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PS00016654A01

# GL20-8DAI/8DAV Analog Output Module

## User Guide

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# Preface

## ■ Introduction

GL20-8DAI is a 8-channel analog current output module and GL20-8DAV is a 8-channel analog voltage output module. The resolution of GL20-8DAI and GL20-8DAV is 16-bit. GL20-8DAI and GL20-8DAV can be used together with AM300 and AM500 series products through GL20-RTU-ECT communication interface module.

This guide describes the product information, mechanical installation, and electrical installation.

## ■ 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 models**<br>EN 61131-2<br>**220 VAC models**<br>EN 61131-2<br>EN 61000-3-2<br>EN 61000-3-3 |
| | LVD | 2014/35/EU | EN 61010-1<br>EN 61010-2-201 |
| | RoHS directive | 2011/65/EU amended by (EU) 2015/863 | EN IEC 63000 |
| UL/cUL | - | | UL 61010-1<br>UL 61010-2-201<br>CAN/CSA-C22.2 No. 61010-1<br>CSA C22.2 NO. 61010-2-201 |
| KCC | - | | - |
| EAC certification | - | | - |

| Certification | Directive | | Standard |
|---|---|---|---|
| UKCA | Safety Regulations | Electrical Equipment (Safety) Regulations 2016 | EN 61010-1<br>EN 61010-2-201 |
| | EMC | Electromagnetic Compatibility Regulations 2016 | **24 VDC models**<br>EN 61131-2<br>**220 VAC models**<br>EN 61131-2<br>EN 61000-3-2<br>EN 61000-3-3 |
| | RoHS | Directive (RoHS) Regulations 2012 | EN IEC 63000 |

## ■ More Data

| Data name | Code | Description |
|---|---|---|
| GL20-RTU-ECT Communication Interface Module User Guide | PS00004985 | Presents product information, mechanical installation, and electrical installation of the product. |
| GL20-RTU-ECT32 Communication Interface Module User Guide | PS00013434 | |
| GL20-8DAI/8DAV Analog Output Module User Guide | PS00016654 | |

## ■ Revision history

| Date | Version | Revision |
|---|---|---|
| March 2025 | A01 | • Modified *"1.3 Technical Data" on page 11*.<br>• Modified *"1.4 Environmental Specifications" on page 13*.<br>• Modified *"3.3 Wiring of Terminals" on page 25*. |
| July, 2024 | A00 | Initial release |

## ■ Access to the Guide

This guide is not delivered with the product. You can obtain the PDF version in the following ways

- 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 Product Warranty Card.

# Fundamental Safety Instructions

## ■ Safety Precautions

1. Read and follow the safety instructions when installing, operating, and maintaining the equipment.
2. To ensure your safety and prevent damage to the equipment, follow the marks on the equipment and all the safety instructions in this guide.
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 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 injury or property damage caused by improper use.

## ■ Safety Levels and Definitions


"DANGER" indicates that failure to comply with the notice can result in severe personal injury or even death.


"WARNING" indicates that failure to comply with the notice may result in severe personal injury or even death.


"CAUTION" indicates that failure to comply with the notice may result in minor or moderate personal injury or equipment damage. Keep this guide properly for future use and deliver it to the end user.

**Control System Design**


- 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 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 equipment.
- To ensure safe operation, for the output signals that may cause critical accidents, use external protection circuit and safety mechanism.
- Once the CPU of the PLC detects an exception 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 cannot be applied to the PLC's power supply input terminals, signal input terminals and output terminals, preventing damage to the equipment.

## Installation

WARNING

- Installation 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 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 (IP rating of the control cabinet enclosure > IP20). Only qualified professionals 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.

**During wiring**


- 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.
- 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.


- To avoid electric shock, cut off the power supply before connecting the product to the power supply.
- The input power of the product must meet the specifications listed in this guide. If the power input does not meet the specifications, the equipment may be damaged. Thus, check regularly that the DC power provided by the switching-mode power supply unit is stable.

**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. 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**

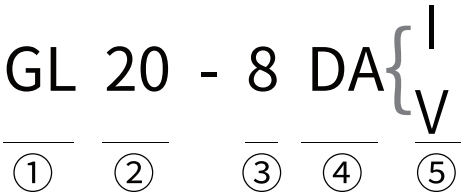
- In the position where the operator directly touches the machinery part, for example, where a machinery tool is loaded/unloaded, or where a machine runs automatically, the on-site manual operating devices and any other alternative means must be carefully arranged and designed so that they are independent of the programmable controller and can start or terminate the automatic running of the system.
- If 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 equipment as industrial waste. Dispose of the battery according to local laws and regulations.
- Recycle retired equipment in accordance with industry waste disposal standards to avoid environmental pollution.

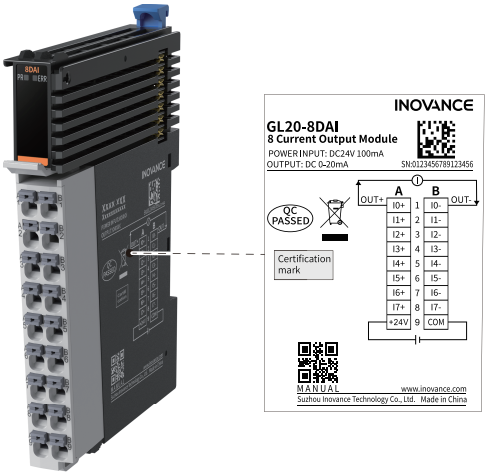
# 1 Product Information

## 1.1 Naming Rules and Nameplate

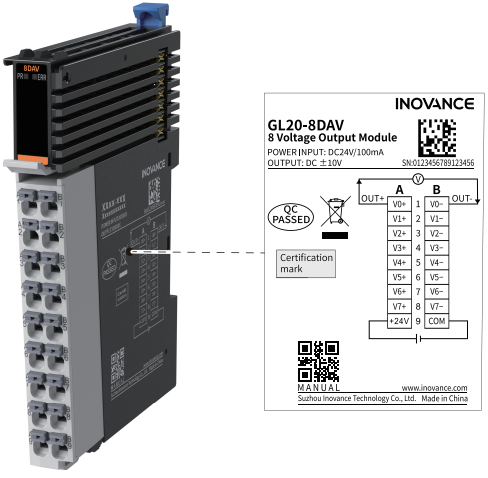



| | |
|---|---|
| ① **Product information**<br>GL: Inovance general local module | ④ **Module type**<br>DA: Analog output |
| ② **Series number**<br>20: 20 series module | ⑤ **Output type**<br>• I: Current<br>• V: Voltage |
| ③ **Number of I/Os**<br>8: 8 channels | |

- GL20-8DAI nameplate information:



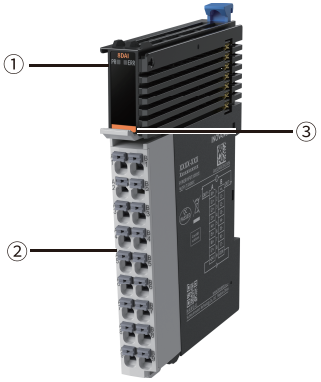

- GL20-8DAV nameplate information:




The data for ordering the product is shown in the following table.

| Model | Description | Material code | Applicable model |
|---|---|---|---|
| GL20-8DAI | GL20 series 8-channel analog output module - current type | 01440622 | It can be used together with AM300 and AM500 series products through GL20-RTU-ECT communication interface module. |
| GL20-8DAV | GL20 series 8-channel analog output module - voltage type | 01440623 | |

## 1.2 Components




| No. | Interface | Function | | | |
|---|---|---|---|---|---|
| ① | Signal indicator | PR (POWER +RUN) | Power/Operation 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 | User terminals | For details, see *"3.2 Terminal Assignment" on page 24* . | | | |

| No. | Interface | Function | |
|---|---|---|---|
| ③ | Color identification | Red: Digital output | Orange: Analog output |
| | | Gray: Digital input | Green: Analog input |
| | | White: Communication | Blue: Other module |

## 1.3 Technical Data

### ■ Basic

| Item | Specification |
|---|---|
| IP rating | IP20 |
| Dimensions (W x H x D) | 12 mm x 100 mm x 75 mm |
| Weight | About 60 g |

### ■ Power supply

| Item | Specification |
|---|---|
| Rated voltage of bus output power supply | 5 VDC (4.75 VDC to 5.25 VDC) |
| Rated bus output current | 100 mA (typical@5 VDC) |
| Rated voltage of terminal output power supply | 24 V (20.4 VDC to 28.8 VDC) |
| Rated current of terminal output power supply | 100 mA (typical@24 V) |
| Rated voltage of terminal output power supply | None |
| Rated current of terminal output power supply | None |

## ■ Output

| Item | | Specification |
|---|---|---|
| Output type | | Analog output |
| Output mode | | • 8DAI (current output)<br>• 8DAV (voltage output) |
| Number of output channels | | 8 |
| Resolution | | 16 bits |
| Conversion time | | 60 μs/channel |
| 8DAI | Current output range | 0 mA to 20 mA, 4 mA to 20 mA |
| | Current output load | 0 Ω to 200 Ω |
| | Current output accuracy (25°C) | ±0.1% (full range) |
| | Current output accuracy (full temperature range) | ±0.5% (full range) |
| | Current output diagnosis | - |
| 8DAV | Voltage output range | ±10 V, 0 V to 10 V, ±5 V, 0 V to 5 V, 1 V to 5 V |
| | Voltage output load | > 1 kΩ |
| | Voltage output accuracy (25°C) | ±0.1% (full range) |
| | Voltage output accuracy (full temperature range) | ±0.5% (full range) |
| | Voltage output diagnosis | - |
| Isolation | | No isolation among interface channels, isolation applied between the power supply and interface, also between the interface and the bus |
| Output indicator | | - |
| Output derating | | - |

## ■ Software

| Item | Specification |
| --- | --- |
| Independent channel enable configuration | Supported |
| Conversion mode configuration | • 8DAI: 0 mA to 20 mA, 4 mA to 20 mA, 0 mA to 20 mA by default<br>• 8DAV: ±10 V, 0 V to 10 V, ±5 V, 0 V to 5 V, 1 V to 5 V, ±10 V by default |
| Output status after stop | Output zero, output last value, output preset value |
| Output present value | Supported |
| Digital output range configuration | • 8DAI: 0 to 20000, 0 to 32000, 0 to 27648<br>• 8DAV: ±20000, ±32000, ±27648 |
| Diagnosis report | Supports 24 V power supply detection and configuration data error detection. |

# 1.4 Environmental Specifications

| Item | Specification |
| --- | --- |
| Installation/ application environment | Free from conductive dust, conductive fibers, explosive dust, flammable gases, water mist/greasy dirt, corrosive dusts/gases, strong vibration, and repetitive shock |
| Altitude | ⩽ 2,000 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 from 5 Hz to 8.4 Hz; 1 g acceleration from 8.4 Hz to 200 Hz; 10 cycles per axial direction<br>• Transportation scenario: Tested according to IEC60068-2-64, 0.01 $g^2$/Hz power spectral density from 5 Hz to 100 Hz; 0.001 $g^2$/Hz power spectral density at 200 Hz; 1.14 g Grms |

| Item | Specification |
| --- | --- |
| Shock resistance | Application/Transportation scenario: Tested according to IEC60068-2-27; 15 g peak acceleration, 11 ms pulse width, 18 cycles in total in X, Y and Z axial directions |
| Operating temperature/humidity | • Temperature: -20°C to +55°C<br>• Humidity: < 95% RH (30°C), without condensation |
| Storage temperature/ humidity | • Temperature: -20°C to +60°C<br>• Humidity: < 95% RH (30°C), without condensation |
| Transportation temperature/humidity | • Temperature: -40°C to +70°C<br>• Humidity: < 95% RH (40°C), without condensation |

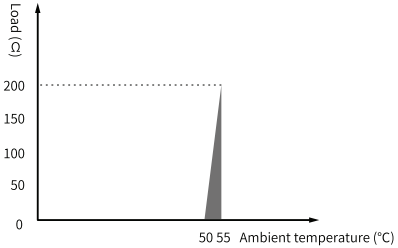
# 2 Mechanical Installation

## 2.1 Requirements of Installation Position

The product can be installed horizontally (recommended), vertically, on top or at the bottom of the electric cabinet. Different installation positions require different operating temperatures, as shown below.

**Installation position and limit of GL20-8DAI**

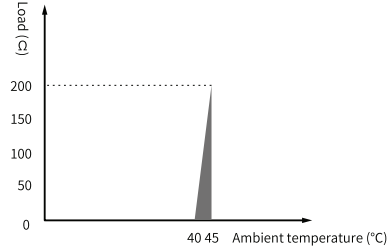
- When installed horizontally:




Caution

When all the eight channels output 20 mA and the load impedance is lower than 50 Ω, it is recommended that the operating temperature be kept to 50°C or below. Otherwise, module overtemperature may occur.

- When installed non-horizontally:



**Caution**

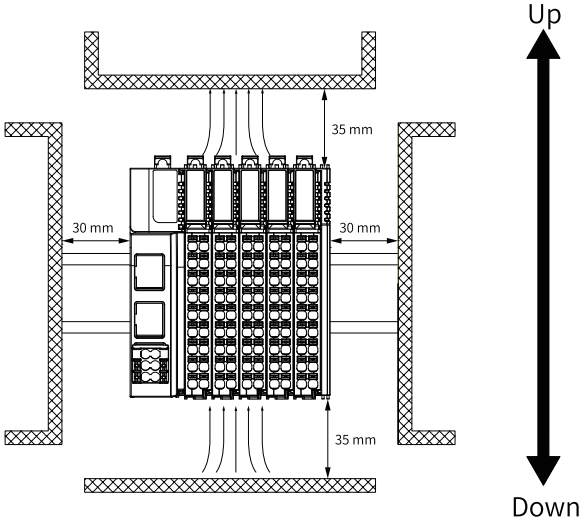
When all the eight channels output 20 mA and the load impedance is lower than 50 Ω, it is recommended that the operating temperature be kept to 40°C or below. Otherwise, module overtemperature may occur.

**Installation position and limit of GL20-8DAV**

When GL20-8DAV module operates at the maximum operating temperature, the load impedance can be 1.5 kΩ to 1 MΩ.

## ■ Optimal installation position

It is recommended to install the product horizontally. To ensure normal ventilation and heat dissipation and allow sufficient wiring space, reserve enough clearance around the product, as shown in the following figure.

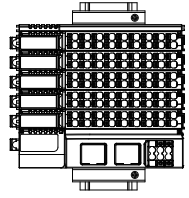


## *Note*

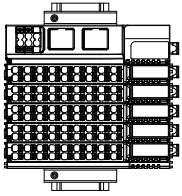
If there is a high-temperature heating source (heater, transformer, large resistor and so on) around the product, keep the product away from the heating source by at least 100 mm.

### ■ Other installation positions

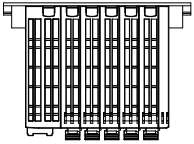
Other installation positions are shown below. The same clearance as the optimal installation position is also required.



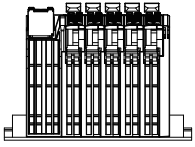
Vertical mounting 1



Vertical mounting 2



Cabinet top mounting



Cabinet bottom mounting

**Caution**

In case of vertical installation:

- If the module is mounted to the PLC, make sure the PLC is arranged below all I/O modules (see vertical mounting 1). The number of modules cannot exceed 6, and the type of modules is not limited.
- Hold the cables with a cable duct to prevent the weight of cables being applied to the lower end plate, which may result in disconnection of the product from the DIN rail.

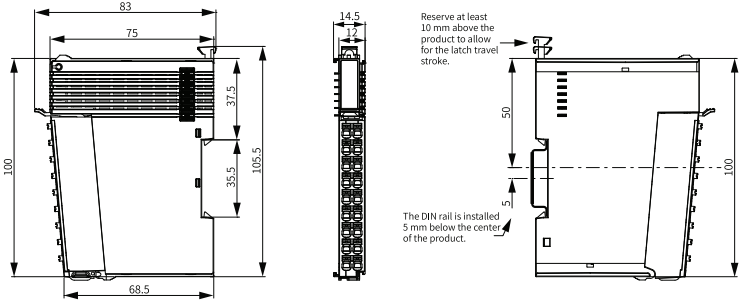
## 2.2 Installation Precautions

- Before installing or removing the module, ensure that the module is powered off.
- Do not hot swap the modules. Otherwise, the modules may be damaged by overcurrent or overvoltage, and the communication interface module or PLC may be subject to restart, user data loss or corruption.
- Prevent the enclosure or terminals of the module from dropping or suffering from impact or shock.

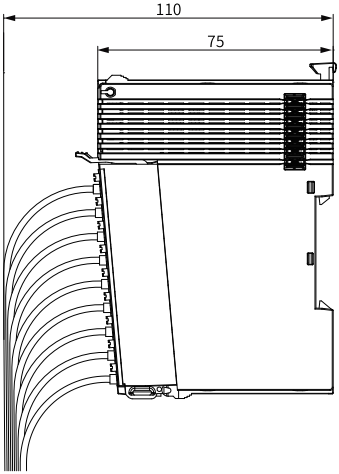
## 2.3 Installation Dimensions

### ■ Module

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

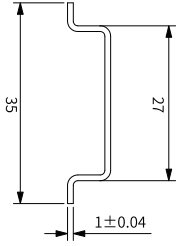


■ **Cable connection**




## 2.4 Installation Method

The module is mounted onto a DIN rail according to IEC 60715 (width: 35 mm, thickness: 1 mm). The dimensions (in mm) are shown below.

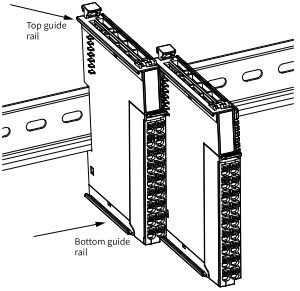


**Caution**

If the thickness of the DIN rail is not as required, the product cannot fit in or function properly as the DIN rail mounting hook does not work.

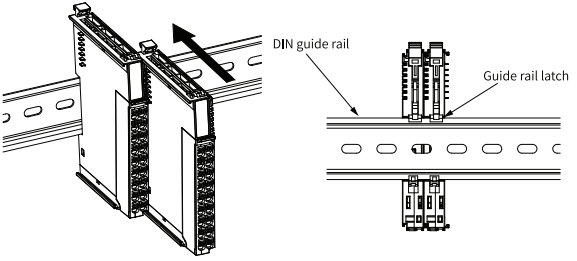
## ■ Side-by-side installation of modules

You can install multiple I/O modules with the help of top and bottom guide rails on the modules, as shown below.

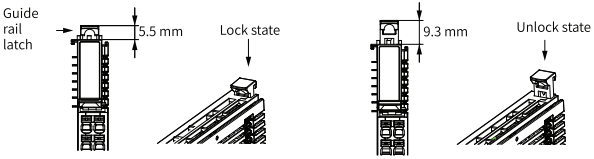



## ■ Installing the module onto DIN rail

1. Align the module with the DIN rail and push the module in the direction indicated by the arrow until you hear a clicking sound, as shown below.



2. Make sure the DIN rail mounting hook of the module is locked. The locked and unlocked states of the mounting hook are shown below.




- If the mounting hook is pressed down, it is locked.
- If the mounting hook is lifted up, it is unlocked.

To lock the PLC to the DIN rail, press down the mounting hook.

---

**Caution**

When the module is not installed on the DIN rail, keep the rail hook in locked state. A hook that kept in unlocked state for a long period of time may fail to function properly.

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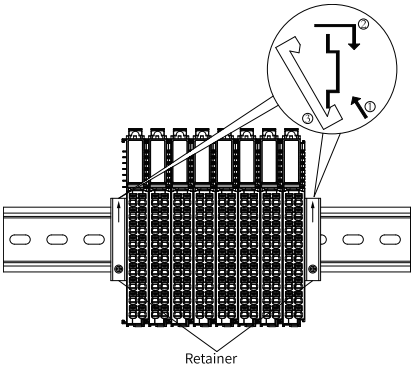
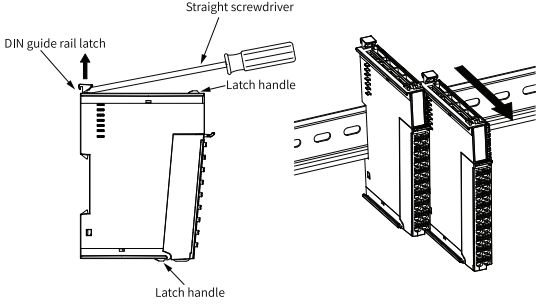
3. Mount a DIN rail end plate on both sides of the PLC or the module.

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.




## ■ Removing the module

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



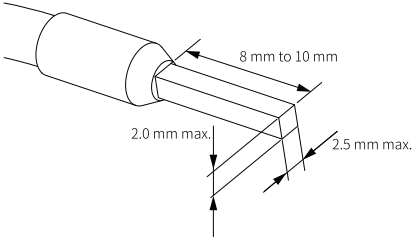
# 3 Electrical Installation

## 3.1 Cable Selection

The cable lug and cable cross sectional area included in the following table are only for reference.

| Material name | Applicable cross sectional area | | 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 | |
| | 1.5 | 16 | E1508 | | 1508 | |

To use other types of tubular lugs, crimp the lug to the cables according to the shape and dimension requirements shown below.



## 3.2 Terminal Assignment


- GL20-8DAI

| Signal on the left side | Terminal on the left side | Terminal on the right side | Signal on the right side |
|---|---|---|---|
| I0+ | A1 | B1 | I0- |
| I1+ | A2 | B2 | I1- |
| I2+ | A3 | B3 | I2- |
| I3+ | A4 | B4 | I3- |
| I4+ | A5 | B5 | I4- |
| I5+ | A6 | B6 | I5- |
| I6+ | A7 | B7 | I6- |
| I7+ | A8 | B8 | I7- |
| 24V | A9 | B9 | COM |

- GL20-8DAV

| Signal on the left side | Terminal on the left side | Terminal on the right side | Signal on the right side |
|---|---|---|---|
| V0+ | A1 | B1 | V0- |
| V1+ | A2 | B2 | V1- |
| V2+ | A3 | B3 | V2- |
| V3+ | A4 | B4 | V3- |
| V4+ | A5 | B5 | V4- |
| V5+ | A6 | B6 | V5- |
| V6+ | A7 | B7 | V6- |
| V7+ | A8 | B8 | V7- |
| 24V | A9 | B9 | COM |

## 3.3 Wiring of Terminals

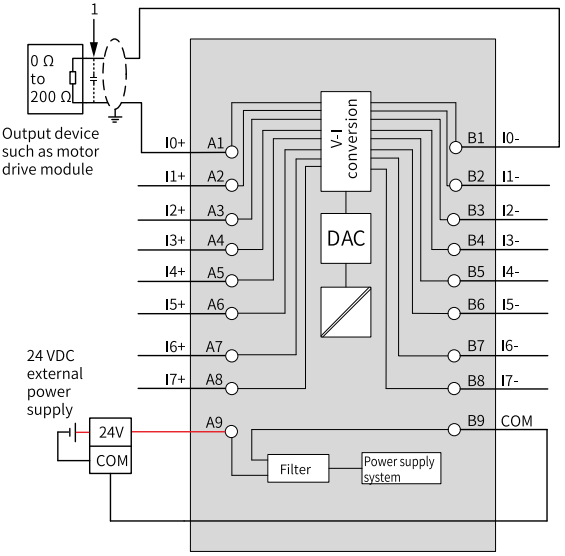
Wiring precautions for GL20-8DAI and GL20-8DAV modules are shown below. Different wiring methods can be used and combined for different channels.

### ■ Wiring precautions

- Do not bundle the expansion cable together with power cables (high voltage, large current) that produce strong interference signals; otherwise, it may be affected 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 interference resistance.
- Apply single-point grounding for the shield of shielded cable and welded and sealed cablecable.

### ■ Circuit block diagram and wiring diagram

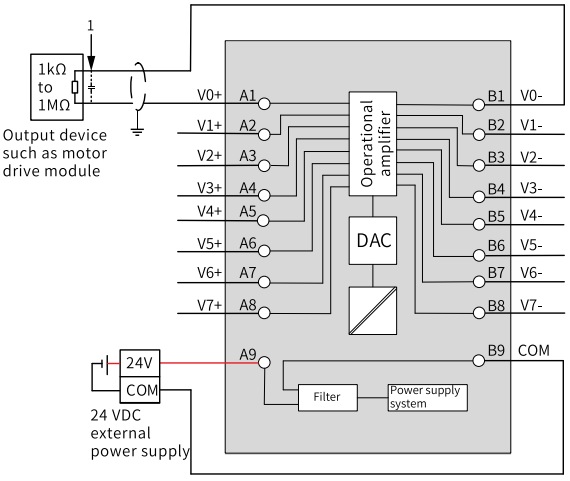
- Two-wire wiring mode of the 8DAI module




## *Note*

- 1: If noise or ripple is generated in external wiring, connect a 25 V capacitor of 0.1 μF to 0.47 μF between terminals I+ and I-.
- The power cable adopts two-conductor shielded twisted pair cable.
- A2-B2,..., and A8-B8 are wired in the same way as A1-B1.

- Two-wire wiring mode of the 8DAV module




## *Note*

- 1: If noise or ripple is generated in external wiring, connect a 25 V capacitor of 0.1 µF to 0.47 µF between terminals V+ and V-.
- A2-B2,..., and A8-B8 are wired in the same way as A1-B1.

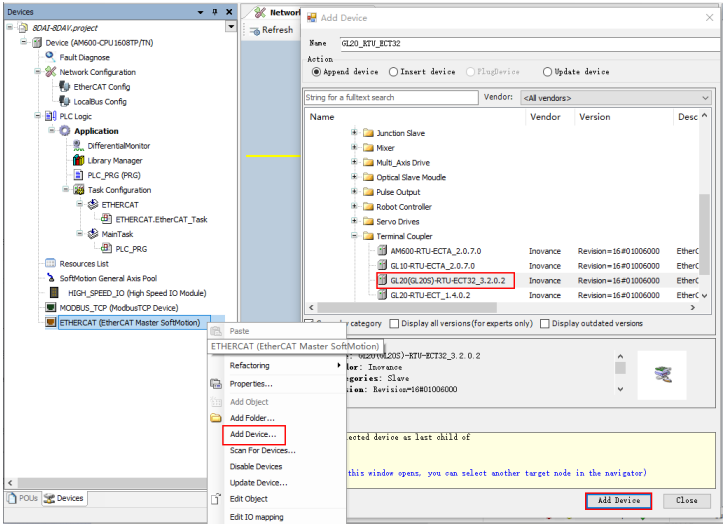
# 4 Program Commissioning

## 4.1 Commissioning Example of InoProShop

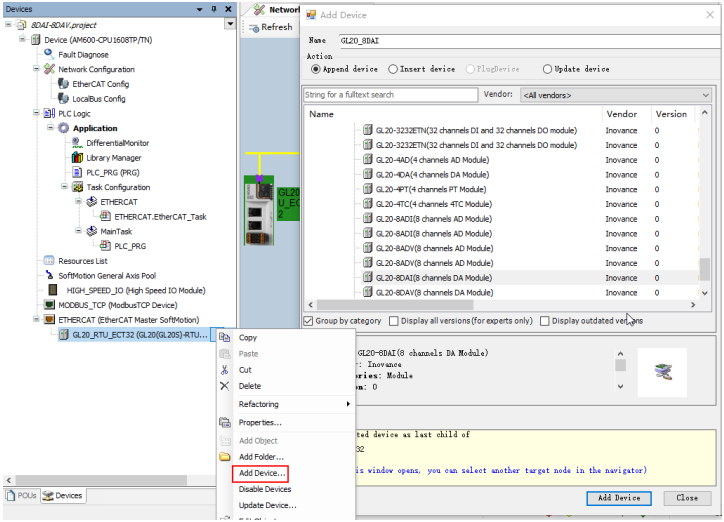
### 4.1.1 Programming the 8DAI Module

Take AM600+GL20 (GL20S)-RTU-ECT32+GL20 (GL20S)-8DAI configuration as an example here.

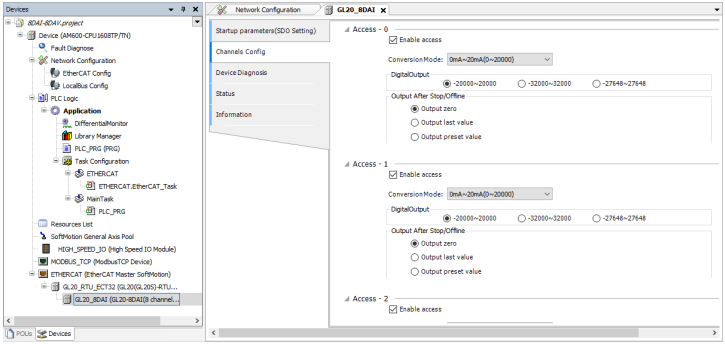
1. Double-click "Network Configuration" in the "Device" navigation tree on the left and select "EtherCAT master" under "EtherCAT" to enable the EtherCAT master.
2. Right-click "ETHERCAT", select "Add Device" in the pop-up menu, and select Fieldbus > EtherCAT > Slave > I/O coupler > GL20(GL20S)-RTU-ECT32_x.x.x.x in the "Add Device" dialog box. Click "Add Device" to add GL20 (GL20S)-RTU-ECT32, as shown in the following figure.



3. Right-click "GL20_RTU_ECT32" in the "Device" tree on the left, select "Add Device", and double-click "GL20 (GL20S)-8DAI" in the pop-up window to add the module, as shown in the following figure.




4. Double-click "GL20_8DAI" in the "Device" tree on the left, select "Enable access" in the "Channels Config" interface, select "DigitalOutput", and configure other parameters as needed, as shown in the following figure.

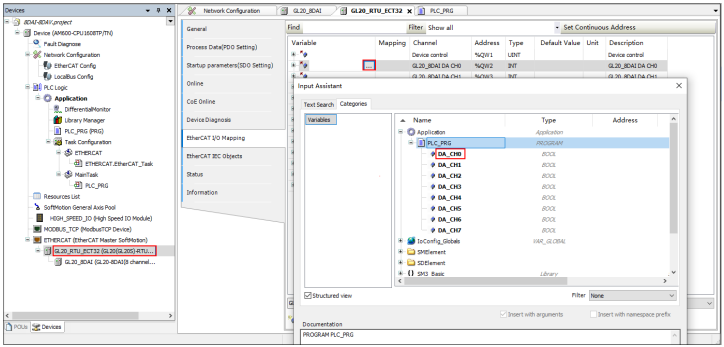


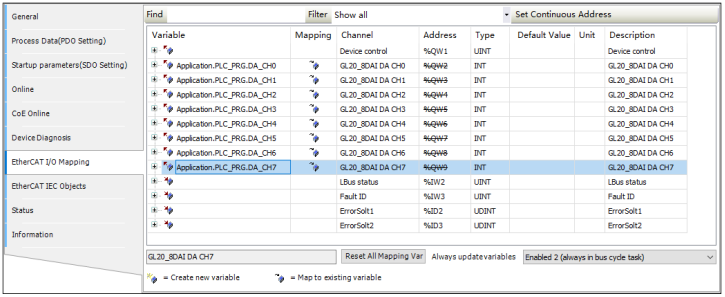

| Name | Description |
|---|---|
| Enable access | Check "Enable access" to activate this channel. |
| Conversion mode | Used to set the analog output conversion type.<br>Conversion mode: 0 mA to 20 mA (0 to 20000) and 4 mA to 20 mA (0 to 20000) |
| Digital output | Used to set the analog output range to determine the range of output conversion value of this channel.<br>Digital output range: -2000 to +20000, -32000 to +32000 and -27648 to +27648 |
| Output status after stop | • Output zero: After the module stops running, the output remains at 0.<br>• Output last value: After the module stops running, the output remains at the last output value.<br>• Output preset value: After the module stops running, the output remains at the preset value. The preset value can be set to an analog value or a digital value. The analog value corresponds to the digital value one by one. Modify one of them and the other also changes accordingly. The preset value range is related to the current conversion mode. |

5. Define variables "DA_CH0", "DA_CH1", "DA_CH2", "DA_CH3", "DA_CH4", "DA_CH5", "DA_CH6", and "DA_CH7" with the ST programming language, as shown below.

```
PROGRAM PLC_PRG
VAR
    DA_CH0:INT;
    DA_CH1:INT;
    DA_CH2:INT;
    DA_CH3:INT;
    DA_CH4:INT;
    DA_CH5:INT;
    DA_CH6:INT;
    DA_CH7:INT;
END_VAR
```

6. Double-click "GL20_RTU_ECT32" in the "Device" tree on the left. In the "EtherCAT I/O Mapping" screen, click ... on the right of the variable column. In the "Input Assistant" dialog box, select the variable "DA_CH0" and click "OK" to map the variable "DA_CH0" defined in the program to channel 0 of the configuration module. Similarly, the map variables "DA_CH1", "DA_CH2", "DA_CH3", "DA_CH4", "DA_CH5", "DA_CH6" and "DA_CH7" to the corresponding channels of the configuration module, as shown in the following figure.






7. Check, compile, log in, download, and run the program.

   a. Click on the toolbar at the top of the interface to check whether the program is correct.

   b. After the program check is correct, click on the toolbar at the top of the interface to compile all the code into PLC executable code.

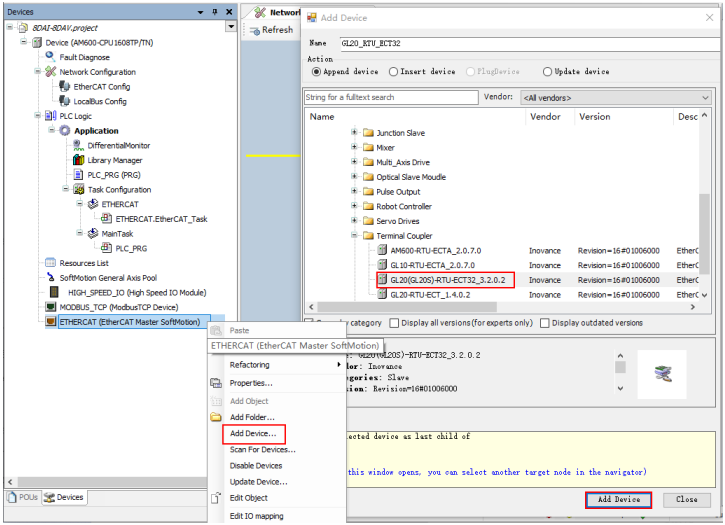
   c. After the compilation is correct, click on the toolbar at the top of the interface, and follow the interface prompts to log in to the PLC and download the program.

   d. After the program download is complete, click on the toolbar at the top of the interface to execute the program.

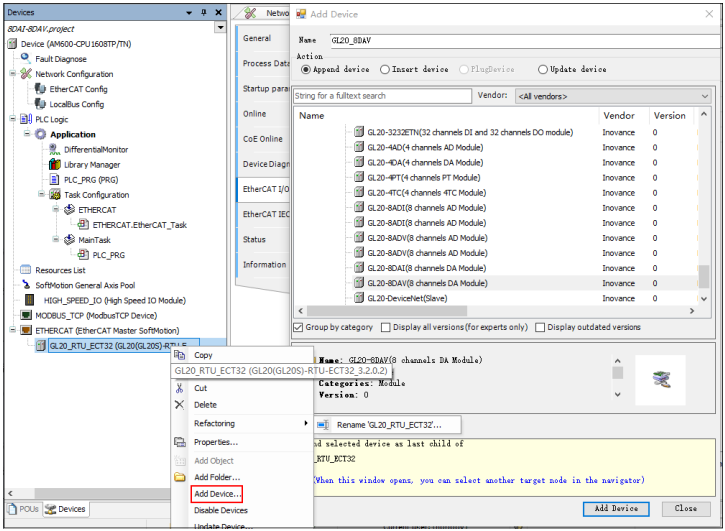
### 4.1.2 Programming the 8DAV Module

The AM600+GL20 (GL20S)-RTU-ECT32+GL20 (GL20S)-8DAV configuration is used as an example here.

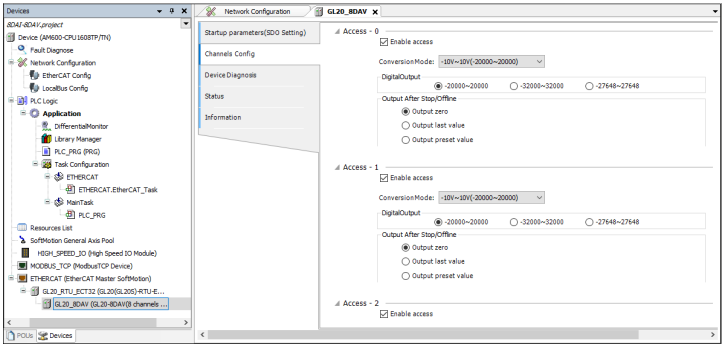
1. Double-click "Network Configuration" in the "Device" navigation tree on the left and select "EtherCAT master" under "EtherCAT" to enable the EtherCAT master.
2. Right-click "ETHERCAT" in the Device tree on the left and select "Add Device" in the pop-up menu. In the "Add Device" dialog box, select Fieldbus > EtherCAT > Slave > I/O coupler > GL20(GL20S)-RTU-ECT32_x.x.x.x and click "Add Device" to add GL20 (GL20S)-RTU-ECT32, as shown in the following figure.




3. In the "Device" tree on the left, right-click "GL20_RTU_ECT32", select "Add Device", and double-click "GL20 (GL20S)-8DAV" in the pop-up window to add the module, as shown in the following figure.




4. Double-click "GL20_8DAV" in the "Device" tree on the left, check "Enable access" in the "Channels Config" interface, select "DigitalOutput", and configure other parameters as needed, as shown in the following figure.



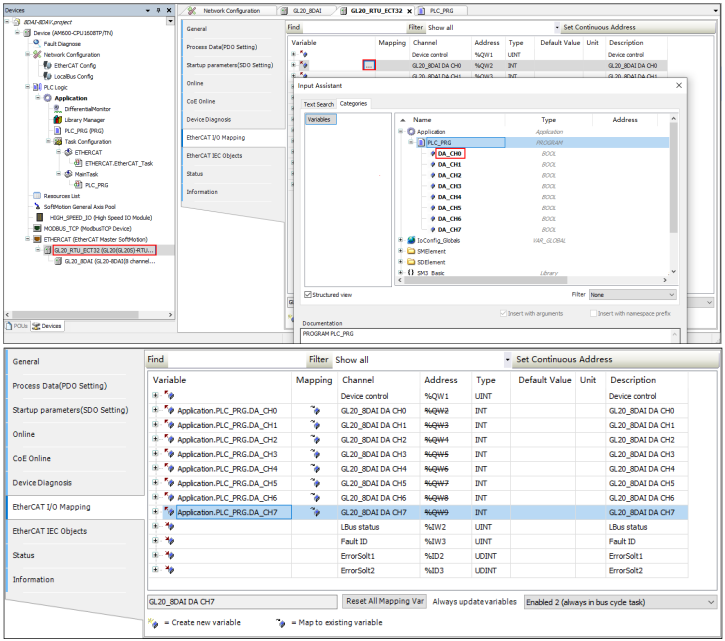
| Name | Description |
| --- | --- |
| Enable access | Check "Enable access" to activate this channel. |
| Conversion Mode | Used to set the analog output conversion type. This setting determines the output conversion type and conversion value range of this channel.<br>Conversion mode: -10 V to +10 V (-20000 to +20000), 0 V to 10 V (0 to 20000), -5 V to +5 V (-20000 to +20000), 0 V to 5 V (0 to 20000), and 1 V to 5 V (0 to 20000) |
| Digital output | Used to set the analog output range to determine the range of output conversion values of this channel.<br>Digital output range: -20000 to +20000, -32000 to +32000, and -27648 to +27648 |
| Output status after stop | • Output zero: After the module stops running, the output remains at 0.<br>• Output last value: After the module stops running, the output remains at the last output value.<br>• Output preset value: After the module stops running, the output is always set to a preset value. The preset value can be set to an analog value or a digital value. The analog value corresponds to the digital value one by one. Modify one of them and the other also changes accordingly. The preset value range is related to the current conversion mode. |

5. Define variables "DA_CH0", "DA_CH1", "DA_CH2", "DA_CH3", "DA_CH4", "DA_CH5", "DA_CH6", and "DA_CH7" with the ST programming language, as shown below.

```
1  PROGRAM PLC_PRG
2  VAR
3      DA_CH0:INT;
4      DA_CH1:INT;
5      DA_CH2:INT;
6      DA_CH3:INT;
7      DA_CH4:INT;
8      DA_CH5:INT;
9      DA_CH6:INT;
10     DA_CH7:INT;
11 END_VAR
```

6. Double-click "GL20_RTU_ECT32" in the "Device" tree on the left. In the "EtherCAT I/O Mapping" screen, click ... on the right of the variable column. In the "Input Assistant" dialog box, select the variable "DA_CH0" and click "OK" to map the variable "DA_CH0" defined in the program to channel 0 of the configuration

module. Similarly, the map variables "DA_CH1", "DA_CH2", "DA_CH3", "DA_CH4", "DA_CH5", "DA_CH6" and "DA_CH7" to the corresponding channels of the configuration module, as shown in the following figure.




7. Check, compile, log in, download, and run the program.

a. Click on the toolbar at the top of the interface to check whether the program is correct.

b. After the program check is correct, click on the toolbar at the top of the interface to compile all the code into PLC executable code.

c. After the compilation is correct, click on the toolbar at the top of the interface, and follow the interface prompts to log in to the PLC and download the program.

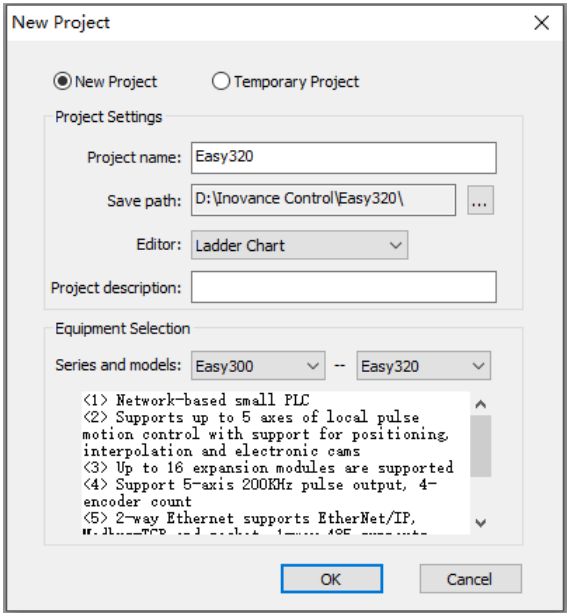
d. After the program download is complete, click on the toolbar at the top of the interface to execute the program.

## 4.2 Commissioning Example of AutoShop

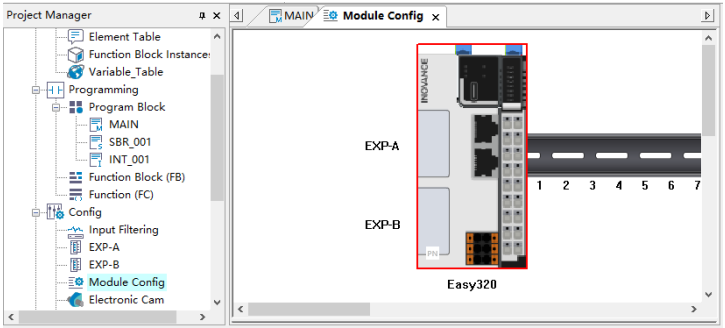
### 4.2.1 Programming the 8DAI Module

The Easy320+GL20 (GL20S)-8DAI configuration is used as an example here.

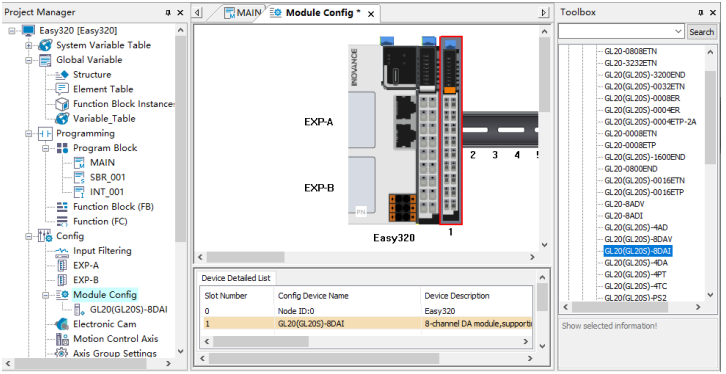
1. Create a project.
   a. Double-click the AutoShop shortcut icon on the PC desktop to open the AutoShop programming software.
   b. Select File > New Project in the menu bar to open the "New Project" dialog box.
   c. Set the project name, project path, programming language, project description, series, and model. Click "OK", as shown in the following figure.



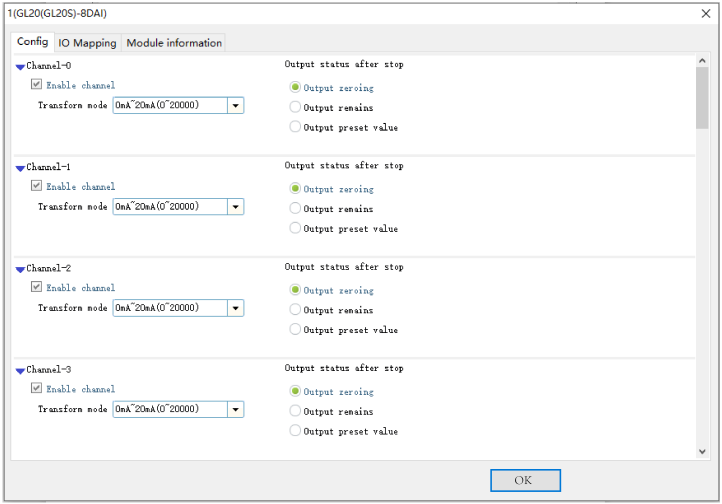

2. Right-click Config > Module Config in the "Project Manager" navigation tree to open the "Module Config" interface, as shown in the following figure.



3. Double-click Expansion Module > Local Module > GL20 (GL20S)-8DAI on the right of the "Toolbox" interface to add the GL20S-8DAI module, as shown in the following figure.




4. Double-click Config > Module Config > GL20 (GL20S)-8DAI in the "Project Manager" navigation tree, and select "Enable access" in the "Config" interface of "1(GL20 (GL20S)-8DAI)" interface. Select "Conversion mode" and "Output state after stop", as shown in the following figure.

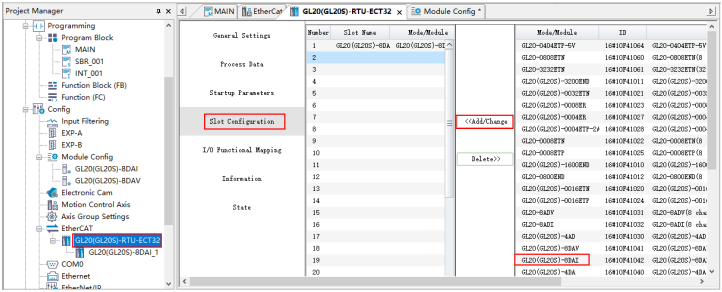



| Name | Description |
|---|---|
| Enable access | Check "Enable access" to activate this channel. |
| Conversion mode | Used to set the analog output conversion type. This setting determines the output conversion type and conversion value range of this channel.<br>Conversion mode: 0 mA to 20 mA (0 to 20000) and 4 mA to 20 mA (0 to 20000) |
| Output status after stop | • Output zero: After the module stops running, the output remains at 0.<br>• Output last value: After the module stops running, the output remains at the last output value.<br>• Output preset value: After the module stops running, the output is always set to a preset value. The preset value can be set to an analog value or a digital value. The analog value corresponds to the digital value one by one. Modify one of them and the other also changes accordingly. The preset value range is related to the current conversion mode. |

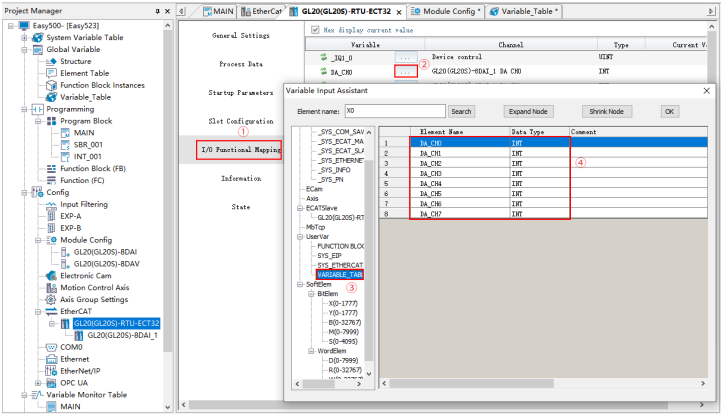
5. Select Global Variables > Variable Table_1 to define variables "DA_CH0", "DA_CH1", "DA_CH2", "DA_CH3", "DA_CH4", "DA_CH5", "DA_CH6", and "DA_CH7".

| NO. | Variable Name | Data Type | Initial Value | Power Down Hold | Network Public |
|---|---|---|---|---|---|
| 1 | DA_CH0 | INT | 0 | Non Retained | Private |
| 2 | DA_CH1 | INT | 0 | Non Retained | Private |
| 3 | DA_CH2 | INT | 0 | Non Retained | Private |
| 4 | DA_CH3 | INT | 0 | Non Retained | Private |
| 5 | DA_CH4 | BOOL | OFF | Non Retained | Private |
| 6 | DA_CH5 | BOOL | OFF | Non Retained | Private |
| 7 | DA_CH6 | BOOL | OFF | Non Retained | Private |
| 8 | DA_CH7 | BOOL | OFF | Non Retained | Private |

6. Double-click "GL20_RTU_ECT32" in the "Device" tree on the left. In the "Slot Configuration" interface, click "GL20(GL20S)-8DAI", and select "Add/Change", as shown below.




7. Click "I/O Functional Mapping", select interface ..., ②, select "Variable Table_1", and map variables “DA_CH0”, “DA_CH1”, “DA_CH2”, “DA_CH3”, “DA_CH4”, “DA_CH5”, “DA_CH6”, and “DA_CH7” ④ to the corresponding channels of the configuration module, as shown in the following figure.




8. Check, compile, log in, download, and run the program.

a. Click on the toolbar at the top of the interface to check whether the program is correct.

b. After the program check is correct, click on the toolbar at the top of the interface to compile all the code into PLC executable code.

c. After the compilation is correct, click on the toolbar at the top of the interface, and follow the interface prompts to log in to the PLC and download the program.

d. After the program download is complete, click on the toolbar at the top of the interface to execute the program.

### 4.2.2 Programming the 8DAV Module

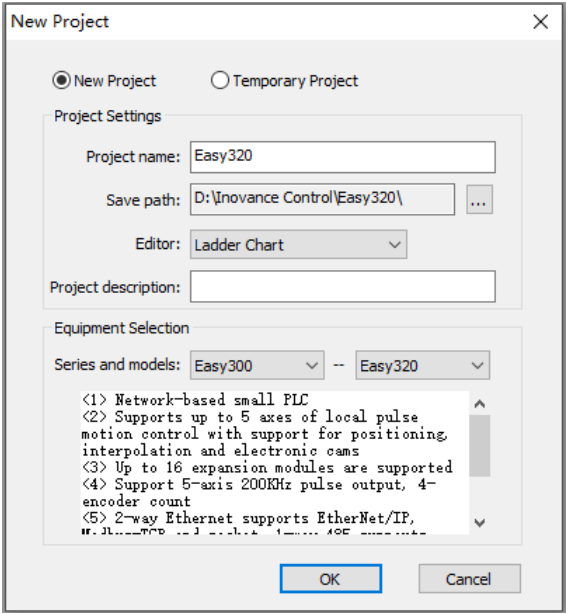
The configuration of Easy320 + GL20 (GL20S)-8DAV is used as an example here.

1. Create a project.

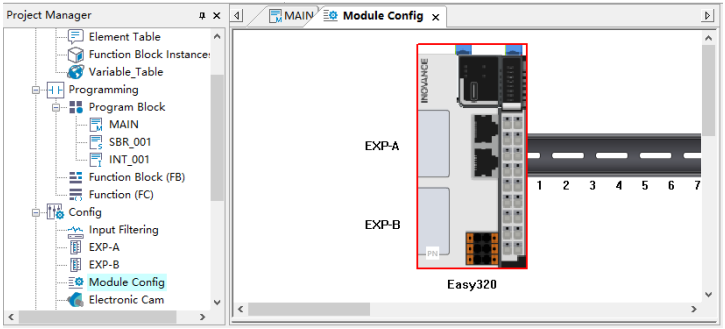
a. Double-click the AutoShop shortcut icon on the PC desktop to open the AutoShop programming software.

b. Select File > New Project in the menu bar to open the "New Project" dialog box.

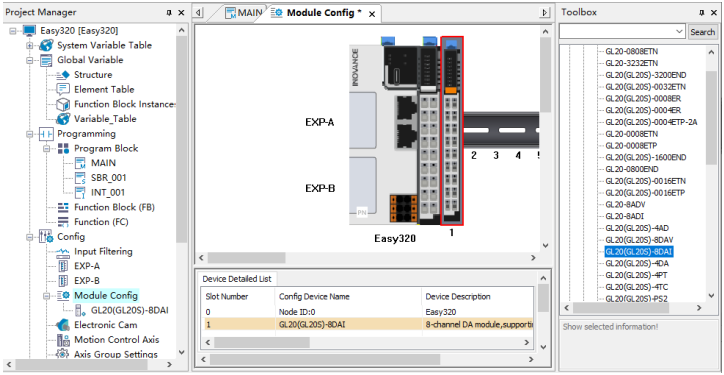
c. Set the project name, project path, programming language, project description, series, and model. Click "OK", as shown in the following figure.



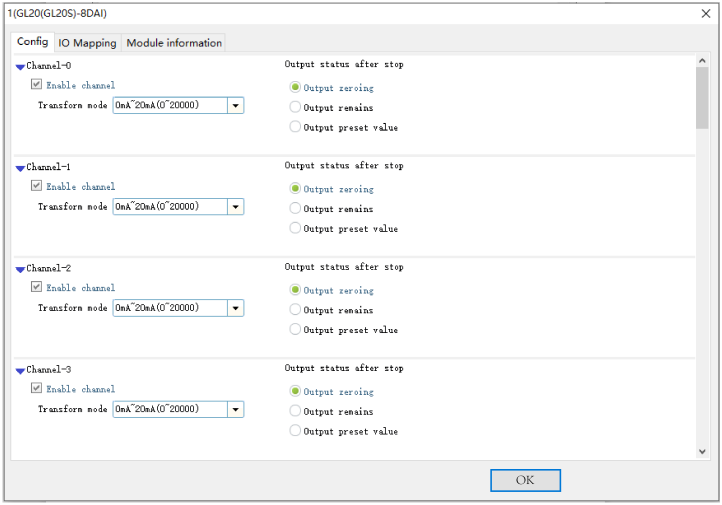

2. Right-click Config > Module Config in the "Project Manager" navigation tree to open the "Module Config" interface, as shown in the following figure.




3. Double-click Expansion Module > Local Module > GL20 (GL20S)-8DAV on the right-hand side of the "Toolbox" interface to add the GL20S-8DAV module.




4. Double-click Config > Module Config > GL20 (GL20S)-8DAV in the "Project Manager" navigation tree, and select "Enable access" in the "Config" interface of "2(GL20 (GL20S)-8DAV)" interface. Select "Conversion mode" and "Output status after stop".

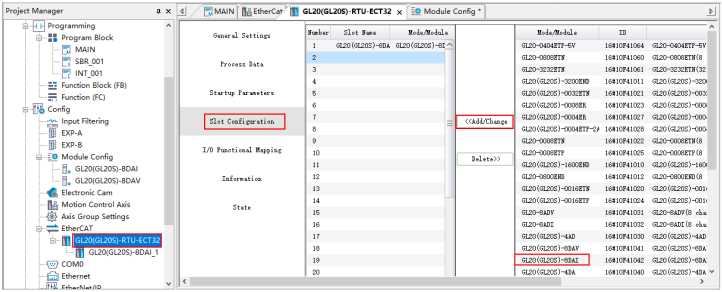



| Name | Description |
|---|---|
| Enable access | Check "Enable access" to activate this channel. |
| Conversion mode | Used to set the analog output conversion type. This setting determines the output conversion type and conversion value range of this channel.<br>Conversion mode: -10 V to +10 V (-20000 to +20000), 0 V to 10 V (0 to 20000), -5 V to +5 V (-20000 to +20000), 0 V to 5 V (0 to 20000), and 1 V to 5 V (0 to 20000) |
| Output status after stop | • Output zero: After the module stops running, the output remains at 0.<br>• Output last value: After the module stops running, the output remains at the last output value.<br>• Output preset value: After the module stops running, the output remains at the preset value. The preset value can be set to an analog value or a digital value. The analog value corresponds to the digital value one by one. Modify one of them and the other also changes accordingly. The preset value range is related to the current conversion mode. |

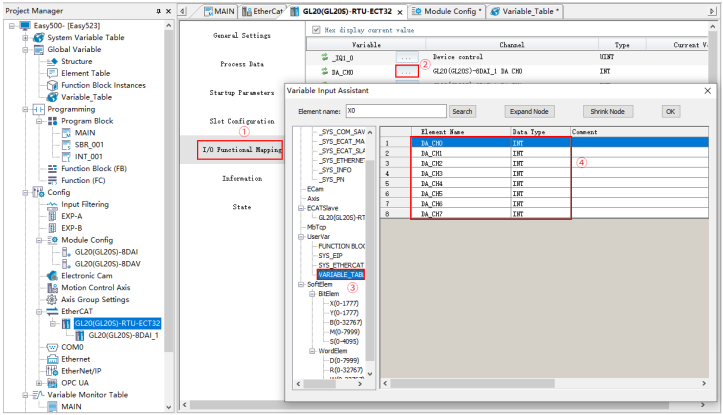
5. Select Global Variables > Variable Table_1 to define variables "DA_CH0", "DA_CH1", "DA_CH2", "DA_CH3", "DA_CH4", "DA_CH5", "DA_CH6", and "DA_CH7".

| NO. | Variable Name | Data Type | Initial Value | Power Down Hold | Network Public |
|---|---|---|---|---|---|
| 1 | DA_CH0 | INT | 0 | Non Retained | Private |
| 2 | DA_CH1 | INT | 0 | Non Retained | Private |
| 3 | DA_CH2 | INT | 0 | Non Retained | Private |
| 4 | DA_CH3 | INT | 0 | Non Retained | Private |
| 5 | DA_CH4 | BOOL | OFF | Non Retained | Private |
| 6 | DA_CH5 | BOOL | OFF | Non Retained | Private |
| 7 | DA_CH6 | BOOL | OFF | Non Retained | Private |
| 8 | DA_CH7 | BOOL | OFF | Non Retained | Private |

6. Double-click "GL20_RTU_ECT32" in the "Device" tree on the left. In the "Slot Configuration" interface, click "GL20(GL20S)-8DAV", and select "Add/Change", as shown below.




7. Click "I/O Functional Mapping", select interface ..., ②, select "Variable Table_1", and map variables “DA_CH0”, “DA_CH1”, “DA_CH2”, “DA_CH3”, “DA_CH4”, “DA_CH5”, “DA_CH6”, and “DA_CH7” ④ to the corresponding channels of the configuration module, as shown in the following figure.




8. Check, compile, log in, download, and run the program.

a. Click on the toolbar at the top of the interface to check whether the program is correct.

b. After the program check is correct, click on the toolbar at the top of the interface to compile all the code into PLC executable code.

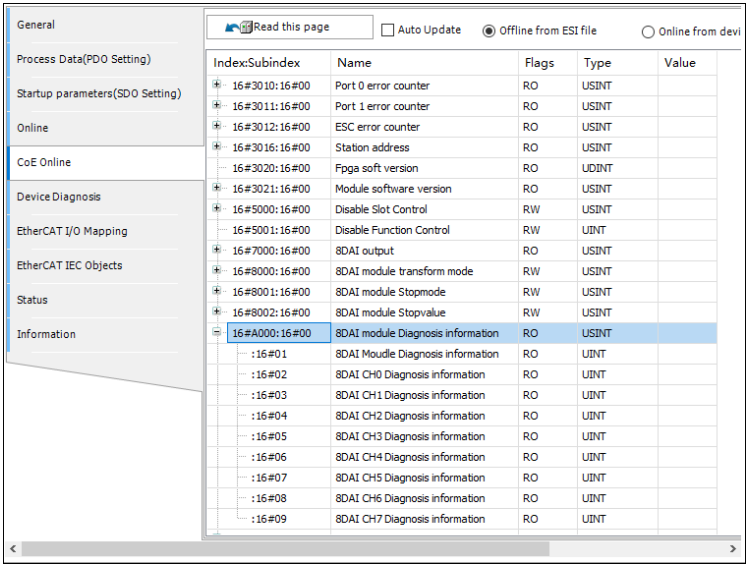
c. After the compilation is correct, click on the toolbar at the top of the interface, and follow the interface prompts to log in to the PLC and download the program.

d. After the program download is complete, click on the toolbar at the top of the interface to execute the program.

# 5 Troubleshooting

## 5.1 8DAI Fault Diagnosis

When the ERR indicator is ON, it indicates that the module encounters a fault. The module reports an error code. You can get the error code information through the diagnostic data object dictionary value displayed on the "CoE Online" interface, as shown below.




| Index:Subindex | Name | Flags | Type | Value |
|---|---|---|---|---|
| 16#3010:16#00 | Port 0 error counter | RO | USINT | |
| 16#3011:16#00 | Port 1 error counter | RO | USINT | |
| 16#3012:16#00 | ESC error counter | RO | USINT | |
| 16#3016:16#00 | Station address | RO | USINT | |
| 16#3020:16#00 | Fpga soft version | RO | UDINT | |
| 16#3021:16#00 | Module software version | RO | USINT | |
| 16#5000:16#00 | Disable Slot Control | RW | USINT | |
| 16#5001:16#00 | Disable Function Control | RW | UINT | |
| 16#7000:16#00 | 8DAI output | RO | USINT | |
| 16#8000:16#00 | 8DAI module transform mode | RW | USINT | |
| 16#8001:16#00 | 8DAI module Stopmode | RW | USINT | |
| 16#8002:16#00 | 8DAI module Stopvalue | RW | USINT | |
| 16#A000:16#00 | 8DAI module Diagnosis information | RO | USINT | |
| :16#01 | 8DAI Moudle Diagnosis information | RO | UINT | |
| :16#02 | 8DAI CH0 Diagnosis information | RO | UINT | |
| :16#03 | 8DAI CH1 Diagnosis information | RO | UINT | |
| :16#04 | 8DAI CH2 Diagnosis information | RO | UINT | |
| :16#05 | 8DAI CH3 Diagnosis information | RO | UINT | |
| :16#06 | 8DAI CH4 Diagnosis information | RO | UINT | |
| :16#07 | 8DAI CH5 Diagnosis information | RO | UINT | |
| :16#08 | 8DAI CH6 Diagnosis information | RO | UINT | |
| :16#09 | 8DAI CH7 Diagnosis information | RO | UINT | |

Mapping data

For the module installed in slot n (n=0-31), the object dictionary definition for index 0xA000+0x40*n is shown in the table below.

| Index | 0xA000+0x40*n: 8DAI module diagnostic information | | | | |
|---|---|---|---|---|---|
| Sub-index | Name | Data type | Access mode | Mapping | Default value |
| 0 | 8DAI module fault code | USINT | RO | NO | 9 |
| 1 | 8DAI module fault information | UINT | RO | NO | 0 |
| 2 | 8DAI module channel 0 fault information | UINT | RO | NO | 0 |
| 3 | 8DAI module channel 1 fault information | UINT | RO | NO | 0 |
| 4 | 8DAI module channel 2 fault information | UINT | RO | NO | 0 |
| 5 | 8DAI module channel 3 fault information | UINT | RO | NO | 0 |
| 6 | 8DAI module channel 4 fault information | UINT | RO | NO | 0 |
| 7 | 8DAI module channel 5 fault information | UINT | RO | NO | 0 |
| 8 | 8DAI module channel 6 fault information | UINT | RO | NO | 0 |
| 9 | 8DAI module channel 7 fault information | UINT | RO | NO | 0 |

## ■ Module fault code

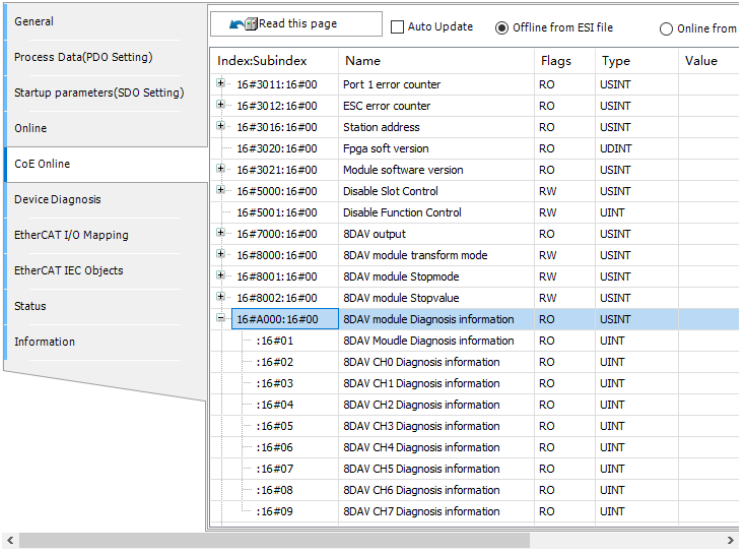
| Fault code | Description | Solution |
|---|---|---|
| 0x5003 | External 24 V power failure | Check the isolated power supply of the module. |

## ■ Module channel fault code

| Fault code | Description | Solution | Remark |
|---|---|---|---|
| 0x6009 | Channel configuration parameter fault | Check whether the configuration parameters are properly transmitted. | Default detection |

## 5.2 8DAV Fault Diagnosis

When the ERR indicator is ON, it indicates that the module encounters a fault. The module reports an error code. You can get the error code information through the diagnostic data object dictionary value displayed on the "CoE Online" interface, as shown below.




| Index:Subindex | Name | Flags | Type | Value |
|---|---|---|---|---|
| 16#3011:16#00 | Port 1 error counter | RO | USINT | |
| 16#3012:16#00 | ESC error counter | RO | USINT | |
| 16#3016:16#00 | Station address | RO | USINT | |
| 16#3020:16#00 | Fpga soft version | RO | UDINT | |
| 16#3021:16#00 | Module software version | RO | USINT | |
| 16#5000:16#00 | Disable Slot Control | RW | USINT | |
| 16#5001:16#00 | Disable Function Control | RW | UINT | |
| 16#7000:16#00 | 8DAV output | RO | USINT | |
| 16#8000:16#00 | 8DAV module transform mode | RW | USINT | |
| 16#8001:16#00 | 8DAV module Stopmode | RW | USINT | |
| 16#8002:16#00 | 8DAV module Stopvalue | RW | USINT | |
| 16#A000:16#00 | 8DAV module Diagnosis information | RO | USINT | |
| :16#01 | 8DAV Moudle Diagnosis information | RO | UINT | |
| :16#02 | 8DAV CH0 Diagnosis information | RO | UINT | |
| :16#03 | 8DAV CH1 Diagnosis information | RO | UINT | |
| :16#04 | 8DAV CH2 Diagnosis information | RO | UINT | |
| :16#05 | 8DAV CH3 Diagnosis information | RO | UINT | |
| :16#06 | 8DAV CH4 Diagnosis information | RO | UINT | |
| :16#07 | 8DAV CH5 Diagnosis information | RO | UINT | |
| :16#08 | 8DAV CH6 Diagnosis information | RO | UINT | |
| :16#09 | 8DAV CH7 Diagnosis information | RO | UINT | |

For the module installed in slot n (n=0-31), the object dictionary definition for index 0xA000+0x40*n is shown in the table below.

| Index | 0xA000+0x40*n: 8DAV module diagnostic information | | | | |
|---|---|---|---|---|---|
| Subindex | Name | Data type | Access mode | Mapping | Default value |
| 0 | 8DAV fault code | USINT | RO | NO | 9 |
| 1 | 8DAV module fault information | UINT | RO | NO | 0 |
| 2 | 8DAV module channel 0 fault information | UINT | RO | NO | 0 |
| 3 | 8DAV module channel 1 fault information | UINT | RO | NO | 0 |
| 4 | 8DAV module channel 2 fault information | UINT | RO | NO | 0 |
| 5 | 8DAV module channel 3 fault information | UINT | RO | NO | 0 |
| 6 | 8DAV module channel 4 fault information | UINT | RO | NO | 0 |
| 7 | 8DAV module channel 5 fault information | UINT | RO | NO | 0 |

| Index | 0xA000+0x40*n: 8DAV module diagnostic information | | | | |
|---|---|---|---|---|---|
| Subindex | Name | Data type | Access mode | Mapping | Default value |
| 8 | 8DAV module channel 6 fault information | UINT | RO | NO | 0 |
| 9 | 8DAV module channel 7 fault information | UINT | RO | NO | 0 |

## ■ Module fault code

| Fault code | Description | Solution |
|---|---|---|
| 0x5003 | External 24 V power failure | Check the isolated power supply of the module. |

## ■ Module channel fault code

| Fault code | Description | Solution | Remark |
|---|---|---|---|
| 0x6009 | Channel configuration parameter fault | Check whether the configuration parameters are properly transmitted. | Default detection |

# 6 Appendix: Version Information

This product supports local and remote adaption to PLC through the communication interface module. The following table describes the version matching information.

## ■ Adapt to PLC locally

| Product name | Board software | Logic software | Logic software/ Programming software |
|---|---|---|---|
| Local module | 1.0.3.0 and later | 0.2.2.0 and later | - |
| AM500 series | 2.1.0.0 and later | - | InoProShop programming software: V1.9.0 and later |
| AM760 series | 2.1.0.0 and later | - | InoProShop programming software: V1.9.0 and later |

## ■ Adapt to PLC remotely

| Product name | Board software | Logic software | Programming software/XML file |
|---|---|---|---|
| Local module | 1.0.3.0 and later | 0.2.2.0 and later | - |
| GL20-RTU-ECT communication interface module | 2.5.9.0 and later | 0.1.4.2 and later | AutoShop programming software: V4.10.2.0 and later<br>InoProShop programming software: V1.9.0 and later<br>XML file: 3.0.14.0 and later |

| Product name | Board software | Logic software | Programming software/XML file |
| --- | --- | --- | --- |
| GL20-RTU-ECT32 communication interface module | 3.0.6.0 and later | 0.1.4.2 and later | AutoShop programming software: V4.10.2.0 and later<br>InoProShop programming software: V1.9.0 and later<br>XML file: 3.0.14.0 and later |
| AM500 series | 2.1.0.0 and later | - | InoProShop programming software: V1.9.0 and later |
| AM760 series | 2.1.0.0 and later | - | InoProShop programming software: V1.9.0 and later |

## *Note*

You can get the firmware of the module and the firmware of communication interface module from Inovance technical support, and download XML files and InoProShop from *https://www.inovance.com*.