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PS00006439A07

GE20-4DO-TN Sink-Type Transistor Output Expansion Card

User Guide

Suzhou Inovance Technology Co., Ltd.

Add.: No.52, Tian E Dang Road, Wuzhong District,
Suzhou 215104, P.R. China
Tel: (0512) 6637 6666 Fax: (0512) 6285 6720
www.inovance.com

Preface

■ Introduction

Thank you for purchasing the GE20-4DO-TN sink-type transistor output expansion card independently developed and produced by Inovance Technology. The GE20-4DO-TN can be used with Easy300/Easy500/AM300/AM500/EVO500 series PLCs, supporting 4-channel sink-type transistor output.

This guide describes the production information, mechanical installation, electrical installation, and programming examples of the product. Before using this product, read this guide carefully to ensure safe use.

■ Standard

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	-		-

Certification	Directive		Standard
EAC certification	-		-
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 Name	Document Coding	Description
Easy Series Programmable Logic Controller User Guide	PS00006444	Introduces the product information, installation and wiring, operation and maintenance of the Easy series products.
AM300 Series Programmable Logic Controller User Guide	PS00008836	Introduces the installation and wiring of the AM300 series PLC, including the product information, mechanical installation, and electrical installation.
AM500 Series Programmable Logic Controller User Guide	PS00008837	Introduces the installation and wiring of the AM500 series PLC, including the product information, mechanical installation, and electrical installation.

Document Name	Document Coding	Description
EVO500 Series Programmable Logic Controller User Guide	PS00016754	Introduces the installation and wiring of the EVO500 series PLC, including the product information, mechanical installation, and electrical installation.
H5U & Easy Series Programmable Logic Controller Programming 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 and application.
GE20-4DO-TN Sink-Type Transistor Output Expansion Card User Guide (This guide)	PS00006439	Introduces the product information, mechanical installation, electrical installation and programming examples of the product.

■ Revision History

Revision date	Version	Description
January 2025	A07	Made minor corrections.
January 2024	A06	Made minor corrections.
October 2023	A05	Made minor corrections.
September 2023	A04	Made minor corrections.
July 2023	A03	Added *"4.2 InoProShop Programming Examples (When used with AM522)" on page 20*.
March 2023	A02	Updated nameplate descriptions, terminal wiring drawings and added partial product specification data, etc.
October 2022	A01	Made minor corrections.
August 2022	A00	Initial release.

■ Access to the Guide

This guide is not delivered with the product. You can obtain the PDF version by the following methods:

- Do keyword search under Service and Support at *www.inovance.com*.
- Scan the QR code on the product with your smart phone.
- Scan the QR code below to install My Inovance app, where you can search for and download user guides.

■ 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 will be charged after the warranty expires.

Within the warranty period, maintenance 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 unusual voltage
- Damage caused by unintended use of the product
- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

The maintenance is 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 the Product Warranty Card.

Fundamental Safety Instructions

■ Safety Disclaimer

1. Read through the safety instructions before installing, operating, and servicing the equipment, and comply with these instructions.
2. To ensure personal and equipment safety, observe the notes indicated on the product labels and all the safety instructions in the user guide.
3. “CAUTION”, “WARNING”, and “DANGER” in this guide only indicate some of the precautions that need to be followed; 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 injury or property damage caused by improper use.

■ 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 death or severe personal injuries.

"CAUTION" indicates that failure to comply with the notice may result in minor or moderate personal injury or equipment damage. Keep this user guide properly for future use and deliver it 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 controller fault occurs.
- Add a fuse or circuit breaker because the module 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 an 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, use external protection circuits 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 skilled personal who have undergone specialized electrical training and possess comprehensive electrical expertise.
- Disconnect all external power supplies of the system before removing/installing the module. Failure to do so may result in electric shock, module fault or malfunction.
- Do not use the PLC in environments with dust, greasy smoke, conductive dust, corrosive or combustible gases, exposed to high temperature, condensation, wind & rain, or subject to vibration and shock. 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 skilled personnel who have undergone specialized electrical training and possess comprehensive electrical expertise 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 module is connected to the respective connector securely and hook the module firmly. Improper installation may result in malfunction, fault or fall-off.

Wiring

DANGER

- Wiring must be carried out by skilled personnel who have undergone specialized electrical training and possess comprehensive electrical expertise.
- Disconnect all external power supplies of the system before wiring. Failure to comply may result in electric shock, module fault or malfunction.
- Install the terminal cover attached to the product before power-on or operation after wiring is done. Failure to comply may result in electric shock.
- Insulate the cable terminals properly to ensure the insulation distance between cables will not be shortened after cables are connected to the terminal block. Failure to comply may result in electric shock or damage to the equipment.

Wiring

- To avoid electric shock, cut off the power supply before connecting the product to the power supply.
- The input power supply of this product must be 24 VDC. Power supplies outside ±20% of 24 VDC can cause severe damage to the product. Therefore, check whether the DC power supply provided by the switching-mode power supply is stable at a regular interval.

Operation and Maintenance

- Operation and maintenance must be carried out by skilled personnel who have undergone specialized electrical training and possess comprehensive electrical expertise.
- 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 module or re-tightening screws on the terminal block or screws of the connector. Failure to comply may result in electric shock.
- Disconnect all external power supplies of the system before assembling/disassembling the module or connecting/removing the communication cables. Failure to comply may result in electric shock or malfunction.

Safety Recommendations

- In the position where the operator directly touches the machinery part, for example, where a machinery tool is loaded/unloaded, or where a machine runs automatically, the on-site manual operating devices and any other alternative means must be carefully arranged and designed so that they are independent of the programmable controller and can start or terminate the automatic running of the system.
- If modification on the program is needed during system operation, use the lock function or other protective measures. Ensure that only authorized personnel can make the necessary modifications.

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

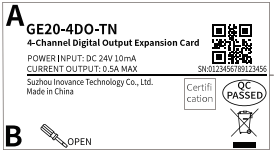
1.1 Model and Nameplate

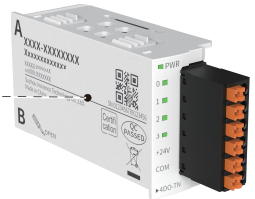
■ Model description

GE20 - 4DO - TN
① ② ③

① **Product Series** GE20 series general-purpose expansion card	③ **Product Code** Sink transistor
② **Product Code** 4-channel digital output card	-

■ Nameplate description



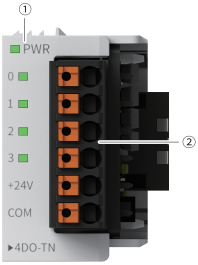


Note

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

Model	Description	Code
GE20-4DO-TN	GE20 series 4-channel digital sink-type transistor output card	01480033

1.2 Components



No.	Type	Mark	Definitions	Indicator Color	Remarks
①	Power indicator	PWR	Power supply normal	Yellow-green	ON when the expansion card is powered on.
	Output indicator	0, 1, 2, and 3	Output status display	Yellow-green	ON when output is active.
②	User terminal	-	-	-	See detailed definition in *"3.2 Terminal Definition" on page 17*

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 (g)	Approx. 18 g

1.3.2 Power Supply Specifications

Item	Specification
Rated input voltage	5 VDC (4.75 VDC to 5.25 VDC)
Rated input current	40 mA (max@5 V)
Input short-circuit protection	Supported
Hot swap	Not supported

1.3.3 Output Specifications

Item		Specification
Output type		Digital output, NPN
Number of output channels		4
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 (in total)
	Output load (lamp load)	1 W/24 VDC (in total)
	Hardware response time ON/OFF	⩽100 μs (OFF→ON, ON→OFF)
	Load current requirements	Load current ⩾5 mA
	Maximum output frequency	100 Hz for resistive load; 0.5 Hz for inductive load; 10 Hz for lamp load
Leakage current at OFF		Less than 10 μA
Max. residual voltage during ON		Less than 0.5 VDC
Isolation mode		Optocoupler isolation
Common terminal mode		4-point/common terminal (“-” of power supply)
Surge protection device (SPD)		Zener diode

Item	Specification
Short circuit protection action	/
Output action display	The output indicator lights up (controlled by hardware) when the output is in drive state.

1.3.4 Environmental Specifications

Item	Specification
Working environment	Free from conductive dust, conductive fibers, explosive dust, flammable gases, water mist/ greasy dirt, corrosive dusts/gases, strong vibration, and repetitive shock
Altitude	⩽ 2000 m
Pollution degree	2
Immunity	2 kV on power supply cable (compliant with 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/axes • 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 200Hz; 1.14 g Grms
Shock resistance	Application/Transportation scenario: Tested according to IEC60068-2-27; 15 g peak acceleration, 11 ms pulse width, 18 times in X/ Y/Z-axis directions
Storage temperature/humidity	• Temperature: -20°C to +60°C • Humidity: < 90% RH (30°C), without condensation

Item	Specification
Transportation temperature/humidity	• Temperature: -40°C to +70°C • Humidity: < 95% RH (30°C), without condensation
Operating temperature/humidity	• Temperature: -20°C to +55°C • Humidity: < 95% RH (40°C), without condensation

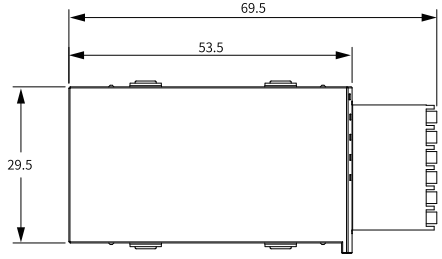
2 Mechanical Installation

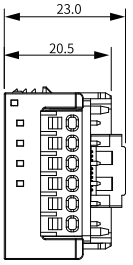
2.1 Installation Precautions

- Make sure the PLC is powered off before installing or removing the expansion card.
- Do not hot swap the expansion cards. Otherwise, the PLC may be subject to restart, user data loss or corruption.
- 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.

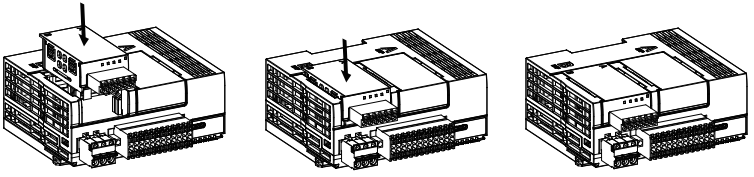




2.3 Installation Method

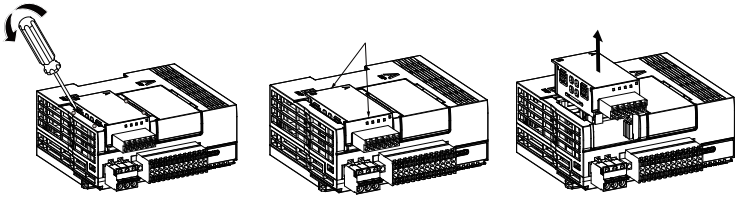
■ Installing the expansion card

The expansion card is snap-fitted with the PLC. Position the PLC horizontally, then align the expansion card with guide ribs and insert vertically into card slot A or B until fully seated, applying firm pressure to secure the connection. The expansion card is properly installed when an audible click is heard and both surfaces align flush, as shown in the following figure.



■ Removing the expansion card

Position the PLC horizontally, then 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. The expansion card is initially disengaged from the PLC when an audible click is heard. 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.



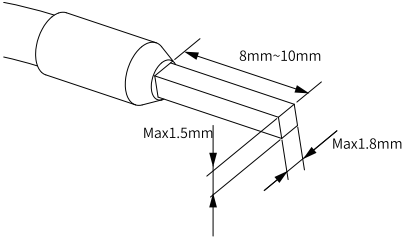
3 Electrical Installation

3.1 Cable Selection

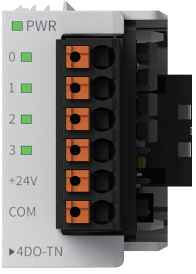
The cable lug and cable diameter included in the following table are only for reference.

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.

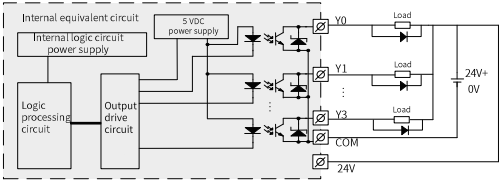


3.2 Terminal Definition



Name	Description
0	Output (Y0)
1	Output (Y1)
2	Output (Y2)
3	Output (Y3)
+24V	Input voltage
COM	Output common terminal

3.3 Terminal Wiring



Note

Connect a flywheel diode when connecting the external inductive load. Diodes can be 1N4001 or similar.

3.4 Cable Connection

Select tubular cables referring to *"3.1 Cable Selection" on page 17* and insert the cables into the output ports.

4 Programming Examples

4.1 AutoShop Programming Examples (When used with Easy523)

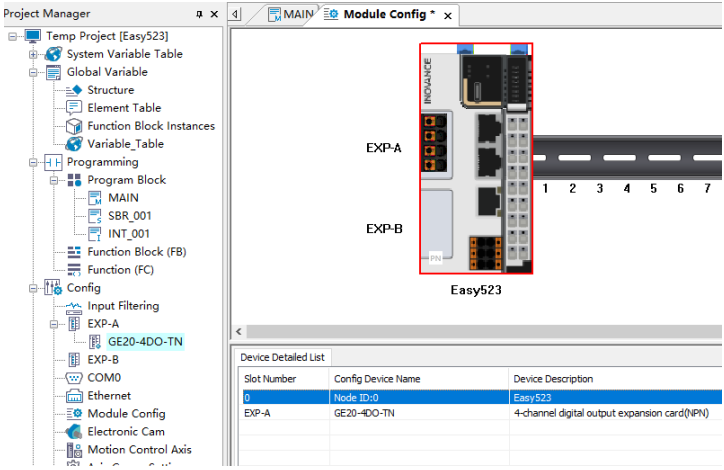
Note:

The type ID of the GE20-4DO-TN expansion card is 5. The configured expansion card type must be consistent with the actually installed expansion card type.

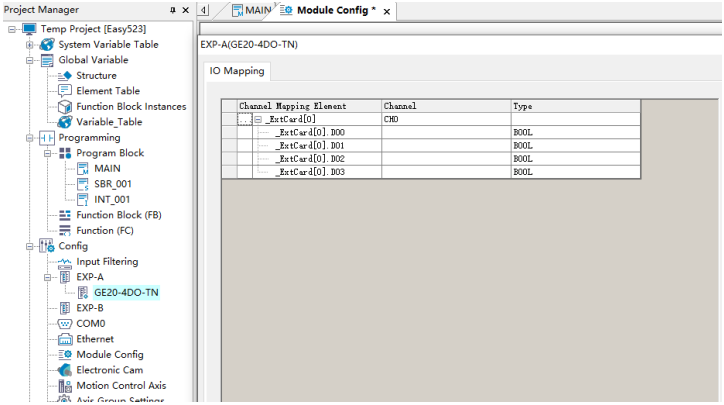
You can view the configured expansion card type ID through the value of the variable name "EXtCard [x].ConfigModule" in the system variable table "_SYS_INFO", and the actual installed expansion card type ID through the value of the variable name "_ExtCard[x].MountedModule" in the system variable table "_SYS_INFO".

Operating procedure:

1. Create a project.
2. In the **Project Manager**, go to **Config**, right-click on **EXP-A** or **EXP-B** and select **GE20-4DO-TN**, or right-click on **Module Config** and select **Auto Scan** to add the GE20-4DO-TN expansion card, as shown in the figure below.



3. Double-click **GE20-4DO-TN** to configure the channel I/O mapping of the GE20-4DO-TN expansion card (by default it is mapped to the system variable "_ExtCard"), or double-click ... to map the channel I/O to the X element that is not currently occupied. Click OK after the configuration is completed, as shown in the following figure.



4. After successful compiling, download the project and run it.

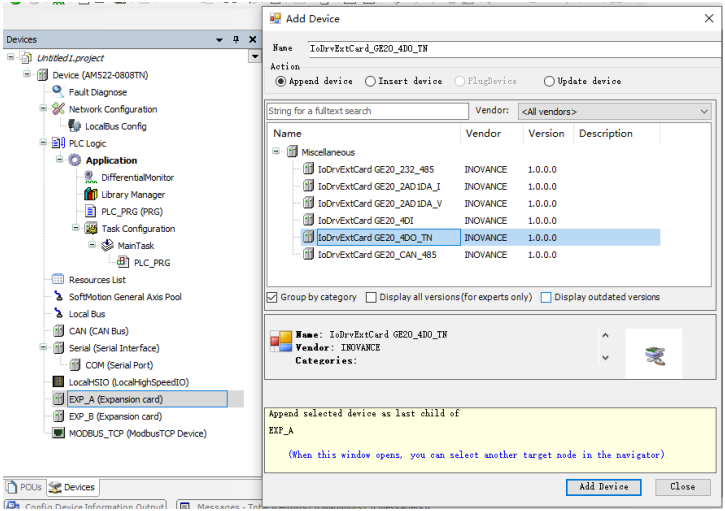
4.2 InoProShop Programming Examples (When used with AM522)

Note:

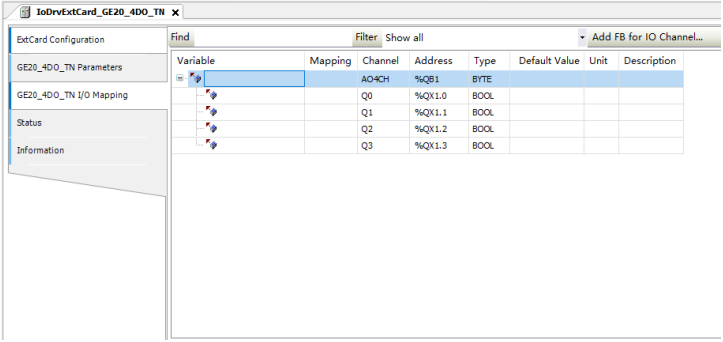
The configured expansion card type must be consistent with the actually installed expansion card type.

Operating procedure:

1. Create a project.
2. In the **Devices** window, right-click the navigation tree **EXP_A (Expansion card)** or **EXP_B (Expansion card)** and select **Add Device**.
3. In the **Add Device** pop-up window, select **IoDrvExtCard_GE20_4DO_TN**, click **Add Device**, and complete the addition, as shown in the following figure.



4. Double-click **IoDrvExtCard_GE20_4DO_TN** to open the configuration interface.
5. In the **GE20_4DO_TN I/O Mapping** tab, configure the channel I/O mapping of the GE20_4DO_TN expansion card, as shown in the following figure.



6. After successful compiling, download the project and run it.