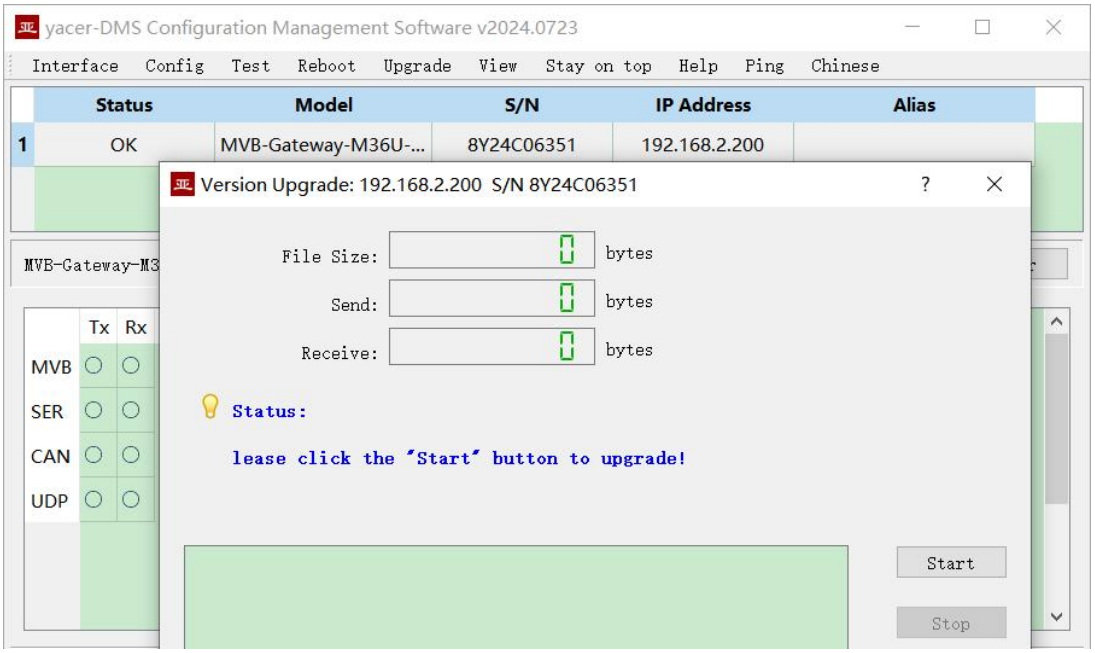
- PD Port Type: Sink or Source port, disable means this entry is invalid;
- PD Port: Set port number 0 ~ 4095;
- Port Size: 2, 4, 8, 16, 32 bytes correspond to 0 ~ 4 of Fcode;

5 System Maintenance

5.1 Firmware Version Upgrade

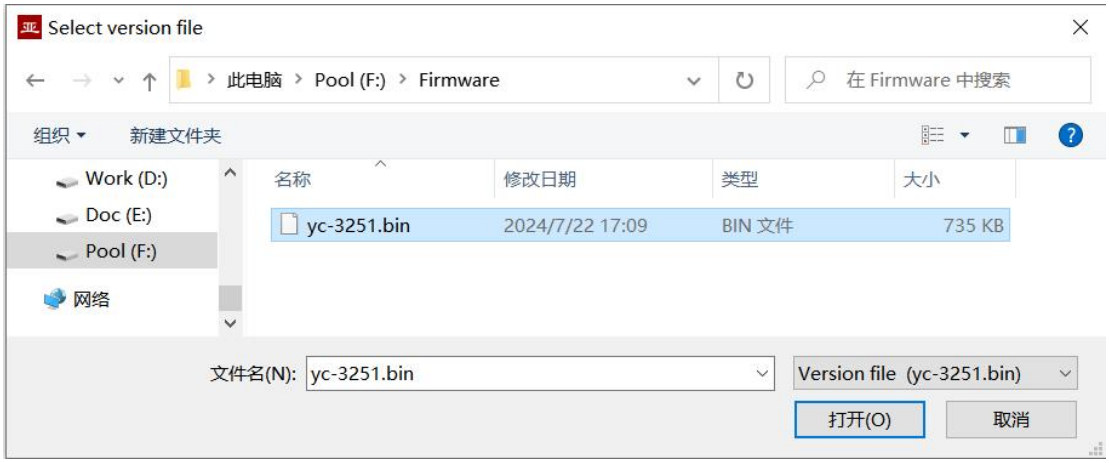
5.1.1 Start Upgrade

Click the “Upgrade” button on the toolbar to pop up the version upgrade dialog, and then click the “Start” button.



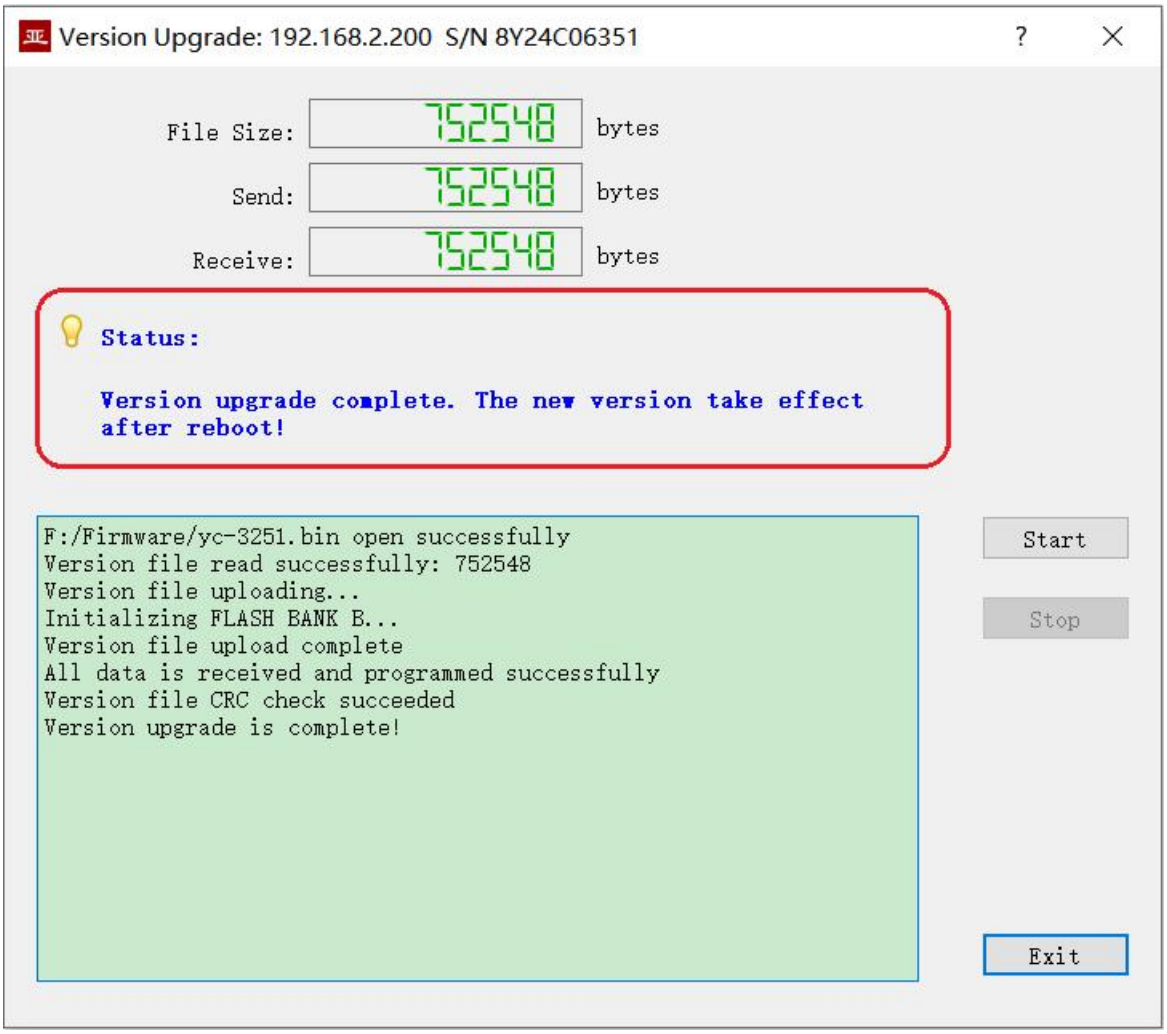
5.1.2 Select Version File

Pop up the “Select version file” dialog, and find the folder where the latest firmware version is stored, select the corresponding file, and click “Open” to start the update.



5.1.3 Complete Upgrade

When the page displays “Version upgrade complete” status, it indicates that the version upgrade is completed.

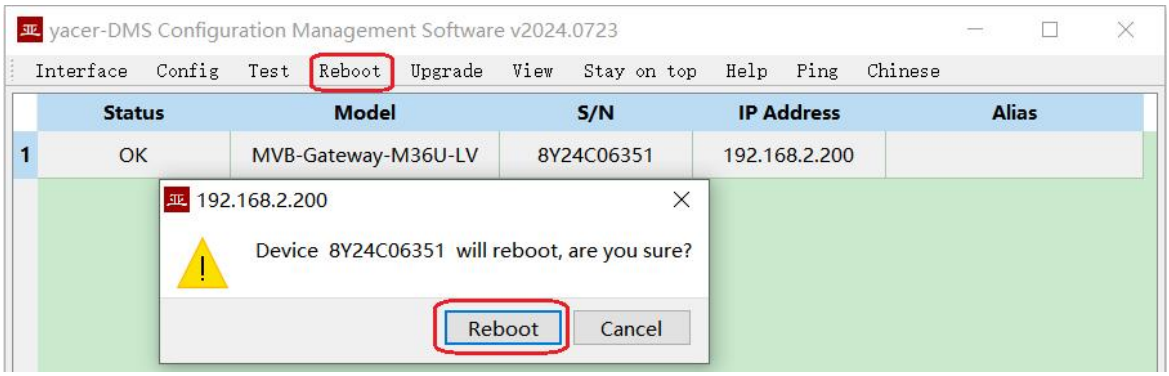


5.1.4 Confirm Upgrade

After the upgrade is completed, power up the device again, observe the version information in the statistical report, and determine whether the new version is successfully updated by the version date.

5.2 Reboot Device

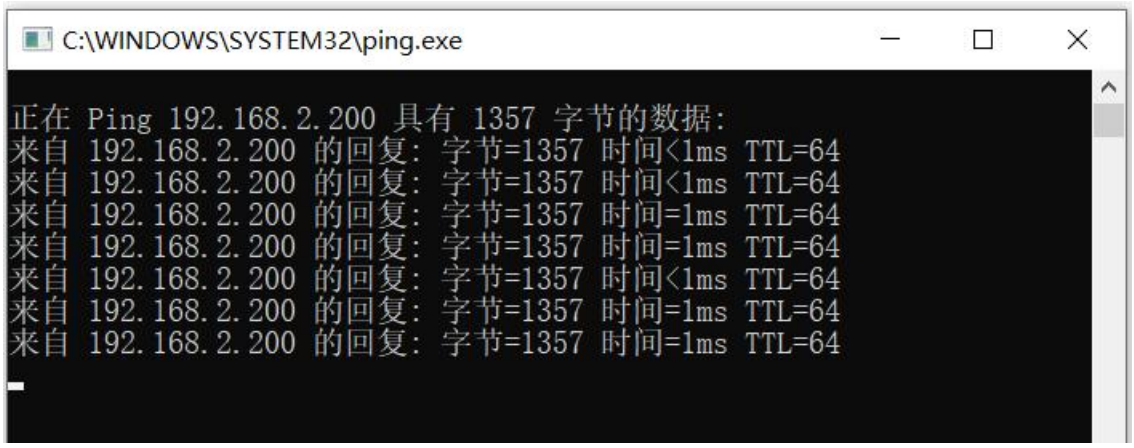
Click the “Reboot” button on the toolbar to pop up the device reboot dialog, and then click the “Reboot” button to reboot the device.



5.3 Ping

By clicking the "Ping" button on the toolbar, DMS automatically starts the ping command on the selected device to check whether the network connection between the configuration management computer and MVB-Gateway is working properly.

Before executing the Ping command, first make sure that the IP addresses of the computer and MVB-Gateway are in the same subnet.



6 Software Development

Reference:

- *THCP Protocol Programming Manual*

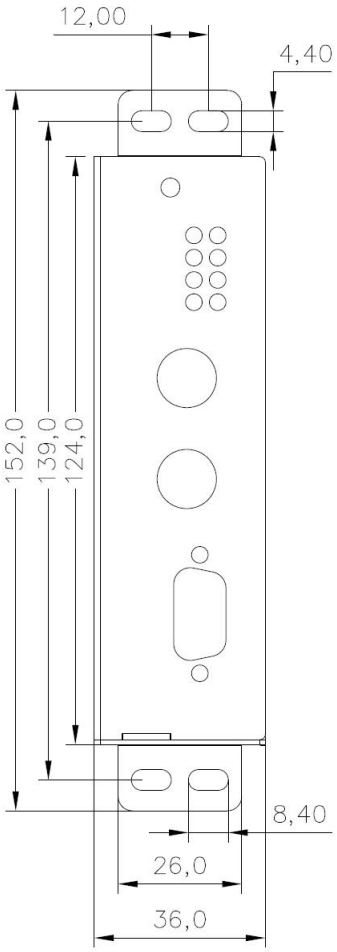
7 Mechanical Characteristics & Installation

The material of the housing shell is stainless steel. The thickness of the sheet metal is 1mm.

Dimensions (Height x Width x depth) : 124 x 36 x 104mm.

MVB-Gateway can be mounted directly using four M4 Screws.

Mounting hole diameter = 4.4mm.



8 Verification and Debugging of MVB

8.1 Auxiliary Equipment

- Yacer MVB-Analyzer;
- Computer;
- YC9T straight-through cable.

8.2 Auxiliary Software

The following software can be obtained by MVB-Gateway attached U-Disk or accessing https://www.yacer.com.cn 'Software' channel:

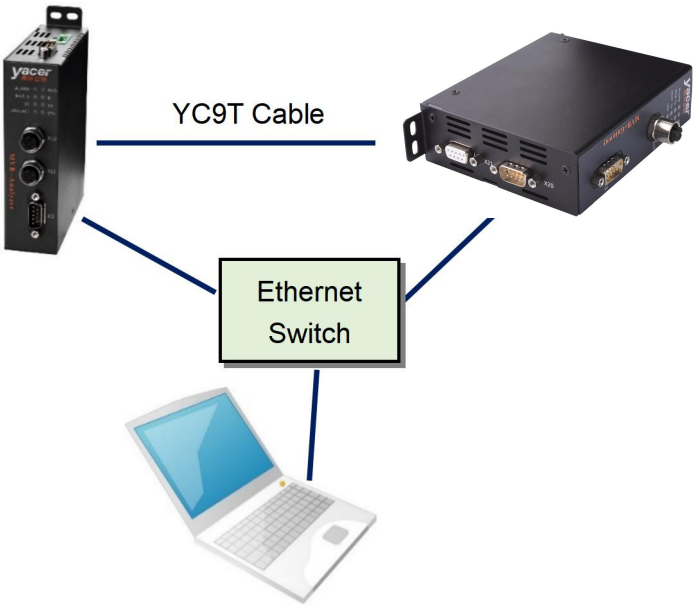
- *yacer-DMS* configuration management software;
- *MVB-Monitor* monitoring and analysis software;
- *MVB-UDP* debugging assistant.

8.3 Debugging and Testing Scheme

MVB-Gateway realizes MVB bus interconnection through YC9T cable and MVB-Analyzer, and computers, MVB-Gateway and MVB-Analyzer realize Ethernet interconnection through switches.

The MVB-Monitor software running on the computer can control the MVB-Analyzer to simulate the host, so as to realize the data transceiver of MVB interface of MVB-Gateway.

The MVB-UDP debugging assistant software is running on the computer to simulate the communication between the host computer and the MVB-Gateway Ethernet interface.


YC9T Cable
Ethernet
Switch

About the Manual

- The manual is for reference only. If there is inconsistency between the manual and the actual product, the actual product shall prevail.
- We are not liable for any loss caused by the operations that do not comply with the manual.
- All the designs and software are subject to change without prior written notice. The product updates might cause some differences between the actual product and the manual. Please contact the customer service for the latest program and supplementary documentation.
- There still might be deviation in technical data, functions and operations description, or errors in print. If there is any doubt or dispute, we reserve the right of final explanation.
- Upgrade the reader software or try other mainstream reader software if the manual (in PDF format) cannot be opened.
- Please visit our website, contact the supplier or customer service if there is any problem occurring when using the device.
- If there is any uncertainty or controversy, we reserve the right of final explanation.