



P500021288A00

GE21-8DO-TN Sink-Type Transistor Output Expansion Card User Guide

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■ Disclaimer of Liability

Due to continuous updates and improvements of products and technologies, the content of this documentation may not fully match the actual products. In the event of any discrepancies, the actual products shall prevail.

The contents are subject to change without notice due to product upgrade.

■ Waste Disposal

The storage, use, and disposal of this product (including optional accessories) must comply with local laws and regulations.

■ Qualified Personnel

The product/system described in this documentation may be operated only by personnel qualified for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel can identify the risks of the product/system and prevent possible dangers.

■ Proper Use of the Product

Proper transportation, storage, assembly, installation, commissioning, operation, and maintenance are required to ensure the safe operation of the product without any problems. The required ambient conditions must be met. All operations must follow the guidelines provided in this documentation.

Preface

■ Introduction

This guide describes the product information, installation, wiring, and configuration and commissioning. Before use, please read this guide thoroughly.

■ Standards compliance

The table below lists the certifications, directives, and standards that the product may comply with. For details about the acquired certificates, see the certification marks on the product nameplate.

Certification	Directive		Standard
CE certification	EMC directive	2014/30/EU	24 VDC products: EN 61131-2 220 VAC products: EN 61131-2 EN 61000-3-2 EN 61000-3-3
	LVD directive	2014/35/EU	EN 61010-1 EN 61010-2-201
	RoHS directive	2011/65/EU amended by (EU) 2015/863	EN IEC 63000
UL/cUL certification	-		UL 61010-1 UL 61010-2-201 CAN/CSA-C22.2 No. 61010-1 CSA C22.2 No. 61010-2-201
KCC certification	-		-
EAC certification	-		-

Certification	Directive		Standard
UKCA certification	Safety regulations	Electrical Equipment (Safety) Regulations 2016	EN 61010-1 EN 61010-2-201
	EMC regulations	Electromagnetic Compatibility Regulations 2016	24 VDC products: EN 61131-2 220 VAC products: EN 61131-2 EN 61000-3-2 EN 61000-3-3
	RoHS regulations	Directive (RoHS) Regulations 2012	EN IEC 63000

■ More documents

Name	Code	Description
Easy321 & Easy511 Programmable Logic Controller User Guide	PS00017976	Describes comprehensive task information for using Easy321 and Easy511 products, including product introduction, installation, wiring, configuration and commissioning, features, fault diagnosis, maintenance, and more.
Easy321S Programmable Logic Controller User Guide	PS00021275	Describes comprehensive task information for using Easy321 products, including product introduction, installation, wiring, configuration and commissioning, product features, fault diagnosis, maintenance, and more.
H5U & Easy Series Programmable Logic Controller Programming Guide	19012249	Describes the basic knowledge of PLC programming, quick start guidance, communication, motion control, and the use of high-speed counters.
H5U & Easy Series Programmable Logic Controller Instruction Guide	19012250	Describes the basic and complex instructions, as well as examples of instructions used in product programming and application.
GE21-8DO-TN Sink-Type Transistor Output Expansion Card User Guide (This guide)	PS00021288	Describes product information, installation, wiring, and configuration and commissioning.

■ Revision history

Date	Version	Description
2025—08	A00	First release.

■ Warranty

Inovance provides warranty service within the warranty period (as specified in your order) for any fault or damage that is caused by proper operation of the user. Maintenance will be charged after the warranty expires.

Within the warranty period, maintenance fee will be charged for the following damage:

- Damage caused by operations not following the instructions in the guide
- Damage caused by fire, flood, and unusual voltage
- Damage caused by using the product for unintended functions
- Damage caused by using the product outside the specified scope
- Secondary damage caused by force majeure (natural disasters, earthquakes and lightning strikes)

When applicable, relevant maintenance fee will be charged according to the latest Price List of Inovance. If otherwise agreed upon, the agreed terms and conditions shall prevail.

For details, see the Warranty Card.

Fundamental Safety Instructions

■ Safety disclaimer

- This chapter provides essential safety instructions for proper use of the product. Before operating the equipment, read through the guide and comprehend all the safety instructions. Failure to comply with the safety precautions may result in death, serious injury, or equipment damage.
- "DANGER", "WARNING", and "CAUTION" items in the user guide do not indicate all safety precautions that need to be followed. Instead, they just supplement the safety precautions.
- Use this equipment according to the designated environment requirements. Damage caused by improper use is not covered by warranty.
- Inovance shall take no responsibility for any personal injuries or property damage caused by improper use.

■ Safety levels and definitions



DANGER

Indicates that failure to comply with the notice can result in death or severe personal injuries.



WARNING

Indicates that failure to comply with the notice may result in severe personal injuries or even death.



CAUTION

Indicates that failure to comply with the notice may result in minor or moderate personal injuries or equipment damage.

■ Safety precautions

- Drawings in the guide are sometimes shown without covers or protective guards. Install the covers or protective guards as specified first, and then perform operations in accordance with the instructions.
- The drawings in the guide are shown for illustration only and may be different from the product you purchased.
- Operators must take mechanical precautions to protect personal safety and wear protective equipment, such as anti-smashing shoes, safety clothing, safety glasses, protective gloves, and protective sleeves.

Unpacking



WARNING

- Do not install the equipment if you find damage, rust, or signs of use on the equipment or accessories upon unpacking.
- Do not install the equipment if you find water seepage or missing or damaged components upon unpacking.
- Do not install the equipment if you find the packing list does not conform to the equipment you received.



CAUTION

- Check whether the packing is intact and whether there is damage, water seepage, dampness, and deformation before unpacking.
- Unpack the package in accordance with the package sequence. Do not hit the package with force.
- Check whether there is damage, rust, or injuries on the surface of the equipment and equipment accessories upon unpacking.
- Check whether the package contents are consistent with the packing list after unpacking.

Storage and transportation



WARNING

- Large-scale or heavy equipment must be transported by qualified professionals using specialized hoisting equipment. Failure to comply may result in personal injury or equipment damage.
- Before hoisting the equipment, ensure the equipment components such as the front cover and terminal blocks are secured firmly with screws. Loosely-connected components may fall off and result in personal injuries or equipment damage.
- Never stand or stay below the equipment when the equipment is being hoisted by the hoisting equipment.
- When hoisting the equipment with a steel rope, ensure the equipment is hoisted at a constant speed without suffering from vibration or shock. Do not turn the equipment over or let the equipment stay hanging in the air. Failure to comply may result in personal injuries or equipment damage.



CAUTION

- Handle the equipment with care during transportation and mind your steps to prevent personal injuries or equipment damage.
- When carrying the equipment with bare hands, hold the equipment casing firmly with care to prevent parts from falling. Failure to comply may result in personal injuries.
- Store and transport the equipment based on the storage and transportation requirements. Failure to comply can result in equipment damage.
- Do not store or transport the drive in environments with water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Do not store the drive for more than three months. Long-term storage requires stricter protection and necessary inspections.
- Pack the drive strictly before transportation. Use a sealed box for long-distance transportation.
- Never transport the equipment with other device or materials that may harm or have negative impacts on the equipment.

Installation



DANGER

- The equipment must be operated only by professionals with electrical knowledge. Non-professionals are not allowed.



WARNING

- Read through the guide and safety instructions before installation.
- Do not install this equipment in places with strong electric or magnetic fields.
- Before installation, check that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply will result in mechanical hazards.
- Do not wear loose clothes or accessories during installation. Failure to comply may result in an electric shock.
- When installing the equipment in a closed environment (such as a cabinet or casing), use a cooling device (such as a fan or air conditioner) to cool the environment down to the required temperature. Failure to comply may result in equipment over-temperature or a fire.
- Do not retrofit the equipment.
- Do not fiddle with the bolts used to fix equipment components or the bolts marked in red.
- When the equipment is installed in a cabinet or final assembly, a fireproof enclosure providing both electrical and mechanical protections must be provided. The IP rating must meet IEC standards and local laws and regulations.
- Before installing devices with strong electromagnetic interference, such as a transformer, install a shielding device for the equipment to prevent malfunction.
- Install the equipment onto an incombustible object such as a metal. Keep the equipment away from combustible objects. Failure to comply will result in a fire.



CAUTION

- Cover the top of the equipment with a piece of cloth or paper during installation. This is to prevent unwanted objects such as metal chippings, oil, and water from falling into the equipment and causing faults. After installation, remove the cloth or paper on the top of the equipment to prevent over-temperature caused by poor ventilation due to blocked ventilation holes.
- Resonance may occur when the equipment operating at a constant speed executes variable speed operations. In this case, install the vibration-proof rubber under the motor frame or use the vibration suppression function to reduce resonance.

Wiring



DANGER

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Before wiring, cut off all the power supplies of the equipment. Wait for at least the time designated on the equipment warning label before further operations because residual voltage still exists after power-off. After waiting for the designated time, measure the DC voltage in the main circuit to ensure the DC voltage is within the safe voltage range. Failure to comply can result in an electric shock.
- Do not perform wiring, remove the equipment cover, or touch the circuit board with power on. Failure to comply can result in an electric shock.
- Check that the equipment is grounded properly. Failure to comply can result in electric shock.



WARNING

- Do not connect the input power supply to the output end of the equipment. Failure to comply will result in equipment damage or even a fire.
- When connecting a drive to the motor, check that the phase sequences of the drive and motor terminals are consistent to prevent reverse motor rotation.
- Cables used for wiring must meet cross-sectional area and shielding requirements. The shield of the cable must be reliably grounded at one end.
- Fix the terminal screws with the tightening torque specified in the user guide. Improper tightening torque may overheat or damage the connecting part, resulting in a fire.
- After wiring is done, check that all cables are connected properly and no screws, washers or exposed cables are left inside the equipment. Failure to comply may result in electric shock or equipment damage.



CAUTION

- Follow the proper electrostatic discharge to perform wiring. Failure to comply may result in damage to the equipment or to the internal circuit of the product.
- Use shielded twisted pairs for the control circuit. Connect the shield to the grounding terminal of the equipment for grounding purpose. Failure to comply will result in equipment malfunction.

Power-on



DANGER

- Before power-on, check that the equipment is installed properly with reliable wiring and the motor can be restarted.
- Check that the power supply meets equipment requirements before power-on to prevent equipment damage or a fire.
- After power-on, do not open the cabinet door or protective cover of the equipment, touch any terminal, or disassemble any unit or component of the equipment. Failure to comply will result in an electric shock.



WARNING

- Perform a trial run after wiring and parameter setting to ensure the equipment operates safely. Failure to comply may result in personal injuries or equipment damage.
- Before power-on, check that the rated voltage of the equipment is consistent with that of the power supply. Failure to comply may result in a fire.
- Before power-on, check that no one is near the equipment, motor, or machine. Failure to comply may result in death or personal injuries.

Operation



DANGER

- The equipment must be operated only by professionals. Failure to comply will result in death or personal injury.
- Do not touch any connecting terminals or disassemble any unit or component of the equipment during operation. Failure to comply will result in an electric shock.



WARNING

- Do not touch the equipment enclosure, fan, or resistor with bare hands. Failure to comply may result in personal injury.
- Prevent metal or other objects from falling into the equipment during operation. Failure to comply may result in a fire or equipment damage.

Maintenance



DANGER

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Do not maintain the equipment with power ON. Failure to comply will result in an electric shock.
- Before maintenance, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.
- In case of a permanent magnet motor, do not touch the motor terminals immediately after power-off because the motor terminals will generate induced voltage during rotation even after the equipment power supply is off. Failure to comply will result in an electric shock.



WARNING

- Perform routine and periodic inspection and maintenance on the equipment according to maintenance requirements and keep a maintenance record.

Repair



DANGER

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Do not repair the equipment with power ON. Failure to comply can result in an electric shock.
- Before inspection and repair, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.



WARNING

- Submit the repair request according to the warranty agreement.
- When the fuse is blown or the circuit breaker or earth leakage circuit breaker (ELCB) trips, wait as specified on the product warning sign before power-on or further operations. Failure to comply may result in personal injuries, equipment damage or even death.
- When the equipment is faulty or damaged, require professionals to perform troubleshooting and repair by following repair instructions and keep a repair record.
- Replace quick-wear parts of the equipment according to the replacement instructions.
- Do not use damaged equipment. Failure to comply may result in death, personal injuries, or severe equipment damage.
- After the equipment is replaced, check the wiring and set parameters again.

Disposal



WARNING

- Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in property damage, personal injury, or even death.
- Recycle retired equipment by observing industry waste disposal standards to avoid environmental pollution.

■ Safety label

For safe equipment operation and maintenance, comply with the safety labels on the equipment. Do not damage or remove the safety labels. The following table describes the meaning of the safety labels.

To ensure safe operation, comply with equipment-related safety labels. The following table describes the meaning of the safety labels.

Safety label	Description
	• Read through the safety instructions before operating the equipment. Failure to comply may result in death, personal injuries, or equipment damage. • Caution: Product surface is hot. Avoid burns! • Do not touch the terminals or remove the cover with power ON or within 10 min after power-off. Failure to comply will result in an electric shock.

1 Product Information

1.1 Product Overview

GE21-8DO-TN is independently developed by INOVANCE, designed for use with Easy321, Easy511 and Easy321S series PLC, and supports 8-channel sink-type transistor output.

1.2 Model Number and Nameplate

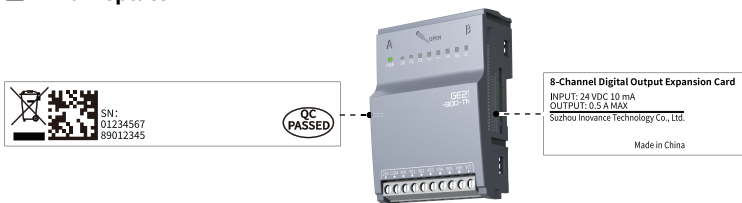
■ Model

GE21 - 8DO - TN

① ② ③

① Product series General-purpose expansion card 21	③ Function code Sink-type transistor
② Product code 8-channel digital output card	-

■ Nameplate

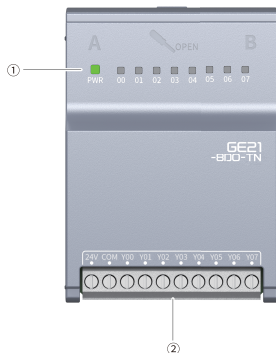


Note

The letters "A" and "B" in the figure indicate that the card slots A and B of the PLC are supported.

Model	Description	Code
GE21-8DO-TN	GE21 series 8-channel digital sink-type transistor output card	01480090

1.3 Components



No.	Type	Interface identifier	Assignment	Indicator color	Description
①	Power supply indicator	PWR	Power supply normal	Yellow-green	ON when the expansion card is powered on.
	Output indicator	00、01、02、03、04、05、06、07	Output status display	Yellow-green	ON when output is active.
②	User terminals	-	-	-	See detailed definition in "3.1 Terminal Assignment" on page 24

1.4 Product Specifications

1.4.1 General Specifications

Item	Specification
IP rating	IP20
Dimensions (W x H x D)	58 mm × 42 mm × 21.4 mm
Weight	Approx. 24 g

1.4.2 Power Supply Specifications

Item	Specification
Rated input voltage	5 VDC (4.75 VDC to 5.25 VDC)
Rated input current	80 mA (max@5 V)
Input short-circuit protection	Supported
Hot swap	Not supported

1.4.3 Output Specifications

Item		Specification
Output type		Digital output, low side
Number of output channels		8
Output voltage class		24 VDC (21.6 VDC to 26.4 VDC)
Common output	Output load (resistive load)	0.5 A/point, 1 A/common terminal
	Output load (inductive load)	6 W/24 VDC (total)
	Output load (lamp load)	1 W/24 VDC (total)
	ON/OFF hardware response time	≤100 μs (OFF→ON, ON→OFF)
	Load current requirements	Load current ≥5 mA
	Maximum output frequency	Resistive load: 100 Hz; inductive load: 0.5 Hz; lamp load: 10 Hz
Leakage current at OFF		Less than 10 μA
Max. residual voltage during ON		Less than 0.5 VDC

Item	Specification
Isolation mode	Optocoupler isolation
Common terminal	8 points/common terminal
Surge protection device (SPD)	Zener diode
Short circuit protection action	A hardware latch fault is triggered upon a short circuit on any channel, with software backend alarming simultaneously. Clear short-circuit fault after power is restored.
Output action display	The output indicator lights up (controlled by hardware) when the output is in drive state.

1.5 Environmental Specifications

Item	Specification
Working environment	Free from conductive dust, conductive fibers, explosive dust, flammable gases, water mist/greasy dirt, corrosive dust/gases, strong vibration, and repetitive shock
Altitude	≤ 2000 m
Pollution degree	Level 2
Immunity	2 kV on power supply line (Conforms to IEC 61000-4-4)
Overvoltage category	I
EMC immunity level	Zone B, IEC61131-2
Anti-static rating	Contact discharge +/-6 kV and air discharge +/-8 kV
Vibration resistance	- Application scenario: Tested according to IEC60068-2-6. 3.5 mm amplitude at 5 Hz to 8.4 Hz; 1 g acceleration at 8.4 Hz to 200 Hz; in ten cycles/axis - Transportation scenario: Tested according to IEC60068-2-64, 0.01 g²/Hz power spectral density at 5 Hz to 100 Hz; 0.001 g²/Hz power spectral density at 200 Hz; 1.14 g Grms
Shock resistance	Application/Transportation scenario: Tested according to IEC60068-2-27; 15 g peak gravitational acceleration; 11 ms pulse width; 18 times in X/Y/Z-axis directions
Operating temperature/humidity	- Temperature: -20 °C to +55 °C - Humidity: < 95% RH (30°C), without condensation

Item	Specification
Storage temperature/ humidity	● Temperature: -20 °C to +60 °C ● Humidity: < 90% RH (30°C), without condensation
Transportation temperature/humidity	● Temperature: -40 °C to +70 °C ● Humidity: < 95% RH (40°C), without condensation

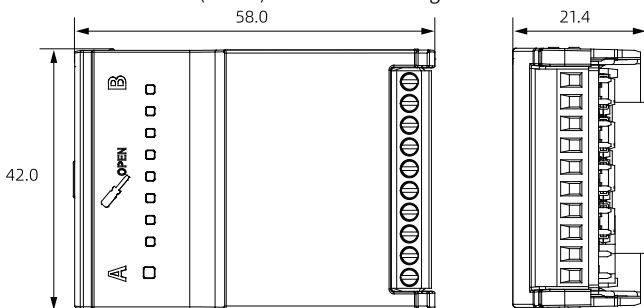
2 Installation

2.1 Installation Precautions

- Make sure the PLC is powered off before installing or removing the expansion card.
- Do not connect/disconnect the expansion card with power ON. This may lead to PLC restart or user data loss or damage.
- Do not drop or shock the housing or terminals of the expansion card to avoid damage.

2.2 Installation Dimensions

The installation dimensions (in mm) are shown in the figure below.

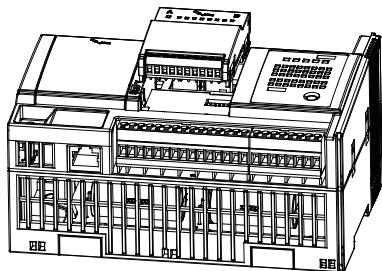


2.3 Installation Method

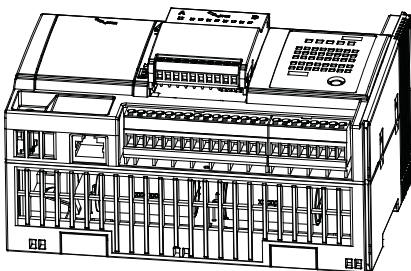
■ Installing the expansion card

The expansion card is snap-fitted with the PLC.

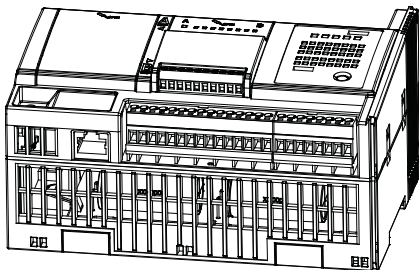
1. Place the PLC horizontally, and align the expansion card module horizontally with it.



2. Insert the expansion card vertically into the PLC's slot A/B (taking slot B as an example) along the guide ribs with the slot.

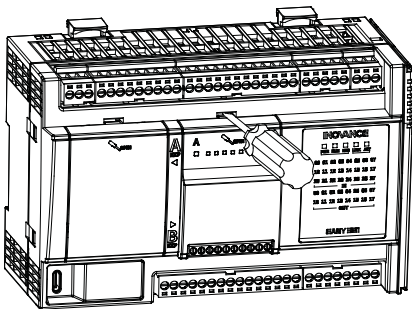


3. Press down on the expansion card until a click is heard and the card surface is flush with the surface of the PLC. Installation is then complete, as shown in the figure below.

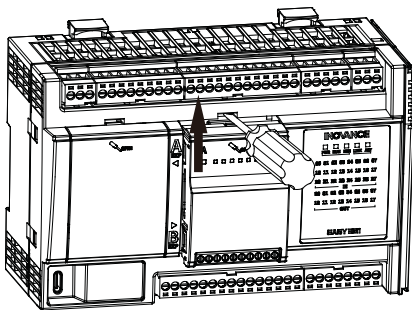


■ Removing the expansion card

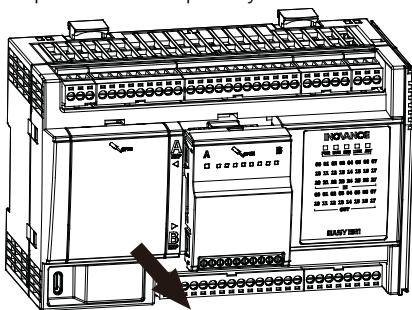
1. Place the PLC horizontally and insert a straight screwdriver into the snap-fit position.



2. Pry the expansion card module upward in the direction of the arrow.

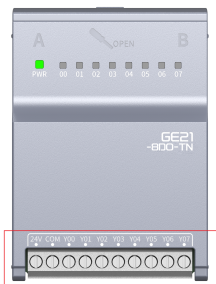


3. Remove the expansion card module vertically when you hear a distinct sound indicating that the expansion card has partially detached from the PLC.



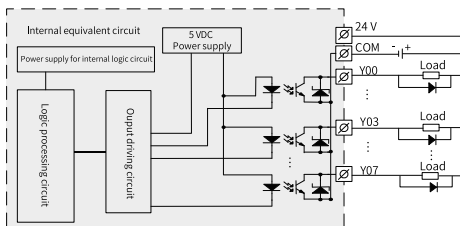
3 Wiring

3.1 Terminal Assignment



Name	Description
24 V	External 24 V power
COM	External power ground (common terminal)
Y00	Y00 output
Y01	Y01 output
Y02	Y02 output
Y03	Y03 output
Y04	Y04 output
Y05	Y05 output
Y06	Y06 output
Y07	Y07 output

3.2 Terminal Wiring



Note

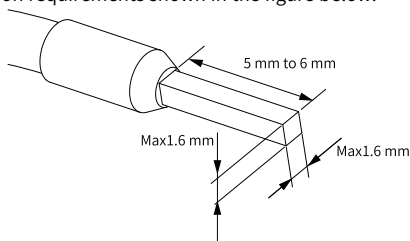
External freewheeling diodes are required for connection with inductive load. Diodes can be 1N4001 or similar.

3.3 Cable Selection

The cable lug and cable diameter in the table below are only for reference. Adjustments can be made based on actual usage after proper calculation.

Supporting material	Applicable cable size		Suzhou Yuanli	
	mm ²	AWG	Option model	Crimping tool
Tubular lug	0.5	20	0508	YAC-5
	0.75	18	7508	

If you use other types of tubular lug, crimp the lug to the cables according to the shape and dimension requirements shown in the figure below.



3.4 Cable Connection

See ["3.3 Cable Selection" on page 25](#) to select a tubular cable. Insert it into the I/O port, and tighten the screws with a straight screwdriver (2 mm to 2.5 mm radius) or a similar tool to secure the cable.

Note

Use a straight screwdriver to loosen the terminal screws and then pull out the cables when disassembling.

4 Configuration and Commissioning

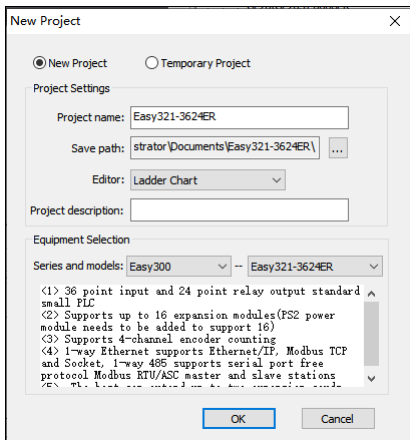
This section takes the configuration of Easy321-3624ER and GE21-8DO-TN on Auto-Shop as an example.

Precautions

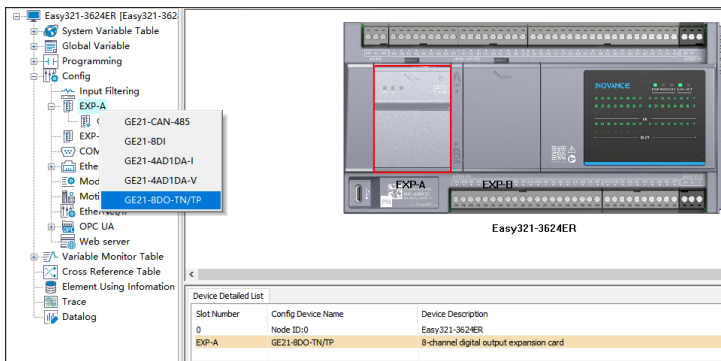
- The type ID of the GE21-8DO-TN expansion card is 1. The configured type of expansion card must be consistent with the type of expansion card actually installed.
- GE21-8DO-TN is displayed as "GE21-8DO-TN/TP" in the software.

Steps:

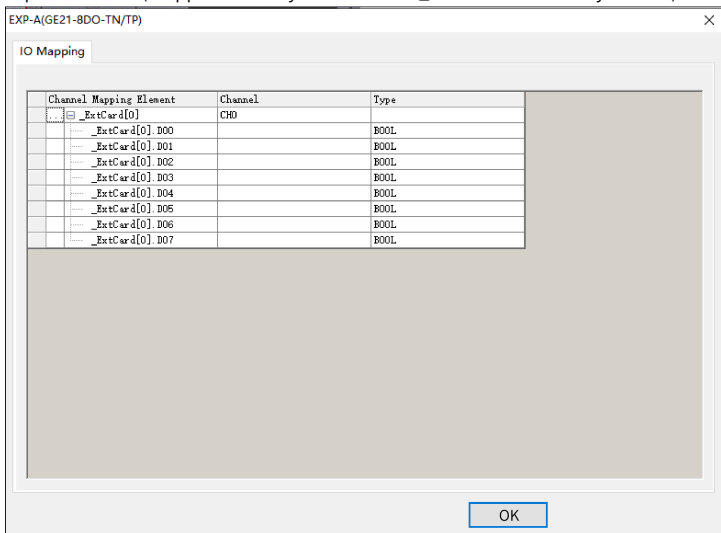
1. Create a new project. Set the "Project name" and "Save path", select the corresponding product series and model under "Series and models", and then click "OK".



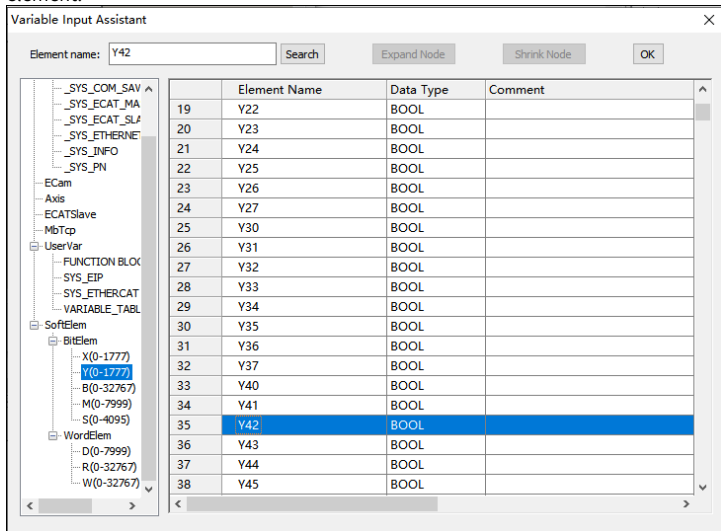
2. In the "Project Manager", right-click "Config > EXP-A or Config > EXP-B" and select "GE21-8DO-TN/TP", or right-click "Module Config" and select "Auto Scan" to add the GE21-8DO-TN expansion card, as shown in the figure below.



3. In the "Project Manager", double-click "Config > EXP-A > GE21-8DO-TN/TP", then double-click  to configure the IO channel mapping for the GE21-8DO-TN expansion card (mapped to the system variable `_ExtCard` structure by default).



4. In the pop-up "Variable Input Assistant" dialog box, select the corresponding Y element.



5. Select to map the IO channel to a Y element that is currently unused, then click "OK" after configuration, as shown in the figure below.

IO Mapping

Channel Mapping Element	Channel	Type
Y42	CH0	
Y42		BOOL
Y43		BOOL
Y44		BOOL
Y45		BOOL
Y46		BOOL
Y47		BOOL
Y50		BOOL
Y51		BOOL

OK

6. After successful compiling, download the project and run it.
- Click the download button  in the toolbar to download the program to the PLC.
 - After the download is complete, click the run button  in the toolbar to run the program.

Service and Support

Should you encounter a safety accident during the use or operation of the product, or face challenges in operating and maintaining the equipment, which remain unresolved after the relevant documentation is consulted, we provide multiple channels to ensure prompt resolution:

- Channel #1: Contact service@inovance.com.
- Channel #2: Visit <https://www.inovance.com/global> to access document downloads, after-sales support, spare parts ordering, repair applications, and authenticity verification services.
- Channel #3: Download My Inovance app (<https://zshc-eu.inovance.com/download-pc/>) where you can access products info and documentation, and query product parameters.

We are committed to providing you with quick and professional technical support, and we look forward to your satisfaction and trust.