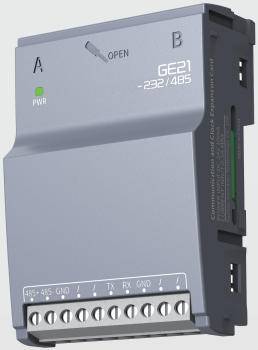
INOVANCE

Advancing industrial technology,
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PS00021820A00

GE21-232/485 Communication 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 presents the product information, installation, wiring, and configuration and commissioning of the product. Read this guide carefully before using the product to ensure safe operation.

■ Standards compliance

The following table 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

Document	Code	Description
Easy321 and Easy511 Programmable Logic Controller User Guide	PS00017976	Presents comprehensive task information for using Easy321 and Easy511 series products, including product introduction, installation, wiring, configuration and commissioning, features, fault diagnosis, maintenance, and appendix.
Easy321S Programmable Logic Controller User Guide	PS00021275	Presents comprehensive task information for using Easy321S series products, including product introduction, installation, wiring, configuration and commissioning, features, fault diagnosis, maintenance, and appendix.
H5U and Easy Series Programmable Logic Controller Programming Guide	19011157	Presents the basic knowledge of PLC programming, quick start guidance, communication, motion control, and high-speed counter usage.

Document	Code	Description
H5U and Easy Series Programmable Logic Controller Instruction Guide	19011156	Presents the basic and complex instructions used for programming applications, as well as examples of these instructions.
GE21-232/485 Communication Expansion Card User Guide (this guide)	PS00021820	Presents the product information, installation, wiring, and configuration and commissioning of the product.

■ Revision history

Date	Version	Description
February 2026	A00	First release.

■ Warranty disclaimer

Inovance provides warranty service within the warranty period (as specified in your order) for any fault or damage that is not caused by improper operation of the user. Maintenance fees will be charged after the warranty period expires.

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

- Damage caused by operations not following the instructions in the user guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by using the product for unintended functions
- Damage caused by using the product outside the specified scope
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

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

For details, see Product Warranty Card.

Fundamental Safety Instructions

■ Safety Disclaimer

- This chapter provides essential safety instructions for proper use of the product. Before using this product, read through the guide and comprehend all the safety instructions. Failure to comply with the safety instructions may result in death, severe injury, or equipment damage.
- "DANGER", "WARNING", and "CAUTION" signs in this guide are only supplements to the safety instructions, and do not reflect all safety instructions to be followed.
- Use this product according to the designated environment requirements. Damage caused by improper use is not covered by warranty.
- Inovance shall take no responsibility for any personal injury or property damage caused by improper use.

■ Safety Levels and Definitions



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



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



Indicates that failure to comply with the notice may result in minor or moderate injury 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, 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 protection measures to protect their safety. For example, they must wear safety shoes, safety clothing, safety glasses, protective gloves and sleeves, or other protective equipment.

Unpacking



- Do not install the product in the case of any damage, rust, or signs of use on the product or accessories upon unpacking.
- Do not install the product in the case of water seepage into the product or missing or damaged components upon unpacking.
- Do not install the product in the case of any discrepancy between the product you received and the product name on the packing list.



- Check whether the packing is intact and whether there is damage, water seepage, dampness, and deformation before unpacking.
- Unpack the package by following the unpacking sequence. Do not strike the package violently.
- Check for damage, rust, or scratches on the surfaces of the product and accessories upon unpacking.
- After unpacking, check the contents against the packing list to ensure that the equipment and accessories are in the correct quantities, and that all documentation is complete.

Storage and transportation



- 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 that components such as the front cover and terminal blocks are secured firmly with screws. Loosely-connected components may fall off and result in personal injury or equipment damage.
- Never stand or stay below the product which is being hoisted.
- 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 injury or equipment damage.



- Handle the equipment with care during transportation and mind your step to prevent personal injury 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 injury.
- Store and transport the equipment based on the storage and transportation requirements. Failure to comply may result in equipment damage.
- Do not store or transport the equipment in equipment exposed to splashing water or rain, direct sunlight, strong electric field, strong magnetic field, or strong vibration.
- Do not store the equipment for more than three months. Long-term storage requires stricter protection and necessary inspections.
- Pack the equipment securely and properly before transportation. Use a sealed container for long-distance transportation.
- Never transport the equipment with other devices or items that could impact or cause harm to the equipment.

Installation



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



- Read through the guide and safety instructions before installation.
- Do not install this product in places with strong electric or magnetic field.
- Before installation, ensure that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply can result in mechanical hazards.
- Do not wear loose clothes or accessories during installation. Failure to comply may result in electric shock.
- Before installing the equipment in an enclosed environment (such as a cabinet or case), use a cooling device (such as a fan or air conditioner) to cool the environment to the required temperature. Failure to comply may result in equipment over-temperature or a fire.
- Do not modify the product.
- Never loosen the fixing bolts on components and modules, or any bolts marked in red.
- When this equipment is installed in a cabinet or final equipment, protection measures such as a fireproof enclosure, electrical enclosure, or mechanical enclosure 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 may result in a fire.

Installation



- Cover the top of the product 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 product and causing faults. After installation, remove the cloth or paper on top of the product 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



- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Before wiring, switch off all the power supplies of the equipment. Wait for at least the time designated on the 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 may result in electric shock.
- Do not perform wiring, remove the equipment cover, or touch the circuit board with power ON. Failure to comply can result in electric shock.
- Ensure that both the equipment and the product are properly grounded. Failure to do so may result in electric shock.



- Do not connect the input power supply to the output end of the equipment. Failure to comply will result in equipment damage or fire.
- When connecting a drive with the motor, ensure that the phase sequences of the drive and motor terminals are consistent to prevent reverse motor rotation.
- Cables used must comply with corresponding cross-sectional area and shielding requirements. The shield of the shielded cable must be grounded at one end properly.
- Fix the terminal screws with the tightening torque specified in the user guide. Insufficient or excessive torque may cause overheating and damage of the joint, which could result 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.

Wiring



- Follow the proper electrostatic discharge (ESD) procedure, and wear an antistatic wrist strap to perform wiring. Failure to comply may damage the equipment or its internal circuits.
- Use shielded twisted pair cables for the control circuit. Connect the shield to the grounding terminal of the equipment. Failure to comply may result in equipment malfunction.

Power-on



- Before power-on, check that the equipment is installed properly with reliable wiring and the motor can be restarted.
- Before power-on, make sure that the power supply meets equipment requirements to prevent equipment damage or even a fire.
- Do not open the cabinet door or protective cover of the product, touch any wiring terminal of the product, or remove any components or parts while the product is powered on. Failure to comply can result in electric shock.



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

Operation



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



- Never touch the enclosure, fan, or resistor with bare hands. Failure to do so may result in burns.
- Prevent metal or other objects from falling into the equipment during operation. Failure to comply may result in a fire or equipment damage.

Maintenance



- 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 can result in electric shock.
- Before maintenance, disconnect all the power supplies of the equipment and wait for at least the time specified on the warning label.
- When using a permanent magnet (PM) motor, do not touch the motor terminals while the motor is rotating, as induced voltage may be present at the terminals even after the product is powered off. Failure to comply may result in electric shock.



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

Repair



- 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 electric shock.
- Before inspection or repair, disconnect all the power supplies of the equipment and wait for at least the time specified on the warning label.



- 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 for at least the time designated on the equipment warning label before power-on or further operations. Failure to comply may result in equipment damage, personal injury, or 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 product in accordance with the replacement instructions.
- Do not use damaged equipment. Failure to comply may result in death, personal injury, or severe equipment damage.
- Recheck the wiring and reset the parameters after equipment replacement.

Disposal



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

■ Safety Label

To ensure safe operation, comply with safety labels on the equipment and do not damage or remove the 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
	• Before using the equipment, read the guide and safety precautions carefully. Failure to comply may result in personal injury, death, or equipment damage. • Caution: The product surface is hot. Do not touch to 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 electric shock.

1 Product Information

1.1 Product Overview

The GE21-232/485 card is independently developed by Inovance. It can be used with Easy321, Easy511 and Easy321S series PLCs, supporting one channel of RS485 communication or one channel of RS232 communication.

1.2 Model and Nameplate

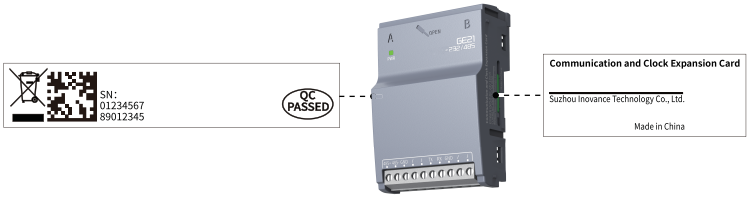
■ Model

GE21- 232/485

① ② ③

① **Product series** Inovance 21 series general-purpose expansion card	③ **Product code** RS485 communication card
② **Product code** RS232 communication card	-

■ Nameplate

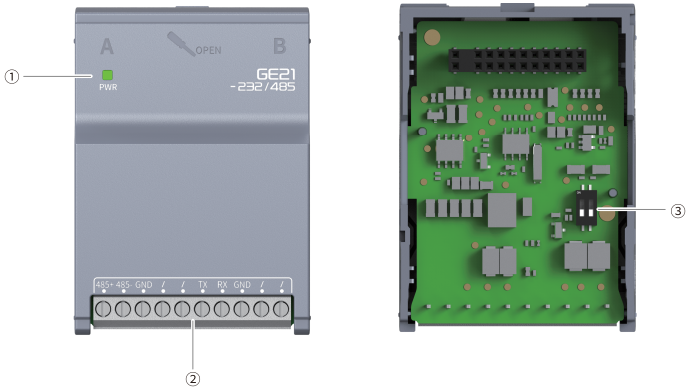


Note

The letter "A" or "B" in the figure indicates that the card slot A or B of the PLC is supported.

Model	Description	Code
GE21-232/485	GE21 Series RS232 or RS485 Communication Card	01480146

1.3 Components



No.	Terminal type	Identification	Definition	Indicator color	Description
①	Power supply indicator	PWR	Normal power supply	Yellow-green	ON when the expansion card is powered on.
②	User terminal	-	-	-	For details, see *"3.1 Terminal Assignment" on page 24*.
③	RS485 DIP switch	1, 2	Used to control the termination resistor	-	The RS485 DIP switch is set to OFF by default. To turn on the switch, toggle switches 1 and 2 using a tool such as tweezers.

1.4 Product Specifications

1.4.1 General Specifications

Item	Specification
IP rating	IP20
Dimensions (W x H x D)	58 mm x 42 mm x 21.4 mm
Weight	Approx. 28 g

1.4.2 Power Supply Specifications

Item	Specification
Rated input voltage	5 VDC (4.75 VDC to 5.25 VDC)
Rated input current	60 mA (typical@5 V)
Input short-circuit protection	Supported
Hot swap	Not supported

1.4.3 Communication Specifications

Item		Specification
RS485	Number of channels	1 channel
	Termination resistor	With termination resistor, which can be controlled by DIP switch. The switch is set to OFF by default, in which case the termination resistor is not connected.
	Number of slaves	Up to 31 slaves (The length of each slave branch must be shorter than 3 m.)
	Communication rate	9.6 kbps, 19.2 kbps, 38.4 kbps, 57.6 kbps, 115.2 kbps
	Communication distance	• Transmission distance < 100 m at a rate of 115.2 kbps • Transmission distance < 1000 m at a rate of 19.2 kbps
RS232	Number of channels	1 channel
	Communication rate	9.6 kbps, 19.2 kbps, 38.4 kbps, 57.6 kbps, 115.2 kbps
	Communication distance	Max. 15 m

Note

If all four RS485 expansion cards as configured as slaves on the same bus, it is not recommended to add any other devices to the bus.

1.5 Environmental Specifications

Item	Specification
Ambient 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	2
Immunity	2 kV on power supply line (compliant with IEC 61000-4-4)

Item	Specification
Overvoltage category	I
EMC immunity level	Zone B, IEC61131-2
ESD protection level	Contact discharge: +/-6 kV; 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; 10 cycles per axis. • Transportation scenario: Tested according to IEC60068-2-64, 0.01 g^2/Hz power spectral density at 5 Hz to 100 Hz; 0.001 g^2/Hz power spectral density at 200 Hz; 1.14 g Grms
Shock resistance	Operating/Transportation: Tested according to IEC60068-2-27; 15 g peak acceleration, 11 ms pulse width, 18 shocks in total in X, Y and Z axes.
Operating temperature/humidity	• Temperature: -20°C to +55°C • Humidity: < 95% RH (30°C), without condensation
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

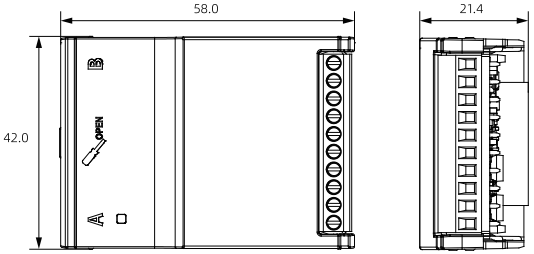
2 Installation

2.1 Installation Precautions

- Make sure the PLC is powered off before installing or removing the expansion card.
- Do not hot-swap the expansion card. Otherwise, this action may cause the main unit (PLC) to restart, or result in data loss/corruption.
- Do not drop or impact the housing or terminals of the expansion card to prevent damage.

2.2 Installation Dimensions

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

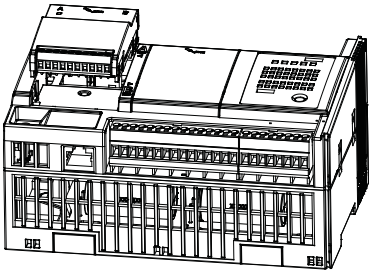


2.3 Installation Procedure

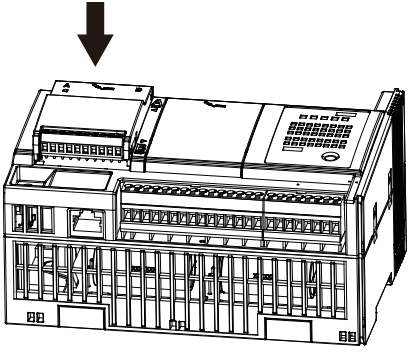
■ Installing the expansion card

The expansion card is snap-fitted with the PLC module.

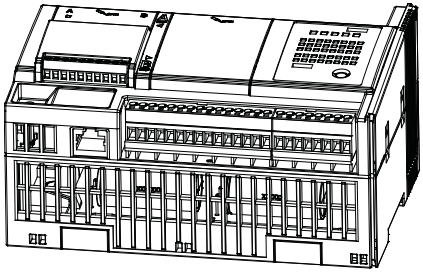
1. Place the PLC horizontally, and align the expansion card module horizontally with it.



2. Insert the expansion card vertically into the card slot A or B (using the slot A as an example) of the PLC along the guide rib.

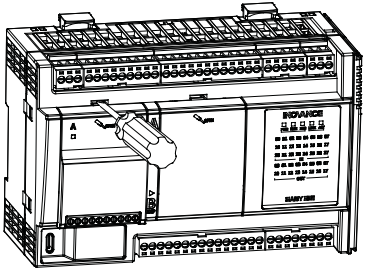


3. Press the expansion card with your hand. When you hear a click and the surface of the expansion card is flush with the surface of the PLC module, the installation is complete, as shown in the figure below.

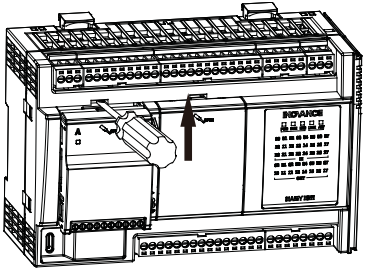


■ Removing the expansion card

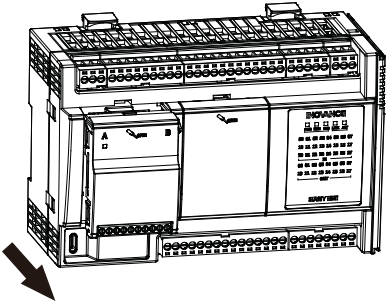
1. Place the PLC module horizontally and insert a slotted screwdriver into the snap-fit position.



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



Terminal name	Signal description
485+	RS485 communication signal (+)
485-	RS485 communication signal (-)
GND	RS485 communication signal ground
/	-
/	-
TX	RS232 communication TX signal
RX	RS232 communication RX signal
GND	RS232 communication signal ground
/	-
/	-

3.2 RS485 Communication

Caution

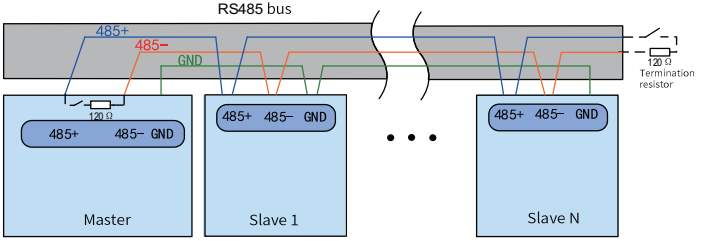
- Do not bundle the extension cable together with power cables (high voltage, large current) which produce strong interference signals. Separate it from other cables and avoid cabling in parallel.
- Select recommended cables and pinboards for connection. It is recommended that shielded cables be used as extension cables to enhance capacity of resisting interference.

■ Wiring requirement

When using RS485 communication, observe the following requirements:

- For the RS485 bus, a shielded twisted-pair cable is recommended. The 485+ and 485- lines must be wired as a twisted pair within this cable.
- Connect 120 Ω termination resistors at both ends of the bus to prevent signal reflection.
- Tie the RS485 signal reference grounds of all nodes together.
- A maximum of 31 nodes are supported. The stub length from each node to the main bus must be less than 3 m.

The RS485 bus topology is shown in the figure below.

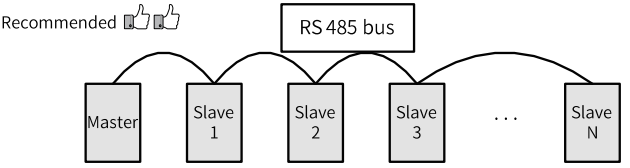


■ Multi-node connection

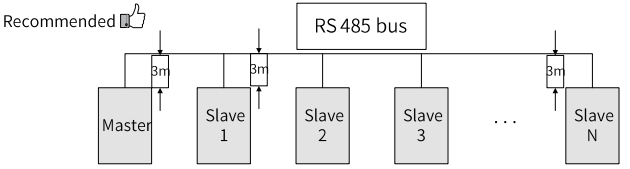
To connect a large number of nodes, the daisy chain topology must be used for the RS485 bus. If a branch line connection is required, keep the stub (from the node to

the main bus) as short as possible, ideally under 3 m. Star connections are prohibited. Common bus structures are shown in the following figures.

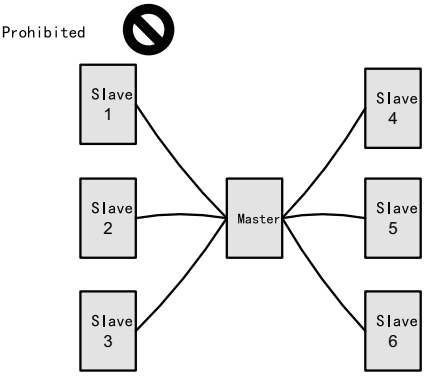
- Daisy chain connection



- Branch line connection



- Star connection (prohibited)

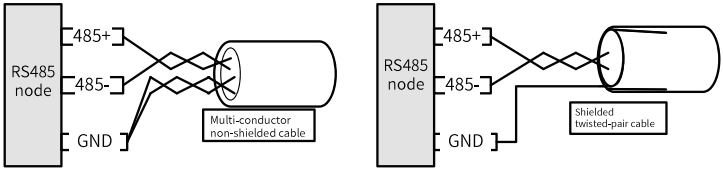


■ Terminal wiring

Check if the on-site RS485 bus contains three cables and that the terminals are not reversed or miswired. Particularly note that if a shielded cable is used, connect the

shield layer to the GND terminal. Never connect the shield layer to any terminal except GND, including the drive housing and grounding terminal of the device.

Due to cable attenuation, it is recommended to use AWG26 or thicker cables if the connection length is longer than 3 m. The 485+ and 485- lines must always be a twisted pair.



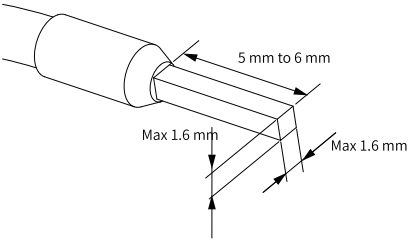
1. Recommended cable 1: Use multi-conductor twisted pair cables, with one twisted pair connected to 485+ and 485-, and others twisted together to connect GND.
2. Recommended cable 2: Use shielded twisted pair cables, with the twisted pair connected 485+ and 485-, and the shield connected to CGND. In applications where shielded cables are used, the shield can be connected to GND only. Never connect the shield to the ground.

3.3 Cable Selection

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

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

If another type of tubular lug is used, crimp the lug onto the stranded wire. The lug must meet the shape and dimensional requirements shown in the figure below.



3.4 Cable Connection

For selection of the cable with a tubular lug, see *"3.3 Cable Selection" on page 27*. To secure the cable, insert it into an input/output terminal and tighten the screw using a slotted screwdriver (Radius: 2 mm to 2.5 mm) or an equivalent tool.

Note

Use a slotted screwdriver to loosen the terminal screw, and then pull out the cable during the removal.

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4 Configuration and Commissioning

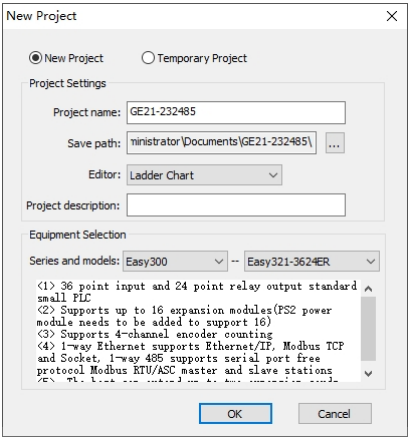
This chapter introduces how to configure the Easy321-3624ER and GE21-232/485 expansion card in the AutoShop.

Precautions

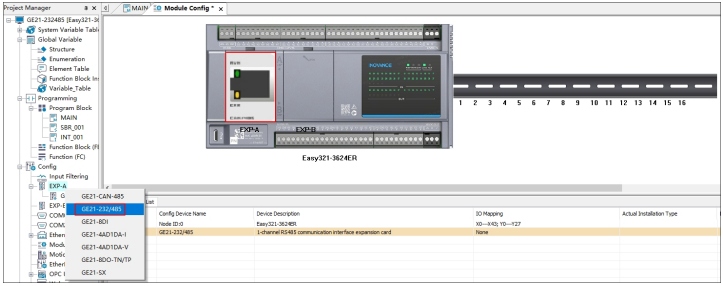
- The GE21-232/485 expansion card supports EXP-A or EXP-B.
- The type ID of the GE21-232/485 expansion card is 7. The configured type of expansion card must be consistent with the type of expansion card actually installed.

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" pane, right-click "Config > EXP-A" and select "GE21-232/485"; or right-click "Config > Module Config" and select "Auto Scan" to add the GE21-232/485 expansion card, as shown in the figure below.



3. Modify the serial port configuration as required. For specific methods, see the "Serial Communication" chapter in the "H5U and Easy Series Programmable Logic Controller Programming and Application Guide".
4. After successful compiling, download the project and run it.
   a. Click the download button in the toolbar to download the program to the PLC.
   b. After the download is complete, click 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.