AI-DeviceNET User Manual

I. Product Introduction

1.1 Overview

The AI-DeviceNet protocol converter is a device that converts the MODBUS-RTU protocol from Yudian instruments into the DeviceNet protocol. It supports three MODBUS-RTU commands (03H, 06H, 10H), allowing for broader communication with other MODBUS-RTU devices.

1.2 Technical Specifications

[1] Enable data communication between multiple Modbus devices and DeviceNet.

[2] Modbus Features

　　Modbus baud rate: 1200, 2400, 4800, 9600, 19200, 38400, 56700, 115200 bps

　　Supported function codes: 03H, 06H, 10H.

　　Supported communication format: RTU format.

　　Write command output mode: Output on change.

　　RS485 interface support: Half-duplex, baud rate: 1200~115200 bps.

　　Data bits: 8 bits.

　　Parity bit: None, odd, even (Selectable).

　　Stop bits: 1 bit, 2 bits (Selectable).

【3】 DeviceNet Features

DeviceNet baud rate: 125K, 250K, 500K.

Support up to 512 bytes input and 512 bytes output, with selectable sizes of 8, 16, 32, 48, 64, 72, 96, 112, 128, 160, 192, 200, 224, 280, 300, 512 bytes.

Support DeviceNet I/O Poll Scanning.

[4] Power Supply: 24VDC

Note:

1) The 10H function code is only supported by the AI-8x88 series instruments.

2) DeviceNet address only supports 0~63.

3) The ModBus device slave address (node) only supports 1~247.

4) Maximum number of commands: 128.

1.3 Port Description

Port	Description
DeviceNet Port	Connect to DeviceNet devices
RS485 Port	Connect to Yudian AI series instruments
USB Port	Connect to the host computer for AI-DeviceNET configuration software communication

1.4 Indicator Light

| Name	Indicator Light	Status	Description
DeviceNET Status Indicator Light	MS	Green light always on	DeviceNet network normal
		Red light always on	DeviceNet network error
		Red light flashing	DeviceNet network initialization
	NS	Green light always on	Device is online and connection is established
		Green light flashing	Device is online but connection is not established
		Red light always on	Device is offline
Serial Port Indicator	RX	Green light flashing	Data received on RS485
		Green light off	No data received on RS485
Power Indicator Light	PWR	Red light always on	Device powered on
		Red light off	Device powered off

1.5 Wiring

Port	Description
A	RS485-A
B	RS485-B
24V+	Positive terminal of 24VDC power supply
24V-	Negative terminal of 24VDC power supply
O1~O6	Reserved
USB Interface	Connect to the host computer
DeviceNet Port	Refer to the DeviceNet Port Description for details

Note:

1. Backplane Power Supply (24VDC) and Panel Power Supply (24VDC): Either set can be used for connection.

2. Backplane RS485 and panel RS485 are interconnected.

Modbus Port:

Either the backplane RS485 or panel RS485 can be connected (only one set required). Users can follow the labels for wiring or directly connect through the backplane bus terminals to other Yudian instruments supporting the Modbus protocol, such as temperature controllers. The wiring diagram for the backplane bus terminal is as follows:
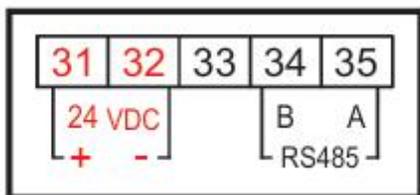
DeviceNet Port:

The DeviceNet side features an open five-pin pluggable terminal, allowing users to wire according to the instructions provided.
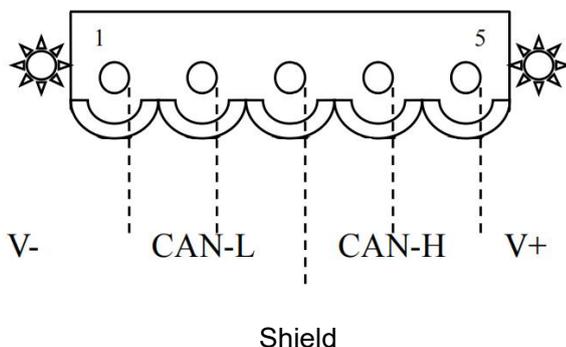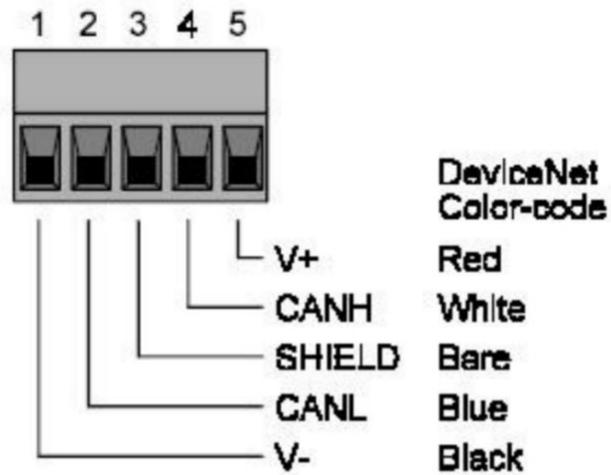
PIN	WIRING
Pin 1	V-, 24VDC negative
Pin 2	CAN-L
Pin 3	Shield
Pin 4	CAN+H
Pin 5	V+, 24VDC positive

The AI-DeviceNet protocol converter is a device that converts the MODBUS-RTU protocol from Yudian instruments into the DeviceNet protocol. It supports three MODBUS-RTU commands (03H, 06H, 10H), allowing for broader communication with other MODBUS-RTU devices.

II: Configuration Description

The fieldbus and subnet configurations come with initial values upon software initialization. Specific parameters should be modified according to actual needs.

2.1 Fieldbus
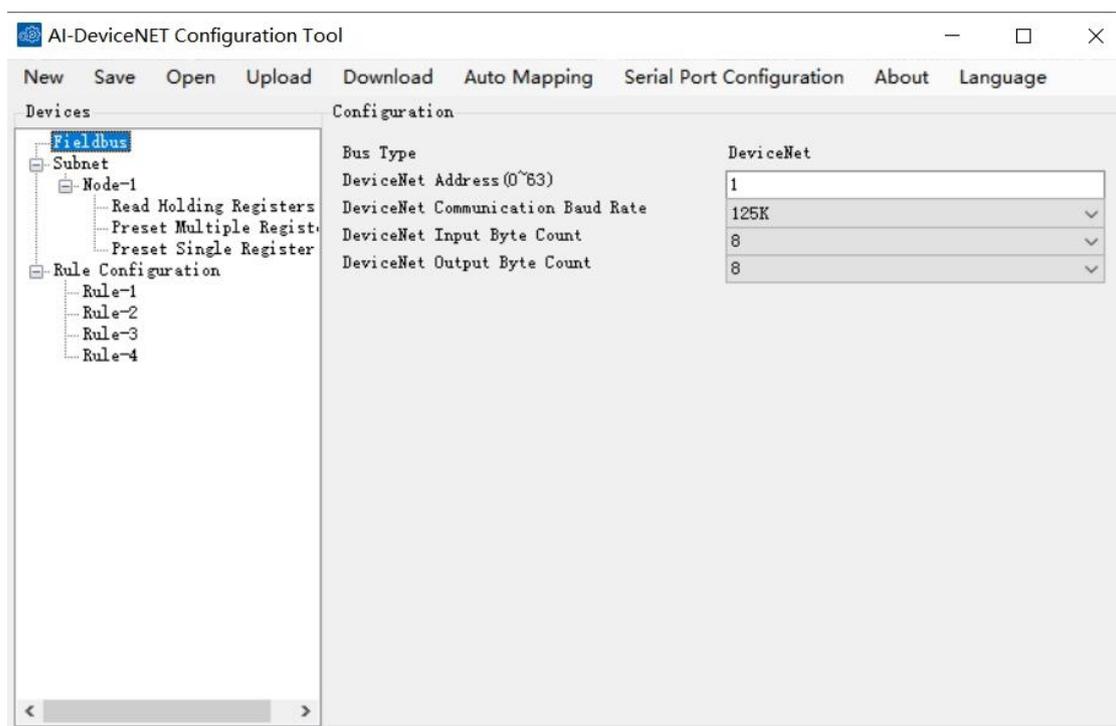
Configurable items include: DeviceNet address, DeviceNet communication baud rate, DeviceNet input byte count, and DeviceNet output byte count.

DeviceNet address: Range 0~63.

DeviceNet communication baud rate: 125K, 250K, 500K selectable.

DeviceNet input byte count: Selectable values include 8, 16, 32, 48, 64, 72, 96, 112, 128, 160, 192, 200, 224, 280, 300, and 512.

DeviceNet output byte count: Selectable values include 8, 16, 32, 48, 64, 72, 96, 112, 128, 160, 192, 200, 224, 280, 300, and 512.

Note: The encoder on the AI-DeviceNet converter can also be used to set the DeviceNet address (as shown in the figure below; the left side represents the tens digit, and the right side represents the ones digit). When the encoder is set to 0, the DeviceNet address is configured according to the downloaded settings. When the encoder is set to another valid address (1~63), the DeviceNet address is configured according to the encoder settings.
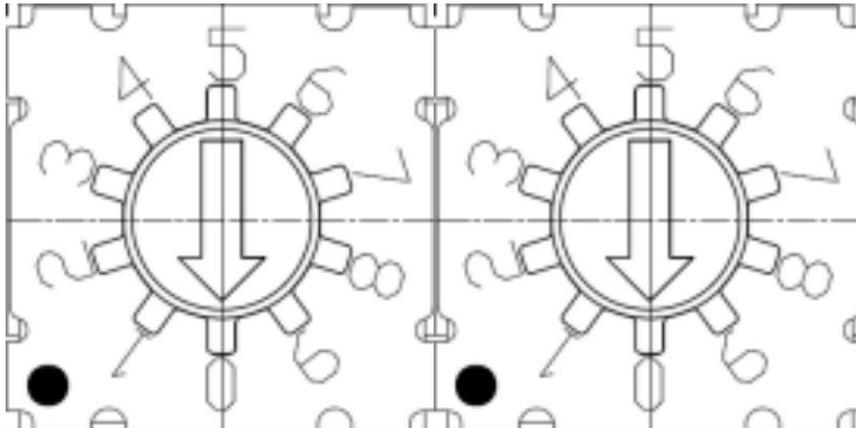
2.2 Subnet
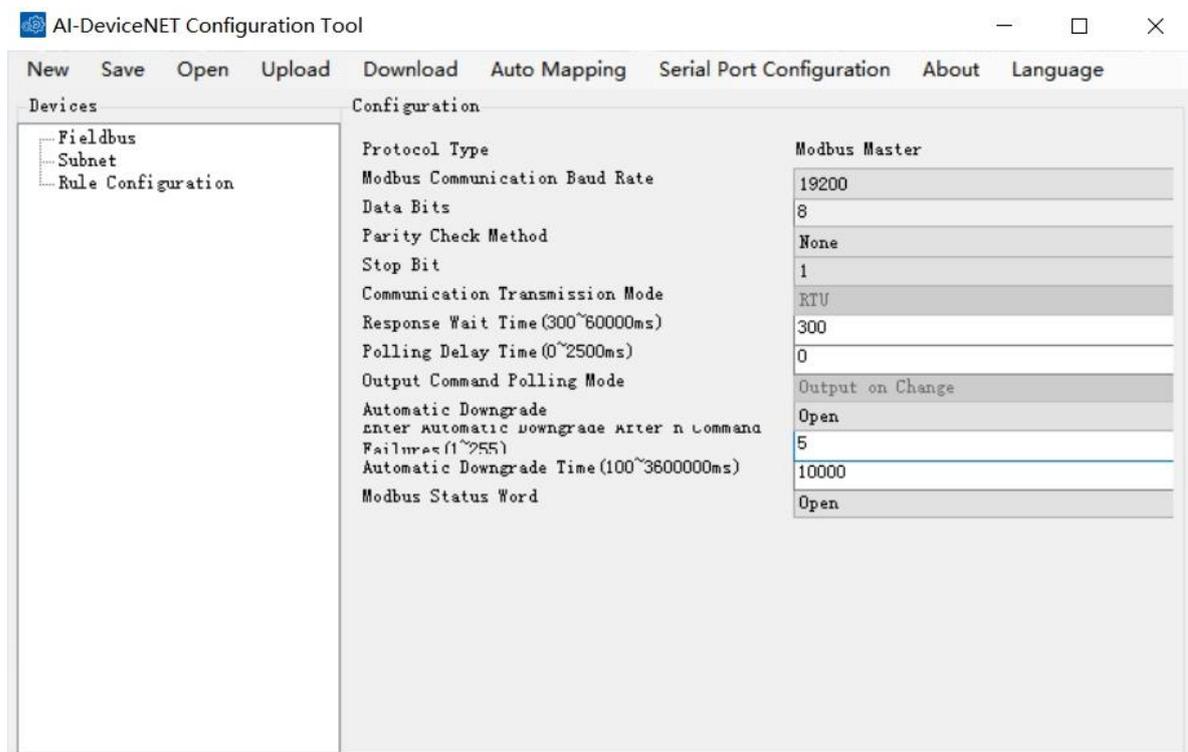
The protocol type is Modbus Master, and the configurable parameters include:

Modbus communication baud rate, parity check method, stop bits, response wait time, polling delay time, automatic downgrade, and Modbus status word.

Modbus communication baud rate: Selectable from 1200, 2400, 9600, 19200, 38400, 57600, and 115200 bps.

Data bits: 8 bits.

Parity check method: None, odd parity, and even parity are available.

Stop bits: Selectable 1 or 2 bits.

Communication transmission mode: RTU.

Response waiting time: The time allowed for the slave to respond after the Modbus master sends a command, ranging from 300 to 60000ms.

Polling delay time: The delay before sending the next Modbus command, after completing a Modbus command and receiving a correct response or a response timeout. The range is 0 ~ 2500ms, **with a default setting of 0**.

Output command polling mode: Output on change: When there is a change in the output data, an output write command is issued, and the output stops once the correct response is received.

Automatic downgrade: Downgrade applies to scenarios where the Modbus command scan mode is set to fast scan. If the Modbus command is configured for fast scanning, the command will downgrade to slow scanning after the Modbus slave fails to respond n times.

Enter automatic downgrade after n command failures (1~255): The command will downgrade to slow scanning after the Modbus slave fails to respond n times.

Automatic downgrade time: The duration for which the Modbus command remains downgraded from fast to slow scanning. Once the time elapses, it will revert to fast scanning. If necessary, the data will be split into multiple packets for transmission, with each packet having a length of 128 bytes.

(The above two parameters can only be configured once automatic downgrading is enabled)

Modbus status word: Available options are Enable or Disable. (When enabled, it occupies 2 input bytes)

Node 2.3
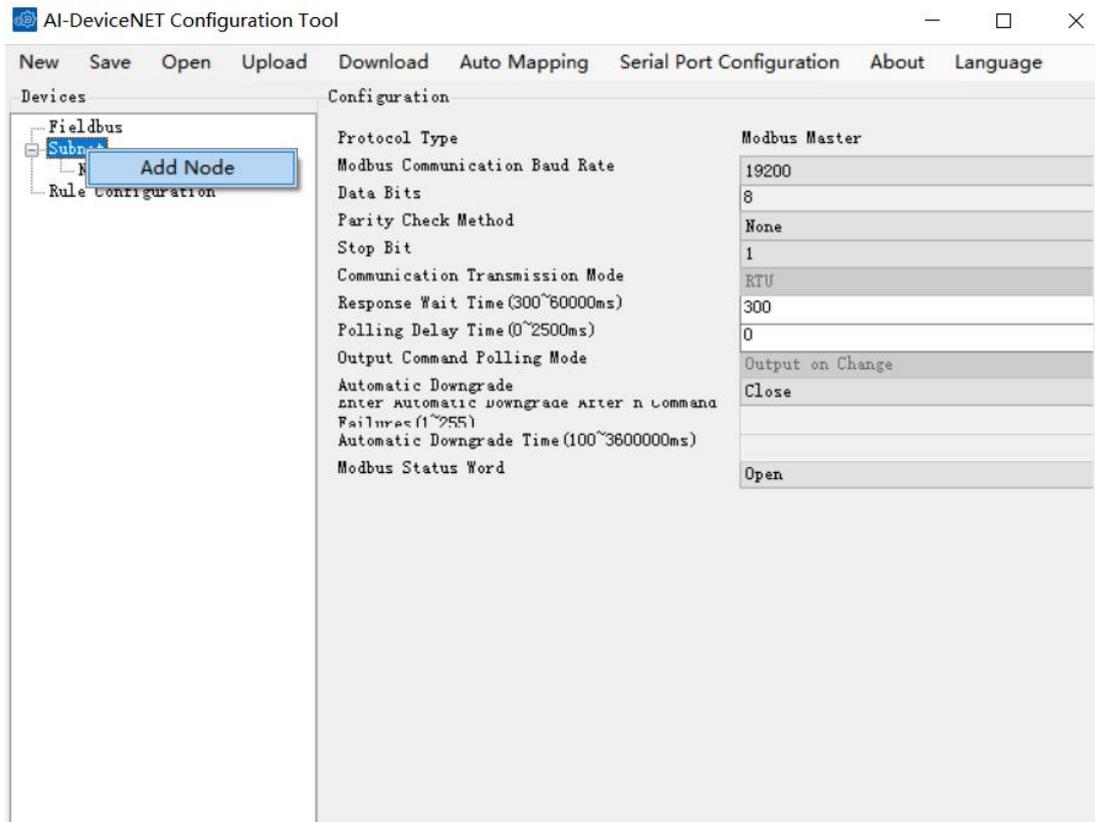
Right-click on the subnet to bring up the function box and select "Add Node".
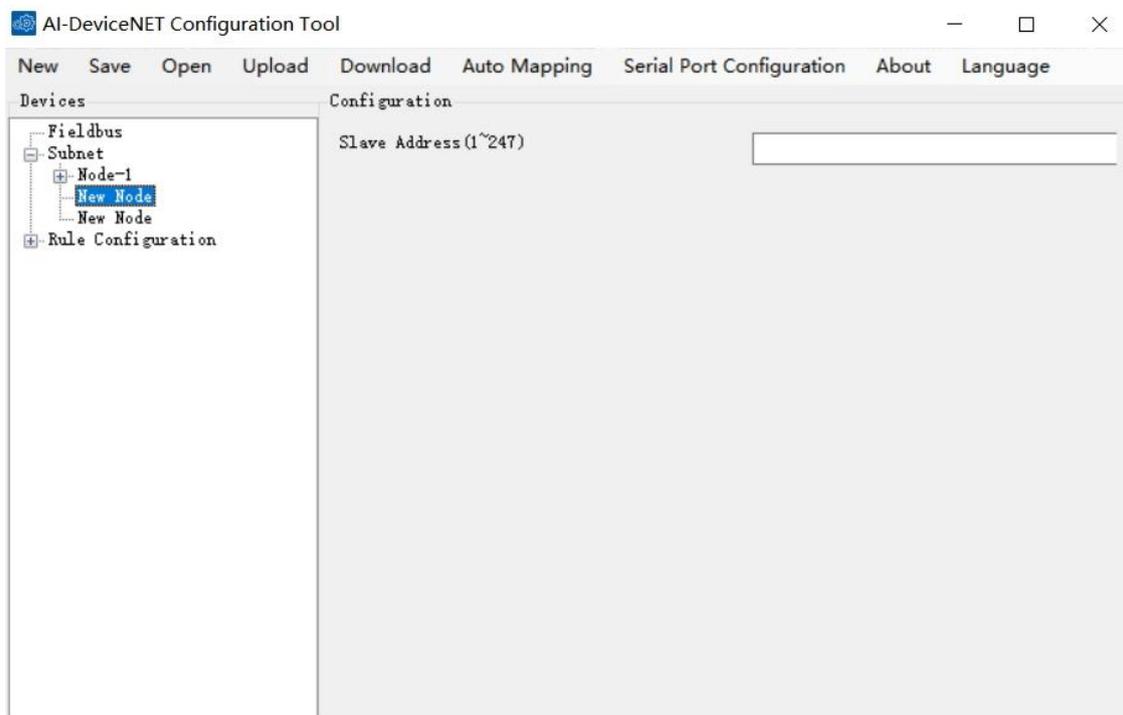
To add a new node, the slave address must be set first before proceeding with further configurations (slave address range: 1~247).
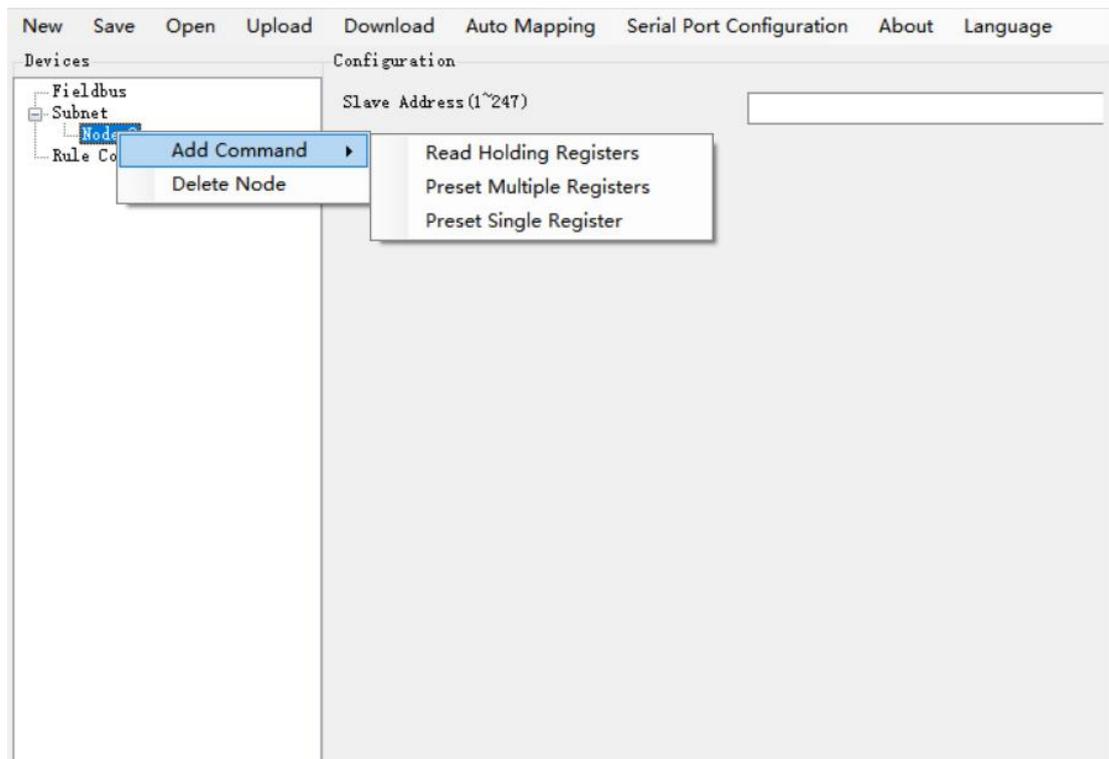
Right-click to display the function box "Add Command" and "Delete Node":

Add command: Options include "Read Holding Register" and "Preset Multiple Registers" (multiple commands can be added to one node).

Delete Node: Delete the currently selected node, including all commands contained within that node.

2.4 Read Holding Register
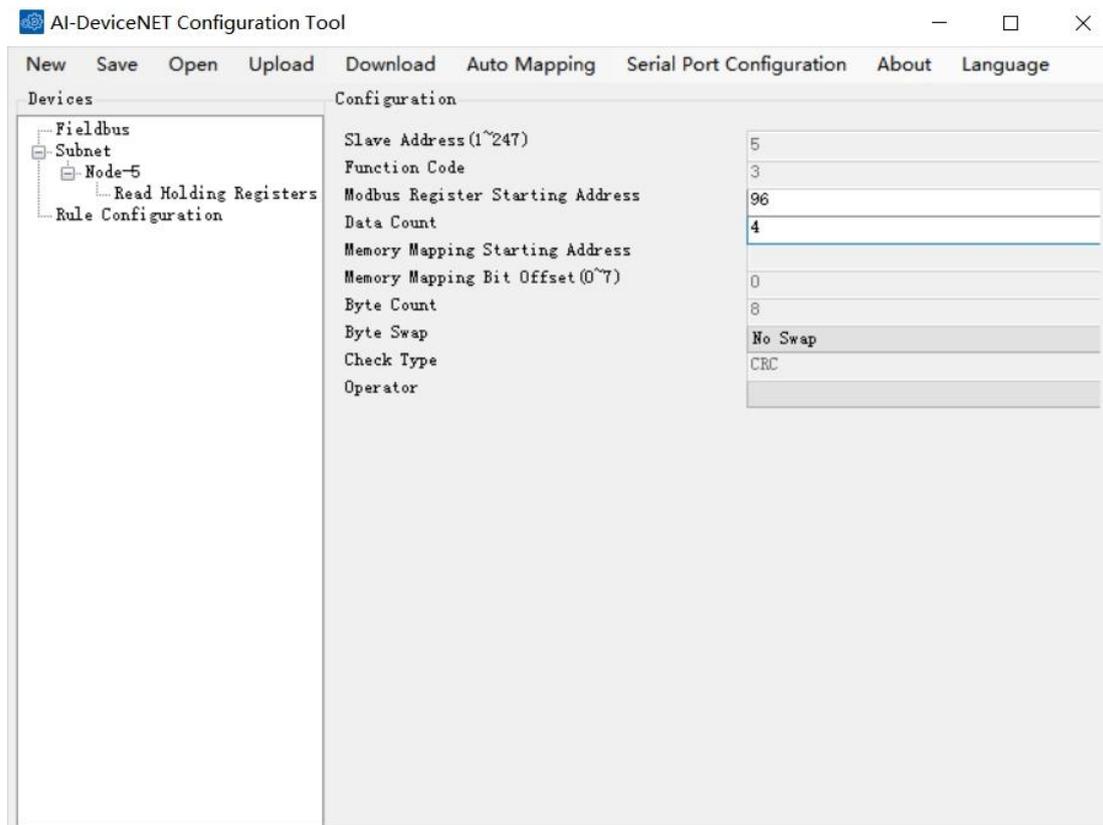
The configurable items include: Modbus register starting address and the number of data.

Slave address: Consistent with node configuration.

Function Code: 3.

Modbus register starting address: The starting address of the register in the Modbus slave device, with a range of 0 ~ 65535.

Data count: The number of registers to be read from the Modbus slave device.

Memory mapping starting address: The starting address of the data within the module's memory buffer.

Memory mapping bit offset (0 ~ 7): 0.

**Byte count:** The number of bytes to be read from the Modbus slave device.

Byte swap: No swap.

Check type: CRC.

Note: The sum of the memory mapping starting address and byte count must not exceed the DeviceNet input byte count (if Modbus status word is enabled, it will occupy 2 input bytes).

2.5 Preset Multiple Registers
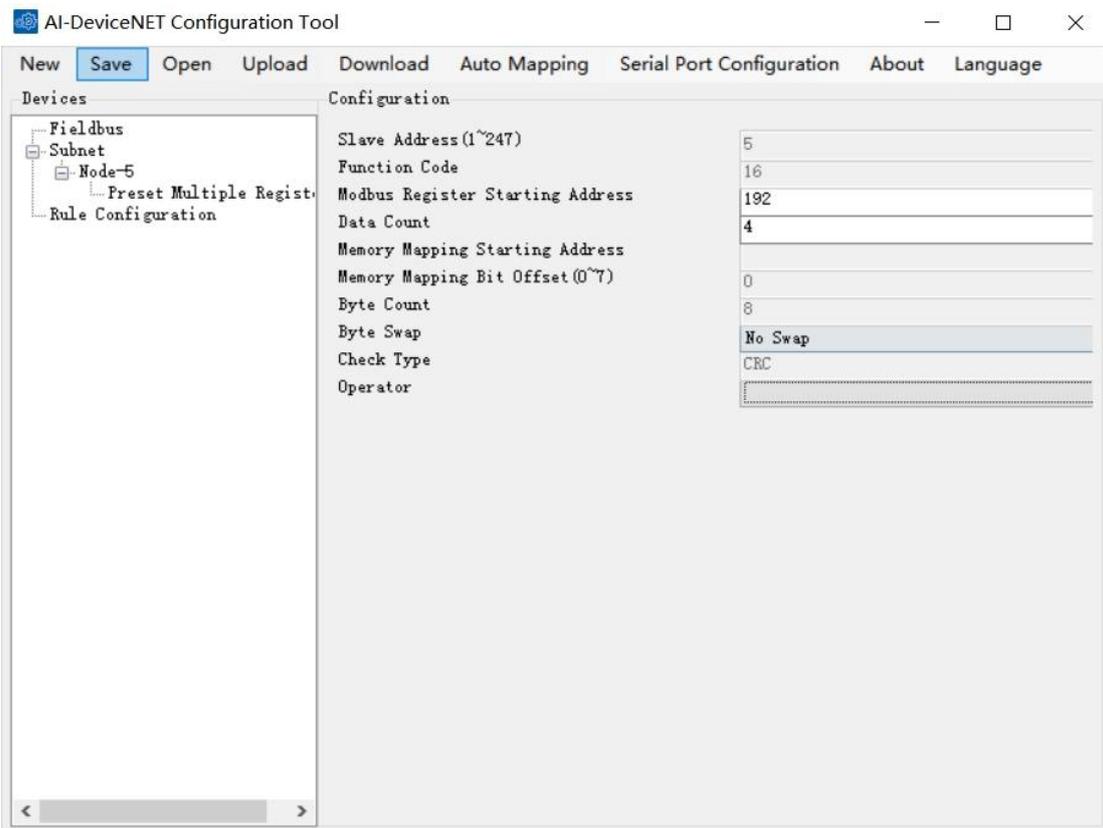
The configurable items include: Modbus register starting address and the number of data.

Slave address: Consistent with node configuration.

Function Code: 16.

Modbus register starting address: The starting address of the register in the Modbus slave device, with a range of 0 ~ 65535.

Data count: The number of registers to be read from the Modbus slave device.

Memory mapping starting address: The starting address of the data within the module's memory buffer.

Memory mapping bit offset (0 ~ 7): 0.

Byte count: The number of bytes to be read from the Modbus slave device.

Byte swap: No swap.

Check type: CRC.

Note: The sum of the starting address for memory mapping and the number of bytes cannot exceed the DeviceNet output byte size.

**When the AI-DeviceNet converter is connected to AI-8x88 series instruments,**

the data count can be set to multiple; other Yudian instruments do not support the MODBUS-RTU protocol with the 10H write multiple parameters command, and the data count can only be set to 1.
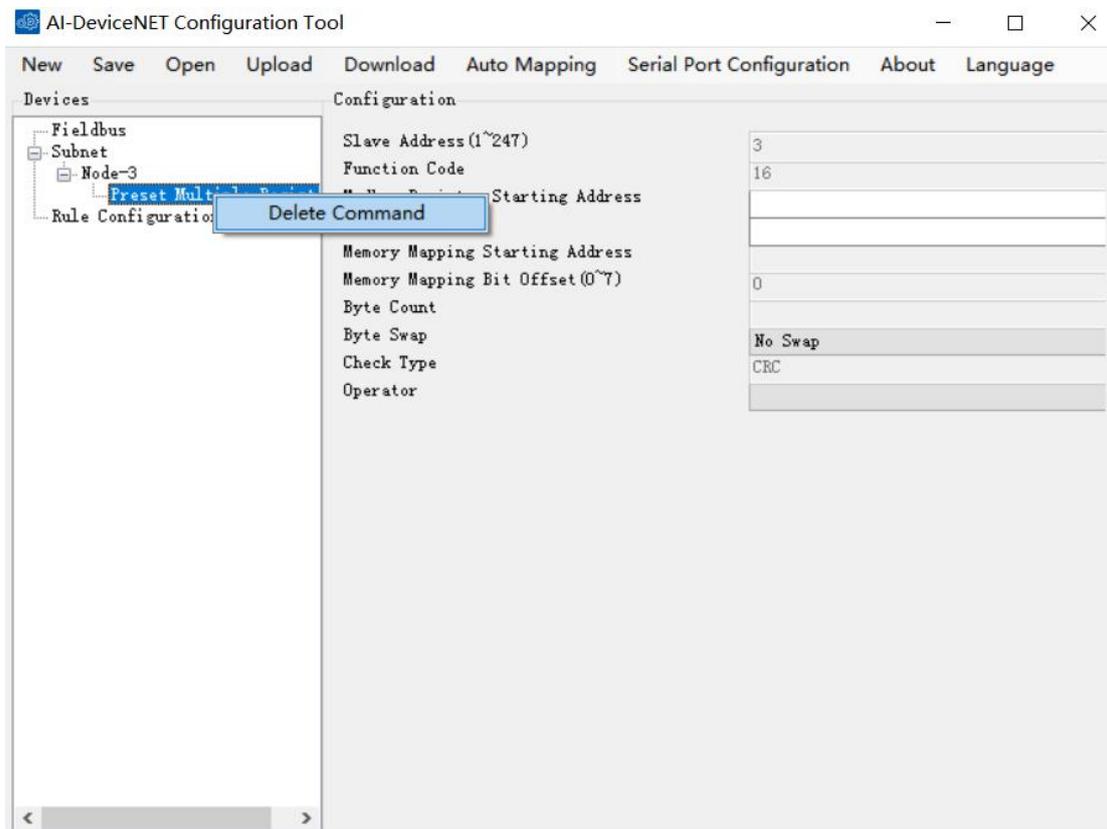
Right-click to open the function menu "Delete Command", and select it to delete the current command. This function also applies to deleting "Read Holding Registers" commands.

# III. Functional Description

3.1 New
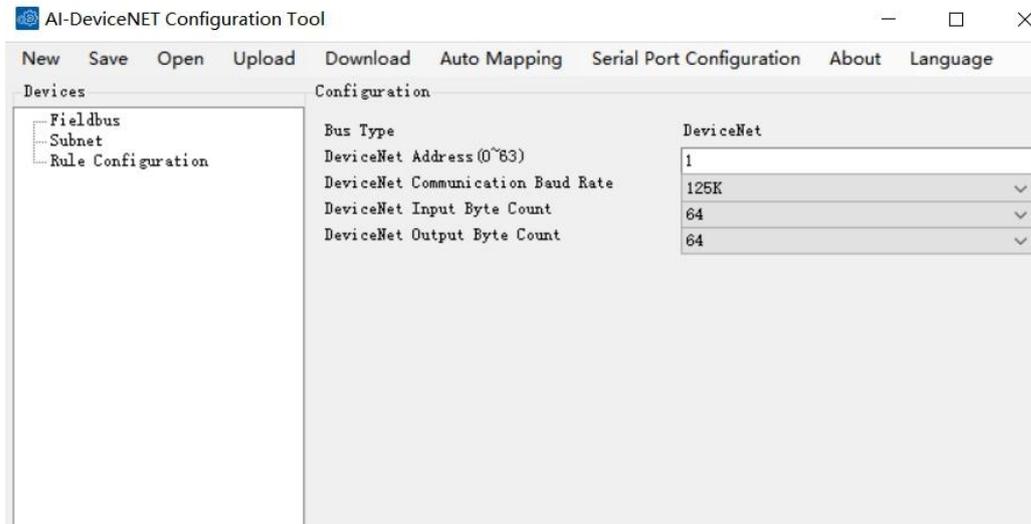
When selecting the "New" function, the configuration interface resets, and all parameters return to their initialized state.

3.2 Save
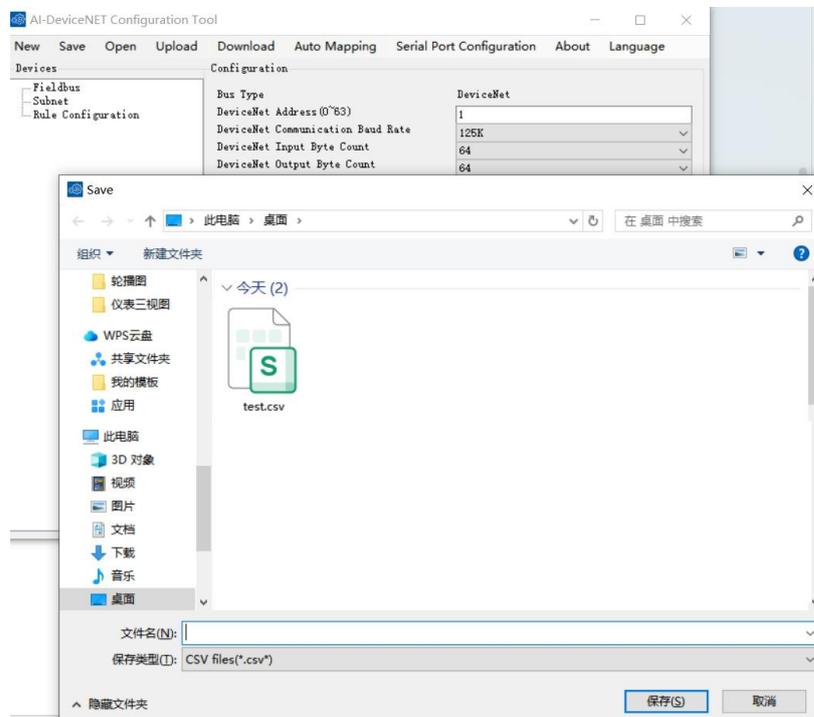
When selecting the "Save" function, the configuration content is exported as a .CSV file.

3.3 Open
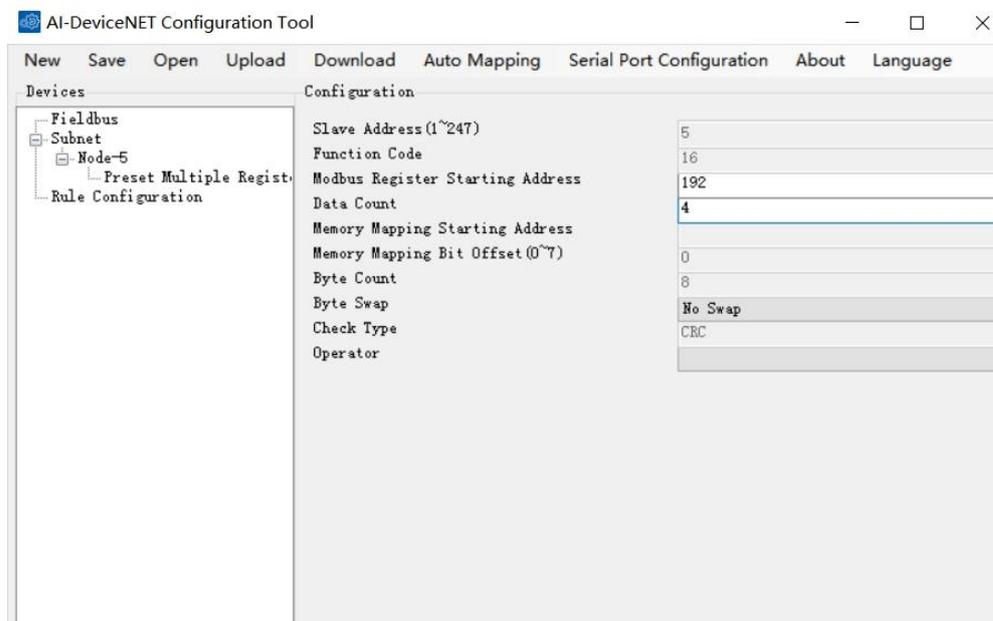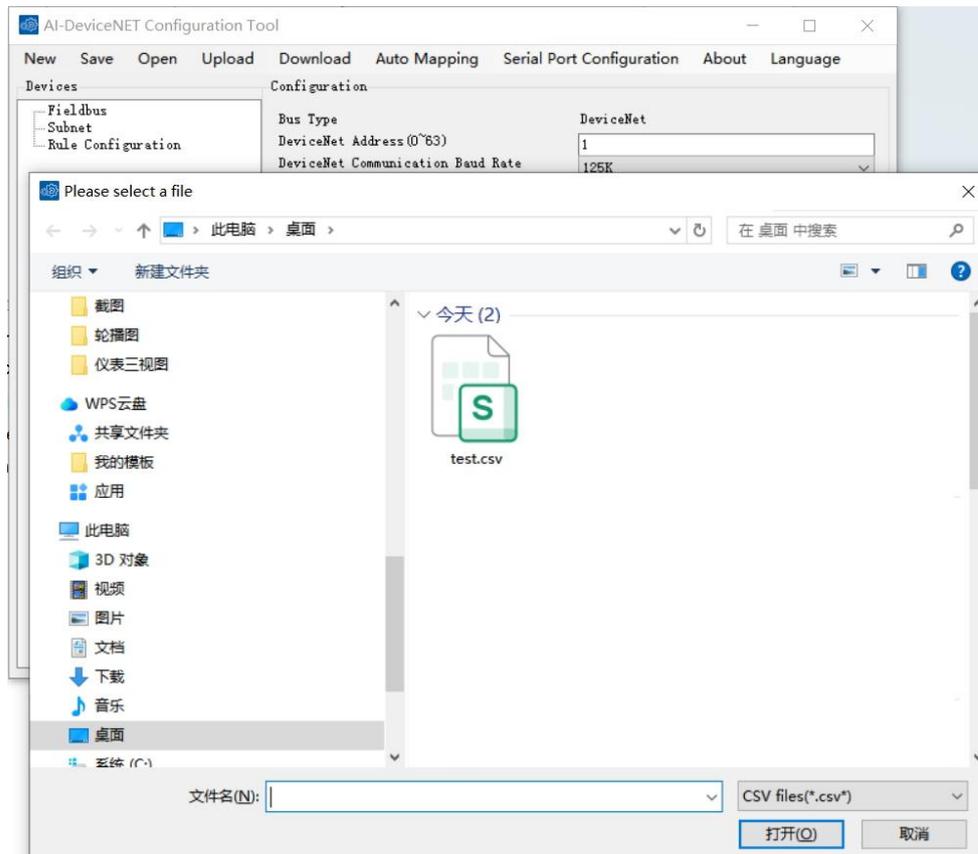


When selecting the "Open" function, a previously saved CSV file is imported into the configuration software.

3.4 Upload
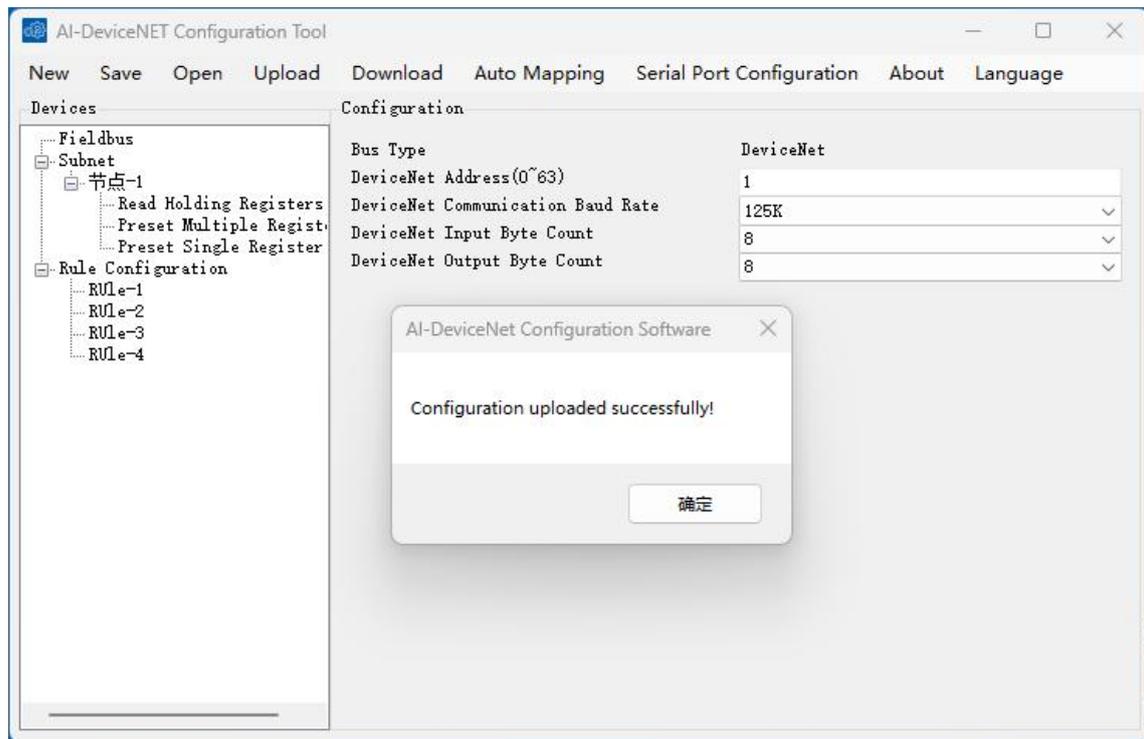
When selecting the "Upload" function, the configuration content stored in the AI-DeviceNet converter is uploaded to the configuration software.

3.5 Download
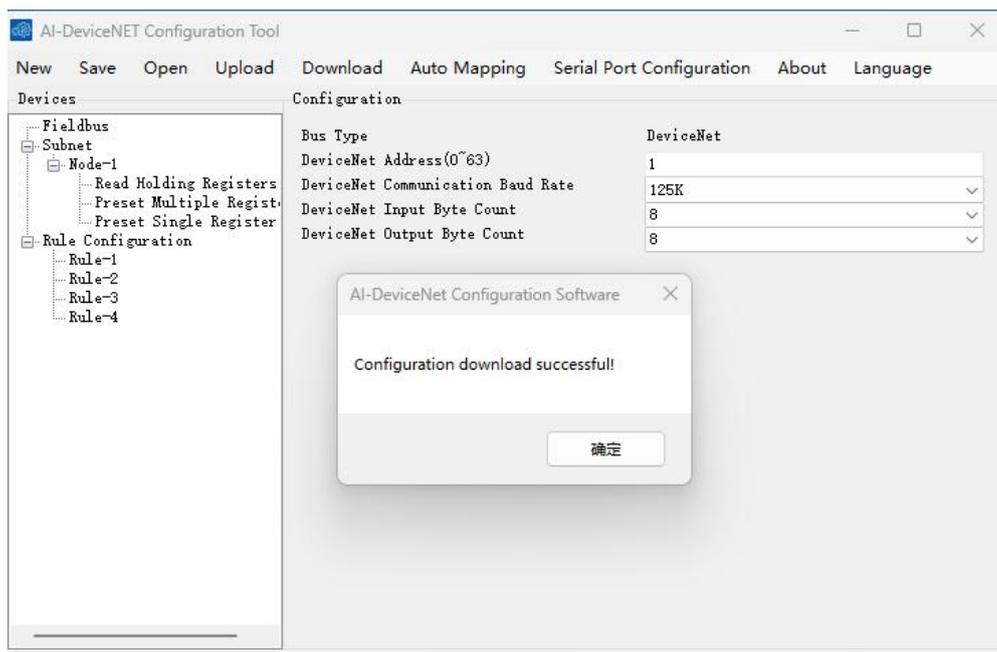
When selecting the "Download" function, the current configuration content is downloaded to the AI-DeviceNet converter.

Note: Since the "Memory Mapping Start Address" cannot be set manually, "Auto Mapping" must be performed before downloading the configuration.

3.6 Auto Mapping
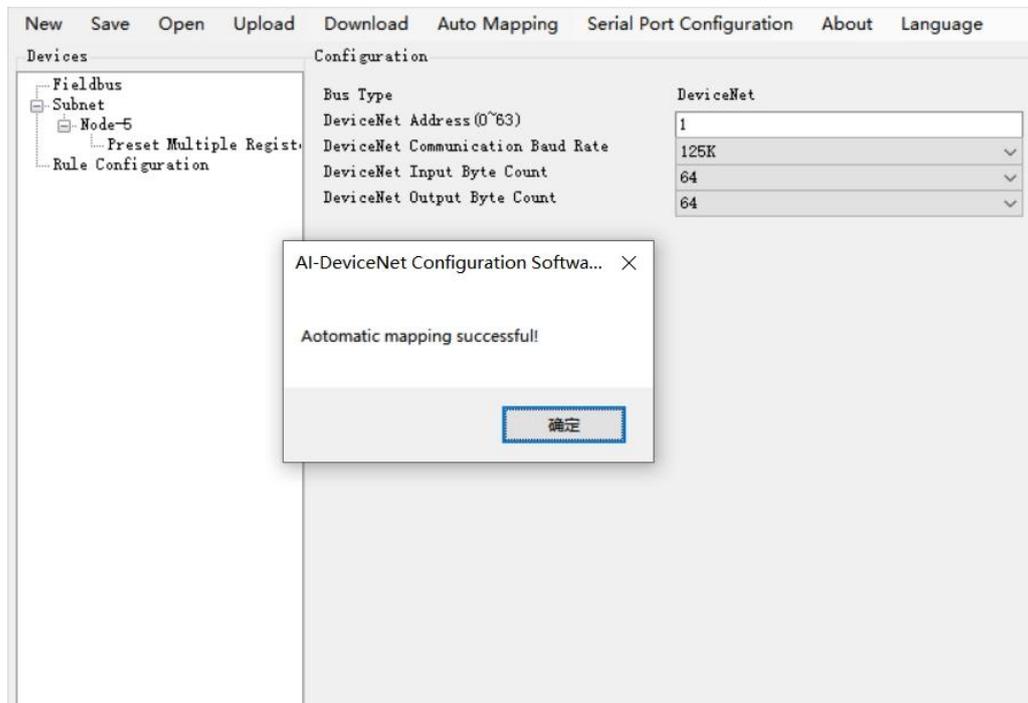
When selecting the "Auto-Mapping" function, the current configuration content is downloaded to the AI-DeviceNet converter.

Note: Since the "Memory Mapping Start Address" cannot be set manually, after any configuration changes, "Auto Mapping" must be selected before downloading the configuration.

3.7 Serial Port Configuration
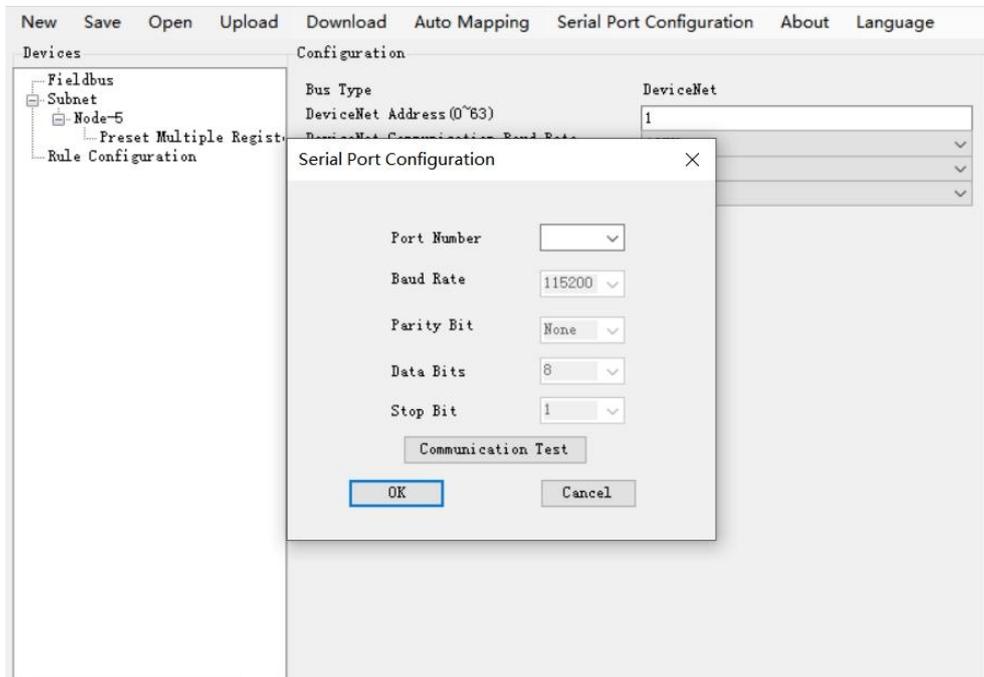
Before configuration transmission, serial port settings must be made by selecting the appropriate port number. After selecting the port number, a "Communication Test" can be performed. Once successful, configuration transmission can proceed normally. (If the serial port is not configured, the serial port configuration option will automatically pop up during "upload" or "download").

3.8 About
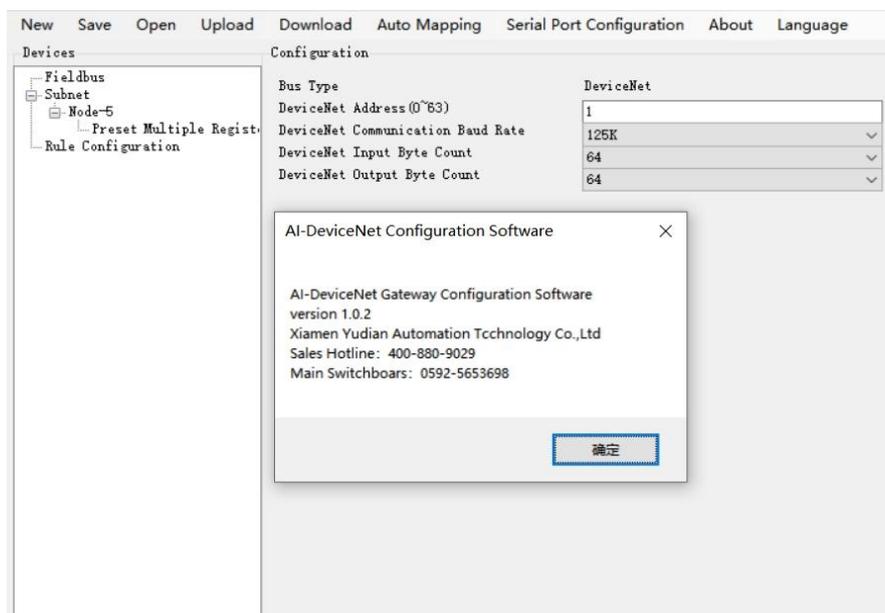
Include the configuration software version number and company contact information.

This product is restriction of use in the industrial environment.

ADDRESS: No.6 Longku East Road, Xiang'an District, Xiamen, Fujian, 361101, China

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