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PS00006437A02

GE20-232/485 Communication Expansion Card

User Guide

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Preface

■ Introduction

Thank you for purchasing the GE20-232/485 communication extension expansion card independently developed and produced by Inovance Technology. The GE20-232/485 can be used with Easy300/Easy500/AM300/AM500 series PLCs and supports one channel of RS485 or RS232 communication.

This guide describes the product information, mechanical installation, communication connection, and programming examples of the product. Before use, please read this guide thoroughly.

■ 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
	Low Voltage Directive (LVD)	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 UL 61010-2-030 CAN/CSA-C22.2 No. 61010-1 CSA C22.2 NO. 61010-2-201 CSA C22.2 NO. 61010-2-030

Certification	Directive	Standard
KCC Certification	-	-
EAC Certification	-	-

■ More Data

Name	Data Code	Description
Easy Series Programmable Logic Controller User Guide	PS00006444	Introduces the product information, installation and wiring, operation and maintenance of the Easy series products.
H5U&Easy Series Programmable Logic Controller Programming and Application Guide	19011157	Introduces 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	19011156	Introduces the basic and complex instructions, as well as examples of instructions used in product programming application.

■ Revision history

Date	Revision	Description
March 2023	A02	Updated the description of nameplate description and added some product specification data.
October 2022	A01	Made minor corrections.
August 2022	A00	First release

■ Document acquisition

This guide is not delivered along with the product. You can download the PDF version in the following means:

- Visit *www.inovance.com*, click Download under Support and enter a keyword to search.
- Scan the QR code on the product to obtain the guide.

■ Warranty Instructions

The warranty period of the product is 18 months as of the date of manufacture (refer to the barcode on the equipment). If otherwise agreed upon, the agreed terms and conditions shall prevail. After the warranty period expires, maintenance will be charged.

Within the warranty period, maintenance will be charged for damages caused by the following:

- your failure to operate the product in accordance with the user guide
- The product is damaged due to fire, flood, and abnormal voltage.
- The user uses the product for abnormal functions.
- The user uses the product outside the specified specification range.
- other events of force majeure, including but not limited to lightning, earthquake and other extreme weather events

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

For details, see Product Warranty Card.

Fundamental Safety Instructions

■ Safety Disclaimer

1. Read and comply with the safety instructions during installation, operation, and maintenance of the equipment.
2. To ensure the safety of humans and the products, follow the marks on the products and all the safety instructions in this document.
3. "CAUTION", "WARNING", and "DANGER" items in this guide do not indicate all safety precautions that need to be followed; instead, they just supplement the safety precautions.
4. Use this product in environments meeting the design and specification requirements; otherwise, a fault may occur. Noncompliance-caused malfunction or damage to parts are not covered in product quality warranty.
5. Inovance shall take no responsibility for any personal injuries or property damage caused by improper usage.

■ Safety Levels and Definitions

DANGER	Indicates that failure to comply with the notice will 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 injury or damage to the equipment. Please keep this guide well so that it can be read when necessary and forward this guide to the end user.

Control System Design

DANGER

- Provide a safety circuit outside the PLC so that the control system can still work safely once external power failure or PLC fault occurs.
- Add a fuse or circuit breaker because the expansion card may smoke or catch fire due to long-time overcurrent caused by operation above rated current or load short-circuit.

WARNING

- An emergency stop circuit, a protection circuit, a forward/reverse operation interlocked circuit, and a upper position limit and lower position limit interlocked circuit must be set in the external circuits of PLC to prevent damage to the machine.
- To ensure safe operation, for the output signals that may cause critical accidents, please design external protection circuit and safety mechanism.
- Once PLC CPU detects abnormality in the system , all outputs may be closed; however, when a fault occurs in the controller circuit, the output may not be under control. Therefore, it is necessary to design an appropriate external control circuit to ensure normal operation.
- If the PLC output units such as relays or transistors are damaged, the output may fail to switch between ON and OFF states according to the commands.
- The PLC is designed to be used in an indoor electrical environment (overvoltage category II). The power supply must have a system-level surge protector, assuring that overvoltage due to lightning shock can't be applied to the PLC's power supply input terminals, signal input terminals and output terminals, to prevent damage to the equipment.

Installation

WARNING

- Installation must be carried out by the specialists who have received the necessary electrical training and understood enough electrical knowledge.
- Disconnect all external power supplies of the system before removing/installing the expansion card. Failure to do so may result in electric shock, expansion card fault or malfunction.
- Do not use the PLC where there are dust, oil smoke, conductive dust, corrosive or combustible gases, or exposed to high temperature, condensation, wind & rain, or subject to vibration and impact. Electric shock, fire and malfunction may also result in damage or deterioration to the product.
- The PLC is open-type equipment that must be installed in a control cabinet with lock (cabinet housing protection > IP20). Only the personnel who have received the necessary electrical training and understood enough electrical knowledge can open the cabinet.

CAUTION

- Prevent metal filings and wire ends from dropping into ventilation holes of the PLC during installation. Failure to comply may result in fire, fault and malfunction.
- Ensure there are no foreign matters on ventilation surface. Failure to comply may result in poor ventilation, which may cause fire, fault and malfunction.
- Ensure the expansion card is connected to the respective connector securely. Improper installation may result in malfunction, fault or fall-off.

Wiring

DANGER

- Wiring must be carried out by personnel who have received the necessary electrical training and understood enough electrical knowledge.
- Disconnect all external power supplies of the system before wiring. Failure to comply may result in electric shock, module fault or malfunction.
- Perform good insulation on terminals so that insulation distance between cables will not reduce after cables are connected to terminals. Failure to comply may result in electric shock or damage to the equipment.

CAUTION

To avoid electric shock, cut off the power supply before connecting the power supply of the HMI.

Operation and Maintenance

CAUTION

- Maintenance & inspection must be carried out by personnel who have the necessary electrical training and experience.
- Do not touch the terminals while the power is on. Failure to comply may result in electric shock or malfunction.
- Disconnect all external power supplies of the system before cleaning the expansion card. Failure to comply may result in electric shock.
- Disconnect all external power supplies of the system before removing the expansion card or connecting/removing the communication wirings. Failure to comply may result in electric shock or malfunction.

Safety Recommendations

- In positions where the mechanical parts is exposed to operators, such as positions for loading and unloading machinery tools, or where the machine operates automatically,
- If modification on the program is needed during system operation, use a password or other protective measures to ensure that only authorized operators can perform such modification.

Disposal



- Treat the scrapped product as industrial waste. Dispose of the battery according to local laws and regulations.
- Recycle retired equipment by observing industry waste disposal standards to avoid environmental pollution.

1 Product Information

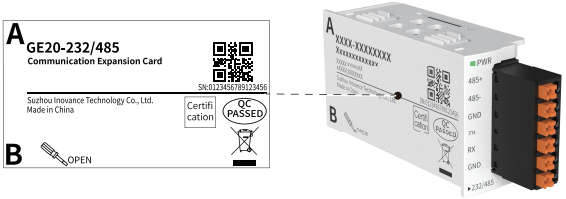
1.1 Model and Nameplate

■ Model description

GE20 – 232 / 485
① ② ③

①	**Product Series** GE20 series general-purpose expansion card	③	**Product Code** RS485 communication card
②	**Product Code** RS232 communication card	-	-

■ Nameplate description

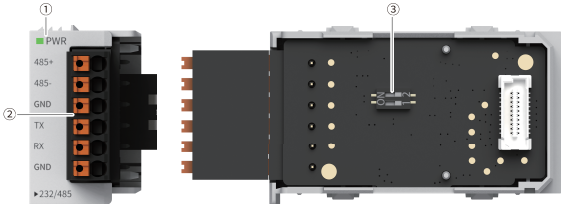


Note

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

Model	Description	Code
GE20-232/485	GE20-232/485-GE20 series RS232 or RS485 communication card	01480029

1.2 Components



No.	Component	Mark	Definition	Indicator color	Description
①	Power supply indicator	PWR	Power supply is normal.	Yellow green	ON when the expansion card is powered on.
②	User terminals	-	-	-	See details in *"3.2 Terminal Definition" on page 14*.
③	RS485 DIP switch	1, 2	Used to control the termina-tion resistor.	-	The RS485 DIP switch is set to OFF by default, i.e. at positions 1 and 2. To turn on the switch, toggle it to position ON using tools such as forceps.

1.3 Specifications

1.3.1 General Specifications

Item	Specification
IP rating	IP20
Dimensions (W x H x D)	69.5 mm x 29.5 mm x 23 mm
Weight	About 17 g

1.3.2 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

1.3.3 Communication Specifications

Item		Specifications
RS485	Number of channels	1
	Isolation mode	Non-isolation
	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 baud rate	9.6 kbit/s, 19.2 kbit/s, 38.4 kbit/s, 57.6 kbit/s, 115.2 kbit/s
	Communication distance	• Rate 115.2 kbit/s: Transmission distance <100 m • Rate 19.2 kbit/s: Transmission distance <1000 m
RS232	Number of channels	1
	Isolation mode	Non-isolation
	Communication baud rate	9.6 kbit/s, 19.2kbit/s, 38.4 kbit/s, 57.6 kbit/s, 115.2 kbit/s

2 Mechanical Installation

2.1 Installation Environment Requirements

Take the operability, serviceability, and adaptability to environment into account when installing the expansion card to the PLC.

Item	Specification
Working environment	No corrosive and flammable gas and no excessive conductive dust
Altitude	Up to 2000 m (80 kPa)
Pollution degree	2 or less
Immunity	2 kV on power supply line (compliant with IEC 61000-4-4)
Overvoltage category	I
EMC immunity level	Zone B, IEC61131-2
Vibration resistance	IEC 60068-2-6, 5 Hz to 8.4 Hz, 3.5 mm, 8.4 Hz to 150 Hz, 1 g, 10 cycles in each of X, Y and Z directions
Shock resistance	IEC 60068-2-27, 150m/s^2, 11 ms, 3 times each in ±X, ±Y and ±Z directions, 18 times in total
Storage temperature/humidity	-20°C to 60 °C; ＜90%RH (non-condensing)
Transportation temperature/ humidity	-40°C to 70 °C; ＜95%RH (non-condensing)
Operating temperature/ humidity	-20°C to 55 °C; ＜95%RH (non-condensing)

2.2 Installation Precaution

- Make sure the PLC is powered off before installing or removing the expansion card.

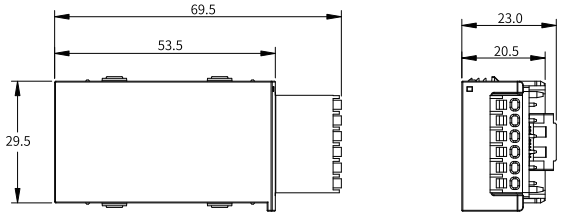


Do not connect/disconnect the expansion card with power ON. This may lead to master restart or user data loss or damage.

- Do not drop or shock the housing or terminals of the expansion card to avoid damage.

2.3 Installation Dimensions

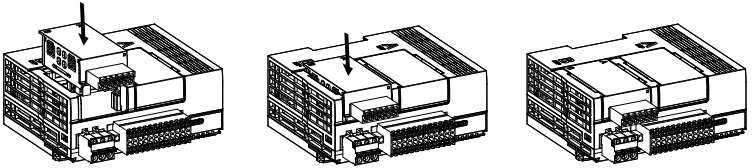
The installation dimensions (in mm) are shown in the figure below.



2.4 Installation Method

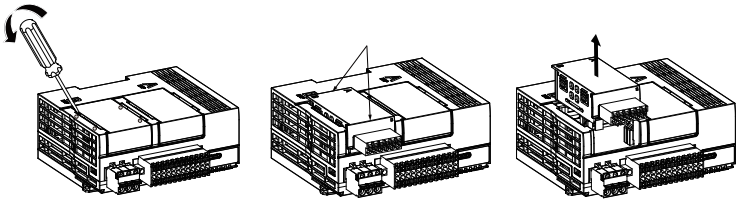
■ Installing the expansion card

The expansion card is snap-fitted with the PLC. Place the PLC horizontally, place the expansion card into the card slot A or B vertically along the guide ribs, and press the expansion card. When you hear a click and the surface of the expansion card is flush with the surface of the PLC, the expansion card is installed in place, as shown in the following figure.



■ Removing the expansion card

Place the PLC horizontally, insert the slotted screwdriver into the snap-fit joints in the order shown in the figure on the left, and pry the expansion card in the direction indicated by the arrow. When you hear a click, the expansion card is initially disengaged from the PLC. Then you can hold the expansion card with two fingers at the positions indicated by the arrow as shown in the middle figure and take out the expansion vertically.



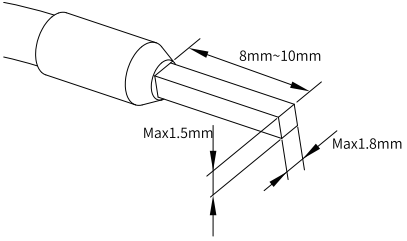
3 Communication Connection

3.1 Cable Selection

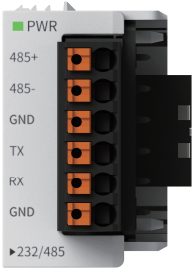
The cable lug and cable diameter included in the following table are only for reference.

Material Name	Applicable Cable Diameter		KST		Suzhou Yuanli	
	mm^2	AWG	Model	Crimping Tool	Model	Crimping tool
Tubular lug	0.3	22	E0308	KST2000L	0308	YAC-5
	0.5	20	E0508		0508	
	0.75	18	E7508		7508	
	1.0	18	E1008		1008	

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.



3.2 Terminal Definition



Name	Description
RS485+	RS485 communication signal+
RS485-	RS485 communication signal-
GND	RS485 communication GND
TX	RS232 signal transmission
RX	RS232 signal reception
GND	RS485 communication GND

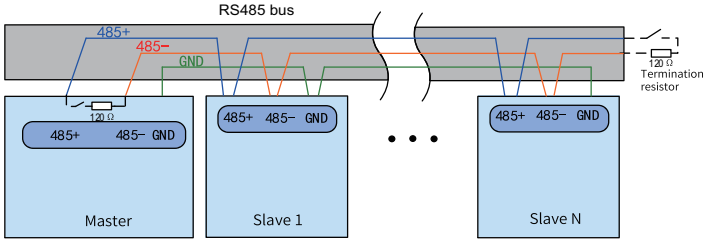
3.3 RS485 Communication

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.

It is recommended to use a shielded twisted pair cable for the RS485 bus. Connect a 120 Ω termination resistor to both ends of the bus respectively to prevent signal reflection. Connect the signal reference grounds of all nodes together. Up to 31 nodes can be connected and the distance between nodes must be less than 3 m.

The RS485 bus topology is shown in the figure below.

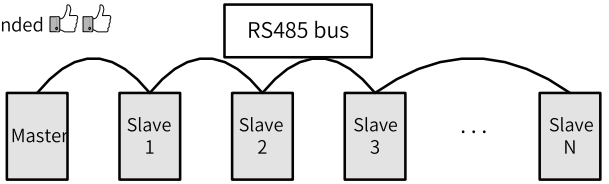


■ Multi-node connection

In case of a large number of nodes, connect the RS485 bus using the daisy chain mode. If the branch line connection is used, the branch line length is as short as possible. The recommended length is shorter than 3 m. Star connections are prohibited. Common bus structures are shown in the following figures.

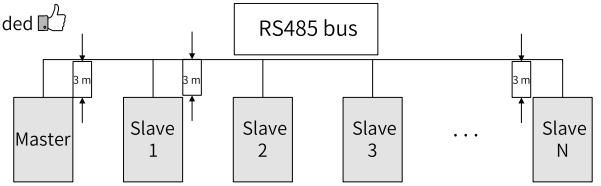
- Daisy chain connection

  Recommended

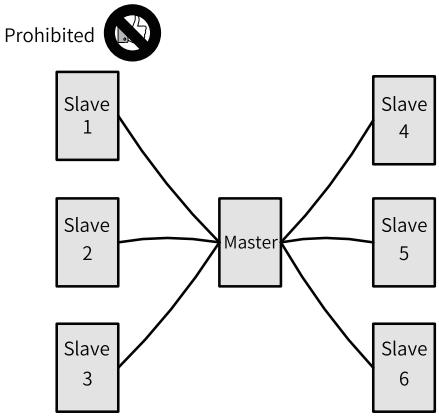


- Branch line connection

  Recommended



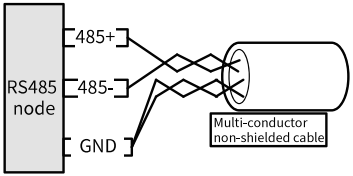
- Star connection (prohibited)

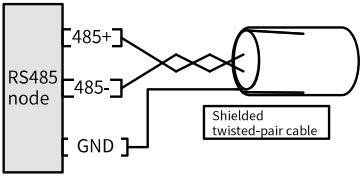


■ Terminal wiring

Check whether there are three conductors in the RS485 bus and whether terminals are connected correctly. If a shielded cable is used, the shield must be connected to GND. Never connect the shield to any terminal except GND, including the drive housing and grounding terminal.

Given the effect of attenuation, it is recommended to use AWG26 or higher cables for connection longer than 3 m. Twisted pair cables are always recommended for connecting 485+ and 485-.





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 GND. In applications where

shielded cables are used, the shield can be connected to GND only. Never connect the shield to the ground.

3.4 Cable Connection

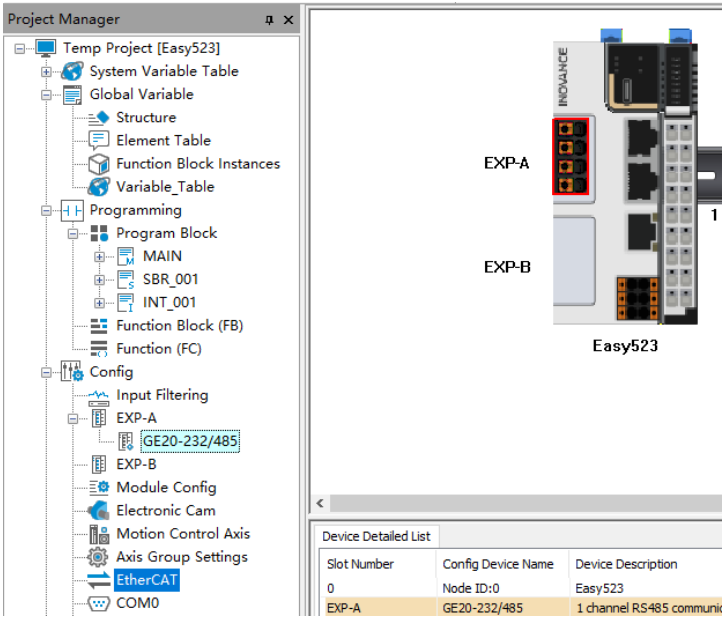
Select tubular cables referring to *"3.1 Cable Selection" on page 14* and insert the cables into the communication ports.

4 Programming Examples (When used with Easy523)

The type ID of the GE20-232/485 expansion card is 7. The configured expansion card type must be consistent with the actually installed expansion card type.

1. Create a new project. In the Project Manager, go to Config, right-click on EXP-A or EXP-B and select “GE20-232/485”, or right-click on Module Config and select “Auto Scan” to add the GE20-232/485 expansion card, as shown in the figure below.

   The serial port is COM2 when the GE20-232/485 expansion card is installed in EXP-A and COM3 when installed in EXP-B.



2. For configuration of the serial communication, see the section “Serial Communication” section in the "H5U&Easy Series Programmable Logic Controller Programming and Application Guide".
3. After successful compiling, download the project and run it.