VEICHI

VH-4AD Analog Input Module

Manual

Stock code: 688698

Preface

■ Brief

VH-4AD is a 4-channel analog input module supporting voltage and current input modes with 16-bit resolution. It can be used with VH series master stations and coupling units such as VH-RTU-ECT or VH-RTU-PN. This manual covers mechanical and electrical installation, troubleshooting, module programming examples, and version compatibility for the product.

■ Additional Materials

Name	Content
VH-RTU-ECT	Detailed instructions on installation, wiring, and operation.
VH-RTU-PN	Detailed instructions on installation, wiring, and operation.
VH-4AD/4DA/4PT/4TC	Detailed instructions on installation, wiring, and operation.

■ Version Change Log

Date	Version	Content
2025-01	V1.0	First release

■ Manual Acquisition

- This manual is not shipped with products. If you need it, please log on to the official website of VEICHI (www.veichi.com), "Services and Support-Data Download", search for keywords and download the PDF file.
- Scan the QR code on the product body to obtain it.

■ Warranty Description

Under normal use, VEICHI provides an 18-month warranty for product malfunctions or damage (starting from the factory date, based on the barcode on the product body, and following contract terms if applicable). After 18 months, repair costs will be charged. Within the first 18 months, repair costs will be incurred for:

- Improper operation of the product without following the manual.
- Damage caused by fire, flood, or abnormal voltage.
- Damage caused by using the product for non-intended purposes.
- Damage caused by exceeding the product's specified usage range.
- Secondary damage caused by force majeure (natural disasters, earthquakes, lightning strikes).
- The relevant service fee shall be calculated by the unified standard of the manufacturer. If there is a contract, terms in it will be of the highest priority.
- Please refer to "Product Warranty Card" for details.

Precautions

■ Safety Statement

1. Read and follow these safety precautions before installing, operating, and maintaining the product.
2. Ensure personal and equipment safety by adhering to marks on the product and safety precautions described in the manual during installation, operation, and maintenance.
3. The "Caution," "Warning," and "Danger" notices in the manual do not cover all of the safety precautions to be observed, but only supplement to safety precautions.
4. Please use the product in an environment that meets the requirements of design specifications, otherwise it may cause failure, abnormal function or component damages, which is not within the scope of product quality assurance.
5. VEICHI will not take on any legal responsibility for personal safety accidents and property damage caused by unauthorized operation of the product.

■ Safety Level

DANGER : Failure to observe the precautions will cause serious personal injuries or deaths.

WARNING : Failure to observe the precautions may cause serious personal injuries or deaths.

CAUTION : Failure to observe the precautions may cause slight personal injuries or product damage.

Please keep this manual safe for reference and ensure it is delivered to the end user.

Control System Design

DANGER :

- Ensure safety circuit design to maintain secure operation during power outages or controller failures;
- Install external safety devices like fuses or circuit breakers to prevent smoking or fire from overcurrent caused by overloads or short circuits.

WARNING :

- Design emergency stop, protection, interlock circuits for forward/reverse operations, and limit switches to prevent product damage in the PLC external circuits;
- Design external protective circuits and safety mechanisms for major accident-related output signals to ensure equipment safety;
- The programmable controller's CPU may shut down all outputs upon detecting system anomalies; design appropriate external control circuits to ensure normal operation in case of partial circuit failure;
- Damage to the PLC relays, transistors, or other output units may render their outputs uncontrollable in switching between ON and OFF states;
- The PLC is designed for indoor use in an overvoltage category II electrical environment; its power system should include lightning protection to prevent damage from overvoltage due to lightning strikes on power/signal input terminals, or control output terminals.

Installation

WARNING :

- Only professionals with relevant maintenance training in electrical equipment and electrical knowledge can install this product;
- Disconnect all external power supplies before disassembling or assembling modules. Failure to do so may result in electric shock, module failure, or malfunction;

- Do not use the PLC in environments with dust, fumes, conductive dust, corrosive gases, flammable gases; exposed to high temperatures, condensation, wind, or rain; or in areas with vibration or impact. Electrical shock, fire, and misoperation can damage and deteriorate the product;
- As the PLC is an open type device, install it in a control cabinet (enclosure protection > IP20) with a lock, accessible only to operators trained in electrical equipment with sufficient electrical knowledge.

- Avoid metal debris and wire ends falling into the PLC's ventilation openings during installation to prevent fire, malfunction, or misoperation;
- Ensure no obstructions on the ventilation surface after installation to avoid impaired heat dissipation, which could cause fire, malfunction, or misoperation;
- Securely connect the module to its connector and lock the hooks during installation to prevent misoperation, failure, or detachment due to improper installation.

Wiring

- Only professionals with relevant training in electrical equipment and electrical knowledge can carry out wiring on this product;
- Disconnect all external power supplies before wiring. Failure to do so may result in electric shock, equipment failure, or malfunction;
- After wiring, install the provided terminal cover before powering up and operating the product to prevent electric shock;
- Ensure proper insulation on cable terminals and maintain the required spacing between cables after installation to avoid electric shock or equipment damage.

- Disconnect the power supply before connection to avoid electric shock;
- The input voltage for this product is DC 24V; supplying power outside the DC24V±20% range can severely damage the product. Regularly check the stability of the DC power provided by the switching power supply.

Operation & Maintenance

- Only professionals with relevant training in electrical equipment and electrical knowledge can operate and maintain this product;
- Disconnect all external power supplies before cleaning modules or adjusting terminal and connector bolts to prevent electric shock;
- Disconnect all external power supplies before removing/installing modules or connecting/disconnecting communication cables. Incomplete disconnection may cause electric shock or misoperation.

Safety Recommendations

- Carefully consider the functionality of field manual devices or other alternatives at locations where operators directly contact mechanical parts, such as loading/unloading stations or automated mechanical operation areas. These should be independent of the PLC and capable of initiating or interrupting the system's automatic operation.
- When modifying programs while the system is running, consider implementing locking or other protective measures to ensure that only authorized personnel can make necessary changes.

Disposal

- Dispose of them according to industrial waste treatment standards. Waste batteries should be disposed of separately in accordance with local laws;
- Treat and recycle scrapped equipment and products according to industrial waste treatment standards to avoid environmental pollution.

1. Product Information

1.1 Naming Rules

VH – 4 AD

⓪ ① ②

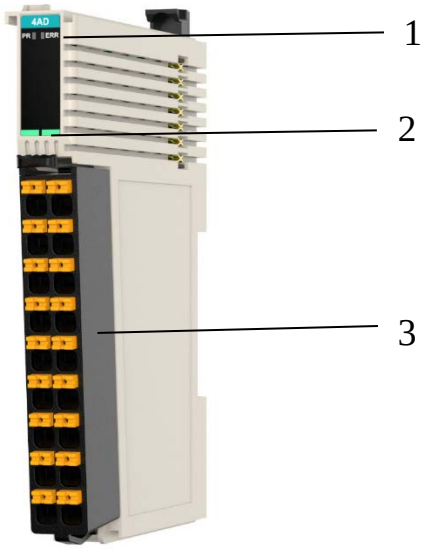
⓪Product information VH: VEICHI slim series module
①Input channels 4: 4 channels 8: 8 channels
②Module type AD: Analog input DA: Analog output PT: Thermal resistance temperature detection TC: Thermocouple temperature detection

Based on the naming rules and nameplate information, the relevant ordering data for this product is shown in the table below:

Model	Description	Code	Product
VH-4AD	A 4-channel analog input module in the VH series, supporting both voltage and current input modes.	9120380024	VH series PLC, VH series coupler

1.2 Component

Here are the module terminal descriptions:



No.	Interface	Description			
1	Signal indicator	PR (POWER+RUN)	Power/Run indicator	On (Green)	Normal
				Off	Module abnormal
				Flash (Green)	Module ready or stopped
		ERR	Error indicator	On (Red)	Module error
2	Color identification	Yellow: IO input			Red: IO output
		Green: Analog input			Blue: Analog output
		Orange: Temperature input			-
3	User terminal	Refer to the terminal definition section for details.			-

1.3 Technical Specification

1.3.1 Power Specification

Item	Specification
Terminal input power rated voltage	24VDC (20.4VDC~28.8VDC)
Terminal input power rated current	2A (typical at 24V)
Bus input power rated voltage	5VDC (4.75VDC~5.25VDC)
Bus input power rated current	85mA (typical at 5V)
Power isolation	24V and 5V isolated
Terminal output power rated voltage	None
Terminal output power rated current	None
Module hot swap	N/A

1.3.2 Input Specification

Item	Specification
Input type	AI
Input method	Voltage/Current input
Input channel	4
Resolution	16 bits
Switching time	250μs for 4 channels
Input voltage	±10V
Voltage input impedance	1MΩ
Voltage input precision (25℃)	±0.1% (full scale)
Voltage input precision (full temp. range)	±0.1% (full scale)
Voltage input range	±15V
Voltage input diagnosis	Open-circuit detection within the 1V~5V
Current input range	±20mA, 4mA~20mA
Current sampling impedance	250Ω
Current input precision	±0.1% (full scale)
Current input precision (full temp. range)	±0.1% (full scale)
Current input range	Instantaneous ±30mA, average ±24mA
Current input diagnosis	Open-circuit detection only for 4mA~20mA
Isolation	Non-isolated between channels, isolated between power supply and interfaces, isolated between interfaces and bus.
Input display	None
Input derating	None

1.3.3 Software Specification

Item	Specification
Independent channel enable	YES
Diagnostic reporting feature	YES
Diagnostic detection enable	Detect short circuits with voltage and open circuits with current; modes with zero output are not supported.
Switching mode	±10V, ±20mA, 4mA~20mA
Filter parameter	Range: 0~255 (no unit)
Overlimit detection enable	YES
Peak hold enable	YES
Switching digital range	-20000~20000, -32000~32000
Sampling time	250μs for 4 channels
Sampling refresh	Asynchronous refresh based on sampling time, not required to sync with bus cycle
Stop mode	Hold current value, no refresh

1.3.4 Environment

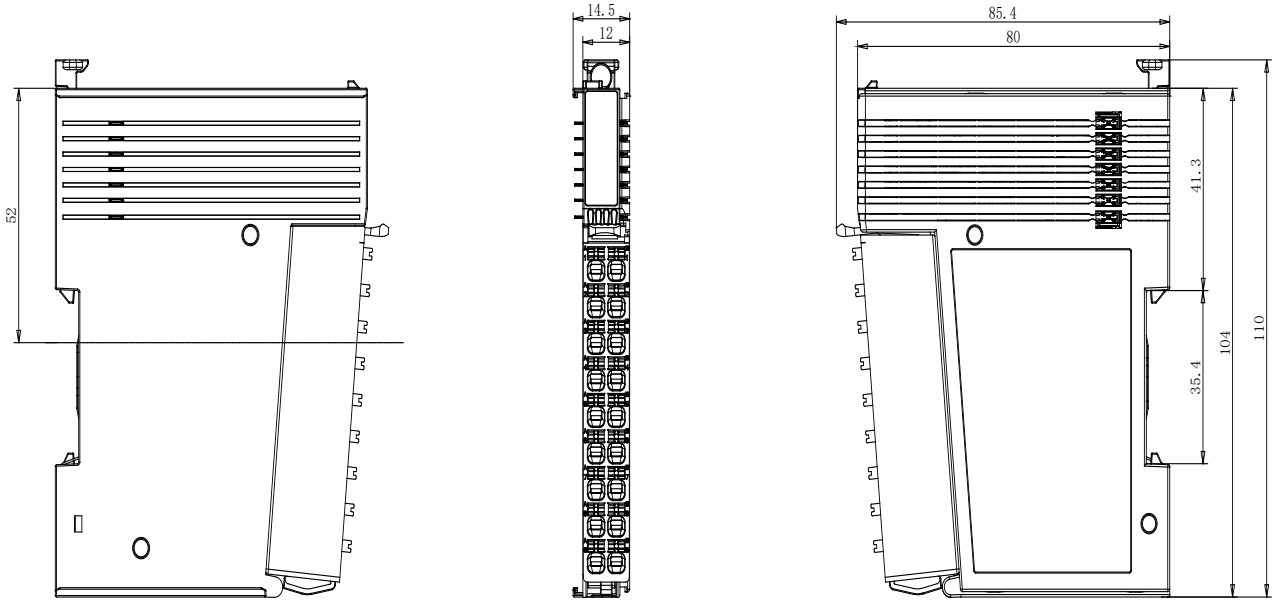
Item	Specification
Operating temperature	-20℃~55℃
Operating humidity	10%~90%RH, no condensation
Use environment	Non-corrosive and combustible gas, slight conductive dust
Storage temperature	-40℃~70℃ (Relative humidity < 90%RH, no condensation)
Altitude	≤2000m
Pollution degree	2
Immunity	Power line 2kV (IEC61000-4-4)
Overvoltage category	I
EMC	Zone B, IEC61131-2
Vibration resistance	IEC 60068-2-6 5Hz~8.4Hz, 3.5mmp, 8.4Hz~150Hz, 1g, X/Y/Z three directions, 10 cycles/direction
Shock resistance	IEC 60068-2-27 150m/s², 11ms, ±X/Y/Z six directions, 3 times/direction, total 18 times

2. Mechanical Installation

2.1 Installation Dimension

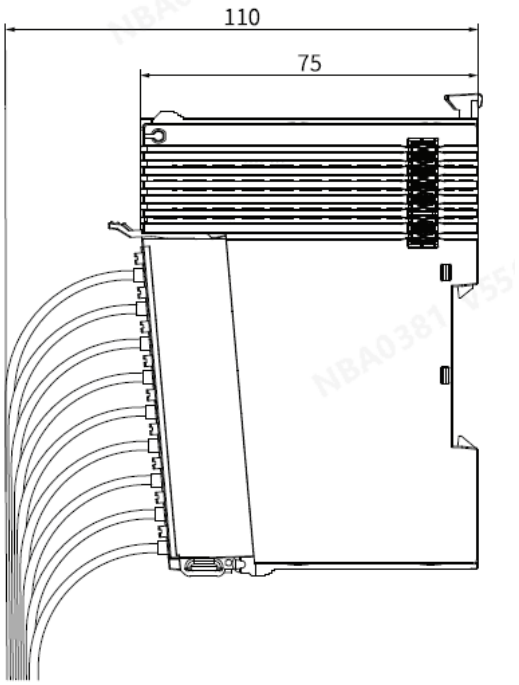
2.1.1 Module

The installation dimensions are shown in the following figure, in millimeters (mm):



Ensure at least 10mm of clearance above the product to accommodate the latch's movement.

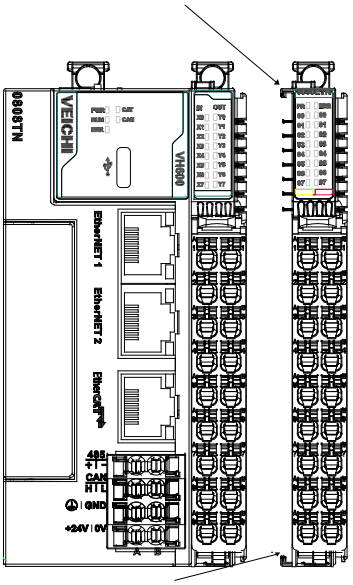
2.1.2 Connection Cable



2.2 Installation Method

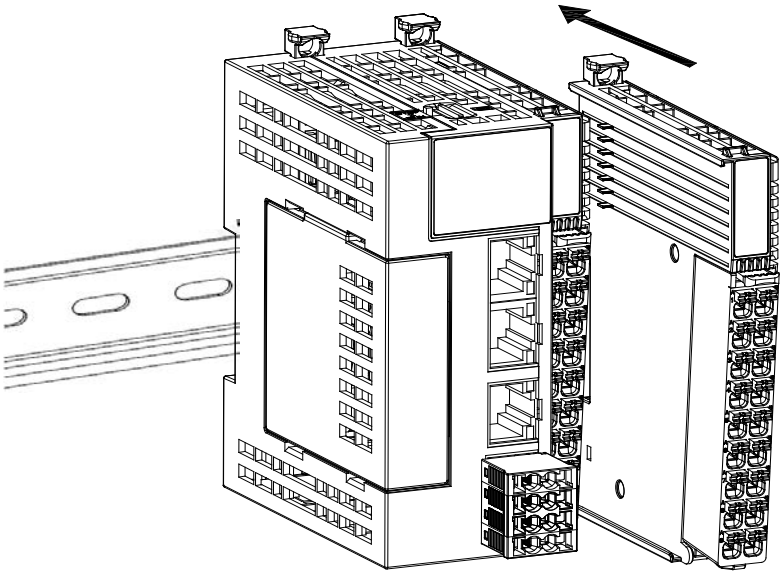
2.2.1 Module Installation

Modules are assembled by sliding to the correct positions from the top and bottom lead rails.



2.2.2 Module Installation on Rail

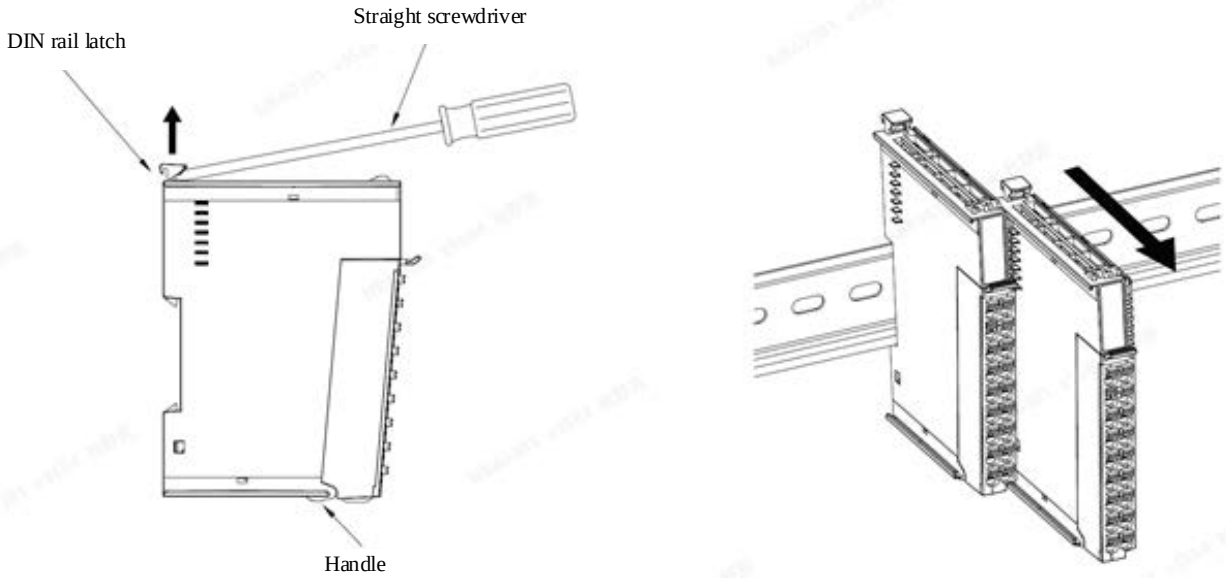
When installing, align the module to the DIN lead rail, press the latch, and there will be an obvious clipping sound if it is in place, as shown in the figure below.



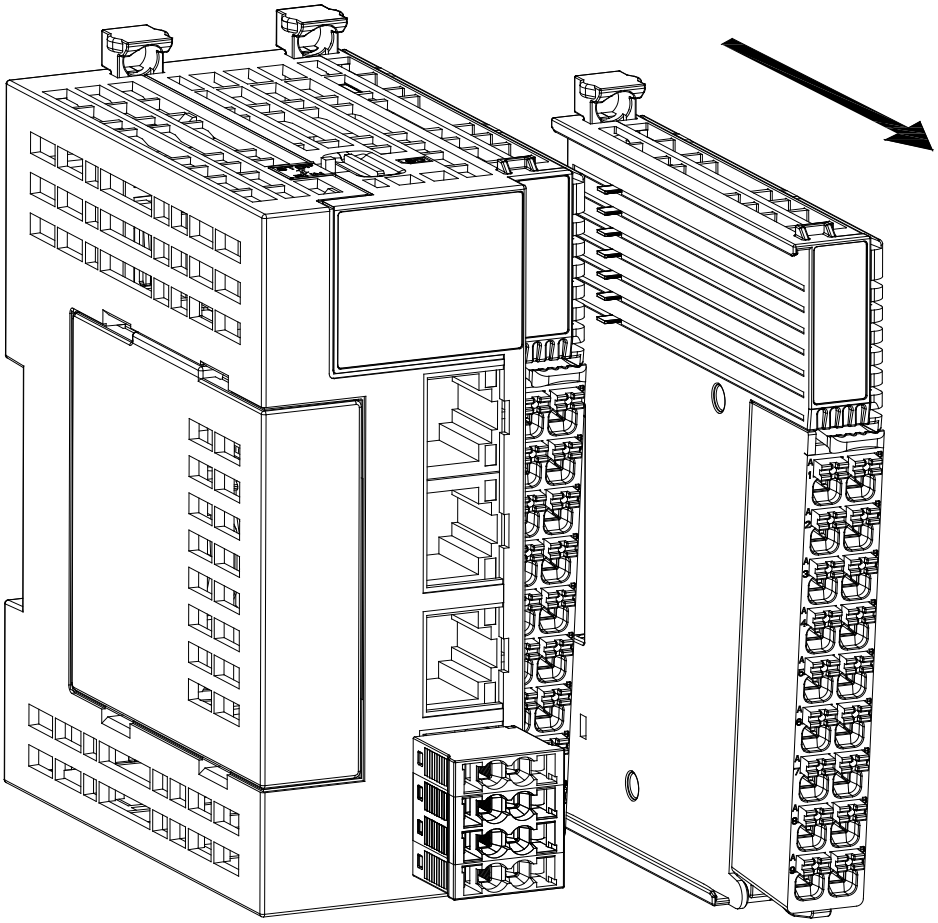
Note: Depress the rail latch to open it, then place the module on the DIN lead rail and press down on the latch to secure it. Install a DIN snap at both ends of the main unit or module. When installing the rail snap, hook the bottom of it to the bottom of the rail and then rotate the snap so that the top end of it is hooked to the top end of the rail, and finally tighten the screws to lock the rail snap.

2.2.3 Disassembly

Use a straight screwdriver or similar tool to pry up the rail latch, then pull the module forward by the handle (raised part).



Depress the rail latch with your finger and then pull the module away from the DIN lead rail.



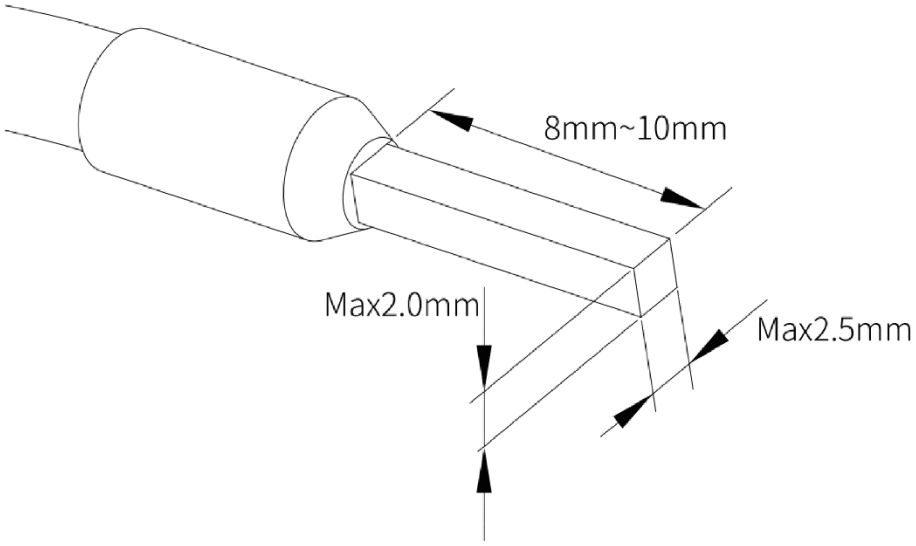
3. Electrical Installation

3.1 Cable Selection

In the following table, the lug diameter is for reference only, which can be calculated reasonably according to actual use and adjusted separately.

Name of Accessories	Diameter	
	GB/mm^2	ANSI/AWG
Tubular lug	0.3	22
	0.5	20
	0.75	18
	1.0	18
	1.5	16

If other tubular lugs are used, press them to the twisted cables. The shape and size requirements are shown in the following figure.



3.2 Definition

Left Signal	Left Terminal	Right Terminal	Right Signal
VI0+	A1	B1	VI1+
I0+	A2	B2	I1+
VI0-	A3	B3	VI1-
VI2+	A4	B4	VI3+
I2+	A5	B5	I3+
VI2-	A6	B6	VI3-
-	A7	B7	-
PE	A8	B8	PE
24V	A9	B9	COM

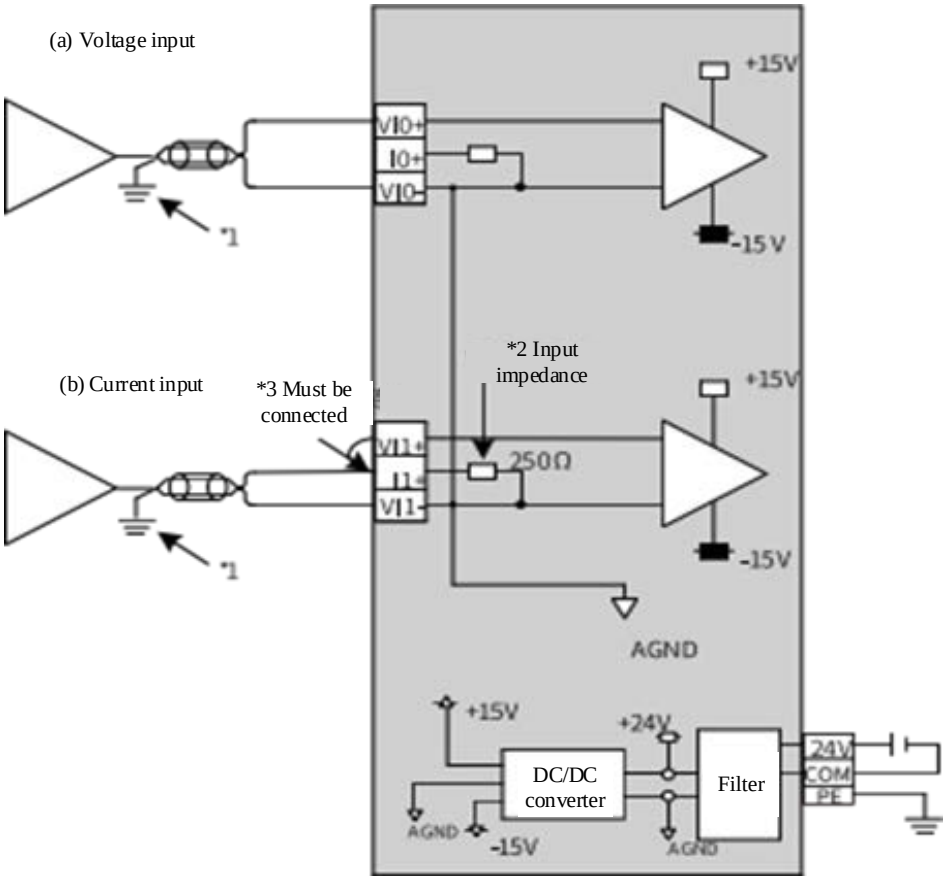
3.3 User Terminal Wiring

3.3.1 Input Terminal Wiring

● Avoid bundling extension cables with power lines (high voltage, high current) that transmit strong interference signals, as this may increase noise, surges, and induction effects. Cables should be separated and not paralleled.

● Use recommended cables and interface boards for connections. It is advised to use shielded cables for extension to enhance interference resistance.

● Ensure single-point grounding for the shields of shielded cables and welded cables.



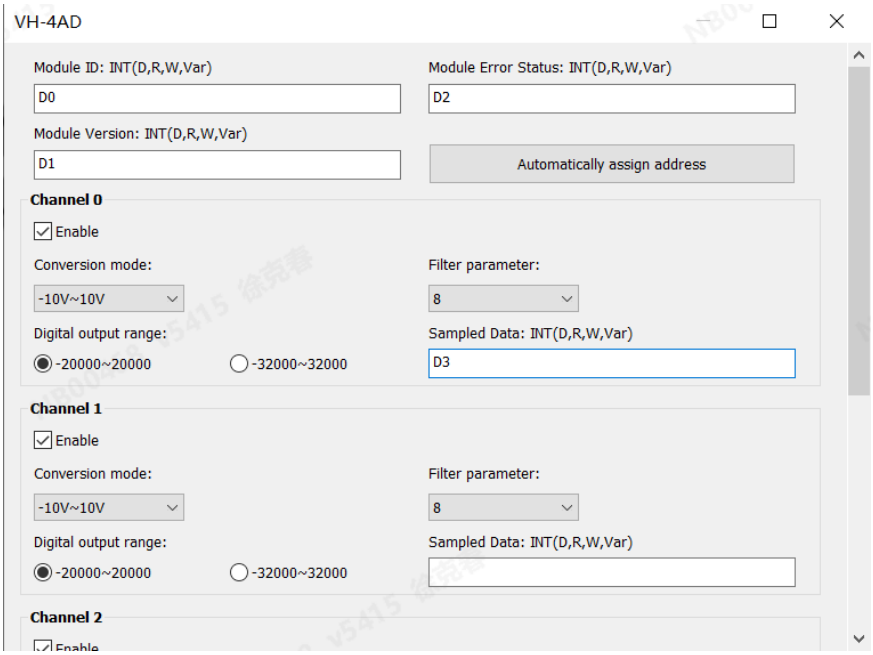
Note: *1 Use two-core twisted shielded cables for analog signal lines.

* 2 Indicates the 4AD input impedance

*3 For current input, connect (V+) with (I+) terminal.

4. Troubleshooting

When the ERR indicator light is on, it indicates a module error with an error code reported. Double-click the 4AD module to access the "Extension Module Configuration" interface, where the error code can be obtained from the configured component address. Here is the "Extension Module Configuration" interface (Autostudio):



4.1 Module ID

ID	Description
9	4AD module

4.2 Module Version

Version	Description
10000	Ver. 1.0
10001	Ver. 1.1

4.3 Error Code

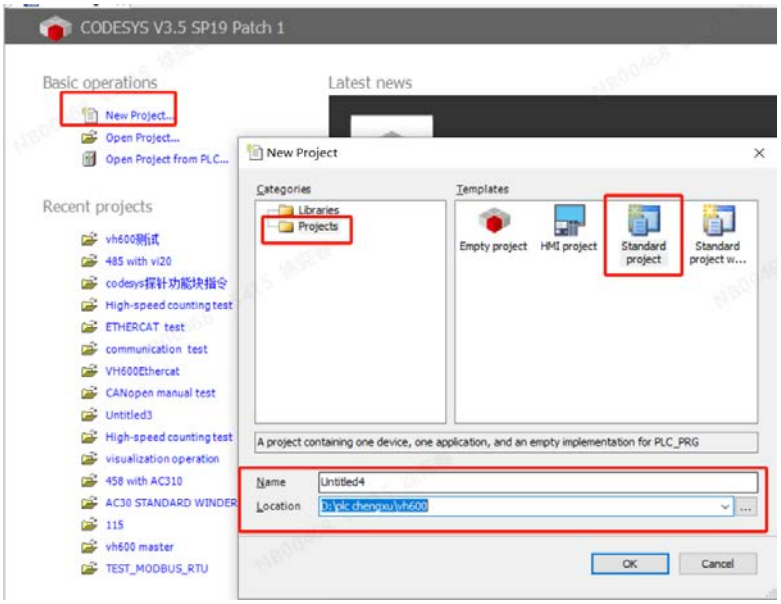
Code	Description	Solutions
Bit 8	Power loss on external 24V supply	Check the module's isolated power supply
Bit 9	ADC error	Power up and restart

5. Module Programming

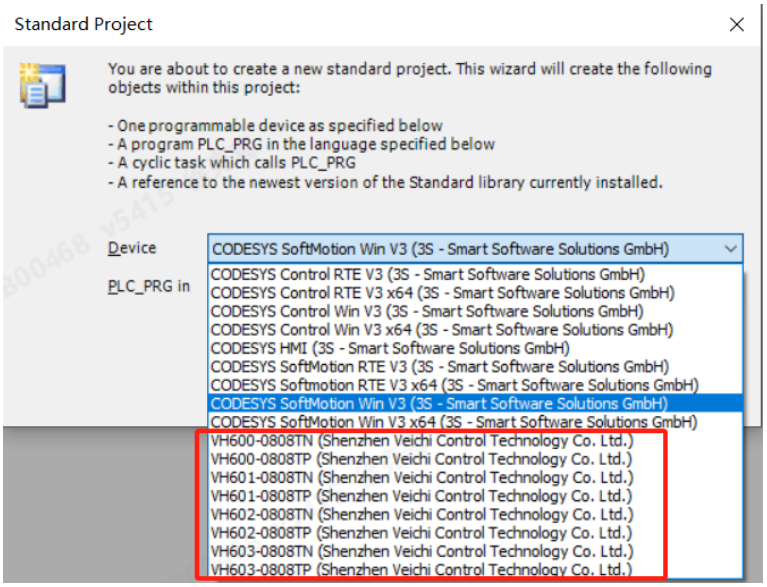
5.1 CODESYS Programming (with VH600)

Here are the instructions for using the input channels 0, 1, 2, 3 of the VH-4AD module with the VH600 series as the control main module:

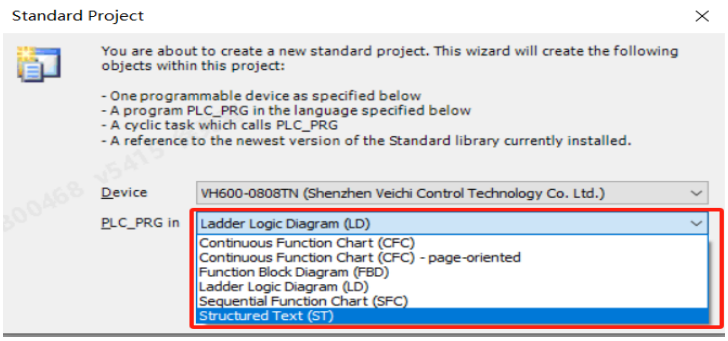
1. Open CODESYS software, click [File]→click [New Project]→select [Standard project]→rename and choose the location→click [OK]. See the figure below for specific steps.



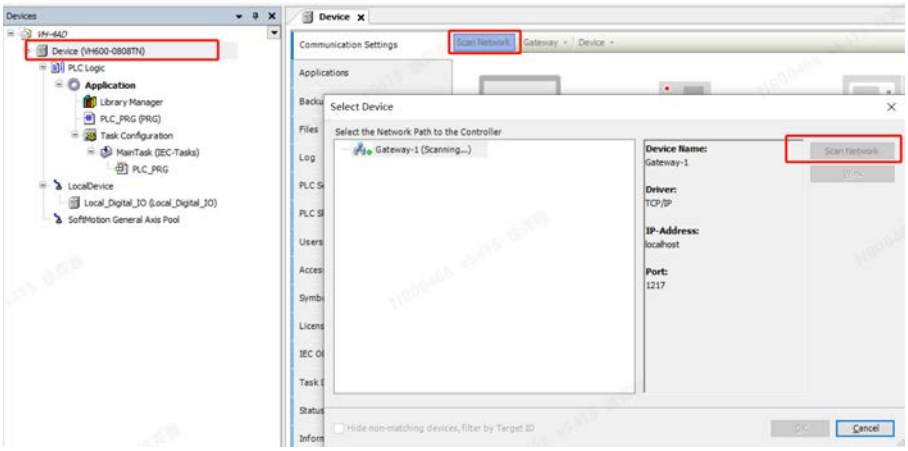
2. After creating a new project, select the appropriate model.



3. Choose the programming language.

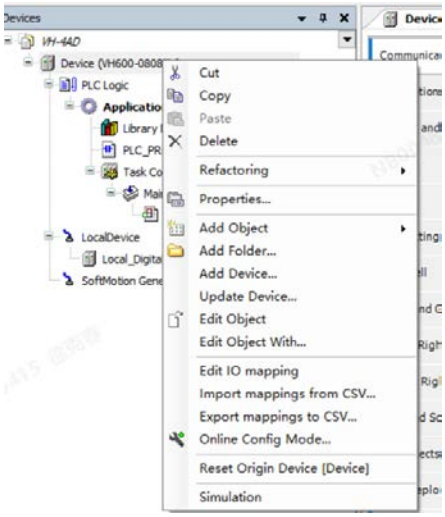


4. Double-click [Devices]→click [Scan Network]→select the detected device model→click [OK], as shown in the figure below:

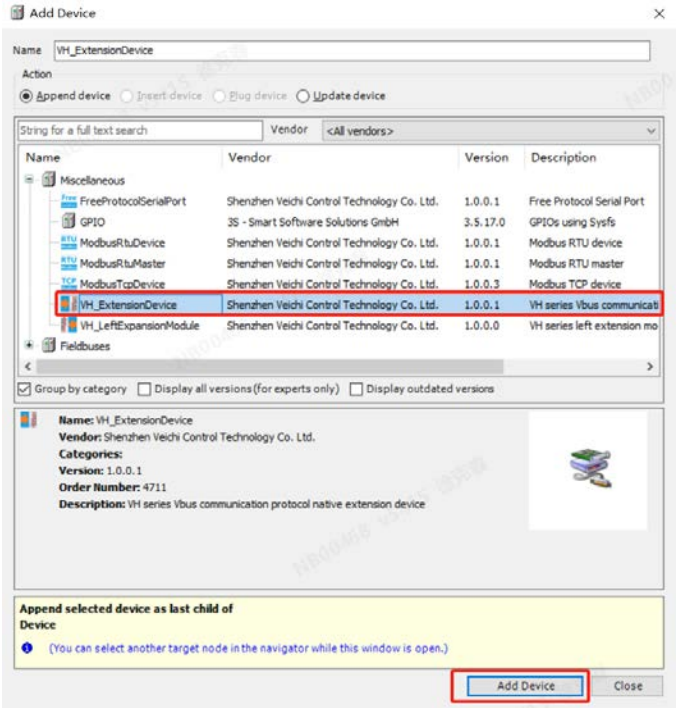


5.1.1 Add Device

1. In the [Devices] window, right-click [Device] and select [Add Device].

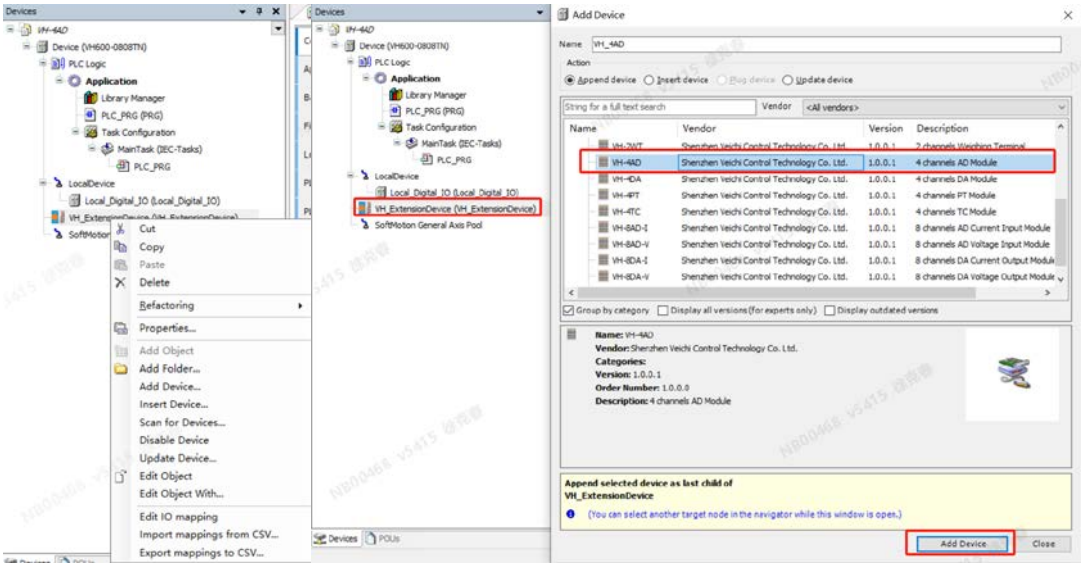


2. Choose Shenzhen Veichi Control Technology Co., Ltd. in [Vendor] column→unfold [Miscellaneous]→double-click [VH_ExtensionDevice] to add it.



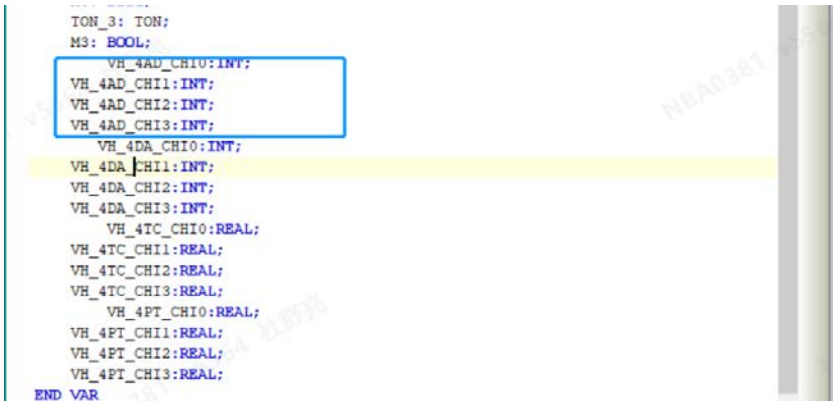
5.1.2 Scan for Devices

Currently, VH600 supports automatic device scanning. Right-click [VH_ExtensionDevice]→select [Scan for Devices]→check [Show Project Differences]→Copy→and click [OK]. The scanned modules order matches the physical devices. Or add the device via [Add Device].

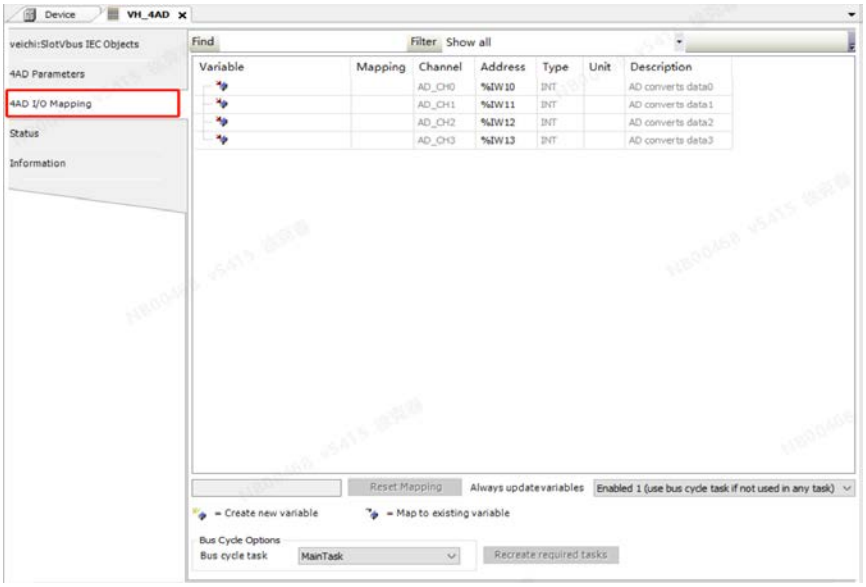


5.1.3 IO Mapping

1. Add custom input variables VH_4AD_CHI0, VH_4AD_CHI1, VH_4AD_CHI2, and VH_4AD_CHI3 in the variables.

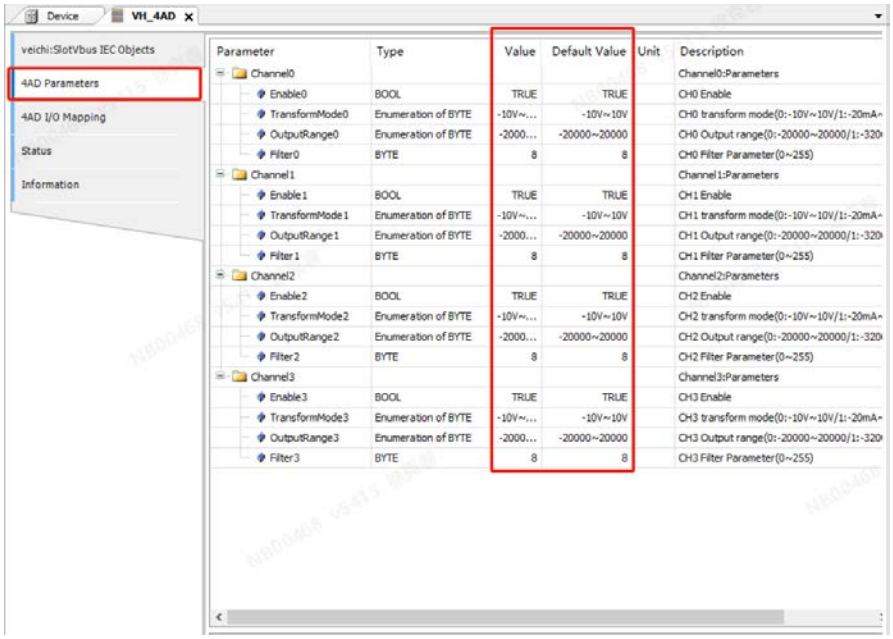


2. Map the input variables VH_4AD_CHI0, VH_4AD_CHI1, VH_4AD_CHI2, and VH_4AD_CHI3 defined in the program to the input channels of the configured module to complete variable mapping.



5.1.4 Set Parameters

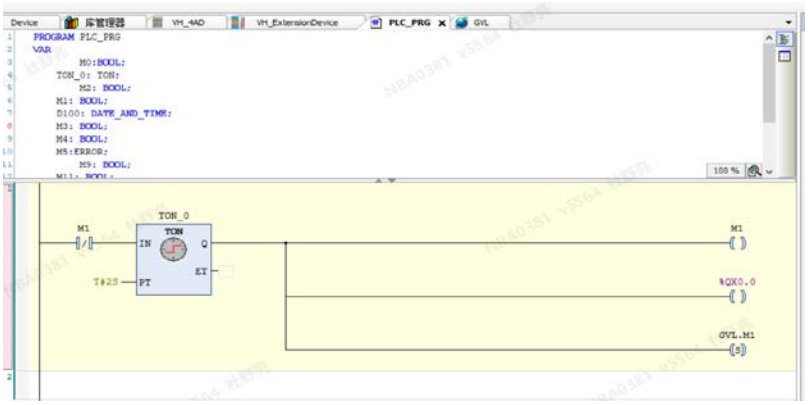
1. Double-click the VH-4AD module to pop up parameter configuration, enable channels, modify channels and switch modes as needed, and set sampling time and filtering parameters.



2. After logging on online, double-click the VH-4AD module to pop up 4AD parameter configuration, modify channels and switch modes as needed, and set sampling time and filtering parameters.

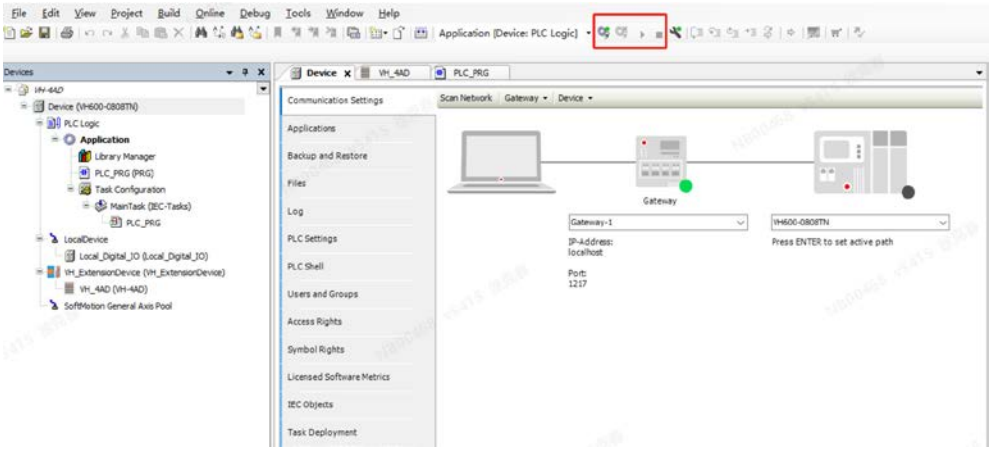
5.1.5 Write User Program

Use LD programming or ST programming.



5.1.6 Compilation, Download, and Running

If compilation is without errors, download and run the program.

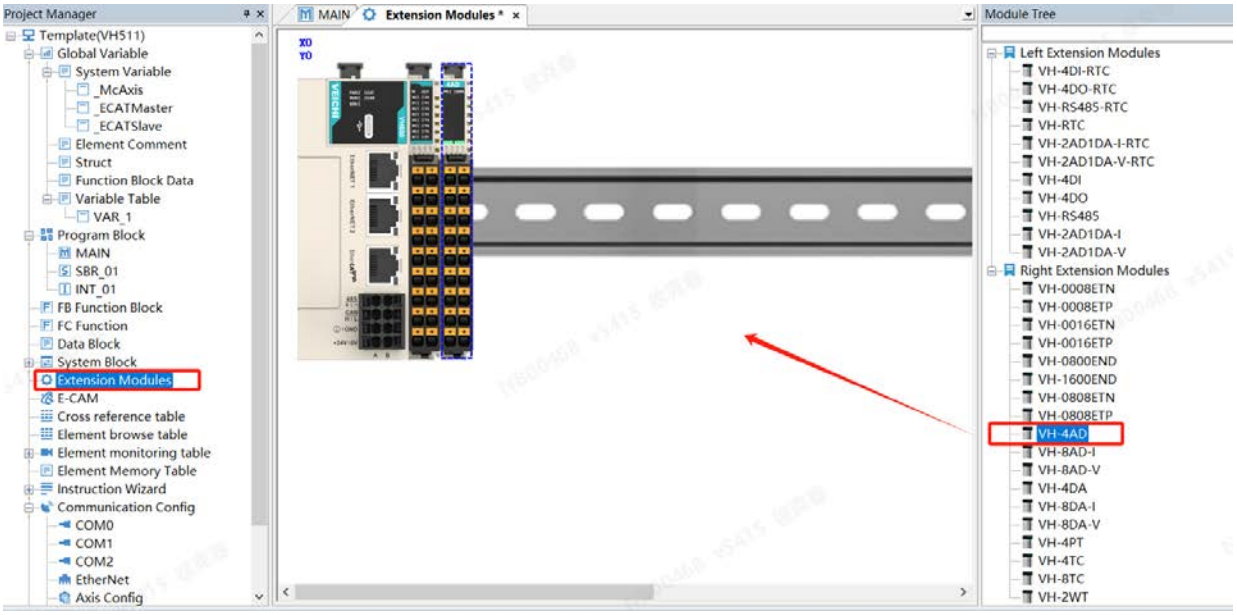


5.2 CODESYS Programming (with VH511)

Here are the instructions for using the input channels 0, 1, 2, 3 of the VH-4AD module with the VH500 series as the control main module:

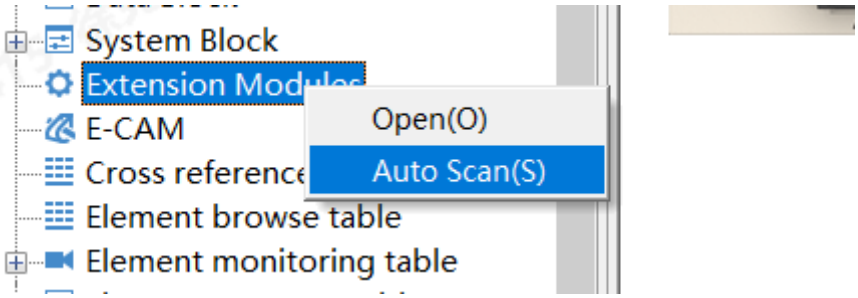
5.2.1 New Project

Open AutoStudio software, click [File]→click [New Project]→select [PLC Type]→name the project and choose the location→click [OK]. In the [Project Manager] interface, double-click [Extension Modules] in the left navigation→double-click [VH-4AD] to complete the addition of the VH-4AD extension module, as shown in the figure.



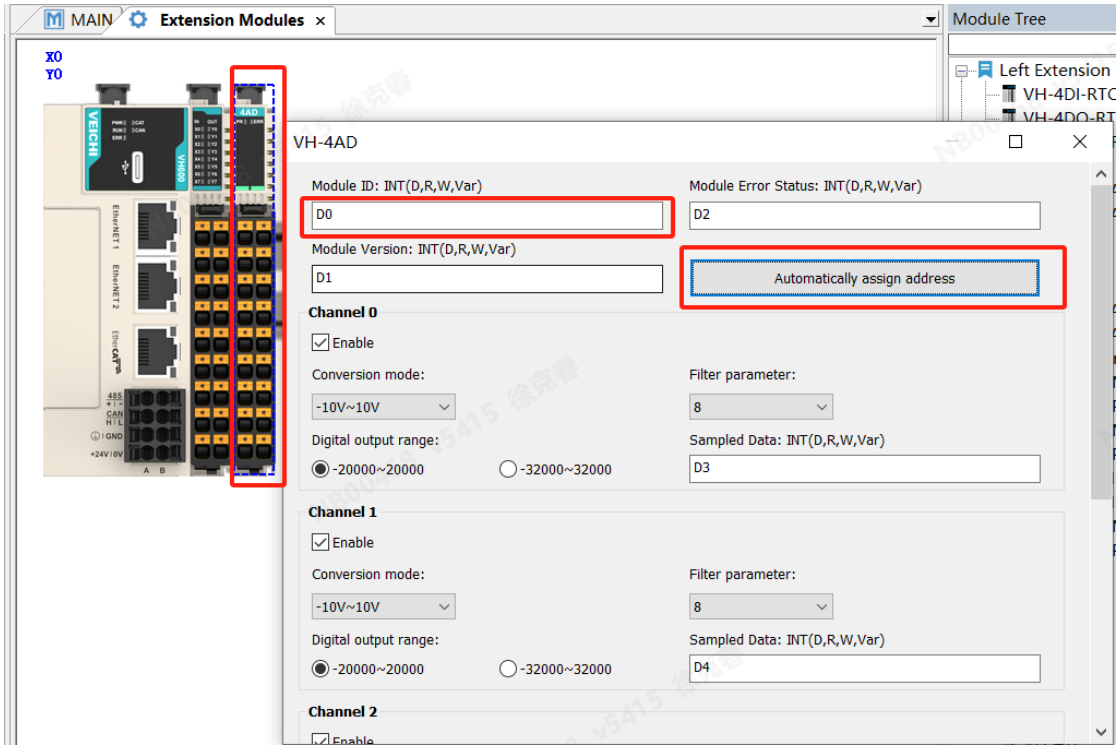
5.2.2 Scan for Devices

Or right-click [Extension Modules] on the left navigation, select [Auto Scan] (new projects should be downloaded first to scan successfully).



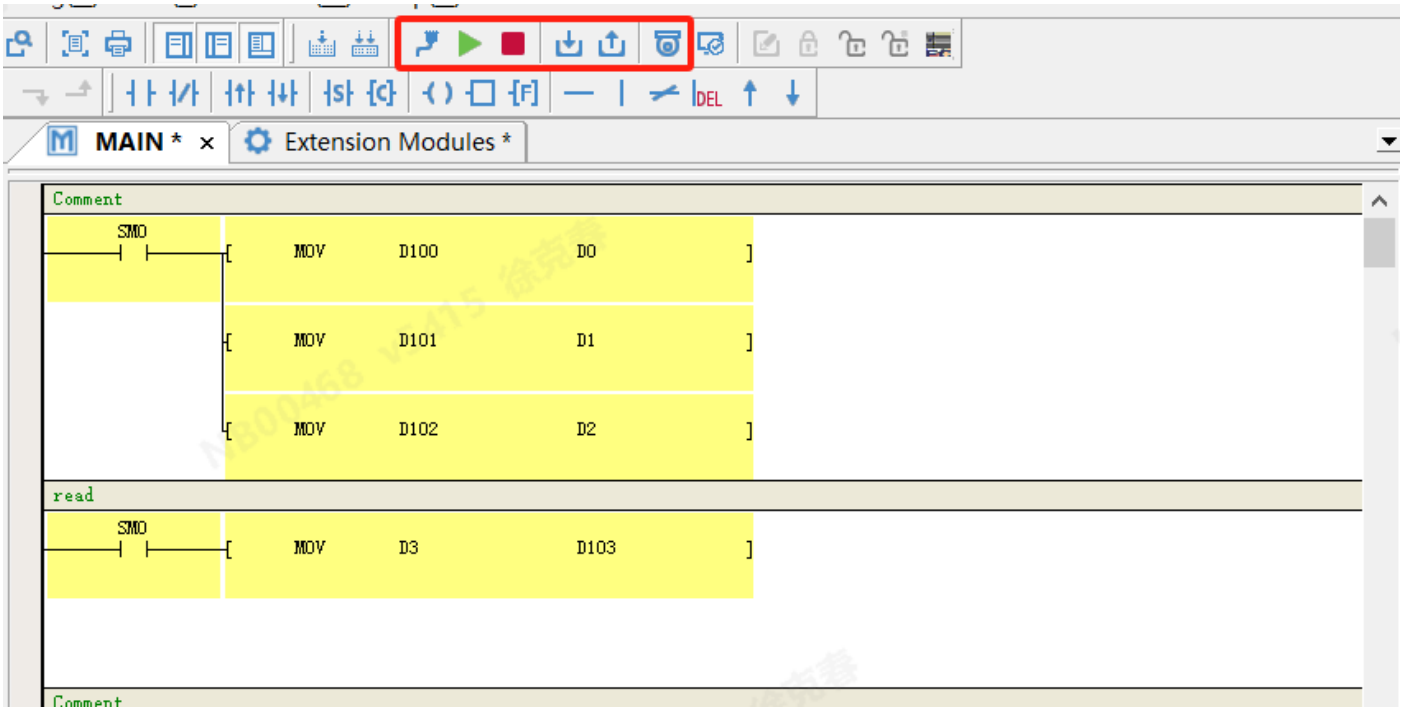
5.2.3 IO Mapping

In the [Extension Module] interface, double-click [VH-4AD]; or right-click [VH-4AD] module and select [Configuration] to enter the window for channel address and parameter settings, and complete the configuration of the VH-4AD extension module, as shown in the figure.



5.2.4 Compilation and Download

After writing the program and compiling it successfully, download it; monitor channel addresses D0~D3, input voltage to the first channel of the 4AD, and check the current value of D3.



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