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GL20-4DA Analog Output Module User Guide

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Preface

About This Guide

GL20-4DA series 4-channel analog output module supports voltage and current output with a 16-bit resolution, and can be used together with a PLC master such as Easy series.

This guide describes the mechanical installation, electrical installation and programming examples of the product.

More Data

Data Name	Data Code	Description
GL20-RTU-ECT Communication Interface Module User Guide	PS00004985	This guide describes the installation, wiring and more of the product.

Revision History

Date	Version	Description
June 2022	A01	Minor corrections
March 2022	A00	First release.

How to Obtain

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

- Log in to Inovance's website (<u>http://en.inovance.cn/</u>), choose Support > Download, search by keyword, and then download the PDF file.
- Scan the QR code on the product with your mobile phone.

Warranty Agreement

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 18 months, a proper maintenance fee is charged.

Within the 18-month warranty period, a reasonable repair fee will be charged for damages caused by the following:

- Operations not following the user instructions
- Fire, flood, or abnormal voltage

- Use of the product for non-recommended functions
- Use of the product outside the scope of intended use
- Force majeure such as natural disasters, earthquake, lightning strike

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.

Safety Instructions

Safety Precautions

- 1. Read and comply with the safety instructions during installation, operation, and maintenance on 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. The "CAUTION," "WARNING," and "DANGER" signs are only supplements to the safety instructions.
- 4. Use this equipment according to the designated environment requirements. Damage caused by improper use is not covered by warranty.
- 5. 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 will result in severe personal injuries or even death.

Marning: 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 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.

During 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 module may smoke or catch fire due to longtime 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, 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 indoor electrical environment (overvoltage category II). The power supply must have a system-level lightning protection device, assuring that overvoltage due to lightning shock cannot be applied to the PLC power supply input terminals, signal input terminals and output terminals and so forth, so as to avoid 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 module. Failure to do so may result in electric shock, module 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.



- 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 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.
- Install the terminal cover attached to the product before power-on or operation after wiring is completed. Failure to comply may result in electric shock.
- 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.



- To avoid electric shock, cut off the power supply before connecting the product to the power supply.
- The input power of the product is 24 VDC. If the power input is not within 24 VDC \pm 20%, the product may be damaged. Therefore, check regularly that the DC power provided by the switching-mode power supply unit is stable.

During Operation and Maintenance



- 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 module or retightening 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 removing the module or connecting/removing the communication wirings. Failure to comply may result in electric shock or malfunction.

Safety Recommendations

- On-site manual devices or other backup means must be equipped in the position where the operator directly touches the mechanical parts, such as loading and unloading mechanical tools, or the position where the machine runs automatically. The manual devices and backup means, which can start or interrupt automatic operations of the system, must be independent of the programmable controller.
- If you need to modify the program while the system is running, 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 产品信息

1.1 Model Number and Nameplate

$$\frac{\mathsf{GL}}{1} \frac{20}{2} - \frac{4}{3} \frac{\mathsf{DA}}{4}$$

① Product Information	③ I/O Points
GL: General local module	4: 4 channels
	8: 8 channels
② Serial Number	④ Module Type
20: 20 series module	DA: Analog output
	AD: Analog input
	AM: Hybrid module
	PT: Heating resistor temperature measurement
	TC: Thermocouple temperature detection



Based on the above description of model number and nameplate, the relevant ordering data of this product is described in the following table.

Model	Description	Product Code	Applicable Model
	GL20 series 4-channel analog output module supports voltage/current output.	01440287	AC800 series, Easy series

1.2 Components



No.	Interface Name		Description						
1	Signal indicators	PR (POWER +RUN)	Power / running indicator	Yellow green	ON when the module is in normal operation				
		ERR	State machine error indicator	Red	ON when an error occurs in the state machine				
2	Terminals	See Term	See Terminal Definition for detailed definition						
			Red: Digital output		Orange: Analog output				
3	Color identification		Gray: Digital input	-	Green: Analog input				
			White: Communication		Blue: Other module				

1.3 Specifications

Power supply specifications

Item	Specification
Rated bus input voltage	5 VDC (4.75 VDC to 5.25 VDC)
Rated bus input current	120 mA (typical@5 V)
Rated terminal input voltage	5 VDC (20.4 VDC to 28.8 VDC)
Rated terminal input current	100 mA (typical@24 V)
Rated terminal output voltage	N/A
Rated terminal output current	N/A
Hot swap	Not supported

Output specifications

Item	Specification
Output type	Analog output
Output mode	Voltage/Current
Output channels	4
Resolution	16-bit
Conversion time	60 us/ channel
Output voltage range	±10 V, 0 to 10 V, ±5 V, 0 to 5 V, 1 to 5V
Voltage output load	1kΩ
Voltage output accuracy (25°C)	\pm 0.1% (full range)
Voltage output accuracy (full temperature range)	\pm 0.5% (full range)
Voltage output diagnosis	Supports short circuit detection, overtemperature protection
Output current range	0 to 20 mA, 4 to 20 mA
Current output load	0-600Ω
Current output accuracy (25°C)	±0.1% (full range)

Item	Specification
Current output accuracy (full temperature range)	\pm 0.5% (full range)
Current output diagnosis	Supports open circuit detection, overtemperature protection
Isolation	No isolation between the channels; Isolation between the channels and the power supply; Isolation between the channels and the bus
Output action display	N/A
Output derating	N/A

Software specifications

Item	Specification
Independent channel enable configuration	Supported
Diagnostic report configuration	Supported
Diagnostic detection configuration	Short circuit detection and wire break detection, not supported by output range containing 0
Conversion mode configuration	± 10 V, 0 to 10 V, ± 5 V, 0 to 5 V, 1 to 5 V, 0 to 20 mA, 4 to 20 mA
Output after stop configuration	Output zero, output last value, output preset value
Preset value configuration	Supported
Digital output range configuration	The default is consistent with that of GL10 (–20000 to 20000) and supports ± 32000
Sampling time	250 us for four channels
Sampling refresh	Refresh asynchronously according to the sampling time, not required to refresh synchronously according to the bus cycle
When in stop mode	Output according to output mode upon stop and present value, no refresh

2 Mechanical Installation

2.1 Mounting Dimensions

Module

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



Cable Connection



2.2 Installation Method

Installing Modules Side-by-Side

You can install multiple modules side by side with the help of top and bottom guides on the modules, as shown below.



Installing Module onto DIN Rail

You can install the module onto a DIN rail. Align the module with the DIN rail and push the module in the direction indicated by the arrow until you hear a click, as shown below.

Note: After the module is installed, the DIN rail mounting hook will automatically move downward to lock the module to the rail. If the hook does not move downward, press down the top of the hook to ensure that the module is installed in place.

Mount an end plate on either side of the module assembly. To mount the end plate, hook the bottom of it to the bottom of the DIN rail, rotate the end plate to hook the top of it to the top of the DIN rail, and then tighten the screw to lock the end plate in place, as shown below.



Removing Module

Pry the DIN rail mounting hook upwards with a tool such as slotted screwdriver, hold the protrusions and pull the module out straight forward, and then press down the top of the DIN rail mounting hook.



3 Electrical Installation

3.1 Cable Selection

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

Material	Applicable Cable Diameter		٢	(ST	Suzhou Yuanli		
Name	mm ²	AWG	Model	Crimping	Model	Crimping	
				Tool		Tool	
Tubular	0.3	22	E0308	KST2000L	0308	YAC-5	
lug	0.5	20	E0508		0508		
	0.75	18	E7508		7508		
	1.0	18	E1008		1008		
	1.5	16	E1508		1508		

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



Signal	Left Terminal	Right Terminal	Signal
V0+	A1	B1	V1+
10+	A2	B2	11+
VI0-	A3	B3	VI1-
V2+	A4	B4	V3+
12+	A5	B5	13+
VI2-	A6	B6	VI3-
-	A7	В7	-
PE	A8	B8	PE
24 V	A9	В9	СОМ

3.3 Terminal Wiring

Wiring Precautions

- Do not bundle the extension cable together with power cables (high voltage, large current) which produce strong interference signals; otherwise, it may be influenced by noise, surge and induction. 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.
- Apply single-point grounding for the shielding of shielded cable and solder sealed cable.

External Wiring

Connection for voltage-controlled signal

(a) Voltage output



- *1 Use 2-core shielded twisted pair cable as power cable.
- *2 If noises or ripples are generated in external wiring, connect a capacitor of 0.1 to 0.47mF25V between terminals V+/I+ and VI-.

Connection for current-controlled signal



- *1 Use 2-core shielded twisted pair cable as power cable.
- *2 If noises or ripples are generated in external wiring, connect a capacitor of 0.1 to 0.47mF25V between terminals V+/I+ and VI-.

4 Programming Examples

The following is an example where the input voltage of channel 0 of the GL20-4DA module is assigned to the corresponding variable, and AC802 is used as the master control module.

1. Add GL20-4DA module.

) 🖸 🖹 📽 📓 🚳 🗠 🗠 👗 🐚 🗠 🗙 I	🗛 석티읍티일 - 이티프 &티역		fulltext search		<all th="" vend<=""><th></th><th></th><th></th></all>			
		Name				Vendor	Version	Description
vices 🗸 🗘 🛪	Device x 1 PLC_PRG		AM600 DO 16 module			Inovance	0	EtherCAT Mod
AC700		-	AM600 DO32 Module			Inovance	0	EtherCAT Mod
B - M Device (AC802-0222-U0R0)	Communication Settings		- 📆 AM600-0016ETN(ETP/ER)(16 d	hannels DO	module)	Inovance	0	EtherCAT Mod
Oevice Diagnose	Applications		- 🗊 AM600-0016XXX(16 channels D	O module)		Inovance	0	EtherCAT Mod
Network Configuration			- 🗊 AM600-0032ETN(32 channels [O Module)		Inovance	0	EtherCAT Mod
EtherCAT Config	Backup and Restore		- 🗊 AM600-4AD(4 channels AD Mo	dule)		Inovance	0	EtherCAT Mod
= 31 PLC Logic	Files		- 🛗 AM600-4DA(4 channels DA Mo	dule)		Inovance	0	EtherCAT Mod
Application Minute Strength Strengt Strength Strengt Strength Strength Strength Strength Strength Stre			- 🗐 AM600-4PT(4 channels PT Mod	ule)		Inovance	0	EtherCAT Mod
PLC.PRG (PRG)	PLC settings		- 🗊 AM600-4TC(4 channels Thermo	couple Mod	lule)	Inovance	0	EtherCAT Mod
Task Configuration	PLC shell		- 🗐 AM600-8TC(8 channels Thermo	couple Mod	iule)	Inovance	0	EtherCAT Mod
H S ETHERCAT_C			- 🗊 GL20-00 16ETN(16 channels DC	module)		Inovance	0	EtherCAT Mod
ETHERCAT_C.EtherCAT_Task	Users and Groups		GL20-0016ETP(16 channels DC	module)		Inovance	0	EtherCAT Mod
🖹 🥩 MainTask	Log		GL20-1600END(16 channels DI	module)		Inovance	0	EtherCAT Mod
-@] PLC_PRG			GL20-4AD(4 channels AD Modu	ie)		Inovance	0	EtherCAT Mod
Resources List	System Setting		GL20-4DA(4 channels DA Modu	ie)		Inovance	0	EtherCAT Mod
MODBUS_TCP (ModbusTCP Device) ETHERCAT_C (EtherCAT Master SoftMotion)	Upgrade							
GL20_RTU_ECT (GL20.4TLLECT 1.2.6.0)		<						>
SoftMotion General # Copy	ployment							
R Paste								
👗 Cut								
× Delete	tion							
Refactoring	•							
Properties								
Add Object								
Add Folder								
Add Device								

2. In the Channels Config interface, check Enable access for Access-0, and set the

parameters as per needs.

Startup parameters(SD0 Setting) A Access - 0	Device PLC_PRG	🧱 Task Configuration 🛛 👔 ETHERCAT_C 👌 💥 Network Configuration 🏻 🚺 Hardware Configuration
channels Config Conversion Mode: -10/v~10/(-20000-20000) V Device Diagnosis Digital/utput • -20000-20000 V Status Output After Stop/Offne • -0utput tare • Output tare • Output tare	Startup parameters(SD0 Setting)	
Status Output After Stop/Offline Information Output last value	Channels Config	
Status Output After Stop/Offlne Information Output areo Output last value	Device Diagnosis	
Information Output last value	Status	
O Output last value	Information	 Output zero
O Utput preset value		O Output last value
		O Output preset value

3. Define variables DA_CH0, DA_CH1, DA_CH2 and DA_CH3 with the ST programming language as shown in the figure below.



4. Map the defined variable DA_CH0 to channel 0 of the configured GL20-4DA module.

General	Find	how all			 Add F 	FB for IO Channel		e		
Process Data(PD0 Setting)	Variable	Mapping	Channel	Address	Туре	Unit	Description			
Process Data(PD0 Setting)	· · · · •		Device control	%QW0	UINT		Device control			
Rartup parameters(SD0 Setting)	÷.**		GL20_4DA DA CH0	%QW1	INT		GL20_4DA DA CH0			
	** slication.PLC_PRG.DA_CH0		Bit0	96082-0	BOOL					
Inline	-14		Bit1	%QX2.1	BOOL			1		
oE Online	- 14		Bit2	%QX2.2	BOOL					
or online	-**		Bit3	%QX2.3	BOOL					
evice Diagnosis	- 54		Bit4	%QX2.4	BOOL					
	- 14		BitS	%QX2.5	BOOL					
EtherCAT JEC Objects Status	Input Assistant Text Search Categories Variables			Туре		Addre	ess O	rigin		
EtherCAT IEC Objects	Text Search Categories			_						
therCAT IEC Objects	Text Search Categories	Name	6on	Type		Addro	ess O	rigin		
EtherCAT IEC Objects	Text Search Categories					Addro	ess O	rigin		
EtherCAT IEC Objects	Text Search Categories	O Applica		Application		Addr	ess O	rigin		
EtherCAT IEC Objects	Text Search Categories	Applica	_PRG	Application PROGRAM		Addr	ess O	rigin		
EtherCAT JEC Objects Status	Text Search Categories	Applica B PLC	_PRG DA_CH0	Application PROGRAM INT		Addr	ess O	rigin		
EtherCAT JEC Objects Status	Text Search Categories	Applica B- PLC - 9	_PRG DA_CH0 DA_CH1	Application PROGRAM INT INT		Addr	ess O	rigin		
EtherCAT JEC Objects Status	Text Search Categories	Applica B- PLC - 9	_PRG DA_CH0 DA_CH1 DA_CH2 DA_CH2 DA_CH3	Application PROGRAM INT INT INT		Addr	ess O	rigin		
EtherCAT IVO Napping EtherCAT IBC Objects Skifes Information	Text Search, Categories	Applica B- PLC - 9 - 9	_PRG DA_CH0 DA_CH1 DA_CH2 DA_CH2 DA_CH3 g_Globals	Application PROGRAM INT INT INT INT INT		Addr		rigin rCAT, 3.5		
EtherCAT IEC Objects Status	Text Search Categories	Applica Applica PLC PLC PLC PLC PLC PLC PLC PLC		Application PROGRAM INT INT INT INT VAR_GLOBAL		Addr	100rrÆthe SM3_Basic	rCAT, 3.5 , 4.10.1.0		
EtherCAT JEC Objects Status	Text Search Coloportes	Applica PLC PLC PLC PLC PLC PLC PLC PLC	PRG DA_CH0 DA_CH1 DA_CH2 DA_CH3 Ig_Globals thereatLib ssic NC	Application PROGRAM INT INT INT INT VAR_GLOBAL Library		Addr	100rrÆthe SM3_Basic	rCAT, 3.5		

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